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Crude Oil Price and Real GDP Growth: An Application of ARDL Bounds Cointegration and Toda-Yamamoto Causality Tests

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Abstract

The main objective of this study is to examine the causality between crude oil price and real GDP growth in Cameroon using annual data spanning from 1980 to 2018. The study adopts the Autoregressive Distributed Lag (ARDL) modelling framework, as well as the Bounds and Toda-Yamamoto cointegration and causality tests. Results from the ARDL estimates reveal that crude oil price has a positive significant effect on real GDP growth. This effect is consistent both in the short-run and long-run. We verified the existence of long-run cointegration following the Bounds test while the direction of causality was established thanks to the Toda-Yamamoto causality test, which showed evidence of unidirectional causality running from real GDP to crude oil price. Consequently, the study recommends that it is necessary for the government to increase domestic investments in the oil sector, strengthen the country's refinery capacity, create strategic crude oil reserves and ensure a proper allocation and management of oil revenues

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1 Introduction

The current growth challenges faced by the global economy are symptoms of a deeper malaise whose panacea is yet to be found. The, variations in crude oil price coupled with the novel coronavirus pandemic constitute major threats to real GDP growth. Thus, recent trends in oil prices and dwindling growth rates in most oil producing Sub-Sahara Africa (SSA) countries in general, and Cameroon in particular have reawakened debates on the oil price–GDP growth relation. However, since the development of the modern oil industry, there have been mixed views on the contribution of natural resources to economic growth and development. On the one hand, most studies before the late 1980s believed that oil was a magic lever to growth. For example, Deaton (1999) posits that oil price hikes have positive effects on Africa's economic development. Deaton's findings corroborate the results of earlier studies (De Long and Williamson 1994, Bardini 1997). Conversely, some researchers validate the resource curse hypothesis propounded by Auty (1993) by asserting that the underdevelopment of most economies especially SSA countries is blamed on resource abundance and poor management of oil revenues (Sachs and Warner 1995, Carmignani and Avom 2010). Therefore, the response to the question whether natural resource abundance is a blessing or curse to economic prosperity remains controversial.

In recent years, the nexus between oil price and GDP growth has been widely exploited and the results often evaluated based on a host of theories notably, the linear/symmetric relationship theory, the asymmetry theory of economic growth and the renaissance growth theory. Proponents of the Linear/Symmetric relationship growth theory (Hamilton 1983, Hooker 1986) posit that changes in GDP growth are caused by oil price changes. Thus, the theory stipulates that there exist a significant negative relation between an oil price increase and GDP growth. However, the asymmetry-in-effect economic growth theory holds that an oil price increase has a negative effect on future GDP growth whereas the effect of an oil price decrease is ambiguous. This asymmetry effect of oil price changes and GDP growth was confirmed by Mark *et al*. (1994) in their analysis of the impact of oil price variation on the growth prospects of African economies.

However, the renaissance growth theory proposed by Lee and Ratti (1995) is of particular importance in this study given that it incorporates both symmetric and asymmetric theories, and makes a distinction between oil price changes and oil price volatility. While the effect of volatility on economic growth is immediate, that of oil price changes is only felt after one year. Nevertheless, irrespective of the variants observed in the preceding theories, we notice a common point of concordance among the proponents, which is the fact that economic growth is driven by crude oil price changes, which corroborates recent studies by Ibrahim (2018), Ogboru *et al*. (2017). Hence, in assessing the effect of crude oil price shocks on Cameroon's economic growth, we explore some related studies from developed as well as developing countries.

Monesa and Qazi (2014) employed the VAR and OLS techniques to examine the effect of oil price shocks on the economic growth of six oil exporting countries (Saudi Arabia, Iran, Kuwait, Nigeria, Venezuela and Indonesia) and found varying effects for different countries. While the effect of an oil shock on GDP growth was significantly negative for Algeria, it was significantly positive for Venezuela. However, the results were statistically insignificant for the rest of the countries. Although other studies focused on Nigeria have confirmed a positive nexus between oil price and GDP growth (Akpan 2009, Mesagan *et al*. 2018), a negative relation is reported for Turkey (Benli *et al*. 2019) and China (Yoshino and Taghizadeh-Hesary 2014, Khan *et al*. 2017).

Furthermore, a few studies focusing on Cameroon (Omgba 2011, Forgha *et al*. 2015, Besso and Pamen 2017) have also provided conflicting results. For instance, Omgba (2011) adopts a VAR modelling framework and found a positive link between oil booms and economic performance. While this positive effect is confirmed by Forgha *et al*. (2015), a negative relation has however been reported (Besso and Pamen 2017, Forgha *et al*. 2013) thereby confirming the validity of the natural resource curse hypothesis for the Cameroonian economy.

Withal, Cameroon's economic performance remains highly correlated with oil revenue, given that she is a net oil exporter with an average daily production of 100000 barrels down from the over 185000 barrels in 1985 (Molina 2015). Thus, the contribution of crude oil to Cameroon's economic growth cannot be overemphasized. For instance, while oil makes a contribution of less than 10% to the country's GDP, it accounts for about 40% of exports and about 40% of government's fiscal revenue (Cossé 2006). This low contribution of oil to GDP is justified by the fact that the economy of Cameroon is relatively diversified compared to Congo where oil accounts for 50% of GDP and 80% of exports. Likewise, oil accounts for 70% and 90% of Nigeria's GDP and exports respectively (Akanni 2007).

Nevertheless, the contribution of oil to macroeconomic variables has fluctuated over the years, leading to recurrent variations in the country's growth rates, with current annual average records of 5% down from the double digit growth rates of over 10% in the mid-1980s. Cameroon is therefore likely to suffer greatly from falling oil prices. Hence, given the plummeting oil prices since 2014, coupled with the outbreak of the novel coronavirus (COVID-19) pandemic since December 2019, Cameroon's growth rate which has averaged barely 5% for the past decade may further worsen.

However, the Cameroon government has over the past two decades adopted and implemented measures aimed at curbing this plummeting growth rates. Among these measures include the structural adjustments programs, the Poverty Reduction Strategy Paper (PRSP) adopted in 2002, which was later revised in 2009 and christened the Growth and Employment Strategy Paper (GESP), which was recently modified and baptized as the national development strategy (NDS) adopted in 2020 to guide the country's development agenda for the 2021-2030 period. Just like the GESP, which envisaged a double digit growth by 2017, the NDS also envisages a double digit growth which is expected to propel the country to her emergence dream by 2035.

Surprisingly, these measures are yet to yield the required results as decelerating growth rates continue to persist in Cameroon (Cossé 2006, Ngouhouo and Mouchili 2014, Ngouhouo and Nchofoung 2021) despite the strategies employed by the government and other foreign bodies in redressing growth related problems arising essentially from oil price shocks. Furthermore, the conflicting results provided by the few existing studies focusing on the oil price-GDP relation for Cameroon (Omgba 2011, Forgha *et al*. 2015, Besso and Pamen 2017) have fuelled the current need to conduct an empirical econometric investigation on the oil price and Cameroon's real GDP relation. Consequently, the objective of this study is twofold: (1) to examine the effect of crude oil price on economic growth, (2) to verify whether a long-run relation exists between crude oil price and economic growth.

Having presented the introduction in section one, the rest of the paper is organised as follows. Section 2 outlines the methodological strategy. The results are presented and discussed in section 3 while the conclusion and policy implications are contained in section 4.

2 Methodology

2.1 Data and Model Specification

This study uses annual data for Cameroon over the period 1980-2018. The data on the variables for the study were sourced from the World Bank Development Indicators (WDI 2019) and the US British Petroleum Statistical Review of World energy (BP 2019). This period seems to be appropriate for the study given that the major crude oil price shocks are absorbed by this time frame, and also because of data availability.

The dependent variable used is real gross domestic product per capita (denoted GDP, measured in millions of current US dollars), explained principally by crude oil price (henceforth denoted COP, which is Brent crude price in current US dollars per barrel of oil). Other explanatory variables include money supply (denoted MS, proxied by the money and quasi money aggregate (M2)); gross domestic savings (denoted SAV, measured as a percentage of GDP) and interest rate (denoted INT, proxied by bank lending interest rate). All variables are considered in natural logarithms except SAV and INT.

Following the extension of the celebrated Solow (1956) growth model by Mankiw et al. (1992) to include human capital as an additional explanatory variable to growth besides the initially considered labour and physical capital, several variables have as well been included in the augmented Cobb-Douglas production function (Abu-Qarn 2019). Thus, in this study, we focus on human capital investment in the form of crude oil. Wherefore, in line with theoretical propositions and reviewed literature, we specify the following econometric model:

$$\mathrm{GDP_t} = \beta_0 + \beta_1\mathrm{COP_t} + \beta_2\mathrm{MS_t} + \beta_3\mathrm{SAV_t} + \beta_4\mathrm{INT_t} + \varepsilon_t \quad (1)$$

Where β_0 is the intercept; β_1, β_2, β_3 and β_4 are respective slope parameters of COP, MS, SAV and INT; and ε_t is the random error term which is assumed to be stationary.

2.2 ARDL Modelling Framework

The study employed the ARDL approach to cointegration developed by Pesaran *et al*. (2001) because of its econometric advantages over other methods. Firstly, the ARDL technique is based on a single ARDL equation, thereby reducing the number of parameters to be estimated, unlike Johansen (1991). Also, the ARDL approach does not require pre-testing of the series to ascertain their order of integration, since it can be used in situations where the variables are either purely I(0), purely I(1) or both I(0) and I(1). Lastly, the ARDL technique is suitable for small sample datasets like that employed by this study and adjusts for both serial correlation and endogeneity since it incorporates adequate number of lags (Avom et al. 2019). Ergo, the ARDL representation of equation (1) is specified as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta COP_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta MS_{t-i} + \sum_{i=0}^{p} \alpha_4 \Delta SAV_{t-i} + \sum_{i=0}^{p} \alpha_5 \Delta INT_{t-i} + \boldsymbol{\lambda}_1 GDP_{t-1} + \boldsymbol{\lambda}_2 COP_t + \boldsymbol{\lambda}_3 MS_t + \boldsymbol{\lambda}_4 SAV_t + \boldsymbol{\lambda}_5 INT_t + \varepsilon_t \quad (2)$$

Where: the variables are all defined as before; Δ denotes the first difference operator; p = lag order selected by the Schwarz Information Criterion (SIC); α_0 is the intercept; ε_t is the stochastic error term; $\alpha_i = 1, 2, 3, 4, 5$ are the short-run dynamic coefficients; $\boldsymbol{\lambda}_i = 1, 2, 3, 4, 5$ are long-run coefficients of the model.

Following the estimation of equation (2), we verify for the existence of cointegration among modelled variables. This is done by performing the ARDL Bounds test according to Pesaran *et al.* (2001) which is based on the null hypothesis (H_0) that no long-run relation exist between the variables. The decision rule is to reject the null hypothesis if the calculated F-statistic exceeds the upper critical bounds or accept the null hypothesis if the F-statistic falls below the lower critical bounds. The Bounds test is however inconclusive if the F-statistic falls within the bounds (lower bound and upper bound). Hence, when the existence of long-run cointegration is established, we proceed to estimate the error correction model (ECM) which is derived from equation (2) as follows:

$$\Delta GDP_t = \partial_0 + \sum_{i=1}^{p-1} \partial_1 \Delta GDP_{t-i} + \sum_{i=0}^{p-1} \partial_2 \Delta COP_{t-I} + \sum_{i=0}^{p-1} \partial_3 \Delta MS_{t-I} + \sum_{i=0}^{p-1} \partial_4 \Delta SAV_{t-i} + \sum_{i=0}^{p-1} \partial_5 \Delta INT_{t-i} + \varphi ECT_{t-1} + \varepsilon_t \quad (3)$$

Where: φ=speed of adjustment of the parameter; ECT_{t-1} is the lagged error correction term. Unlike the short-run dynamics which are captured by the individual coefficients of the lagged terms, information of long-run causality is contained in the ECT_{t-1}. Withal, significance of a lagged explanatory variable suggests short-run causality while a significant non-zero ($\omega_i \neq 0$) but negative ECT_{t-1} implies long-run causality among modelled variables.

3 Empirical Results

3.1 Descriptive Statistics

The mean and standard deviation values in Table I reveal that the level of variability is moderate for some variables (COP, MS and INT) and somewhat volatile for GDP and SAV. Real GDP has reached maximum and minimum values of \$1540.568 and \$649.9918 in the year 2014 and 2000 respectively. Crude oil price however attained its peak value of \$111.6697 in 2012 and the lowest value of \$12.71566 in 1998. Given that Cameroon is a net oil exporter which is theoretically believed to benefit during periods of oil price hikes, these variations are indicative of the fact that the effect of crude oil price shocks on real GDP is felt after a lag of two years.

Table I: Descriptive Statistics and Correlations

	GDP	COP	MS	SAV	INT
Mean	996.7493	41.64964	17.70499	21.01917	11.02028
Maximum	1540.568	111.6697	23.66621	29.56272	19.29000
Minimum	649.9918	12.71566	11.05116	16.53679	-3.770000
Std. Dev.	257.8223	31.09816	3.769555	3.057589	6.508808
Skewness	0.493311	1.185302	-0.089952	1.329054	-0.558291
Kurtosis	2.013302	3.036983	1.798581	4.273931	2.252334
Jarque-Bera	2.920495	8.431693	2.213660	13.03266	2.708638
(P-value)	(0.2321)	(0.0147)	(0.3306)	(0.0014)	(0.2581)
GDP	1				
COP	0.785129	1			
MS	0.249704	0.188251	1		
SAV	-0.447328	-0.339808	0.374787	1	
INT	-0.181896	-0.189744	-0.541661	-0.380268	1

Source: Computed by Authors from Eviews9 Output

Moreover, one may likely assume that the lowest and highest growth rates recorded in Cameroon in the year 2000 and 2014 respectively could have been occasioned by the respective lowest and highest values of crude oil price in 1998 and 2012. This therefore leaves us with the belief that there is a high degree of correlation between crude oil price and economic growth in Cameroon. The correlation results show evidence of the existence of a generally weak correlation between independent variables. However, while there is positive correlation between GDP and explanatory variables such as COP and MS, the correlation is negative between GDP and SAV as well as between INT. Thus, this weak correlation between independent variables shows evidence of the absence of multicollinearity which is indicative of a strong explanatory power of the estimated coefficients.

3.2 Unit Root Tests

The study performed unit root test to verify whether the variables are not integrated of an order above one, so as to avoid spurious results inherent in the presence of I(2) variables (Nkoro & Uko, 2016). Thus, the stationarity of variables was examined by employing the Dickey-Fuller Generalised Least Square (DF-GLS), the ADF and Philips-Perron (PP) unit root tests. All three tests show similar results for all the modelled variables, even though Alimi (2014) recommends the DF-GLS over ADF and PP, by arguing that the ADF and PP tests have very poor size and power properties, and thus unreliable for small sample datasets. The unit root results in Table II show that but for savings that is stationary at levels, the other variables are stationary at first difference. Thus, our variables are both I(0) and I(1).

Table II: Unit Root Tests

Variable	ADF Test t-Statistic (P-value)	PP Test t-Statistic (P-value)	DF-GLS Test t-Statistic (P-value)	Order of Integration
GDP	-4.003103* (0.0039)	-5.731750* (0.0000)	-4.036501* (0.0003)	I(1)
COP	-5.268976* (0.0001)	-4.455922* (0.0001)	-5.323479* (0.0000)	I(1)
MS	-5.648479* (0.0000)	-5.648479* (0.0000)	-5.693926* (0.0000)	I(1)
SAV	-2.726325*** (0.0795)	-2.943670*** (0.0502)	-2.298512** (0.0276)	I(0)
INT	-5.813577* (0.0000)	-6.008286* (0.0000)	-5.878780* (0.0000)	I(1)

Source: Computed by Authors. Notes: *, **, & *** denote statistical significance at 1%, 5%, and 10% respectively; I(0)= stationary at levels; I(1)= stationary at first difference

3.3 Bounds Test to Cointegration

In performing the Bounds test to cointegration, two main steps are followed: first we estimate the specified ARDL model and then select an optimal lag length. Consequently, the optimal lag length was automatically selected based on the Schwarz information criteria. Thus, Figure 1 reveals an optimal lag length of ARDL(1,4,1,3,0) for the top 20 models of the estimated ARDL model.

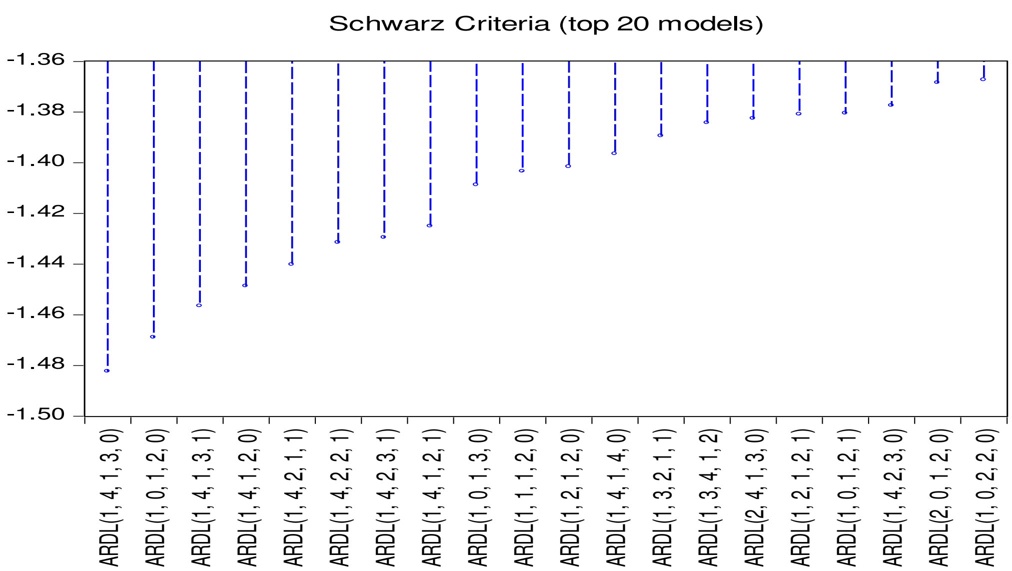


Figure 1: Lag Length Graph
Source: Computed by Authors from Eviews9 Output

Having determined an optimal lag length, we then conducted the Bounds test (see Table III) and the results show that the F-statistic is 3.969, which exceeds the upper critical bound of 3.52 at the 10% level of significance. Thus, the null hypothesis of no cointegration is rejected. Nevertheless, although the existence of cointegration has been established, the direction of causality remains unknown. In effect, we proceed to the determination of the direction of causality by employing the Toda-Yamamoto (1995) causality test (results are presented in Table IV).

Table III: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist		
Variables	F-statistic	K
F(GDP, COP, MS, SAV, INT)	3.969728*	4
Critical Value	Lower Bound (I0)	Upper Bound (I1)
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Computed by Authors: Notes: * denotes statistical significance at 10%

Table IV: Toda-Yamamoto Non-causality Analysis

Variable	GDP	COP	MS	SAV	INT
GDP	…….	14.29359* (0.0008)	4.561612 (0.1022)	1.863001 (0.3940)	9.260821** (0.0098)
COP	0.454405 (0.7968)	…….	4.659414 (0.6863)	0.784574 (0.6755)	0.492029 (0.7819)
MS	2.069928 (0.3552)	0.207174 (0.9016)	…….	1.124549 (0.5699)	2.596419 (0.2730)
SAV	5.918105*** (0.0519)	4.658743*** (0.0974)	1.074013 (0.5845)	…….	18.80611* (0.0001)
INT	5.545387*** (0.0625)	3.349233 (0.1874)	8.454124** (0.0146)	5.281675*** (0.0713)	…….

Source: Computed by Authors from Eviews9 Output. Notes: P-values are given in parentheses ( ); *; ** & *** denotes statistical significance at 1%, 5% & 10% respectively

Table IV shows evidence of both unidirectional and bidirectional causality between the dependent and explanatory variables. Specifically, there is evidence of unidirectional causality from GDP to crude oil price (COP), from (SAV to GDP; SAV to COP; INT to GDP; and INT to MS). Bidirectional causality is established between interest rate (INT) and GDP, thereby implying a feedback effect. A feedback effect is also observed between INT and savings (SAV).

3.4 Error Correction Model Estimates

The short-run results in Table V show that the coefficient of the lagged error correction term, ECT(-1) is negative and statistically significant at 5%, thereby confirming the existence of long-run cointegration between the independent variables and real GDP. Thus, the ECT(-1) coefficient of –0.286313, implies that the deviation from long-run equilibrium of real GDP in the previous year is corrected by about 29% in the current year to restore equilibrium. Furthermore, the results show that current and first lag values of crude oil have insignificant effects on real GDP while the effects of the second and third lag values significantly impact real GDP. Specifically, there is evidence at the 5% level of significance that the second lag of crude oil has a negative effect on real GDP while the effect is positive for the third lag. We find similar effects of money supply and savings on real GDP. Also, interest rates have a significant positive effect on real GDP at the 1% level of significance.

Table V: Estimation Results of ARDL(1, 4, 1, 3, 0)

Dependent Variable: GDP				
	Short-run Coefficients			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(COP)	0.079636	0.048967	1.626316	0.1213
D(COP(-1))	-0.100471	0.090361	-1.111886	0.2808
D(COP(-2))	-0.139751**	0.058794	-2.376947	0.0288
D(COP(-3))	0.187006**	0.060506	3.090720	0.0063
D(MS)	-0.787463*	0.147776	-5.328757	0.0000
D(SAV)	0.545663**	0.251410	2.170414	0.0436
D(SAV(-1))	-0.551279**	0.182545	-3.019960	0.0074
D(SAV(-2))	-0.253583***	0.124826	-2.031495	0.0572
D(INT)	0.011170*	0.003047	3.665817	0.0018
ECT(-1)	-0.286313**	0.102133	-2.803322	0.0118
	Long-run Coefficients			
COP	0.571445*	0.150660	3.792948	0.0013
MS	0.472724	0.477610	0.989770	0.3354
SAV	1.315920	0.842962	1.561067	0.1359
INT	0.039012**	0.017184	2.270292	0.0357
C	-0.901773	3.149827	-0.286293	0.7779

Source: Computed by Authors from Eviews9 Output. Notes: *, **, &*** represent statistical significance at 1%, 5% & 10% respectively

In addition, the results of the long-run coefficients reveal that there is a significant positive long-run relation between crude oil price and real GDP, as well as interest rate and real GDP. Specifically, there is evidence at the 1% level of significance that a 10% increase in crude oil price has the tendency of raising Cameroon's real GDP by 5.7% in the long-run. This result is consistent with the findings of Akanni and Adejumo (2006), Akpan (2009) and Forgha *et al.* (2015) but contrary to the findings of Besso and Pamen (2017).

3.5 Robustness Checks

The relevance and pertinence of the model was validated based on diagnostic checks such as the tests for heteroscedasticity, serial correlation, normality and specification, as well as model stability. The diagnostic test results in Table VI indicate that the model is correctly specified, serially uncorrelated, and homoscedastic. Hence, the results of our estimations can be reliably interpreted and used for policy recommendations.

Table VI: Model Diagnostics

Test Hypothesis	Test	Statistic Value (P-value)
Heteroskedasticity	Breusch-Pagan-Godfrey	1.287086 (0.3040)
Serial Correlation	Breusch-Godfrey	1.484580 (0.2596)
Specification	Ramsey RESET	0.001360 (0.9710)
Normality	Jarque-Bera	0.191889 (0.191889)

Source: Computed by Authors from Eviews9 Output

In addition, the stability of the model was verified with the help of the Cumulative Sum (CUSUM) and the CUSUM squares of recursive residuals stability tests (see Figures 2 and 3) which show that all coefficients of the estimated model lie within the 5 percent critical bounds, thereby confirming the existence of a long-run relation between modeled variables and the stability of estimated coefficients (Alimi 2014).

Figure 2: CUSUM Residual Test

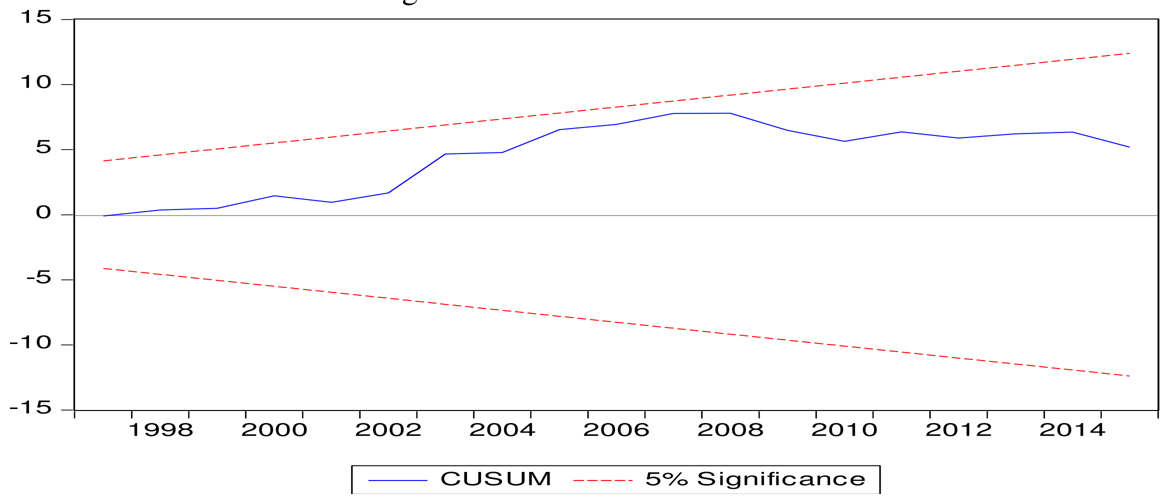
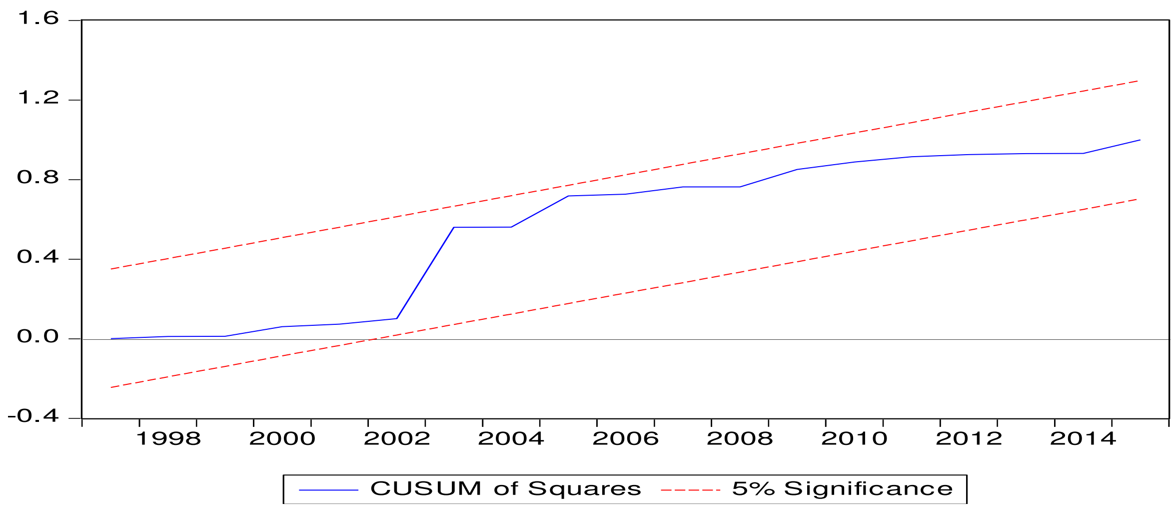
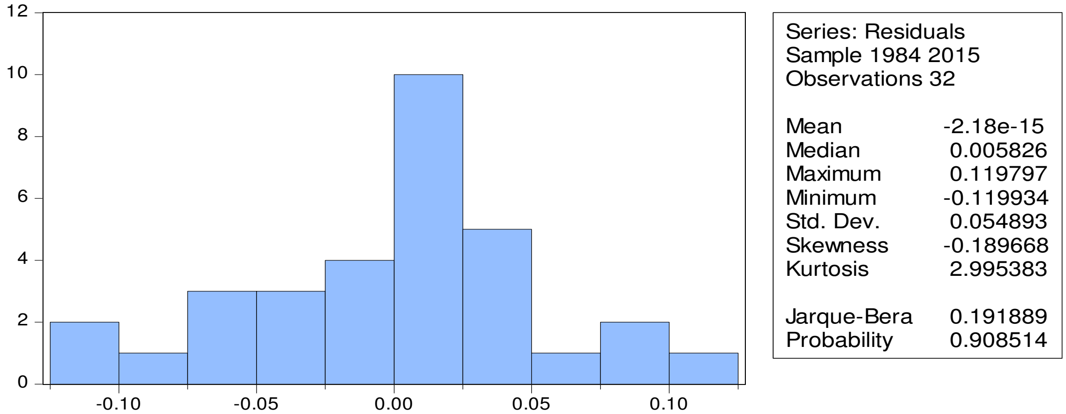


Figure 3: CUSUMsq Residual Test



Finally, the histogram normality test was conducted to verify for normality (see figure 4). Consequently, we observe from Figure 4 that the probability value of the Jarque-Bera statistic is insignificant, which shows evidence of the normality of the modelled variables.

Figure 4: Histogram Normality Test



4 Conclusion and Policy Implications

The main purpose of this study was to investigate the effect of crude oil price shocks on Cameroon's real GDP growth. The study employed the ARDL estimation technique and found a positive significant effect of oil price on the economic growth of Cameroon. This effect is consistent in both the short-run and long-run periods. Furthermore, the ARDL Bounds test to cointegration revealed the existence of a long-run relation between real GDP and the explanatory variables, thereby necessitating the estimation of the error correction model. However, given the inability of the ARDL Bounds test to establish the direction of causality among variables, we employed the Toda-Yayamoto (1995) causality test and found evidence of unidirectional causality among the dependent and explanatory variables. For example, we found evidence of unidirectional causality running from crude oil price to real GDP.

Based on these findings, the study recommends that it is necessary for oil exporting countries in general and Cameroon in particular to increase domestic investments in the oil sector, and ensure a proper allocation and management of oil revenues. Moreover, oil rich countries could embrace economic diversification in order to gauge against structural changes eminent with export booms from the oil sector (Corden and Neary, 1982). In addition, the highly variable crude oil prices require that oil rich countries should strengthen their refinery capacities and create strategic crude oil reserves in order to take advantage of oil price hikes.

References

Akanni, O.P. (2007) "Oil wealth and economic growth in oil exporting African countries" *African Economic Research Consortium*, AERC Research Paper 170.

Akanni, O.P., Adejumo, A.V. (2006) "Oil price shock and macroeconomic activity in Nigeria" *International Research Journal of Finance and Economics* **3**, 28-34.

Alimi, R.S. (2014) "ARDL Bounds testing approach to cointegration: A re-examination of augmented Fisher hypothesis in an open economy" *Asian Journal of Economic Modelling* **2**(2), 103-114.

Auty, R.M. (1993) "Sustaining development *in the* mineral economies*: the* resource curse thesis" *Routledge*: London.

Avom, D., Miamo, W.C., Achuo, E.D., Dinga, G.D. (2019) "The employment and economic growth nexus in Cameroon: an autoregressive distributed lag approach" *Journal of Economics & Management Sciences* **1**(2), 158-174.

Bardini, C. (1997) "Without coal in the age of steam: a factor-endowment explanation of the Italian industrial lag before World War I" *Journal of Economic History*, **57**, 633-653.

Benli, M., Altintas, H., Kaplan, M. (2019) "Asymmetric effect of oil prices on economic growth: Evidence from Turkey" *Bilecik Şeyh Edebali University Journal of Social Sciences Institute* **4**(1), 266-279.

Besso, C.R., Pamen, E.P. (2017) "Oil price shock and economic growth: Experience of CEMAC countries" *Theoretical and Practical Research in the Economic Fields* **8**(1), 5-18.

BP. (2019) British Petroleum Statistical Review of World Energy June 2019. http://www.bp.com/statisticalreview.

Carmignani, F., Avom, D. (2010) "The social development effect of primary commodity export dependence" *Ecological Economics* **10**(2), 317-330.

Corden, W.M., Neary, J. P. (1982) "Booming sector and de-industrialisation in a small open economy" *The economic journal* **92**(368), 825-848.

Cossé, M.S. (2006) "*Strengthening Transparency in the Oil Sector in Cameroon: Why Does It Matter?*" International Monetary Fund.

De Long, J.B., Williamson, J.G. (1994) "Natural resources and convergence in the nineteenth and twentieth centuries" Harvard University.

Deaton, A. (1999) "Commodity prices and growth in Africa" *Journal of Economic Perspectives* **13**(3), 23-40.

Forgha, N.G., Sama, M.C., Achuo, E.D. (2015) "Petroleum products price fluctuations and economic growth in Cameroon" *Growth* **2**(2), 30-40.

Forgha, N.G., Vukenkeng, A., Aquilas, N. (2013) "Natural resource abundance and economic growth: the Cameroon Experience" *African Journal of Social Sciences* **5**(3), 78-90.

Hamilton, J. (1983) "Oil and the macroeconomy since World War II" *Journal of Political Economy* **96**, 593-617.

Hooker, C. (1986) "Effects of oil price and exchange rate variations on government revenue in China" *Journal of Economics* **2**(1), 2-3.

Ibrahim, T. (2018) "Oil price fluctuation and aggregate output performance in Nigeria" Munich Personal RePEc Archive, MPRA Paper No. 88636.

Johansen, S. (1991) "Estimation and hypothesis testing of cointegrating vectors in Gaussian vector autoregressive models" *Econometrica* **59**, 1551-1580.

Khan, G., Kiani, A., Ahmed, A.M. (2017) "Globalization, endogenous oil price shocks and Chinese economic activity" *The Lahore Journal of Economics* **22**(2), 39–64.

Lee, K.S., Ratti, R.A. (1995) "Oil shocks and the macro-economy: the role of price Variability" *The Energy Journal* **16**(4), 39–56.

Mankiw, N.G., Romer, D., Weil, D.N. (1992) "A contribution to the empirics of economic growth" *The Quarterly Journal of Economics* **107**(2), 407-437.

Mark, G., Olsen, T., Mysen, Y. (1994) "Impact of oil price variation on the growth prospects of African economies" *African Economic Writer's Publication* **2**(5), 80-83.

Mesagan, E.P., Alimi, O.Y., Adebiyi, K.A. (2018) "Population growth, energy use, crude oil price, and the Nigerian economy" *Economic Studies* **27**(2), 115-132.

Molina, G. (2015) "Camaroon ramping up oil production as prices moving down" *Oil Price: Oil and Energy News. July*, *28*.

Monesa, I., Qazi, L.T. (2014) "The effects of oil price shocks on economic growth of oil exporting countries: A case of six OPEC economies" *Business and Economic Review*, **5**(1), 65-87.

Ngouhouo, I., Mouchili, E. (2014) "Saving, investment and economic growth in Cameroun: a multivariate approach" *International Journal of Economics and Finance* ***6***(9), 244-253.

Ngouhouo, I., Nchofoung, T. (2021) "Does trade openness affect employment in Cameroon?" *Foreign Trade Review* 1-12. Doi: 10.117/0015732520961307.

Nkoro, E., Uko, E. (2016) "Autoregressive distributed lag (ARDL) cointegration technique: application and interpretation" *Journal of Statistical and Econometric Models* **5**(4), 63-91.

Ogboru, I., Rivi, M.T., Idisi, P. (2017) "The impact of changes in crude oil prices on economic growth in Nigeria: 1986–2015" *Journal of Economics and Sustainable Development* **8**(12), 78-89.

Omgba, L.D. (2011) "Oil wealth and non-oil sector performance in a developing country: evidence from Cameroon" *Oxford Development Studies* **39**(4), 487-503.

Pesaran, M.H., Shin, Y., Smith, RJ. (2001) "Bounds testing approach to the analysis of level relationships" *Journal of Applied Econometrics* **16**, 289–326.

Sachs, J.D., Warner, A.M. (2001) "The curse of natural resources" *European economic review* ***45***(4-6), 827-838.

Solow, R.M. (1956) "A contribution to the theory of economic growth" *The quarterly journal of economics* **70**(1), 65-94.

Toda, H.Y., Yamamoto, T. (1995) "Statistical inference in vector autoregressions with possibly integrated processes" *Journal of Econometrics* **66**, 225-250.

WDI. (2019) World Development Indicators Data Catalogue. Accessed on 28/06/2019 from the webpage https://datacatalogue.worldbank.org>dataset.

Yoshino, N., Taghizadeh-Hesary, F. (2014) "Economic impacts of oil price fluctuations on developed and emerging economies" *IEEJ Energy Journal* **9**(3), 58-75.