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Mohammed Toufik Meziane,
Relizane University, Algeria
https://orcid.org/0009-0009-3765-5848

THE IMPACT OF FISCAL POLICY ON OIL PRICES - THE CASE OF ALGERIA DURING THE PERIOD FROM 1970 TO 2022

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Abstract. *There is a consensus among experts in the field of economics that the weak economic performance of certain oil-exporting countries can be attributed to their approach in responding to fluctuations in petroleum prices. This is primarily due to the fact that in most of these countries, government expenditures are heavily reliant on revenues generated from the export of hydrocarbons. This research paper aims to examine the impact of petroleum price fluctuations on several macroeconomic indicators in Algeria from 1970 to 2022. These variables include the gross domestic product, petroleum price, currency rate, imports, and total income. The price of petroleum is regarded as the primary determinant of economic activity in Algeria. This may be demonstrated by the function of Batch responsiveness, which measures the responsiveness of variables to changes in petroleum prices.*

Keywords: *Financial Policy, Oil Prices, Stationarity, Co-integration, Response functions.*

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Introduction

Fiscal policy is one of the most important macroeconomic policies because it can help the national economy reach the most goals. This is because it has many tools that are some of the most important tools of economic management for promoting economic growth and getting rid of problems that hurt economic stability (Emmanuel & Olamide, 2018). Tools for economic policy that are both general and specific When it comes to how government spending and taxes affect aggregate demand and then macroeconomic factors, there are stabilizing effects.

Since then, fiscal policy has become a more important part of economic policy and a major tool for guiding the direction of the economy and dealing with shocks and crises (Akinboyo, 2020). It also has an effect on economic growth, especially in developing countries. In modern systems, fiscal policy has made it the state's job and obligation to guide the national economy in all of its parts, and fiscal policy has become a key part of the national economy's efforts to reach its goals.

Since the government owns the energy sector in most developing countries (Alley, 2016), fiscal policy is the most important way that money from oil exports goes into the local economy. On the other hand, the huge oil money is used to figure out how to handle economic policy. It makes the oil-producing countries more creditworthy and makes it easier for them to get loans from other countries. Since it is easier for the government to spend money and more people want the government to spend money (Rickne, 2009), the government spends more. In this case, the increase in oil revenues will cause a deficit in the balance of payments. This deficit is paid for by using future oil revenues as a guarantee to borrow money from outside the country. If oil revenues decline or stay the same instead of rising as expected, the gap between government income and spending will grow over time, which could lead to the country being in debt and unable to pay its bills.

From 1973 to 2022, the global petroleum market went through a series of tremors because of how it affected a number of different things (Chib & Benbouziane, 2019). These tremors finally showed up in the volatility of oil prices and led to a state of instability. All of this had effects that added up on oil economies and on growth in all its forms. Oil became a drug for many countries

(Adeosun & Fagbemi, 2019). Every day, policymakers around the world keep an eye on the global energy markets. This is because their economies are sensitive to every change in the price of oil, which is what they use to set their goals and objectives.

We used Algeria as a research model to back up this study and show how it fits into the bigger picture. Algeria's government gets most of its money from the oil and gas industry (Bouzid, 1999). The crisis of 1986, when prices on the oil market dropped sharply, is a good example from history. Spending is less than what comes in. This put pressure on fiscal policy and made it harder for it to adapt to changes in the local economy. From it, we can see the following parts of the study problem:

How does the government's fiscal strategy react to changes in the price of oil?

To solve the last problem, we came up with the following theories:

Hypotheses:

1. Oil-exporting countries can grow and have stable economies with the help of fiscal policy.

2. Because the Algerian economy was tied to the revenues from the hydrocarbon sector, the growth of the agricultural and manufacturing sectors slowed down significantly and clearly. This supports the idea that the Algerian economy was hit by the Dutch disease.

3. Trying to figure out what made oil prices go up in the first place.

4. A look at how changes in the price of oil affect Algeria's economic policies.

Literature Review

1. Fiscal policy in oil exporting countries:

Countries that export primary commodities have more drastic changes in their economic situation than countries with a more diverse economic base (Mahmah & Kandil, 2019). Most countries act based on their economic situation when deciding the role of fiscal policy, and the limits of flexibility depend on the stages of growth, the amount of resources available, and how realistic the goals are. That the country's fiscal policy plays a big role in moving the money made from oil to other key sectors (Afonso & Rault, 2010). This helps the country be more competitive and less likely to become too dependent on oil exports. Many economists say that the poor economic performance of some oil-exporting countries is due to how their governments respond to changes in the price of oil. This is because in most of these countries (Khan, Husnain,, & Abbas, Q., Shah, S.Z.A., 2019), government spending is closely tied to revenue from fuel exports, and changes in oil export revenues are caused by changes in the price of oil. Along with how the government spends money, this leads to a cyclical fiscal policy that hurts the businesses of oil-exporting countries in a big way.

1.1. Dutch disease:

The Dutch disease, also known as the "problem of raw materials boom", refers to the industrial decline caused by North Sea oil production and exports. Keynesian economists initially referred to this as the "problem of raw materials boom" due to the transfer of capital and floating exchange rates. In the 1970s, economic models were created to explain the impact of rising fuel prices, finding a mine, or wealth from outside sources on a particular sector. Cordon and Neary's 1982 study showed that the boom in exports had complicated effects on economic growth in other areas, leading to unemployment (Cordon & Neary, 1982). The Dutch disease was not limited to developing countries, hydrocarbons, or raw materials exports. Symptoms of the Dutch disease can also be caused by capital flows, such as foreign aid, foreign aid, or gold from South America.

Cordon used a three-part model to describe the signs and symptoms of the Dutch disease (Cordon & Max, 1982, p. 36):

a) Growing market,

b) Falling behind,

c) Commodities that can't be traded. The Cor Model, based on this case, has one moving factor, work, and other production factors unique to each sector.

There are two things that happen when a field grows (P & Van Wijnbergen, 1986):

a. What spending does:

Spending on non-tradable commodities causes short-term price increases, leading to increased national currency real prices. Export revenues also increase in the lagging sector, but these prices are set by markets. Higher non-tradable goods prices attract more workers, causing the falling sector to make less (Cordon & Neary, 1984, p. 86).

b. How materials are used:

Increased prices in the prosperous sector increase labor marginal product, leading to resource movement. This causes workers to move from the failing sector and non-tradable goods sector to the prosperous sector. Direct deindustrialization occurs when labor is moved from the second sector to countries, while indirect deindustrialization occurs when labor is moved from the lagging sector to the non-tradable goods sector (Cordon & Neary, 1982). The petroleum sector's small work use cancels out resource effects, and the rise in exchange rates causes the lagging sector to produce less and the non-returnable goods sector to produce more.

The Hamilton model for the production of a specific commodity provides a simple means of demonstrating the nature of the impact of oil price variations on the macroeconomic and fiscal policy on the portion of the inputs inside the production function (Hamilton, 1993).

$$y = f(L, K, E)y \tag{1}$$

Where: L It represents the labor and K capital component and E represents the cost of oil in the inputs, and the profit margin is in the following function:

$$pY - wL - rk - P_e E \tag{2}$$

Where: P It represents the price of the commodity and w the wage, and r it represents the interest on the capital, and P_e it represents the price of oil.

And in a fully competitive market, companies continue to supply the production chain with oil as long as oil prices are less than the marginal product of the energy component:

$$P_e = pF_e(L, K, E) \tag{3}$$

Where: F_e represents the derivative of the production function with respect to E and dividing it to pY so that we have the following equation:

$$\frac{P_e E}{PY} = \frac{F_e(L, K, E)}{E/Y} \tag{4}$$

Where: $\frac{P_e E}{PY}$ It represents the elasticity of production $\frac{F_e(L, K, E)}{E/Y}$. It represents the percentage of spending on oil out of the total production.

The percentage of oil use in production remained between 4% and 5% until the late 1970s, then increased to 8% during the reverse shock of oil (1979-1980). Since 2004, it has increased to 3.3%. Hamilton's model suggests that fluctuations in oil prices can lead to a decline in wages and jobs, frictional unemployment, and individuals not taking jobs in certain sectors due to their belief that their old jobs will become profitable. This highlights the potential impact of oil price fluctuations on production and unemployment.

The Woodford and Rotenberg model suggests that monopolies in markets may explain the impact of oil price fluctuations on the economy. They found that a rise in oil prices leads to a decline in production and a decrease in real wages. The economic model was modified to assume perfect competition conditions, and the effect of oil price fluctuations was limited. The effective model depends on implicit interdependence between companies, with fluctuations in oil prices causing a direct rise in unemployment rate and wages, followed by a decline in value after 14 months. Both mechanisms provide a logical explanation for oil price relationships with macroeconomics and public finances, but cannot explain changes in crude income output.

Materials and Methods

Algeria faces risks from oil price fluctuations due to its dependence on hydrocarbons. The 1986 crisis led to imbalances in macroeconomic balances, affecting development and growth. Algeria's budget is closely linked to oil price fluctuations, as the primary resource for government budgets is related to crude oil prices. These fluctuations impact hydrocarbon export revenues, which determine the country's capabilities in imports and public expenditure policy.

The oil shocks that the Algerian economy was exposed to, in addition to the instability and uncertainty in the global oil markets, are a result of the high correlation with oil, and therefore these fluctuations are reflected in the economic policies pursued by Algeria. In this applied study, we will demonstrate the impact of oil prices on some of the macroeconomic variables represented In: raw internal product, exchange rates, imports, total revenues, and the values of the variables to be studied, which we took from the International Monetary Fund (IFS/FMI) statistics, are heterogeneous in size, since some of them are calculated in dollars, so we entered the logarithm on all the variables. These The data is annual data for the period from 1970 AD to the year 2022, i.e. the size of the sample inquired is 52 observations, which is a rather small size from the minimum required to carry out these tests, and the variables to be studied are:

Table 1
Variable description and Data sources

Variable	Data source	Code
Gross domestic product	Data are taken from World Bank statistics and International Monetary Fund statistics	LGDP
Exchange rate	Expressing the exchange rate of the dinar in dollars, we symbolize it with the symbol ER, and after introducing the logarithm to it, we symbolize it with the symbol LER. The data is taken from statistics from the International Monetary Fund.	LER
Oil price	We denote it with the symbol (POILI), and after entering the logarithm it becomes “LPOILI”. Data are taken from World Bank statistics.	LPOILI
Imports	It is the value of the country's imports at current prices (CIF), and we symbolize it with the symbol (im). By inserting the logarithm, we change the symbol as follows: Lim.	im
Total revenues	It is the value of the country’s revenues, and we symbolize it with the symbol (RES). By inserting the logarithm, we change the symbol as follows: LRES. The data is taken from World Bank statistics.	RES

In this research, we try to investigate the type of variables that are considered stable or unstable, and if these variables are unstable, we test them according to the tests used, and what is their degree of integration?

2.1. The Unit root test:

One of the necessary conditions for performing simultaneous integration tests is that the time series be stable of the same degree, otherwise there can be no simultaneous integration relationship between variables, we use here the "ADF" test for single root.

Augmented Dickey Fuller Test "ADF":

The ADF test is based on the three basic models and on the following hypotheses (Bourbonnais, 2015):

$$\begin{aligned} H_0 = \phi_j = 1 \\ H_1 = \phi_j < 1 \end{aligned} \quad (5)$$

Accepting the nihilistic hypothesis H_0 means that there is a single root, from which the time series is unstable, and using the "OLS" method to estimate $\o j$ in the three models. We get $t.\O_j$. which is subject to the distribution of "Student", if it is $t.\O_j$. The calculated value is greater than the tabular "Student" statistic, we accept the hypothesis H_0. That is, there is a single root.

But if it is $t\o j$. Smaller than the tabular "Student" statistic, we reject the nihilistic hypothesis, accept the alternative hypothesis, and therefore the chain is stable.

Dickie Fuller rookie test "ADF" (1970-2022)

Using EVIEWS we get the following results:

Table 2
Dickie Fuller Rookie Test

Variable	Degree of delay "Lag Mic"	Calculated value "ADF ($t.Ø_j$)"	Probability of a single root (Prob-RU)
LPOIL	4	-0,815986	[0,9557]
LPIB	1	-2.051216	[0,5577]
LER	9	-1.915464	[0.6300]
LIM	9	-0.030002	[0,9942]
LRES	6	-0,977688	[0,9356]

Using the program "EVIEWS 8.0", the results in Table 1 show that the calculated value of "ADF ($t.Ø_j$)" is greater than the tabular critical values at the level of significance 10%; 5%; 1%. It also shows the probability of a single root, greater at all levels of significance, including the acceptance of the null hypothesis, and therefore all the variables of the study are unstable, and to return them stable, we apply the differences of degree (1) and show that the variables are still unstable and then we applied the differences of the second degree.

Table 3
ADF Test Second degree

Second degree 2-nd différence critical values				
10%; 5%; 1%	*(Prob)*	*Calculated value "ADF ($t.Ø_j$)"*	*Degree of delay "Lag Mic"*	*Variable*
$(-1{,}61)(-1{,}95)(-2{,}64)$	[0.0000]	-11.89710	0	∇ LPOIL
	[0.0000]	-6.856323	0	∇ Lpib
	[0.0000]	-8.548009	0	∇ LER
	[0.0000]	-10.58341	0	∇ LIM
	[0.0000]	-8.188984	0	∇ LRES

Using Eviews, the results from Table 2 are as follows:

Hence, all series are stable, and we reject the hypothesis H_0, so these time series of all variables are integrated of the second order at all levels of morality:

$$Ler.lpib.\lim.lpoil.lres \rightarrow CI(2) \quad 1\% \quad 5\% \quad 10\% \tag{6}$$

2.2. Simultaneous Integration Test:

We first determine the degree of delay of the variables, this determination is made using the Aic standard and the Schwartz standard, and then we perform the simultaneous integration test.

1.2.2. Determination of the degree of delay:

Using the Acai test and the Schwartz test, the proposed delay score is the first delay score (-3) because both tests cannot be calculated beyond this score, due to the small sample size taken from 1970 to 2022.

2.2.2. Cointegration test

After verifying the first condition, which is the stability of variables of the same degree, we estimate the long-term relationships by the method of "OLS", here we perform the Johansen Cointégration test to study the relationship in the long term or using the "Johansen" test of eigenvalues and the test of the maximum reasonableness ratio (the greatest probability) to find out the order of simultaneous integration.

The "Johansen" test is based on estimating the following model:

$$\Delta y_t = A_0 + A_1 . y_{t\text{-P}} + A_{1.} \Delta y_{t\text{-}1} + A_2 y_{t\text{-}2} + \ldots\ldots\ldots + A_{p\text{-}1} . \Delta y_{t\text{-p-}1} + \xi_T \tag{7}$$

In order to calculate the number of delays in the model, it is as follows:

$P=1$: The form is as follows:

$$\Delta y_t = A_0 + A_{1.} \Delta y_{t-1} + \xi_t \quad (8)$$

$P=2$: The form is as follows:

$$\Delta y_t = A_0 + A_2 y_{t-2} + A_{t-1} . \Delta y_{t-1} + \xi_T \quad (9)$$

$P=3$: The form becomes as follows:

$$\Delta y_t = A_0 + . \Delta y_{t-3} + \Delta y_{t-2} + \Delta y_{t-1} + \xi_T \quad (10)$$
$$\vdots$$

1. If $(r=0)$ (r: rank of matrix A).

In this case there is no "Cointegration" between the variables, and the debugging model (ECM) cannot be formed.

2. If $(r=k)$ (k: number of proposed variables).

In this case all variables are stable, and simultaneous integration is not subtracted.

3. If it is $(1 \leq r \leq k)$

In this case it exists a synchronous integration relationship, and the error correction model can be formed The rank of the matrix r determines the number of the simultaneous integration relationship between the variable.

From the special values of matrix A the statistic is calculated:

$$\lambda_{\text{Trace}} = -n . \sum_{i=r+1}^{k} \ln(1-\lambda_i) \quad (11)$$

λ_i: Values for the matrix.

N: Views.

r : Matrix rank.

k : Number of variables.

Results

3.1. Hypotheses of the Johansen test:

$$\left| \begin{array}{l} H_0 : r=0 \\ H_1 : r>0 \end{array} \right. \quad (12)$$

If the hypothesis H_0 is rejected, we pass the second test, λ_{Trace} greater than the tabular critical values.

$$\left| \begin{array}{l} H_0 : r=1 \\ H_1 : r>1 \end{array} \right. \quad (13)$$

If the null hypothesis H_0 is rejected, then the rank of the matrix is equal to k the number of variables studied ($r=k$), hence there is no co-integratioln relationship between the variables because they are all stable.

Therefore, using Eviews and using the Johansen Test for Greater Eigenvalue and the Max-Eigenvalue test, we will try here to find a simultaneous integration relationship between the variables studied in the long term (Ler, Lpoil, Lpib, Lres, LiM).

H_0: There is no co-integration relationship.

H_1: Having a co-integration relationship.

Table 4
Concurrent Integration Rank Test (Johansen Test)

Date: 02/14/23 Time: 12:16				
Sample (adjusted): 1970 2022				
Included observations: 52 after adjustments				
Trend assumption: Linear deterministic trend				
Series: LER LIMP LPIB LPOIL				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.590140	66.39256	47.85613	0.0004
At most 1*	0.326087	27.14722	29.79707	0.0981
At most 2	0.184716	9.782459	15.49471	0.2978
At most 3	0.017947	0.796845	3.841466	0.3720
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

From Table 3 we can extract the following results:

Hypothesis (1):

$r=0$ The calculated value "Max-Eigenvalue" (66.39256) is greater than the critical values at the level of 5%, (47.85613), so we reject the nihilistic hypothesis H_0 and accept the hypothesis H_1, that mean the existence of a simultaneous integration relationship.

Hypothesis (2):

$r=1$ The calculated value (27.14722) is greater than the critical values at the level of 5%, and the value of: (25.79707) Hence we reject the null hypothesis H_0 and accept H_1, the existence of a simultaneous integration relationship.

Therefore, we can conclude from Table 3 that there are two simultaneous integration relationships between the variables at the level of 5%.

We will test all possible cases in order to find these two relationships between the variables studied:

1. Granger test for synchronous integration:

To find the two relationships for simultaneous integration, we use the "Granger" test, which is one of the tests applied to the residuals (the remnants of the proposed equations), then we were able to extract these two relationships as follows:

The first relationship: oil price and crude domestic product [Lpoil-Lpib]: Using the "Granger" test and the "Eviews" program, the following result was obtained:

Table 5
Granger test for the cointegration of (oil price and crude domestic product)

P-Value	*ADF*	*"Lag Mic" delay*	*Residual*
[0,9812]	-0,013624	1	$e_t = ALpoil_t - Lpib_t$

We can see from the table that the calculated value of: ADF, is greater than the critical value and with a greater probability [0.9812] at the level of 1% we reject the hypothesis H_0 and accept . H_1 there is simultaneous integration between [Lpoil-Lpib].

Second Relationship: Oil Price and Exchange Rate [LPoil-Ler]:

Using the "Granger" test and the "Eviews" program, the following result was obtained:

Table 6
Granger test of the co-integration of the price of petroleum and the exchange rate

P-Value	*ADF*	*"Lag Mic" delay*	*Residual*
[0,9824]	-0,14521	3	$e_t = ALpoil_t - er_t$

By the table we reject H_0 and accept. H_1 That is, the existence of simultaneous integration between the price of oil and the exchange rate.

using the "Granger" applied to the remainder of the equations proposed in the model, we were able to obtain two relationships for simultaneous integration in the long term:

1) A relationship of mutual integration between the price of oil and the gross domestic product.

2) A common integration relationship between the price of oil and the exchange rate.

2. Causal Relationship Test:

We will try to test the direction of causal relationships using the "Granger" method between all the studied variables (lpib.lm2.lcrd.lpm.lpg) and here we try to show what variable affects the other, the first affects the second or the second in the first, or they are affected by each other at the same time, and from the conditions for studying the causal relationship all the variables used must be stable of the same degree.

Granger causal test:

First case:

Table 7
Granger causality test between oil price and GDP [Lpoil-Lpib]

Pairwise Granger Causality Tests			
Date: 02/14/23 Time: 12:44			
Sample: 1970 2022			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LPOIL does not Granger Cause LPIB	52	2.91711	0.0660
LPIB does not Granger Cause LPOIL		4.84818	0.0132

We notice through Table 7 that the values (F): (2.91711) and (4.84818) are the largest tabular values at the level of 1% and 5%, and using the probability [0.066] is greater at the level of %1 and thus we reject the null hypothesis, that is, the existence of a causal relationship between the two variables, meaning there is a causal relationship from the differential of D(Lpoil) to the differential of D(Lpib). As for the second relationship, we also note that the probability of [0.0132] is greater at the level of 1% and 5%, and from it there is a causal relationship in both directions.

Second case:

Table 8
Granger causal test between petroleum price and exchange rate

Pairwise Granger Causality Tests			
Date: 02/14/23 Time: 12:48			
Sample: 1970 2022			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LER does not Granger Cause LPOIL	52	2.76993	0.0750
LPOIL does not Granger Cause LER		0.76446	0.4724

We can see from the table in the first relationship that the value of F [2.76993] is greater at the level of %1 and %5, and from it the null hypothesis is rejected, i.e. the existence of a causal relationship between the two variables. The second relationship from [Ler] to [Lpoil] differential is that the probability value [0.47] is greater at the level of 1%, and from it we reject the null hypothesis, i.e. there is a causal relationship between the price of oil and the exchange rate, and from it there is a causal relationship in both directions.

3. Analysis of response functions:

The "Granger" causality test shows a relationship between the variables, and to show this relationship, we calculate the response functions for all the variables under study, we note, for example, from the form of the response functions the variables of the effect of the change in the oil price variable on the other total variables.

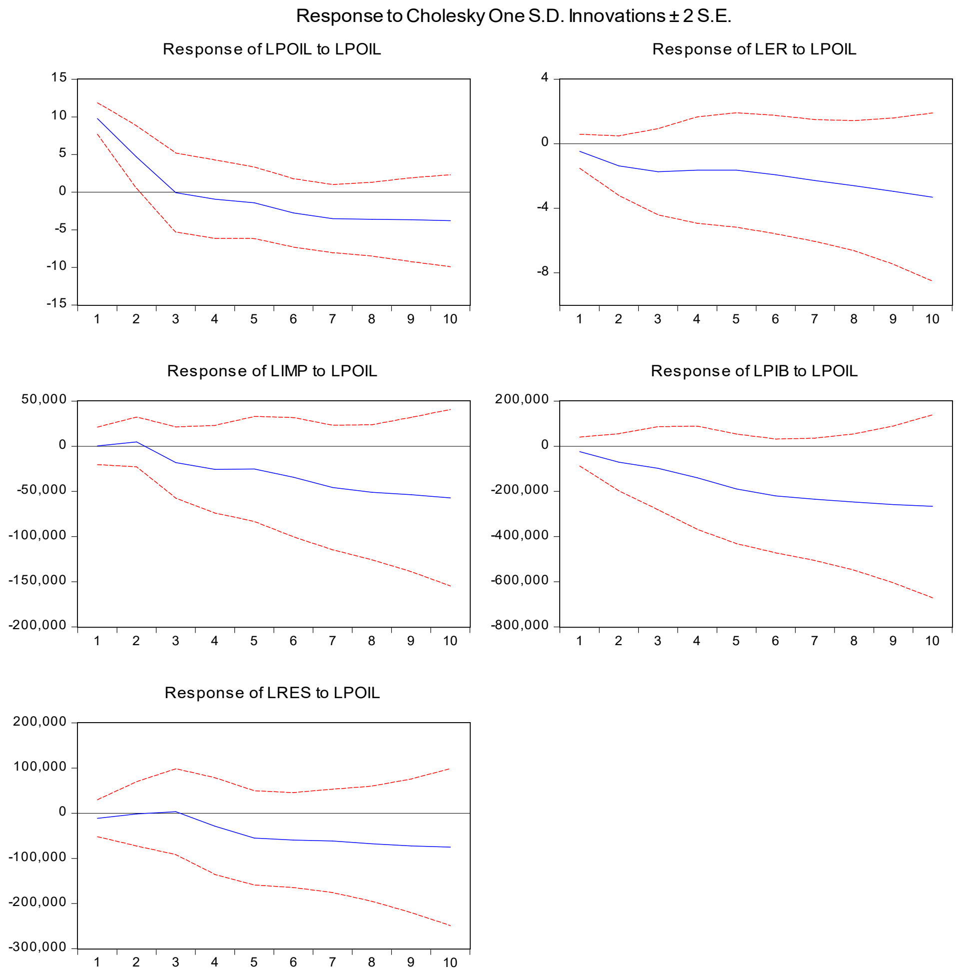

Figure 1. Form of the response functions

Source: calculated by the authors

4. Estimation of the Standard Model: The results of the econometric analysis of the impact of independent variables on the price of oil in Algeria indicated the following:

Table 9
Estimation of the Standard Model

Dependent Variable: LPOIL				
Method: Least Squares				
Date: 02/14/23 Time: 13:05				
Sample: 1970 2022				
Included observations: 52				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPIB	1.471205	6.442306	2.286030	0.0275
LIMP	5.445605	1.915205	2.850547	0.0068
LER	0.788709	0.200453	-3.934630	0.0003
LRES	3.528605	1.345605	-2.623669	0.0122
C	16.98852	2.984648	5.691967	0.0000
R-squared	0.984512	Mean dependent var		33.52435
Adjusted R-squared	0.959343	S.D. dependent var		31.26350
S.E. of regression	12.91518	Akaike info criterion		8.057005
Sum squared resid	6838.873	Schwarz criterion		8.255771
Log likelihood	-180.3111	Hannan-Quinn criter.		8.131464
F-statistic	55.67151	Durbin-Watson stat		1.992955
Prob(F-statistic)	0.000000			

Hence, the estimated equation becomes as follows:

$$lpoil = 16.98 + 1.47\,lpid + 5.44\lim + 0.78\,ler + 3.52\,lres \tag{14}$$

Statistical analysis: The coefficient of determination (R2) indicates that the independent variables affecting the price of oil in Algeria, namely GDP, exchange rate, imports, total revenues explain only 98.45 percent of the changes in the price of oil and 1.55 percent due to other variables that were not included in the model, and the parameters of the model are significant depending on the test (DW) on the absence of the model from the problem of self-correlation, and we did not find that the model means from the problem of instability of homogeneity of variance.

The heteroscedasticity test aims to determine whether there is an inequality of residual variance for all observations in the linear regression model. The heteroscedasticity test can be done with the Harvey test. The decision-making is based on the probability figures from the result of the Harvey test. The results of the heteroscedasticity test can be seen below.

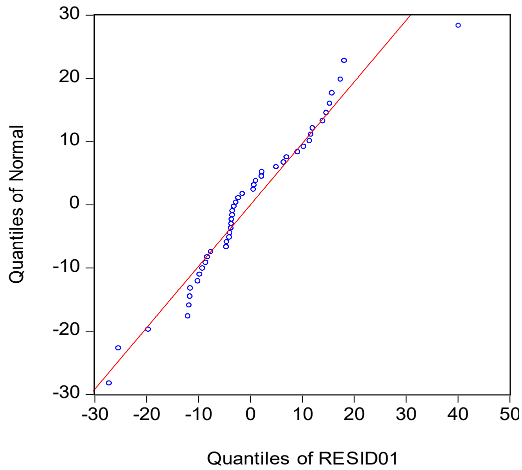

Figure 2. Propagation of residues of the first model

Source: calculated by the authors

The second model: the relationship can be estimated in its standard form as follows:

Table 10

Estimation of the Second Model

Dependent Variable: LPIB				
Method: Least Squares				
Date: 02/14/23 Time: 13:30				
Sample: 1970 2022				
Included observations: 52				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOIL	76.74987	3357.343	2.286030	0.0275
LER	26.71633	3381.282	7.901241	0.0000
LIMP	0.368559	0.473473	0.778417	0.4408
LRES	1.352926	0.254146	5.323427	0.0000
C	18.26321	86578.41	-2.109441	0.0411
R-squared	0.984641	Mean dependent var		3266451.
Adjusted R-squared	0.914119	S.D. dependent var		3844156.
S.E. of regression	294807.8	Akaike info criterion		28.12836
Sum squared resid	3.568612	Schwarz criterion		28.32712
Log likelihood	-641.9522	Hannan-Quinn criter.		28.20282
F-statistic	1902.581	Durbin-Watson stat		1.942127
Prob(F-statistic)	0.000000			

Hence, the estimated equation becomes as follows:

$$lpib = 18.98 + 76.74\,lpoi + 26.71\,ler + 0.36\lim + 1.35\,lres \tag{15}$$

Statistical analysis: The coefficient of determination (R2) indicates that the independent variables affecting the GDP, namely, exchange rate, imports, total revenues, oil price, explain only 98.46 percent of the changes in GDP, and the parameters of the model are significant depending on the (DW) test.

The third model: the relationship can be estimated in its standard form as follows:

Table 11
Estimation of the Third Model

Dependent Variable: LRES				
Method: Least Squares				
Date: 02/14/23 Time: 13:44				
Sample: 1970 2022				
Included observations: 52				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOIL	4.089619	1558.740	-2.623669	0.0122
LPIB	0.302087	0.056747	5.323427	0.0000
LIMP	0.918593	0.173822	5.284682	0.0000
LER	9.676054	2038.718	-4.746146	0.0000
C	72.63677	41553.07	1.748048	0.0879
R-squared	0.983813	Mean dependent var		1321156.
Adjusted R-squared	0.963209	S.D. dependent var		1690446.
S.E. of regression	139305.3	Akaike info criterion		26.62905
Sum squared resid	7.9632511	Schwarz criterion		26.82781
Log likelihood	-607.4680	Hannan-Quinn criter.		26.70350
F-statistic	1646.359	Durbin-Watson stat		1.983684
Prob(F-statistic)	0.000000			

Hence, the estimated equation becomes as follows:

$$lres = 72.63 + 4.089\,lpoil + 9.67\,ler + 0.91\lim + 0.3\,lpib \tag{16}$$

Statistical analysis: The coefficient of determination (R2) indicates that the independent variables affecting the total revenues explain the changes that have occurred, and the parameters of the model are significant depending on the (DW) test.

Conclusion

Through this research, we have studied and analyzed the response of fiscal policy to the fluctuations of oil prices and the impact of these fluctuations on some macroeconomic variables and by applying the method of joint integration to the economic variables under the proposed study, we found that all the variables studied: gross domestic product, oil price, exchange rate, imports, total revenues are second-class integrals, then using the test (Johansen) on the three basic models we found the ranks of simultaneous integration There are two relationships for joint integration, which is the first relationship Between the price of oil and the gross domestic product and the second between the price of oil and the exchange rate. The results showed that the price of oil is among the most important determinants of economic activity in Algeria through what was shown by the impulse response functions to the response of variables to the change in the price of oil.

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