International Journal of Studies in Business Management, Economics and Strategies
Volume 02, Issue 06, June, 2023
ISSN (E): 2949-883X
Scholarsdigest.org

"ANALYZING THE IMPACT OF CRUDE OIL PRICES ON ECONOMIC ACTIVITY IN SELECTED OPEC MEMBER COUNTRIES"

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Abstract
The impact of crude oil prices on countries' economies has been a subject of interest for decades. During this time, the empirical linkage between oil prices and economic activity has been continuously studied; however, the measured results have shown different and contradictory outcomes. Therefore, the present study aims to examine the effect of crude oil prices on economic activities in selected OPEC member countries from 2000 to 2019. This research employs panel data methodology and a simultaneous equation system approach using a three-stage least squares (3SLS) method. The results indicate a positive and significant impact of crude oil prices on the consumer price index and liquidity volume, amounting to 0.221 and 1.200, respectively. Additionally, the results suggest a negative and significant influence of crude oil prices on the exchange rate and interest rate, with amounts of -0.195 and -0.175, respectively. This study can also serve as useful research for investigating the impact of crude oil prices on economic activity in other countries.

Keywords: crude oil prices, macroeconomic indicators, three-stage least squares, and OPEC member countries.

1) Introduction:

Crude oil is one of the most important energy resources and, like other major commodities, a source of revenue for exporting countries (Ojikutu, 2017). Following the oil shock of 1973, studies on the relationship between oil prices and macroeconomics have increasingly expanded as oil is a part of the economy. There is a widespread consensus that crude oil prices affect global economic activities and financial markets. As a result, crude oil prices' behaviour and driving factors have garnered increasing attention from academic researchers (Ghosmi & Koyachi, 2016).

The relationship between oil prices and macroeconomics has been a topic of interest for many years. The recent decline in oil prices has renewed interest in this discussion. Some believe

that oil prices have a significant impact on macroeconomic imbalances. In contrast, others argue that changes in countries' economic structures make oil prices less powerful in affecting macroeconomic activity. Several academic studies have been conducted to evaluate this relationship. Some studies choose multiple variables generally believed to represent macroeconomics, such as inflation, exchange rates, industrial production, interest rates, total money supply, or gross domestic product (GDP).

Some other studies focus on a single variable, such as stock market activity. Another distinction among the studies conducted in this field is the set of countries selected for analysis. The United States has been the center of most research in recent centuries. Other advanced countries are followed individually or grouped into recognized categories such as E-7 and OECD (Kilik &Cankaya, 2020).

It is undoubtedly true that crude oil is one of the most valuable natural resources at the international level. Gupta (2008) stated that oil fuels the economy and argued that the world is heavily dependent on oil to meet its energy needs, and a regular supply of it is vital for countries' sustainable economic and social development (Picane, 2018).

On the other hand, people in oil-exporting countries (OPEC) are closely watching fluctuations in oil prices because they know their well-being and livelihoods depend on increased oil revenues. The global oil market is practically under the influence of OPEC behaviour, as OPEC is the main player in the worldwide oil market, with control over more than half of the world's oil exports. OPEC is considered a major supplier with 40% of oil production and more than half of the world's oil exports. Any oil shock or disruption in this vital commodity's supply can cause a global economic crisis.

Therefore, this study aims to investigate the impact of crude oil prices on selected economic activities for chosen OPEC member countries. A review of relevant literature made it apparent that there was no direct research on the impact of crude oil prices on economic activity in the selected OPEC member countries. Therefore, this research is considered innovative in its own right. This article consists of five separate sections. The first section deals with an introduction. Subsequently, the relevant literature and research background will be discussed in the second section, followed by the methodology in the third section. The fourth section will present the findings and analysis; finally, the fifth section will provide conclusions.

2) Literature Review

2-1) The relationship between crude oil prices and economic activity

Due to the world's heavy dependence on oil products, oil has always been an indicator of economic stability in the modern era (Ghalayini et al., 2011). There is a relationship between crude oil prices and economic activity. It has been shown that oil price shocks are the main source of production fluctuations in some oil-exporting countries. It has also been found that oil price shocks have different effects on oil-importing countries' economies than oil-exporting countries (Picane, 2018). Hamilton (1988, 1996) reinforces the idea that there is a significant relationship between oil shocks and economic recession (Ftit et al., 2016).

Research in this area mainly examines two aspects of the relationship between oil prices and economic activity: the impact of oil price shocks and the impact of oil price volatility. These two approaches differ in how they incorporate oil prices into their models. While the first

approach places oil prices at their level, the second approach uses various fluctuations to obtain uncertainty about oil prices (Rafik et al., 2009).

2-2) Crude oil prices and macroeconomic indicators

Oil price shocks significantly impact macroeconomic indicators such as gross domestic product (GDP), interest rates, investment, inflation, unemployment, exchange rates, consumer price index, and M1 money supply. The impact of oil price changes on the economy is asymmetric; the negative effect of increasing oil prices is greater than the positive impact of decreasing oil prices. Academic efforts to analyze the effect of oil price volatility on economic activity have been limited, and most studies have focused on advanced countries, especially the United States (Picane, 2018).

Based on the existing foundations, the hypotheses considered for this study are:

• Crude oil prices positively and significantly affect liquidity in selected OPEC member countries.

• Crude oil prices positively and significantly affect the consumer price index in selected OPEC member countries.

• Crude oil prices negatively and significantly affect exchange rates in selected OPEC member countries.

• Crude oil prices negatively and significantly affect interest rates in selected OPEC member countries.

2-3) Research background:

Yıldırım et al. (2014) conducted a study to examine the relationship between crude oil prices and industrial production in G7 countries using evidence from non-parametric and asymmetric causality tests. This study examined non-linear links using the new approach to non-linear causality developed by Hatami (2012). In addition, the unusualness of the error term and time-varying variable fluctuations may lead to biased estimates. Therefore, Hacker and Hatami (2006) developed a bootstrap simulation method to generate strong values against non-normality and time-varying erraticvolatility. Furthermore, the classic non-linear causality test was used for comparison purposes.

Rattiab et al. (2016) examined the relationship between crude oil prices, global industrial production, prices, central bank interest rates, and M1 money supply with an error correction model augmented with a global factor. The results of their study are as follows: 1) at the global level, money, industrial production, and prices are integrated; 2) there is a positive relationship between global oil prices and the increase in global interest rates; 3) there is a positive relationship between global money supply, price level, and industrial production with the increase in oil prices; 4) positive innovations in global interest rates are associated with a decrease in oil prices, and 5) the United States, the Eurozone, and China are the main drivers of global macroeconomic factors.

Fatiti (2016) investigated the relationship between crude oil prices and economic growth in selected OPEC countries using the frequency domain analysis method proposed by Priestley and Tong (1973), which provides a simultaneous spectral decomposition for different horizons, short-term and medium-term, that measures the dynamic correlation between

variables. In this study, the degree of mutual dependence between crude oil prices and economic activity growth in four major countries (United Arab Emirates, Kuwait, Saudi Arabia, and Venezuela) in the Organization of the Petroleum Exporting Countries (OPEC) was examined during the period from September 2000 to December. The Engle-Granger cointegration method was used to complete the study with long-term dependence analysis. The author concluded that oil price shocks during fluctuations in the global trade cycle or financial turmoil impact the relationship between oil and economic growth in OPEC countries.

Alley (2016) conducted a study titled "Oil price shocks and economic growth in Nigeria: a generalized method of moments approach using annual data from 1981 to 2012". The results of this study showed that oil price shocks have a negligible impact on economic growth, while oil prices significantly improve it. The positive and significant effect of oil prices on economic growth confirms the conventional wisdom that an increase in oil prices benefits an oil-exporting country like Nigeria. However, shocks create uncertainty and weaken the effective financial management of crude oil revenues, which is considered one of the negative effects of oil price shocks.

Bastianin (2016) investigated the effects of oil price shocks on stock market volatility using evidence from G7 countries. He identified the reasons for oil price shocks and evaluated the innovative impact of oil supply and demand on financial volatility. He concluded that stock market volatility does not respond to oil supply shocks. On the contrary, demand shocks significantly affect stock market volatility in G7 markets. His results showed that economic policies and financial regulation activities designed to mitigate the impact of unexpected oil price movements should be prepared by examining the source of oil price shocks.

Diaz et al. (2016) investigated the relationship between oil price fluctuations and stock returns in G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) using monthly data for the period from 1970 to 2014 and an autoregressive-distributed lag model with variables of interest rates, economic activity, stock returns, and oil price volatility, taking into account the structural break in 1986. They found a negative response of G7 stock markets to increased oil price volatility. They concluded that global oil price fluctuations affect stock markets more than national oil price fluctuations.

Al Raeesi (2018) evaluated the response of G7 real exchange rates to oil price shocks using the Kilian index (2009) and forecast error variance decomposition. He found evidence that oil shocks are associated with an increase (depreciation) in the real exchange rate for oil-exporting (importing) countries. Furthermore, the evidence indicated that demand-specific oil shocks are the main driver of changes in the real exchange rate, while oil supply shocks have the least impact on it. Finally, regarding the role of monetary policy in responding to oil shocks and exchange rates, he observed evidence that economic policies only respond to specific demand shocks and total demand shocks in three countries. In comparison, monetary policy responds to real exchange rate fluctuations in four countries.

Fenghua et al. (2019) examined the effects of crude oil price shocks and monetary policies on the Chinese economy. This study investigated the dynamic effects of crude oil prices and monetary policies on the Chinese economy from January 1996 to June 2017. The results of this study include: 1) a positive impact on short-term economic growth and inflation in China, but long-term effects appear to be varied; 2) Chinese monetary policy shocks have a positive

effect on economic growth and inflation overall. Specifically, an increase in money supply can partially offset the negative impact of crude oil prices on China's economic growth; 3) Chinese monetary policy has a positive impact on crude oil prices and plays an important role in the relationship between crude oil price shocks and the economy; and 4) during the recent global financial crisis, crude oil price shocks had a greater negative impact on China's economic growth, while the long-term effects of monetary policies on China's economic growth were weaker compared to other periods.

Eyden (2019) investigated the relationship between oil price fluctuations and economic growth using evidence from advanced economies, utilizing data panel estimators including fixed effects, Least Squares Dummy Variables Corrected by Bias (LSDVC), Generalized Method of Moments (GMM), Feasible Generalized Least Squares (FGLS), and Random Coefficients (RC). He examined the impact of real oil price fluctuations on real gross domestic product (GDP) growth for 17 member countries of the Organization for Economic Cooperation and Development (OECD) over 144 years from 1870 to 2013. The main finding of this research was that oil price fluctuations significantly negatively affect economic growth in OECD countries. Additionally, during periods of slope heterogeneity, oil-producing countries are significantly affected by oil price uncertainty, especially Norway and Canada.

Jarrett (2019) examined the impact of oil price fluctuations on institutions and economic growth using periods of extreme oil price instability as a nearly exogenous source of changes. He argues that taxation can strengthen development and reduce production volatility, increasing energy security. This study used a panel-distributed lag regression model with data from 30 oil-producing countries from 1980 through 2016. The results of this study confirm that the effects of oil fluctuations lead to a reduction in economic growth. Institutions in the financial sector are seen as a strong case for supporting the positive role of financial development in enhancing energy security and promoting economic growth.

BinMo (2019) investigated the effects of crude oil prices on economic growth in BRICS countries using an empirical approach based on the wavelet-based quantile-on-quantile method, which decomposes raw information into different investment horizons and addresses comprehensive effects at different quantiles. He found that heterogeneous effects exist across countries, periods, and different levels due to various oil policies and economic development. Additionally, this study found a positive and stable outcome of oil prices in Brazil and Russia at a high level in BRICS countries. For China, a positive short-term and medium-term effect was observed, followed by a negative impact; however, over the longterm, oil prices stimulated economic growth. For South Africa, only a short-term negative effect was observed, but a positive effect reappeared, although it diminished over time. The empirical results of this study are of great importance for policy implications in BRICS countries to maintain a secure and sustainable economic system.

3) Research Methodology

In the single-equation method, each equation is calculated without considering other equations. Although these single equations are compatible, they are not effective. The reason

for their inefficiency is that the relationship between the disturbance terms in the other equations is ignored. That is, it is assumed that the disturbance term of the first equation does not correlate with the disturbance terms of differential equations. This is similar to seemingly unrelated equations, where the correlation between disturbance terms is ignored. To achieve efficiency, we must use all available information in the simultaneous system of equations. In this case, the relationship between the disturbance terms is also considered in the calculations. One of the methods used to do this is the three-stage least squares (3SLS) method, which is an extension of the 2SLS method. The 2SLS method uses an instrumental variable to resolve the estimator compatibility. In continuing this method, a way must be found to achieve the efficiency of the simultaneous system of equations. Weighted least squares (GLS) are used for this purpose(Baltagi, 2005).

3-1) Model Specification and Variable Introduction:

This study will study the population of oil exporting and importing countries using a sample of selected OPEC member countries[1] from 2000 to 2019. Based on the overall structure of the combined data and the proposed assumptions, the study models for estimating are as follows, which will be calculated for the selected OPEC member countries. Since the following equations are related, the simultaneous equation system will use the three-stage least squares (3SLS) method. Four equations have been considered as follows:

$$\mathbf{1)}\ \mathbf{LnCPI_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\mathbf{LnOil_{it}} + \boldsymbol{\beta_2}\mathbf{LnExc_{it}} + \boldsymbol{\beta_3}\mathbf{LnM1_{it}} + \boldsymbol{\beta_4}\mathbf{LnGDP_{it}} + \boldsymbol{\beta_5}\mathbf{InIRate_{it}} + \boldsymbol{\varepsilon_{it}}$$

$$\mathbf{2)}\ \mathbf{LnExc_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\mathbf{LnOil_{it}} + \boldsymbol{\beta_2}\mathbf{LnCPI_{it}} + \boldsymbol{\beta_3}\mathbf{LnM1_{it}} + \boldsymbol{\beta_4}\mathbf{LnGOV_{it}} + \boldsymbol{\beta_5}\mathbf{InIRate_{it}} + \boldsymbol{\varepsilon_{it}}$$

$$\mathbf{3)}\ \mathbf{LnM1_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\mathbf{LnOil_{it}} + \boldsymbol{\beta_2}\mathbf{LnExc_{it}} + \boldsymbol{\beta_3}\mathbf{LnCPI_{it}} + \boldsymbol{\beta_4}\mathbf{LnTO_{it}} + \boldsymbol{\beta_5}\mathbf{InIRate_{it}} + \boldsymbol{\varepsilon_{it}}$$

$$\mathbf{4)}\ \mathbf{InIRate_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\mathbf{LnOil_{it}} + \boldsymbol{\beta_2}\mathbf{LnExc_{it}} + \boldsymbol{\beta_3}\mathbf{LnM1_{it}} + \boldsymbol{\beta_4}\mathbf{LnUN_{it}} + \boldsymbol{\beta_5}\mathbf{LnCPI_{it}} + \boldsymbol{\varepsilon_{it}}$$

Sources of information and the definition of each variable in Table (1) are summarized as follows:

Table (2) - Definition of Research Variables and Statistical Sources:

Variable	Definition	Data Source
OIL	Crude oil price	World Bank, BP Statistical Review
CPI	Consumer price index (inflation rate)	World Bank, United Nations
M1	Money supply (currency in circulation + demand deposits)	World Bank, International Monetary Fund (IMF)

[1] The selected countries are Algeria, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Equatorial Guinea, Angola, and Venezuela.

Variable	Definition	Data Source
EXE	Official exchange rate (annual average)	World Bank
IRATE	Long-term interest rate	World Bank, IMF
GDP	Gross domestic product per capita (constant 2010 US dollars)	World Bank (Development indicators)
GOV	Government expenditure as a share of GDP	World Bank (Development indicators)
TO	Trade openness (exports + imports as a % of GDP)	World Bank
UN	Unemployment rate	World Bank, IMF

Source: Research findings
* All variables are in natural log scale.

4) Data Analysis

To begin the estimation process, it must first be determined whether the panel data model has fixed effects. Therefore, Hausman and F-Limer tests are used.

Table (2) - F-Limer Test

F Statistic	Probability Value
4.02	0.0000

Source: Research Findings

As seen in Table (2), considering the probability distribution of F, the model should be analyzed as a panel, and the null hypothesis should be rejected.

Table (3) - Hosmer's Test

Chi-square statistic value	Probability Value
27.75	0.0000

Source: Research Findings

Based on Table (3), the null hypothesis H_0 in this test states that there is no relationship between the disturbance term related to the width from the origin and the explanatory variables. If this hypothesis is not rejected, we will face a model fitted with random effects. On the other hand, the alternative hypothesis H_1 indicates distortion and inconsistency between the disturbance term and the explanatory variables. If the null hypothesis H_0 is

rejected, the model with fixed effects will be appropriate (Baltagi, 2005), which is the case here where the null hypothesis is rejected.

4-1) Unit Root Test (LLC Test) for the Test of Validity

Table (4) shows the validity of variables based on the LLC test. In this Table, all variables have been measured at the level.

Table (4): Unit Root Test (Validity Test) at Level

Variables	Statistic Value	Probability Level
Exchange Rate	-0.651	0.257
Gross Domestic Product	-4.946	0.000
Interest Rate	-3.986	0.000
Oil Price	2.800	0.997
Government Expenditure	-0.827	0.204
Unemployment Rate	-2.174	0.014
Money Supply	0.549	0.708
Consumer Price Index	3.139	0.999
Trade Openness	-2.351	0.009

Source: Research Findings

It is worth noting here that based on the probability levels obtained at the story, some variables in the relevant test are non-stationary, and to make all variables stationary together for estimating a flawless model, the growth rate is used from the variables of the appropriate model. This means that gross domestic product, interest rate, unemployment rate, and trade openness variables are stationary. Still,the exchange rate, oil price, government expenditure, money supply, and consumer price index variables are non-stationary and require a growth rate. Therefore, Table (5) presents variables after being transformed into stationary using the growth rate.

Table (5): Unit Root Test (Validity Test) of Variables from Growth Rate

Variables	Statistic Value	Probability Level
Exchange Rate	20.893-	0.000
Crude Oil Price	5.732-	0.000
Government Expenditure	3.202-	0.000
Money Supply	3.380	0.000

Variables	Statistic Value	Probability Level
Consumer Price Index	10.114-	0.000

Source: Research Findings

After examining the stationarity and ensuring the stationarity of all variables at the level, it is now time to estimate the main model of the research using the simultaneous equations system and the 3sls method. To clarify the results - and considering the relevant estimation whose output is attached - each estimated model is rewritten, and the estimation result is specified in the Table.

4-2) Results of the First Model Estimation

Table (6): Estimation of the First Model Independent Variables

(Dependent variable: Consumer Price Index)	Coefficient	Statistic Value	Probability Level*
Oil Price	0.221	3.158	0.004
Money Supply	-1.626	-0.380	0.704
Exchange Rate	1.187	2.259	0.006
Interest Rate	2.903	1.340	0.005
Gross Domestic Product	-0.040	-0.022	0.003
Width from Origin	0.103	1.379	0.004

Source: Research Findings*Significant at the 5% level.

According to the results obtained from the estimation of the first model, crude oil prices had a positive and significant effect on the consumer price index. Therefore, the first hypothesis of the research is confirmed, indicating that if the percentage of crude oil price increases by one percent, the portion of the consumer price index will increase by 0.221 percent. The result obtained for OPEC member countries, which mostly rely on oil-based economies, is very considerable. Furthermore, if the exchange rate increases by one percent, the percentage of the consumer price index will increase by 1.187 percent. If gross domestic product increases by one unit, the portion of the consumer price index will decrease by 0.040 percent. On the other hand, if the interest rate increases by one team, the percentage of the consumer price index will increase by 2.903 percent. It is noteworthy that the money supply variable does not affect inflation.

4-3) Results of the Second Model Estimation

Table (7): Estimation of the Second Model Independent Variables

(Dependent variable: Money Supply)	Coefficient	Statistic Value	Probability Level*
Oil Price	-0.195	-0.268	0.008
Consumer Price Index	0.859	2.271	0.006
Money Supply	1.286	0.150	0.880
Interest Rate	-2.318	-0.212	0.831
Government Expenditure	0.010	2.021	0.002
Width from Origin	0.090	1.057	0.065

Source: Research Findings*Significant at the 5% level.

According to the results obtained from the estimation of the second model, crude oil price had a significant negative effect on the exchange rate. Therefore, the second hypothesis of the research is confirmed, indicating that if the percentage of crude oil price increases by one percent, the exchange rate will decrease by 0.195 percent. The result obtained for OPEC member countries, which mostly rely on oil-based economies, is very considerable. Furthermore, if the consumer price index increases by one percent, the exchange rate will increase by 0.859 percent. If the government expenditure increases by one percent, the exchange rate will increase by 0.010 percent. On the other hand, the money supply and interest rate variables do not affect the exchange rate.

4-4) Results of the Third Model Estimation

Table (8): Estimation of the Third Model Independent Variables

(Dependent variable: Exchange Rate)	Coefficient	Statistic Value	Probability Level*
Oil Price	1.200	1.028	0.000
Consumer Price Index	-0.219-	-0.025	0.080
Exchange Rate	-0.694-	-0.023	0.081**
Interest Rate	1.109	1.082	0.035
Trade Openness	0.250	2.047	0.002
Width from Origin	0.039	0.998	0.085**

Source: Research Findings*Significant at the 5% level.**Significant at the 10% level.

According to the results obtained from the estimation of the third model, crude oil prices had a significant positive effect on the money supply. Therefore, the third hypothesis of the research is confirmed, indicating that if the percentage of crude oil price increases by one percent, the money supply will increase by 1.200 percent. Furthermore, if the consumer price index increases by one percent, the money supply will decrease by 0.219 percent. If the exchange rate increases by one percent, the money supply will reduce by 0.694 percent. If the interest rate increases by one unit, the money supply will decrease by 1.109 percent. Also, if trade openness increases by one team, the money supply will increase by 0.250 percent. Notably, the width from the original variable has no significant effect on the money supply.

4-5) Results of the Fourth Model Estimation

Table (9): Estimation of the Fourth Model Independent Variables

(Dependent variable: Interest Rate)	Coefficient	Statistic Value	Probability Level*
Oil Price	-0.175	-0.025	0.080**
Consumer Price Index	0.539	3.041	0.067
Money Supply	0.623	1.142	0.086**
Exchange Rate	0.931	2.025	0.009
Unemployment Rate	0.043	1.014	0.088**
Width from Origin	0.077	1.026	0.078**

Source: Research Findings*Significant at the 5% level.**Significant at the 10% level.

Based on the results obtained from the estimation of the fourth model, crude oil price had a significant negative effect on the interest rate. Therefore, the fourth hypothesis of the research is confirmed, indicating that if the percentage of crude oil price increases by one percent, the interest rate will decrease by 0.175 percent. If the consumer price index increases by one percent, the interest rate will increase by 0.539 percent. If the money supply increases by one unit, the interest rate will increase by 0.623 percent. If the exchange rate increases by one percent, the interest rate will increase by 0.931 percent. Moreover, if the unemployment rate increases by one unit, the interest rate will increase by 0.043 percent.

In light of these calculations, it can be interpreted and inferred that the hypotheses presented in Chapter 1 had not been rejected. The estimation results indicate the accuracy of the proposed model and collected data. This means that the hypothesis "the price of oil has a positive and significant effect on the money supply in selected OPEC member countries," the hypothesis "the price of oil has a positive and significant effect on the consumer price index in selected OPEC member countries," the hypothesis "the price of oil has a significant negative effect on the exchange rate in selected OPEC member countries," and the hypothesis "the price of oil has a significant negative effect on the interest rate in selected OPEC member countries" have all been confirmed.

4-6) Testing Classical Assumptions

Table (10): presents the results of the Jarque-Bera test.

Table (10) - Results of the Normality Test

Jarque-Bera Statistic	Probability Value
66.711	0/151

Source: Research Findings

The Jarque-Bera test examines the null hypothesis that the variable is normally distributed. We can observe the probability value to check the normality of the variable. If the probability value is greater than 0.05, the null hypothesis of normality will not be rejected. As can be seen in Table (10), the null hypothesis is not denied, indicating that the data are normally distributed.The results of the autocorrelation test are presented in Table (11).

Table (11): Results of Autocorrelation Test

Test Statistic	Probability Value
133.456	0.079

Source: Research Findings

In this test, the null hypothesis is the absence of autocorrelation, which, based on Table (11) is not rejected due to the high probability value (above 5%), indicating the absence of autocorrelation. It should be noted that the LM test is used for this investigation.The results of the heteroscedasticity test are presented in Table (12).

Table (12):Results of the Heteroscedasticity Test

Test Statistic	Probability Value
45.79	0.057

Source: Research Findings

In this test, the null hypothesis is the homogeneity of variances. As shown in Table (12), the probability value is higher than 5%, indicating the rejection of the null hypothesis and the absence of heteroscedasticity. Therefore, there is no problem in this regard. It should also be noted that the White test is used for this investigation.

5) Conclusion

The oil sector is a significant source of revenue for oil-exporting countries. The price of oil determines the income generated from it. Due to the non-elastic demand for oil, an increase in its price signifies an increase in the revenue of oil-exporting economies, while a decrease in oil price can harm economic growth. Therefore, oil prices are crucial for these economies since

most of their revenue depends on oil production, price, and income. In addition, an oil price increase is good news for oil-exporting countries as it may lead to a rise in investment and other economic activities within the country, thus accelerating economic growth.

Therefore, the oil sector is the backbone of the economies of oil-exporting countries due to their economic dependence on oil revenue. Oil prices determine their incomes due to the mandatory nature of demand in the global market. Hence, an increase in oil price indicates an increase in revenue, while a decrease may harm the economic growth of oil-exporting countries. Considering these arguments, this study has examined the impact of crude oil prices on the economic activities of OPEC member countries.

It seems that the price of oil and the level of inflation are causally related. An increase in oil prices leads to inflation, a measure of the general trend of prices in the economy. On the other hand, a decrease in the price of oil reduces inflationary pressures. History shows that these two are indeed related, but since the oil shock in the 1970s, the relationship has become more complex. Oil and inflation are linked because oil is a fundamental input in the economy - used in vital activities such as fueling vehicles and heating homes - and if input costs increase, the cost of final products must also increase. For example, if the price of oil increases, the production of plastic will be more expensive. Then a plastic company will transfer part or all of this cost to the consumer, increasing prices and ultimately creating inflation.

An increase in oil prices leads to inflation, but the inverse relationship is not straightforward. A decrease in oil prices does not necessarily lead to reducedcosts of goods and services. These countries' economic, institutional, and political conditions can explain the sources of this asymmetry. In this regard, it can be argued that the more strict the institutions are, the more pronounced the asymmetries will be.

Despite the important findings of this study, its main limitation is its focus solely on the impact of crude oil prices on macroeconomic performance indicators such as inflation rates, liquidity, exchange rates, and interest rates. Additionally, analyzing the results of crude oil prices on other economic variables such as investment, current account balance, budget balance, and social indicators such as unemployment, wage inequality, poverty, and essential welfare is necessary. These aspects can be addressed in future studies. Furthermore, dynamic econometric models can be used to examine and explain the existing emotional relationships between various economic variables.

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