The Relationship between Oil Price Shocks, Inflation Rate and Economic Growth
(Econometric Study the Case of Algeria over the Period 1971-2016)

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العلاقة بين صدمات أسعار النفط، معدل التضخم، والنمو الاقتصادي
(دراسة قياسية حالة الجزائر خلال الفترة 1971 – 2016)

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Abstract:
This article examines the relationship between petroleum price shocks, inflation, and economic growth in Algeria from 1971 to 2016. The results of the estimation using the NARDL model revealed a non-linear effect of oil prices on inflation, as well as a strong relationship between high oil prices and inflation rates. This relationship is also absent when petroleum prices fall, according to the estimation.

Keywords: Inflation, Oil price, Growth rate, NARDL, Cointegration.
(JEL) Classification Codes: E31, Q43, O47, C51, C52.

ملخص:
تهدف هذه الورقة إلى دراسة العلاقة بين صدمات أسعار النفط، التضخم والنمو الاقتصادي في الجزائر خلال الفترة 1971 – 2016 باستخدام منهجية الانحدار الذاتي للفجوات الزمنية الموزعة الغير خطي (NARDL). كشفت نتائج التقدير عن وجود تأثير غير خطي لسعر النفط على التضخم، بالإضافة إلى وجود علاقة قوية بين ارتفاع أسعار النفط ومعدل التضخم، في حين تغيب هذه العلاقة عند انخفاض أسعار النفط.

الكلمات المفتاحية: التضخم، أسعار النفط، معدل النمو، NARDL، Cointegration.
الترميز الاقتصادي (JEL): E31، Q43، O47، C51، C52

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1. Introduction:

Because most monetary policies seek to control inflation, it's crucial to grasp the empirical relationship between oil prices, inflation rates, and economic growth. Knowing the inflationary implications of rising oil prices can help the monetary authorities devise policies to counteract these shocks. However, the impact varies from country to country because of certain factors such as the relative position as importers or exporters of oil, or tax composition differences, or the sectoral structure.

As result, due to its significant economic effects, the subject of oil price changes has obtained widespread academic and government discussion. The relationship between oil price shocks and the macroeconomic is also investigated. Similarly, large studies show that oil price shocks have had an impact on inflation.

Algeria has been able to boost its macroeconomic indices as a consequence of high oil revenues, which has allowed it to manage the trade surplus as a result of high oil revenues and an increase in real GDP during the last decade. After Nigeria and Libya, it is Africa's greatest oil producer, ranking 15th among the countries with the largest oil reserves (12.200 million barrels in January 2018). (BP Statistical Review, June 2018).

Because of its substantial reliance on oil and gas, Algeria's economy is suffering from the "resource curse" (Auty, 1993). The hydrocarbon sector is the most important contributor to Algeria's economy. This sector accounts for around 45.7% of the overall GDP. As a result of the ongoing decrease, which began in 2014, the Algerian economy has been badly impacted by the nature of its economic structure. This led to a sharp decline in the State's revenues and exchange reserves. This was followed by a significant imbalance in macroeconomic balances, worsening of the balance Trade and balance of payments, the degradation of the national currency as well, inflation, and the a drop in the value of economic growth. As a result, we must address the following issue:

What influence do oil prices changes in Algeria, and what are the implications for inflation and growth?

The recent large fluctuations in oil prices have piqued economists' interest, particularly in terms of their impact on inflation and economic growth. Figure 1 depicts variations in oil prices, inflation, and growth in Algeria over the period 1971 - 2016. We note that despite the decline in oil prices in years. However, the rate of inflation remained high in parallel with low growth rates, beginning in 1991.

Oil prices in 1990 were $ 20 per barrel, but after 1991 prices fell due to Iraq's invasion of Kuwait, and during the Asian crisis 1997-1998, prices continued to fall below $ 10. Since the end of 1999, oil prices have begun to recover.

Oil prices fluctuated between $ 25 and $ 30 in the first half of 2000, and in 2001 crude oil prices continued to decline as global economic activity slowed due to the 9/11 attacks. However, prices began to rise in early 2002, in the first quarter of 2003, oil prices reached new highs and continued to rise between September 2003 and December 2006. Prices continued to rise from 2007-2008 up to $ 95, followed by price declines in 2009 due to the global recession and a decline in global economic output. After 2010 oil prices rose until 2013, hovering in the $ 108 range. From 2014 to mid-2016, oil prices experienced a decline in the $ 50 range.

Inflation rates fluctuated during the period 1970-2016. This can be attributed to several reasons, including increases in international price, the expansion of total expenditure in Algeria, large increases in public sector wages without productivity, weak market competitiveness and monopoly, uncontrolled monetary expansion, and deficit In the budget, imported inflation, the development of external indebtedness and imbalance of payments, the exchange rate and the devaluation of the national currency.

During the period 1970-2016, The GDP growth rate fluctuated, reaching its highest point in 1974, before declining due to Algeria's crisis, which was triggered by the drop in oil prices. However, the reforms implemented by the state such as the stabilization and structural adjustment program (1994-1998) and a contractionary monetary policy that have contributed to improving economic growth rates. Though, it deteriorated from 2012 to 2016 as a result of the present economic crisis, namely the drop in oil prices.

2. Theoretical background and previous empirical works:

The current empirical evidence has shown the results are not identical. While the positive relationship between oil price and inflation is well-founded. For example, Hooker (2002) estimated the effect of changes in oil price on the US inflation rate, finding a considerable direct contribution to core inflation before 1981 but little or no pass through since that time.

The presence of an asymmetric relationship between oil price shocks and the inflation rate has been proven by numerous empirical studies (Mork, 1989; Mory, 1993; and Hamilton, 1996).

Cunado & Gracia (2004) examined how oil price shocks affect economic activity and the consumer price index in six Asian countries. According to the findings, oil prices have a considerable impact. Nakov and Pescatori (2007), and Killian (2008) have confirmed an oil price fluctuations have a minor impact on the consumer price index.

Rebeca & Marcelo (2004) examined the impact of oil price shocks on the real economic activity in the major industrialized countries, they discovered that oil prices had a non-linear influence on real GDP. Oil price increases, in particular, are shown to have a higher influence on GDP growth than oil price increases are found to have a negative impact on economic activity in all situations save Japan.

Lecheheb & Sirag (2016) examined the relationship between oil price changes and inflation rate in Algeria, they discovered there is a substantial association relationship between oil price increases and inflation rate.

Adelek et al (2019) studied the impact of crude oil price shocks on Africa's oil-producing countries' macroeconomic performance. Algeria is one of eight big net oil producers listed in the study. The findings revealed that output responds differently to abrupt rises and decreases in oil prices. Also, structural inflation is more likely to accompany severe drops in oil prices than monetary inflation, because both output and investment fall sharply.

3. Model:

Our paper examines the relationship between oil price changes, inflation rate, and economic growth in Algeria from 1971 to 2016. It is in generally use full to consider an augmented Phillips curve with the following structure

$$CPI_t = \alpha + \beta_1 GDP_t + \beta_2 OILp_t + \varepsilon_t \dots\dots (3.1)$$

Where:

CPI: is inflation rate (consumer price index), GDP is economic growth, $OILp$ is oil price, β_i is a vector of long run coefficients.

The asymmetric impact of oil price variations will not be captured, because equation (3.1) has a linear specification.

Following the empirical investigation of (Cunado & Gracia, 2005) (Ibrahim, 2015) and taking into account the asymmetry in the relationship between oil price and inflation, our model can be determined as follows:

$$CPI_t = \theta_0 + \theta_1 GDP_t + \theta_2 OILp_t{}^{+} + \theta_3 OILp_t{}^{-} + \varepsilon_t \ldots\ldots (3.2)$$

Where θ_i is a vector of long-run coefficients, the and are partial sums of the positive and negative changes in following Pesaran et al. (2001) and Shin et al. (2011), it is simple to rewrite equation two in the error correction form as:

$$\Delta CPI_t = \alpha_0 + \alpha_1 CPI_{t-1} + \alpha_2 GDP_{t-1} + \alpha_3 OILp_{t-1}{}^{+} + \alpha_4 OILp_{t-1}{}^{-} + \sum_{i=1}^{p} \rho_{1i} \Delta CPI_{t-i}$$
$$+ \sum_{i=0}^{q} \rho_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{n} \rho_{3i} OILp_{t-i}^{+} \sum_{i=0}^{m} \rho_{4i} OILp_{t-i}^{-} + \mu_t \ldots\ldots (3.3)$$

Where:

$$OILp_t^{+} = \sum_{i=1}^{t} \Delta OILp_t^{+} = \sum_{i=1}^{t} \max\,(\Delta OILp_t, 0)$$
$$OILp_t^{-} = \sum_{i=1}^{t} \Delta OILp_t^{-} = \sum_{i=1}^{t} \min\,(\Delta OILp_t, 0)$$

Over the past years, many researchers have studied the relationship between oil price shocks and economic growth On the one hand and between the shocks of oil prices and inflation on the other hand. They found conflicting results depending on the nature of the country if it is a source or importer of oil. One of the reasons for the varying empirical results is the variety of methods and testing procedures used in the analyses.

4. Empirical Analysis and Results:

The aim of this paper is to examine the relationship between oil price shocks, inflation and economic growth in Algeria using the annual data from 1971 to 2016. In this study, the variables are Consumer price index (IPC), oil price (POIL) and real economic growth (TRGDP).

To achieve the objective of this study, some econometric techniques such as cointegration and error correction techniques are used in this study. Furthermore, certain important tools from these methodologies, including impulse response functions and variance decomposition, are used to investigate the dynamic impacts of oil price shocks in inflation and economic growth on the Algerian macroeconomic. There are three phases in the estimating process to validate the stationarity of each variable. The first step is to see if the variables have a unit root (Engle and Granger, 1987). The Augmented Dickey-Fuller tests (F-ADF) and KPSS tests are used to do this. The second stage is to determine if the variables have a long-run cointegrating relationship. The use bound test is used to do this. Third, selecting an appropriate lag length for the NARDL model/

estimation of the long run estimates of the selected NARDL model. Finally, the NARDL model is reparametrized into an error correction model.

4.1. Stationary: graph, ACF function and Unite Root Test

4.1.1. Graph:

A critical first step in any econometric analysis is to visually inspect the data, a stochastic process is said to be covariance stationary if the means, the variance, and the covariance of the process are constant through time.

We show in Figure 2, the economic growth series is constant during the study period (1971-2016) while the two series (ipc, poil) are not constant and have an increasing trend.

4.1.2. ACF function:

Another method to convey the same argument is to point out that the Table1 series shown a clear trend. The estimated model's tight fit, on the other hand, may lead a researcher to believe the series is genuinely stationary around the cubic trend line presented in Table1. Our eyes can be misled because such trend lines are fitted to make the observed residuals as little as feasible.

Table1 shows the ACF of the GDP rate, Oil price and Inflation rate. We can see that the ACF decays slowly. Indeed, a series with a stochastic trend will exhibit this sort of delayed decay in the ACF. As a result, detrending the data doesn't appear to provide a stationary series.

It is feasible to officially evaluate whether a series is stationary, rather than relying simply on correlogram analysis. In the next sections, we'll look at some of these tests. The technique for testing is not as simple as it appears. We are unable to employ traditional testing methods since they all assume that the data is stationary. For the time being, suffice it to remark that Nelson and Plosser are unable to refuse the unit root null hypothesis. However, before we look at the tests for a unit root, it's worth noting that the problem of non-stationarity also emerges in the setting of a typical regression model.

4.1.3. Unit root ADF & KPSS Test:

The unit root test is used to determine whether or not variables are stationary. The Augmented Dickey-Fuller test (ADF), based on Dickey and Fuller's (1979) work, is used to assess the degree of differentiation required to attain stationarity and to evaluate the presence of unit roots. If a non-stationary variable becomes stationary after "d"times differentiation, then the order of integration is said to be "d". The test is based on the estimation of the following regression, which contains both a constant term and a trend:

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=2}^{p} \beta_i \Delta y_{t-i+1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots (1)^4$$

The null hypothesis is: $\gamma = 0$, that the series is non stationary and has a unit root. Table 2 summarizes the findings of the Unit root test.*

The estimated values of γ for real RGDP, at the 0.01, 0.05, and 0.1 levels, are statistically distinct from zero. However, at the 0.01, 0.05, and 0.1 levels, the projected values of γ for Oil price POIL and Inflation rate IPC are not statistically different from zero.

* **Notes:** A constant is included in both the enhanced Augmented Dickey-Fuller and Phillips-Perron unit-root tests. When a linear trend is added, similar findings are achieved, but they are not reported here. AIC determines the best lag duration, with a maximum of 0 lag being considered. The rejection of null hypothesis (p<confidence level) indicates that the process is stationary process at the level or first difference.

Taking the first difference of the variables (IPC & POIL), we see that the absolute value of the ADF statistic is above the critical values at all significance levels (1%, 5%, and 10%). So that the null hypothesis of the presence of a unit root in the case of the first differentiated variable can be rejected and the variables (IPC, POIL) under considered are I(1), While TRGDP is I(0).

The aim KPSS test is to eliminate the series' deterministic trend and make it stationary.

The hypotheses differ from those used in the ADF test:

$$H_0 = Y_t \sim I(0)$$
$$H_1 = Y_t \sim I(1)$$

The findings of the KPSS test, which has higher power than the ADF test, tend to corroborate the stationarity of the three variables at the first difference, and therefore all variables I(1), as shown in table 2.

4.2. Lag length Test:

The proper lag length for the cointegration test was chosen utilizing the VAR framework to ensure agreement of the study findings with real economic conditions and economic theories. Table 3 shows the outcome of the lag length selection criterion.

The LR, FPE, AIC, SC, and HQ criteria all supported a lag length 1[**]. For the cointegration test and Autoregressive Distributed Lag model, lag length 1will be employed.

4.3. Cointegration Test or Bound Cointegration Testing Approach:

When only one cointegration vector exist, the cointegration procedure of Johansen and Juselius (1990) cannot be applied. Therefore, it is imperative to study the Autoregressive Distributed Lag (ARDL) approach proposed by Narayan (2005) for cointegration or the bound procedure for a long-run relationship. This approach is suitable for small samples as the critical values for a large sample are significantly different from the small sample size.

In this case, using the ARDL approach to cointegration will provide realistic and efficient estimates. In contrast to the cointegration procedure developed by Johansen and Juselius (1990), the Autoregressive Distributed Lag (ARDL) approach to cointegration aids in the identification of the cointegrating vector(s).

For linear and nonlinear specifications, we use the bound test/cointegration test. Table 4 summarizes the outcomes of the test. When the linear form is stated, the F-statistic 2.05 is smaller than the lower critical constraint, indicating that there is no evidence of cointegration. However, the long-run relationship exists, and at all levels (1%, 2.5%, 5%, and 10%), the F-statistic 5.04 exceeds the upper critical bound.

4.4 Estimation of the Long Run Estimates of the Selected NARDL Model

We evaluated the nonlinear model stated in equation (3) using a general-to-specific procedure, and the results are shown in Table 6. We can use the model to analyze inflation dynamics and their responses to real GDP, as well as positive changes and negative in oil prices. We execute several diagnostic tests to assess the appropriateness of the dynamic model before estimating the long-run model and drawing conclusions. The R2 value is around 0.71, indicating that the independent variables

[**] In the annual data, the number of lags is typically small 1 or 2.

have high power in explaining the changes in the dependent variable. Furthermore, the serial correlation LM test demonstrates that the absence of autocorrelation in the residuals. On the other hand, the autoregressive conditional heteroskedasticity ARCH shows that the residuals have constant variance over time. Moreover, Jarque-Bera or normality and Ramsey RESET tests indicate that the error tends to follow normal distribution, and the model is correctly specified, respectively. In addition, as illustrated in Figure 3, the model's stability is assessed using CUSUM and CUSUM of squares tests. Both tests demonstrate the model coefficients' stability because the estimated model fits inside the 5% significance line for CUSUM and CUSUM of squares tests.

4.5. Symmetric Dynamic Multipliers

The presence of cointegration indicates that the variables have at least one long-run equilibrium relationship. The NECM is used to correct for cointegration relationship disequilibrium and test for long and short-run causation between cointegrated variables. The mean of the error correction term (ECT) is used to rectify the disequilibrium.

0.081; 0.102 and 0.084 are the coefficient of poil_n, poil_p, and trgdp respectively. They aren't, however, the long-run coefficients. To find the long-run coefficients, we divide the negative of the coefficient of each poil_n, poil_p, and trgdp by the coefficient of tipc(-1).

Thus, we can derive the cointegrating estimation from the above results with CPI as dependent variable while RGDP, $POIL^+$ and $POIL^-$ as regressors, as follows:

$$DCPI_t = 11.26 - 0.38TRGDP + 0.46DPOIL_P{}^+ + 0.37DPOIL_N{}^-$$

Reparameterization of NARDL Model into Error Correction Model

The third stage is to create a class of models that encapsulates the concept of rectification after cointegration between variables has been proven. Because the departure from long-run equilibrium is gradually corrected through a series of short-run adjustments, this is known as the Error Correction Model (ECM), which is the name given to the entire system and it is utilized to allow for and short-run adjustment dynamics and indicate the speed of such adjustment to the long-run equilibrium state. In general, an ECM derived from Pesaran et al. (2001) can be expressed as follows: (Yangcheol , Byngchul, & Matthew, 2011, p. 12)

$$\Delta y_t = \rho y_{t-1} + \theta^{+\prime} x_{t-1}^{+} + \theta^{+\prime} x_{t-1}^{-} + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} (\varphi_j^{+\prime} \Delta x_{t-j}^{+} + \varphi_j^{-\prime} \Delta x_{t-j}^{-}) + \varepsilon_t$$

$$= \rho \xi_{t-1+} \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{p-1} (\varphi_j^{+\prime} \Delta x_{t-j}^{+} + \varphi_j^{-\prime} \Delta x_{t-j}^{-}) + \varepsilon_t$$

Where $\mathrm{ECT}_{t=1}$ is the error correction term lagged one period, ρ is the short-run coefficient of the error correction term ($-1< \alpha <0$).

The long-run relationship is represented by the error correction term the. The presence of long-run relationship is indicated by a negative and significant one. The coefficients of lagged explanatory variables, on the other hand, suggest a short-run causality relationship between the studied variables shown in table 3.

Table 7 presents the long-run coefficients estimated from the dynamic model described in Table 5. The results show that real income has a negative long-run impact on consumer price inflation, which is statistically significant at 5%. It shows that a 41% rise in real GDP results in a

0.41% decrease in the inflation rate. One of the study's most important findings is that oil prices have an unequal effect on consumer price inflation. Positive changes in oil price have a statistically significant positive impact on inflation, whilst the negative changes tend to be insignificant. According to our estimates, a 1% rise in oil price will result in a 0.04% rise in the inflation rate.

5. Conclusion and Policy Implication:

When it comes to the impact of oil price shocks on inflation and economic growth, the models and variables used always produce different results. This paper uses Narayan cointegration techniques as well as Nonlinear ARDL to investigate the short-run and long-run relationship between three economic variables in Algeria. The findings show that there is a long-run relationship between the three economic variables; the inflation rate, economic growth, and oil price. The long-run coefficients indicate that there is a positive long-run relationship between variables.

Because the study found that oil prices have a favorable impact on inflation and are mostly driven by oil price shocks, the government should increase its efforts to increase output in the oil sub-sector. As a result, revenue would rise and more finances would be accessible, allowing for increased growth. It must be kept in mind, however, that while attempting to expand oil production, the government must not over-concentrate on the oil sub-sector by diverting attention away from the country's non-oil sector. This is significant since in the past, natural oil reserves have been demonstrated to decrease to zero levels. When there are no oil reserves, there is no production and no revenue from oil. So, what happens if Algeria finds itself in this situation in terms of employment, poverty, and growth? The only approach to avoid this impending threat is for the government to invest major resources to strengthen the non-oil economy at the same time as efforts to increase oil output and revenue are accelerated. In addition, resources like energy, road infrastructure, long and medium-term loan facilities, and an enabling business climate should be supplied to the manufacturing sub-sector in order to promote export output and maybe assist in the manufacture of particular items. If the government achieves this, it will broaden the revenue base and help to stabilize the economy during periods when oil revenue declines due to resource depletion or a drop in the worldwide price of oil, as is currently the case. As most monetary authorities try to keep inflation under control, the empirical link between oil prices and inflation rates becomes increasingly important. Knowledge of the inflationary impact of rising oil prices will then aid monetary authorities in implementing appropriate policies to counteract these shocks.

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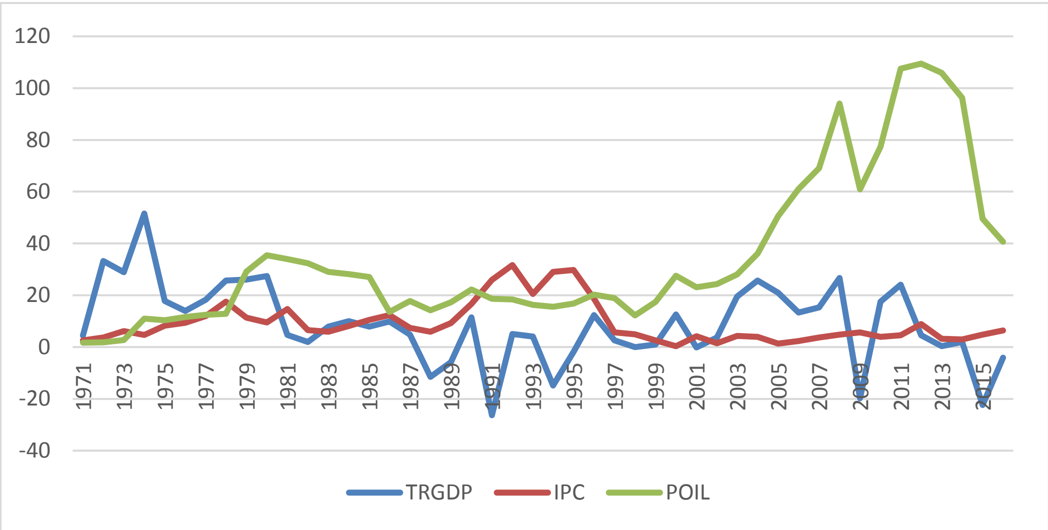
Appendix: Figures, Tables, Variables and Data Sources

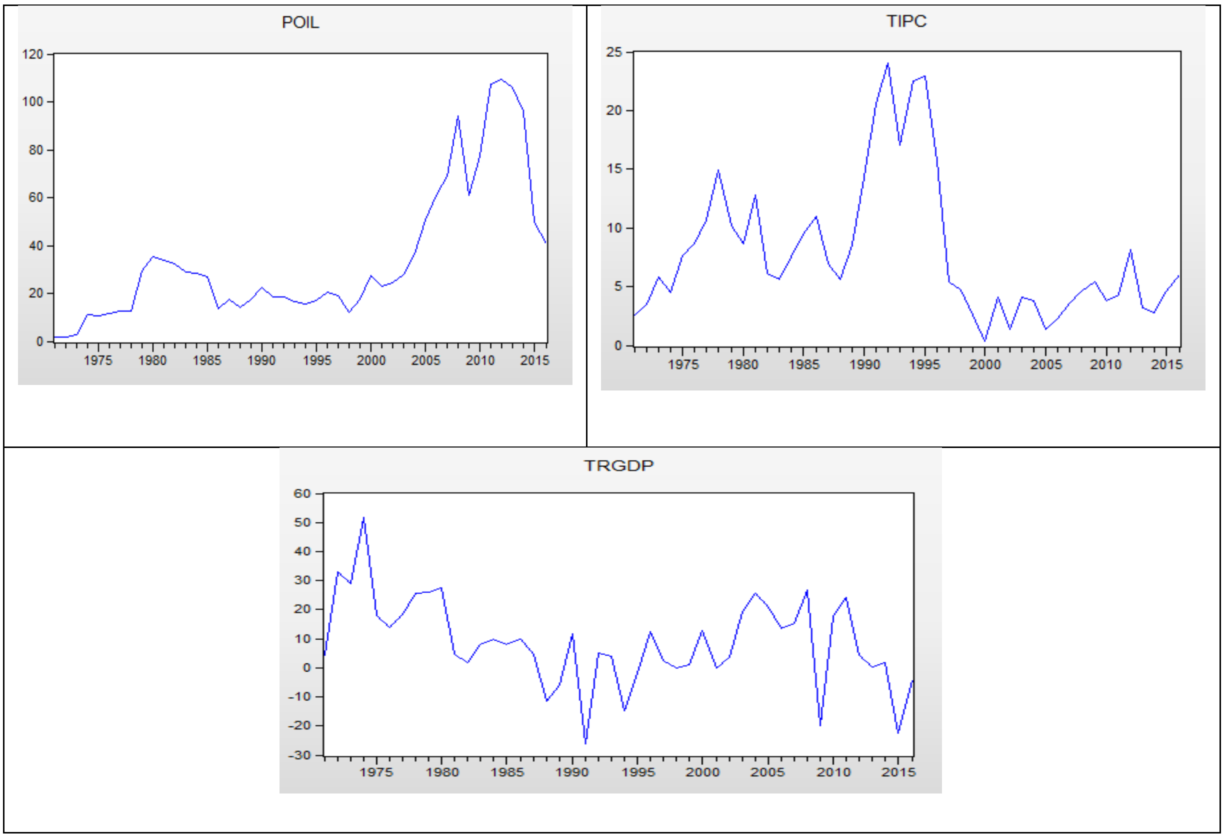
Appendix A: Figures

Figure1: The development of oil prices, inflation rate, and growth in Algeria (1971 - 2016)



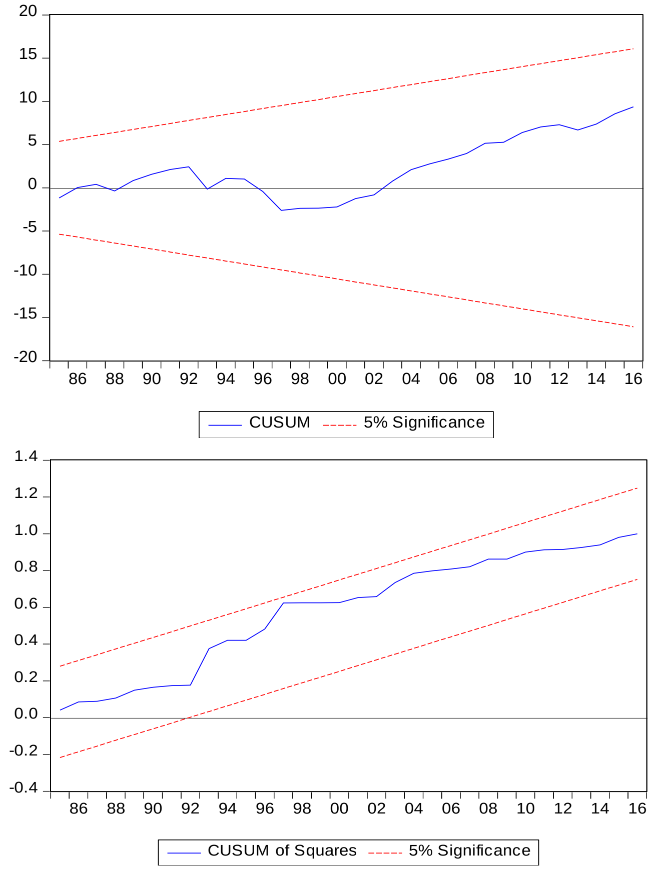
Source: World Bank (2016), OPEC and authors' calculation

Figure 2:Graph of Stationary



Source: Eviews 10

Figure 3: Cusum&Cusum of Squares



Source: Eviews 10

Appendix B: Tables

Table 1:ACF function

variable / AC	LRGDP	POIL	IPC
1	**0.370**	**0.901**	**0.810**
2	**0.248**	**0.783**	**0.605**
3	**0.315**	**0.665**	**0.453**
4	**0.176**	**0.537**	**0.259**

Table 2:Unit Root Test

Unit root Test			
Variables	**rgdp**	**POIL**	**IPC**
Levels	-4.378 P=(0.0011)	-1.611 P=(0.4686)	-2.164 P=(0.2215)
First Difference		-5.836 P=(0.0000)	-6.181 P=(0.0000)
Perron's Test			

Levels	-5.457 P<0.01	-3.212 P=(0.5597)	-4.049 P=(0.1409)
First Difference		-8.179 P<0.01	-7.359 P<0.01
KPSS Test			
Variables	**rgdp**	**POIL**	**IPC**
Levels	0.21 LM-Stat=(0.14)	0.14 LM-Stat=(0.13)	0.119 LM-Stat=(0.116)
First Difference	0.46 LM-Stat=(0.116)	0.34 LM-Stat=(0.09)	0.73 LM-Stat=(0.08)

Table 3: Lag selection based on VAR lag length criterion

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-688.9353	NA	2.51e+09	32.99692	33.16241	33.05758
1	-540.0816	262.2661*	4518011.*	26.67055	27.49801*	26.97385*
2	-532.8931	11.29631	7029482.	27.09015	28.57958	27.63608
3	-516.0268	23.29150	7140872.	27.04889	29.20030	27.83747

Table 4: Bound test for linear/nonlinear cointegration

Model	F-st	L/B	U/B	Result
Linear	2.05	4.083	5.207	non cointegration
Nonlinear	5.40	3.535	4.733	cointegration

Notes: The critical values are from Narayan (2005) case III 5% significance level.

Table 5: nonlinear ARDL results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TIPC(-1)	0.723434	0.124170	5.826139	0.0000
TRGDP	-0.044120	0.080090	-0.550878	0.5855
TRGDP(-1)	-0.061365	0.077333	-0.793520	0.4333
TRGDP(-2)	-0.009189	0.044716	-0.205495	0.8385
POIL_P	-0.052483	0.091069	-0.576304	0.5684
POIL_P(-1)	0.214666	0.150253	1.428699	0.1628
POIL_P(-2)	-0.175735	0.101391	-1.733248	0.0927
POIL_N	0.002431	0.074977	0.032424	0.9743
POIL_N(-1)	-0.000804	0.105363	-0.007631	0.9940
POIL_N(-2)	0.022486	0.082693	0.271924	0.7874
C	4.423046	1.794364	2.464966	0.0193

R^2	0.71
Serial correlation LM(1)	0.13
Serial correlation LM(2)	0.32
Heteroskedasticity ARCH (1)	0.69
Heteroskedasticity ARCH (2)	0.89
Normality Jarque-Bera	0.37
Ramsey RESET	0.33

Table 6: Long run relationship:

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.423046	2.148580	2.058590	0.0478
TIPC(-1)*	-0.276566	0.118465	-2.334581	0.0260
TRGDP(-1)	-0.114674	0.080873	-1.417956	0.1659
POIL_P(-1)	-0.013553	0.039323	-0.344659	0.7326
POIL_N(-1)	0.024113	0.077981	0.309220	0.7592
D(TRGDP)	-0.044120	0.062872	-0.701742	0.4879
D(TRGDP(-1))	0.009189	0.053809	0.170769	0.8655
D(POIL_P)	-0.052483	0.115614	-0.453956	0.6529
D(POIL_P(-1))	0.175735	0.124991	1.405987	0.1694
D(POIL_N)	0.002431	0.092497	0.026282	0.9792
D(POIL_N(-1))	-0.022486	0.107511	-0.209154	0.8357

Table 7: The result of the long-run equilibrium relationship

Dependent variable: CPI

variable	Coefficient	Std. Error	t-statistic	Prob
TRGDP	-0.414634	0.259691	-1.596643	0.0375
POIL_P	0.049004	0.118953	-0.411964	0.0158
POIL_N	-0.087189	0.237216	0.367549	0.2647
C	15.99272	5.268455	3.035562	0.0047

Appendix C: Variables and Data Sources:

TRGDP = Economic Growth.

IPC= Inflation Rate

POIL = Oli price

The time period of the study is from 1971 to 2016. Data are sourced from the World Bank.

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