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ESTIMATING THE IMPACT OF OIL RENTS ON THE ECONOMIC GROWTH OF THE OPEC COUNTRIES

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Abstract:
This study aimed to know the effect of oil rents on the economic growth of in a panel of nine selected oil exporting countries by the panel integration for 1997 to 2015. Our findings suggest that there is one-way strong causality running from oil rents to GDPG and foreign direct investment. Also, the long run elasticity coefficient reveals that the 1% change in oil rents will change the GDP growth by 0.46%. The results of the coefficient (ECM) are -0.1459 meaning that system corrects its previous period disequilibrium at a speed of 14.5% annually to reach at the steady state. OPEC countries should pursue an integrated economic policy by diversifying sources of GDP and not relying solely on oil revenues because the latter is heavily affected by fluctuations in world oil prices and the exchange rate against local currencies.

Keywords: oil rents; economic growth; oil-exporting countries; panel data approach; fixed effects model

1. Introduction

Oil is the most important variable in economic life, but, this importance began to emerge clearly after the economic developments in the world, and what is more important is the development of energy, which is playing a major role in moving the economy, as oil still holds an important position in the balance Global energy is one of the primary sources of energy. Oil is an important international commodity for countries and also has an impact on developed or developing capital markets (Erdoğan, M., 2011& Ulusoy, 2017, 2012).

Oil prices continued to fall, with negative effects on major producer countries but at different rates, while Venezuela recently tried through a tour of its president and senior officials to mobilize support to reduce production to stop the collapse of prices, but it was not successful (Naím, M., 2013). The table shows the world's top oil

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exporters, according to OPEC data for 2013 compared with the previous year. Iran was the biggest affected by its exports as a result of Western sanctions and Canada's highest growth rate. The export figures for some countries include condensates and associated gases extracted with crude oil, while monitoring of the impact of Western sanctions on Russian exports remains important during the previous period, and this was reflected on the economy, which most forecasts indicate negatively affected and his entry into stagnation.

Table 1: Top 10 oil exporting countries in the world

Countries	Quantity of exports (million barrels)	Annual percentage change	Daily production (million barrels)
Saudi Arabia	**7.57**	**% 0.2**	**9.63**
Russia	**4.71**	**% 1.0**	**10.14**
United Arab Emirates	**2.7**	**% 10.5**	**2.79**
Iraq	**2.39**	**% 1.4**	**2.57**
Nigeria	**2.19**	**% 7.4**	**1.75**
Kuwait	**2.06**	**% 0.6**	**2.92**
Canada	**2.02**	**% 15.6**	**1.38**
Venezuela	**1.94**	**% 12.3**	**2.78**
Angola	**1.67**	**% 0.4**	**1.7**
Iran	**1.22**	**% 42.2**	**3.57**
Middle east	**17.65**	**% 3.2**	**23.83**
OPEC	**24.05**	**% 4.0**	**31.6**

Source: EIA, (2017). https://www.eia.gov/beta/international/index.cfm?topL=exp

The dependence of the oil-exporting countries on the oil commodity and its revenues as a basic commodity to financing their development programs has made their economies affected by the fluctuations in the world oil markets, which is reflected on the macroeconomic performance of these countries. In addition, Alexeev and Conrad (2011) claimed that over-dependence on natural resource rents had adverse effects on the institutional context of a resource-rich country and could continue for a long time, threatening long-term economic growth. In this regard, it is about how inflation levels can be reduced on the one hand and the negative economic and social effects on the oil countries on the other. The central tool in the process of control here lies in the prices of oil derivatives within these countries themselves. The higher the prices of these derivatives, the higher the price and the lower the purchasing power of local currencies, and vice versa. Conversely, keeping and lowering the prices of oil derivatives will contribute effectively to maintaining acceptable levels of inflation in general, although they will remain high compared to the past two decades (see (Erdoğan, M. and Ilter, 2004 & Erdogan, M., and Dinç, E. 2009).

This study aims to investigate the impact of oil rents on the economic growth of eight exporting countries (Algeria, Angola, Canada, Russian, Iran, Nigeria, Kuwait and Venezuela) during the period 1997-2015. For achieve the objective of the study, a methodology was used to mix time series data with (Panel data approach) model by

applying Fixed Effects Model (FEM) and Random Effects Model (REM). The remainder of this paper is organized as follows. The second section deals with a literature review about the impact of oil rents on economic growth. The third section deals with the methodology of the study and the model used. Section four illustrates the definition of variables, and data sources. Finally, section five presents the main conclusions of this study.

2. The Literature Reviews

In the course of our research, we have been able to examine several studies that affect part of our study, which we refer to as follows:

Study of the International Monetary Fund (2007) "The role of financial institutions in managing the prosperity of oil revenues" of oil-exporting countries. The study touched to the role of financial institutions related to oil funds and financial rules and guidelines, legislation and financial responsibility in managing the returns of the recent oil boom. Also, pointed to the relationship of oil prices to the general budget, and touched on some of the basic principles related to the management of oil revenues. The study found that the increasing in oil revenues in the oil-exporting countries led to an increased in public expenditure and the decrease of many indicators of the effectiveness of the government in the management of oil revenues and dealing with fluctuations in oil prices. Although, many of them have established oil funds.

At the experimental level, Sachs & Warner, (1997) found a negative correlation between natural resource exports and economic growth, based on a sample of 97 developing countries during 1971 and 1989. Berry, A. (2008), using a comparative analysis of a range of countries: Indonesia, Venezuela, Chile and Nigeria, has reached negative results of the impact of resources on job creation and income distribution in oil-exporting countries and minerals (Aimer, 2017, 2018). Thorp, Rosemary, et al., (2012) notes that oil and mineral producers generally have serious problems in institutional development on long-term, although in some exceptional cases, such as Chile and Botswana, which have strong institutions that have prevented adverse effects and allowed for growth and diversification.

Mehrara, M. (2007) study examined the relationship between energy consumption and income of 11 developing oil exporters during 1971-2002. Using the Granger causality under the co-integration Panel model, the results indicate a strong causal relationship in one direction of GDP to energy consumption with no rebound effects for oil-exporting countries, so that GDP is the one driving energy consumption.

Arezki, R., & Brückner, M. (2011) the researcher revealed the effects of oil rents on corruption and stability of the country, which exploits the external variation within the country to measure new oil rents for selected countries from 30 oil exporting countries for the period 1992-2005 by using panel fixed effects regressions. The results indicate that the increase of oil rents leads to a large increase in corruption and lead to a significant deterioration in rights while at the same time leading to a significant improvement in civil liberties.

Fuinhas, Marques, & Couto, (2015) this research aims to detect the effects of oil rent on economic growth of the oil producing countries and based on panel regressions during 1970-2012. The results indicate that there is a positive effect on the short and long term between the ratio of oil production to primary energy consumption and economic growth. Oil prices only have a positive impact on short-term growth. Oil rents also to reduce growth of short- and long-term, suggesting it is more of a curse than a boon to economies.

Matallah, S., & Matallah, (2016) this article aims to explore the impact of oil rents on the economic growth of oil exporting countries in the Middle East and North Africa (Yemen, UAE, Saudi Arabia, Qatar, Oman, Libya, Kuwait, Iraq, Iran, Bahrain, and Algeria). Using OLS method, fixed effects, random effects, and GMM. The results of this study showed that the economic growth of these countries is significantly affected and positive by oil rents.

Aimer, N. M. M. (2016) study reveals the correlation between oil prices and stock market indices in the Middle East during the period from March 2000 to March 2015. The results show strong evidence of the volatility of the price of oil for all stock market indices in the Middle East (exporting and importing oil).

Aimer, N. M. M. (2016) study examined the long-term relationship between the price of crude oil and growth. It is estimated that high oil prices have a positive and statistical impact on Libya's economic growth.

As for our study, it differed from the above studies in that it dealt with this study of the effects of oil rents on the economic growth of the selected countries of oil exporting.

3. Methodology of study and model

3.1. Methodology of study

Based on previous literature studies on the impact of oil rents on economic growth, the model can be written as follows:

$$GDPG_{it} = \alpha_0 + \alpha_1 OILR_{it} + \alpha_2 INV_{it} + \alpha_3 IMP_{it} + \mathcal{E}_{it}$$
$$i = 1,2,3,\ldots\ldots,8$$
$$t = 1,2,3,\ldots\ldots,T$$

Where i state

N: number of countries constituting the sample of the study.

t: time period.

T: number of views.

GDPG: GDP growth (annual %) (Economic growth).

FDI: Foreign direct investment, net inflows (% of GDP).

OILR: Oil rents (% of GDP). Oil rents are the difference between the value of crude oil production at world prices and total costs of production.

IMP: Imports of goods and services (% of GDP).

Ɛ: random error limit.

3.2. Data of the study

This study aims to investigate the impact of oil rents on the economic growth of eight exporting countries (Algeria, Angola, Canada, Russian, Iran, Nigeria, Kuwait and Venezuela) during the period 1997-2015. These countries were selected according to the data availability criterion for the variables studied for all the years of the study period.
The data source (GDPG, FDI, IMP, OILR) from the World Bank database (global development indicators), http://databank.worldbank.org/ddp/home.do

3.2.1. The dependent variable

Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. "GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources" (IMF, 2017).

3.2.2. Independent variables

Foreign direct investment (FDI) is "the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP" (IMF, 2017).
Oil Rents: Oil rents is the difference between the total cost (exploration, production, storage, transportation, refining and marketing) and the price of refined products of markets of the final consumer, after deducting the costs of intermediary companies between the oil exporting countries, expressing their share in the difference between the cost of production and the price of crude oil.
Imports of goods and services (% of GDP): Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

3.3. Empirical Results

3.3.1. Stability of time series (Unit Root Test)

The results of the unit root tests for all variables are shown in the following table, which includes test results at the level and the first difference.

Table 2: Panel unit root test Results

Variable	Panel unit root test		
	Non	**Intercept, Trend**	**Intercept**
GDPG	-12.3577 (0.000)*	-12.0679 (0.000)*	-8.36857 (0.000)*
OILR	-11.7053 (0.000)*	-9.02648 (0.000)*	-7.39137 (0.000)*
FDI	-12.8742 (0.000)*	-8.64177 (0.000)*	-9.41714 (0.000)*
IMP	-8.94708 (0.000)*	-4.27889 (0.000)*	-4.57599 (0.000)*

Note: * indicates the rejection of the null hypothesis of non-stationary at 1% significance level.
Source: Computed by using E-views 8.

The above table shows that the variables are non-stationary at level I (0) during the study period, According to the majority of tests and after making the differences at the first difference, the variables are stationary of the same level I(1) (see Baltagi, B. 2008).

3.3.2. Estimation of the model either by fixed effects or random effects

After we have identified the relationship between the interpreted variable and the dependent variable, the estimation is done using the FEM model and the REM random effect model. Therefore, the results of the estimate can be summarized by using E-views 8 in the following table.

3.3.2.1. Estimation of the by fixed effects model

The fixed effects model has constant trends over time. The fixed limit is different for each unit but it is constant over time. The fixed limit reflects the characteristics of the units being tested, as these properties vary from unit to unit. For the random effects model, the slope is also constant over time, but the fixed limit is random, this randomization is a function in the mean values plus the random limit (Manez, Rochina, and Sanchis 2004).

Depending on the estimation results of this model, we note that coefficients of the model were statistically significant, with the coefficient of constant (0.000) and the coefficients of the study variables less than 0.05. In addition to that (F-statistic) probability value is less (0.05) indicated that the model is statistically significant. The positive sign of the coefficient of oil rents (OILR=0.972) indicate the significant correlation relationship between economic growth and oil rents. Also, when oil rents increase by one unit leading to an increase in GDP growth of 97.2 percent.

Table 3: Results of Estimation of the Impact of Oil Rents on Economic Growth in the OPEC Countries (1997-2015) by Fixed Effects Model (FEM)

Dependent Variable: GDPG				
Method: Panel Least Squares				
Sample: 1997 2015				
Periods included: 19				
Cross-sections included: 8				
Total panel (balanced) observations: 152				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMP	2.799153	0.326487	8.573541	0.0000
OILR	0.972346	0.330331	2.943549	0.0038
FDI	-1.275813	0.481579	-2.649228	0.0090
C	-77.52676	11.77991	-6.581271	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.576847	Mean dependent vary		20.25339
Adjusted R-squared	0.546836	S.D. dependent vary		41.70901
S.E. of regression	28.07745	Akaike info criterion		9.577427
Sum squared resid	111156.4	Schwarz criterion		9.796260
Log likelihood	-716.8844	Hannan-Quinn criter.		9.666324
F-statistic	19.22127	Durbin-Watson stat		1.246613
Prob(F-statistic)	0.000000			

Source: Author's preparation based on EViews10.

3.3.2.2. Estimation of the by Random Effects Model (REM))

The random effects model is appropriate for estimation if there is a defect in the conditions of the fixed effects model. To estimate the random effects model using Generalized Least Squares-GLS.

Table 4: Results of Assessment of the Random Effects Model (REM)

Dependent Variable: GDPG				
Method: Panel EGLS (Cross-section random effects)				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMP	2.524312	0.300173	8.409538	0.0000
OILR	0.671855	0.288837	2.326070	0.0214
FDI	-1.169712	0.475847	-2.458166	0.0151
C	-63.54190	12.55710	-5.060236	0.0000

Source: Author's preparation based on Eviews10.

3.3.2.3. Results of differentiation between the model of fixed and random effects

This test is used to select the appropriate model between the fixed and random effects models and its results are shown in the following table.

Table 5: Results of Hausman test for the differentiation between the model of fixed and Random effects

Correlated Random Effects - Hausman Test Equation: Untitled Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		7.179783	3	0.0664
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
IMP	2.799153	2.524312	0.016491	0.0323
OILR	0.972346	0.671855	0.025692	0.0608
FDI	-1.275813	-1.169712	0.005488	0.1521

Source: Author's preparation based on EViews10.

The results of this test indicate that the calculated value is (7.179783) and a probability equal to (0.0664). However, according to the results of the EViews10, which directly gives us the appropriate model, which explains that the fixed effects model is appropriate for this study (Hsiao, C., 2014).

3.3.3. Vector Error Correction Estimates

Finally, short and long run equilibrium has been investigated with the help of error correction model (ECM) which is an appropriate system of single equation. The error correction model tells us the degree to which the equilibrium behavior drives short run dynamics. Equilibrium relationship in turn have implications for a short run behavior, one or more series move to restore equilibrium. The results of ECM are given in Table 6.

Table 6: Results of Error Correction Model (ECM)

Vector Error Correction Estimates				
Cointegrating Eq:	CointEq1			
GDPG(-1)	1.000000			
IMP(-1)	2.179853 (0.51989) [4.19288]			
OILR(-1)	-0.541768 (0.43223) [-1.25342]			
DFI(-1)	1.286678 (1.43908) [0.89410]			
C	-75.08799			
Error Correction:	D(GDPG)	D(IMP)	D(OILR)	D(DFI)
CointEq1	-0.145935 (0.02212) [-6.59727]	-0.039369 (0.00713) [-5.52055]	0.000218 (0.00997) [0.02184]	-0.000294 (0.00919) [-0.03195]

In light of the results of the error correction model, we notice the error correction significance ECM (-1) at a statistical significance level of 0%, with the expected negative signal. This confirms the existence of a long-term equilibrium relationship in the model. The value of the error correction factor (-14.0) indicates that GDP growth is adjusted to its equilibrium value in each time period by disruption of remaining equilibrium of period (t-1) of 91%.

In other words, when the oil rents values deviate in the short term in period (t-1) from their long-term equilibrium value, about 14% of this deviation or imbalance is corrected in period (t).

On the other hand, this the error correction reflects the speed of adjustment towards equilibrium, in the sense that GDP growth takes one year towards its equilibrium value after the impact of shock in the system due to change in the independent variable (oil rents).

3.3.3. Cointegration test results

Through the previous results, we found that the variables are unstable; therefore, the appropriate model for this study may be a false model, so the analysis of cointegration can overcome this problem and try to develop a long-term balance between the variables. Using the Pedroni test we get the following results.

Table 7: Pedroni test results

Tests				**Weighted tests**	
Partial tests		**Statistic**	**Prob.**	**Statistic**	**Prob.**
Within States	V-Stat	1.273603	0.1014	-1.603253	0.9456
	Rho	-1.773185	0.0381	-0.034685	0.4862
	PP	-4.785388	0.0000	3.109729	0.0009
	ADF	-2.191922	0.0142	-2.818561	0.0024
Between countries	Rho	0.565670	0.7142		
	PP	-3.815215	0.0001		
	ADF	-2.007472	0.0223		

Source: Author's preparation based on EViews10.

The above table indicates that out of 11 partial tests, seven tests have a probability of less than 5%. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. In other words, there is a common integration between the variables of the study, which confirms a long-term equilibrium relationship to the effect of oil revenues on economic growth.

3.3.4. Causal test results

At this stage, we examine the direction of causal relations between economic variables using the Granger method and the following table shows this relationship.

Table 8: Causal test results

Pairwise Dumitrescu Hurlin Panel Causality Tests Sample: 1997 2015 Lags: 2			
Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
OILR does not homogeneously cause GDPG	5.99157	3.45599	0.0005
GDPG does not homogeneously cause OILR	1.61599	-0.75441	0.4506
FDI does not homogeneously cause OILR	1.25529	-1.10149	0.2707
OILR does not homogeneously cause FDI	6.01580	3.47930	0.0005

Source: Author's preparation based on EViews10

The results of the above table indicate that the probability of a null hypothesis is less than 0.05. Therefore, the alternative hypothesis is accepted and the null hypothesis is rejected. This indicates a causal relationship between the two variables which stems from oil rents towards economic growth. As the increase in the volume of oil revenues of the Organization of the Petroleum Exporting Countries "OPEC" result in increased economic growth rate.

In the second case, the probability of null hypothesis in the first case is greater than (0.05), and therefore accept the null hypothesis and reject the alternative hypothesis, that is, economic growth does not cause oil rents.

The results of the above table indicate that the probability of a null hypothesis is less than 0.05. Therefore, the alternative hypothesis is accepted and the null hypothesis is rejected. This indicates a causal relationship between the two variables which stems from oil rents towards FDI.

4. Conclusion

The study was conducted to highlight the role played by oil rents and their impact on the economic growth of the OPEC member countries. Many of the economists who stressed that oil rents are considered the most important engines of economic growth, it's the thing which gave importance to the study of this subject. This study thus deals with the standard study of the impact of oil rents on the economic growth of the group of the members of the Organization of Petroleum Exporting Countries (OPEC), using the method of standard analysis of longitudinal data or integrated "Panel". Then we discussed the tests of joint integration to examine the existence of long-term balance between the variables and the causal relationship between them. Finally, we concluded with the presentation, analysis and discussion of the results to show the positive impact of oil rents on the economic growth of the OPEC countries. Using Granger causality within the framework of a panel Co-integration model, our findings suggest that there is one-way strong causality running from oil rents to GDPG, so that it is the oil rents that drives the GDPG, not vice versa. There is short and long run equilibrium as indicated by the statistically significant coefficient of oil rents and error correction term. The long run elasticity coefficient reveals that the 1% change in oil rents will change the GDP growth by 0.46%. The results of ECM indicate that there is both short and long run equilibrium in the system. The coefficient of one period lag residual is negative and

significant which represent the long run equilibrium. The coefficient is -0.1459 meaning that system corrects its previous period disequilibrium at a speed of 14.5% annually to reach at the steady state. Based on the results of this study, OPEC countries should pursue an integrated economic policy by diversifying sources of gross domestic product and not relying solely on oil revenues because the latter is heavily affected by fluctuations in world oil prices and the exchange rate against local currencies.

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