



**An Empirical Analysis of the Modulating Effect  
between Oil and Non-Oil Revenue in Explaining  
Economic Growth in Cameroon**

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**Abstract:** Oil is expected to amplify the impact of technology and create tremendous economic prosperity in oil exporting countries. In this context, this paper examines the effects of oil and non-oil revenue on economic growth in Cameroon, with emphasis on their modulating role. In this endeavor, used is made of time series data spanning from 1980 - 2018 and an Autoregressive Distributed lag (ARDL) model to estimate the long and short-run effects of these variables on economic growth. Results indicate a long-run relationship between GDP, oil revenue, non-oil revenue, gross capital formation and general government expenditure. The long-term results reveal that oil revenue registers a positive and insignificant effect on economic growth while non-oil revenue has a negative and significant effect on economic growth. However, in the short-run both oil and non-oil revenue register positive and significant effects on economic growth. However, when the two revenue sources were interacted, the results indicate that oil and non-oil revenue are competitive in spurring economic growth in the long term. These findings suggest that public policy interventions should improve its revenue collection mechanism through the strict implementation and proper monitoring of the oil agencies so as to reduce revenue leakages resulting from the embezzlement of funds. These results further suggest that government should improve its agricultural processing and its manufacturing sector.

**Keywords:** Oil and non-oil revenue; Economic growth; autoregressive distributed lag; bound test

**JEL Classification:** H20

## 1. Introduction

As most world economies depend on oil, it is important to understand the dynamics of oil revenue and economic growth in every oil producing nation. Oil is a strategic product not only because it is widely used but fundamentally because it is limited in supply, also because it is a non-renewable source of energy which is depleting. Since the 1960s, Africa has been producing crude oil in silence. It was not until the attacks of 11 September 2001 and the outbreak of the second Iraq war that sub-Saharan Africa, and particularly the Gulf of Guinea, became the focus of the major oil-consuming countries (Jean 2017). Cameroon which is a modest oil producer is located in Saharan Africa particularly at the Gulf of Guinea with a population of about 25 million inhabitants and its surface area is about 475,440 km<sup>2</sup>. The northern part of Cameroon is partially-desert broadening the maroua plain with diverse mineral endowment and a game reserve (Zef et al., 2017).

The economy of Cameroon is primarily dominated by the agricultural sector and the exploitation of oil and non-oil resources remains the main export products services of the country and the driving forces behind its economic growth. Agriculture being the backbone of every economic activities of the economy has employed more that 70% of its population and has contributed 22.3% of the country's economic growth, agriculture being the second export product of the country after oil remains the most

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economic activity carried out in the economy. The economy is currently regarded as one of the prominent primary commodities producers in Sub Saharan Africa (SSA). In terms of its commercial activities, Cameroon remains the giant in agricultural products in SSA which is being exported to other countries such as Chad, Congo, Central Africa republic among others while it exports cash crops like coffee, cocoa, banana cotton among others, timber and oil to other countries like America, U.K, china and South Korea. Cameroon exports more than half of its export product to the European Union (EU) and its remain its largest trading partner. Oil and agriculture have over the decade influence the economic growth of Cameroon, accounting for 50 % and 30.1% of its exports respectively, and 40% of both export and fiscal revenue and 22.3% of its economic growth respectively (Sotamenou & Nehgwelah, 2018).

Like most developing countries, Cameroon's economic development is based mainly on its primary sector. Globally, the country is food self-sufficient. According to CIA World Fact book (2010), estimates of Cameroon's GDP (PPP) in 2009 stood at \$42.55 billion and the production and consumption capacity of 5741KWh and 5201KWh respectively. The GDP growth rate was 2.0% and GDP per capital (PPP) was estimated at \$2.300. Oil plays a pivotal role in shaping the economy of Cameroon. With Its reserve of natural gas and oil, the country has put in place new policies to develop and improve the various sources of energy as well as expand its energy sector. Cameroon's major sources of energy are biomass, petroleum and electricity (CIA World Fact book, 2010). In this strive to improve and develop new sources of energy in Cameroon, empirical knowledge on how oil and non-oil interact to determine economic growth is very vital.

The secondary sector has been on a rapidly rise, though the agricultural sector has been on a consistent decline across the various commodities. The export commodity sector declined considerably while the manufacturing sector improved rapidly. The economic growth of Cameroon improved for closed to two decades and collapsed within the mid-1980s, this was partly as a result of the considerable fall in the world price of its main export product and economic mismanagement coupled with bad governance. This led to a sharp and severe fall on the economic growth of Cameroon (Amin, 2002). As per 2009 estimates, Cameroon had an annual GDP (purchasing period power parity) of \$42.55billion. With these figures, it ranked 94<sup>th</sup> in the world. According to the 2009 estimates, Cameroon had an annual GDP (purchasing period power parity) of \$42.55billion. With these figures, its ranked 94<sup>th</sup> in the world. With respect to these estimates, the economy of Cameroon had an inflationary rate of 5.3% more than 3.5% of 2008 figures. Cameroon had a severe export deficit due to the global economic recession of 2008. The agricultural sector constitutes 19.8% of GDP, industry accounts for 29.7% and the services sector 50.4% according to 2009 estimates (CIA World Fact book, 2012).

The economy of Cameroon has remained resilient despite it security challenges and external shocks in 2019, grew at an estimated rate of 4.1% due to its resilient tertiary sector and increase in investments and consumption. Ranked 151 world widely in 2018 and 21 in Africa on human development index, Cameroon still lags in terms of human development. The poverty growth rate slightly dropped from 39.9% to 37.5% in 2007 and 2014 respectively. Hence, this trend will not help in achieving some goals in the growth and employment strategy paper: poverty rate at 28.7% and workforce underemployment falling from 76% to 50% in 2020. The inflation rate in Cameroon rose from 1.1% to 2.4% within the period of 2018 to 2019 respectively, but was below the 3% CEMAC limit. There has been a constant decrease in its fiscal deficit of 3.8%, 2.5 and 2.3% of GDP in 2017, 2018 and 2019 respectively due to the three years planning context of fiscal consideration of 2017–2019. Cameroon current account deficit was constant at 3.5% of GDP within the period of 2018 and 2019 and dropped in 2020 by 2.6%. in November 2018 the IMF's assessment revealed that Cameroon continue to be at high risk of debt distress with debts amounting closely to 39% of GDP, compared to 12% in 2007. (Cameroon Economic Outlook, 2020).

Oil is the backbone for all sectors especially manufacturing, agricultural and services sector. Oil



provision can affect an economy either positively or negatively. For instance, changes in oil prices have a direct influence on economic growth and development. That is, increase in oil prices increase the cost of doing business, leading to a negative effect on economic growth and vice versa in the short-run. Oil is widely regarded as a propelling force behind any economic activity and indeed industrial production. In this regard, it is policy relevant to assess whether oil revenue modulates the effect of non-oil revenue on economic growth in Cameroon. High grade oil resources will amplify Low grade oil can hinder the development of new technologies while high grade oil can act as facilitators. Ojinnaka (1998) Suggested that the consumption of oil track with the national product. Hence, economic modernization is an important indicator of the scale of oil consumption. Cameroon began offshore oil production in 1977 and oil production has been on a steady decline for a long time now and the trend is expected to continue as existing oil reserves are depleted.

Within 2008 and 2009 oil production dropped by 1.6% and 13.1% respectively, Output dropped to 30.8million barrels and 26.6million barrels respectively from 31.3 million barrels in 2007. This is as a result of the drastic of the international financial crisis of 2009, reduction in the price of oil and the depletion of the main oil wells. Further justification is the slow and failure to execute various development projects which have been either postponed or stopped indefinitely. The oil production reduction could also be explained by the cut down in the country's budget revenue by FCFA 272.2billion in 2009. Likewise, the drop-in taxes received by the government from the oil sources from the National Hydrocarbon Corporation (NHC) from FCFA 651.7 billion in 2008 to FCFA 331.7billion in 2009 representing a 50% reduction. Oil production is expected to average some 65,000barrels per day in 2011 and dropped to about 55,000barrel per day in 2012. Cameroon is ranked 47<sup>th</sup> globally in terms of volume of oil and gas reserve. It was estimated world widely to natural gas proven reserves worth 4.8 trillion cubic feet (4,800 bcm); Ebone and Kribi compo basin are the main oil fields in Cameroon (EIA, 2015).

In view of the united nation sustainable development goal number 7: to ensure access to reliable, sustainable, affordable and modern clean energy for all, many countries strive to achieve this target, though the effort put in place are not sufficient to achieve the energy goal 7 by 2035. Efforts have been made to improve energy efficiently and expanding access to electricity. However, millions of people across the world still continue to leave without these basic facilities and no visible progress have been made to improve on clean cooking fuel and modern technologies which have affect the health status of billions of women in the world and have also prevented the out of school children to learn with ease. This has continually hinder efforts toward the achievement of goal 7: to ensure access to reliable, sustainable, affordable and modern clean energy for all. Disruptions in supply chains could wreak havoc on energy services, and reduced incomes could limit people's ability to pay for them. In addition, plummeting oil prices are likely to discourage growth in renewable energy (UN, 2020).

## **1.2. Problem Statement**

Cameroon's growth performance since independence has been very diverse. Being richly endowed, the country's growth rates performance has been very volatile and dismal over the past decades. Its yearly average growth rate was 3.5% over the last four decades, which in average, its less than half that of a low-income country. Driving by coffee and cocoa boom its average growth rate amounted to 5.7% between 1972 and 1979. The discovery and exploitation of oil in Cameroon started around 1977 just immediately before the second world oil choc which alter Cameroon growth trajectory between 1977 and 1986 to 9.4%. However, this high growth period was very brief in the country. The general drop in the prices of commodities and oil, coupled with mismanagement plunged the country in a severe economic crisis. By the 80s and 90s, GDP reduced by 5% on average, decreasing the per capita income of 1993 to half of its 1986 level. Due to the reluctance of the government to properly engage with the IMF in September 1988 for a series of Structural Adjustment Programs later supported by the World

Bank which led to the growth collapse (IMF, 2007).

The greatest puzzle in development economics is whether natural resource endowments promote or hamper economic prosperity and development in every nation including Cameroon. Although many oil exporting countries have amassed great wealth through oil revenue thereby creating economic prosperity in their countries through large investments in infrastructure, social services and human capital development though many studies carried out by different authors revealed that abundant natural resources endowment maybe harmful for the economy. Laourari and Gasmi (2016) termed this phenomenon, resource curse, which come to be related with many negative consequences on the natural resource of a country on its economic, political and social welfare. It was observed that many richly endowed countries with resources such as coal, oil, gas, gold have failed to transfer this wealth of nation for the economic benefits of its society at large, this has made those richly endowed countries to have low economic growth and development as compared to non-natural resource scarce countries which turn to develop more than their counterpart. However, these richly endowed countries have turn to developed at a low pace, have been subjected to political, social vulnerability and often suffered structural disequilibria. This research work thus seeks to answer the following research questions. It is on the basis of the above concerns that this study intends to provide answers to the following research questions: (1) How does economic growth respond to changes in oil revenue in Cameroon? (2) What is the effect of non-oil revenue on economic growth in Cameroon? (3) Does non-oil revenue modulate the effect of oil revenue on economic growth in Cameroon?

## **2. Research Objectives**

### **2.1. Main Objectives of the Study**

- The main objective of this study is to examine the effect of oil and non-oil revenue on economic growth in Cameroon.

### **2.2. Specific Research Objectives**

- To investigate the effect of oil revenue on economic growth in Cameroon.
- To assess the effect of non-oil revenue on economic growth in Cameroon.
- To ascertain whether oil revenue modulates the effect of non-oil revenue on economic growth in Cameroon.

## **3. Outline of the Paper**

This paper is organized into seven sections. Section 1 dwells on the background of the paper. Section II hosts the research objectives and Section III presents the outline of the paper. Section IV reviews the literature and Section V presents the methodology and data used. Section VI presents the findings and Section VII submits the conclusion and policy implications.

## **4. Literature Review and Knowledge Gaps**

### **4.1. Empirical Review**

Idowu (2016) analyzed the effects of oil and non-oil exports on economic growth in Nigerian. In this endeavor use was made of time series data spanning from 1981-2015 and Johansen co-integration test,



Granger causality test, variance decomposition and impulse response functions was used to estimate the variables under study. The long run results revealed the existence of co-integration between the variables. It was also discovered that there is unidirectional causality from the granger causality test in the short run, running from oil export to gross domestic product. The results further revealed that there is a unidirectional causality in the long run, running from non-oil export to gross domestic product and a bidirectional causality running from oil export to gross domestic product in the long run. They also found out that non-oil export had a positive relationship with GDP while oil export had a negative relationship with GDP. This paper provides very vital information but rather fails to ascertain whether oil revenue modulates the effect of non-oil revenue on economic growth which this study will filled the visible literature gap.

Okezie et al. (2016) evaluated the contribution of non-oil revenue to government revenue and economic growth in Nigeria. In this endeavor use was made of time series data spanning from 1980-2014 and the Ordinary Least Squares Regression was used to estimate the variables. the results disclosed that government revenue have a positive relationship with GDP though it is insignificant even at 10% levels of significance, the study further revealed that non-oil revenue have a positive relationship with GDP and it is statistically significant. Thus, the study suggest that the government should develop new strategies and put in efforts at the federal levels to develop its non-oil sector due to its great potentials to help diversify the national productive sectors of the country in enhancing its revenue and growth.

Bernard and Albert (2009) investigated Governance and Oil revenue in Cameroon. The study found out that between 1977 and 2006 Cameroon has captured a great part of its oil revenue and only 46% of it have accrued to the government and may have been transferred to the budget of its country while the rest of its 54% cannot be properly accounted for. The study argues that this is as a result of mismanagement, corruption, embezzlement and poor governance that have let to these problems in Cameroon, the efforts puts in place by foreign bodies have proven to be insufficient to save Cameroon's oil sector due to inadequate accountability and lack of transparency as a result of poor governance in the country. The inadequate accountability and transparency in the oil sector have resulted to the failure of short- and long-term development projects in the economy of Cameroon. Many donors have been pushing for better governance and adequate transparency in the oil sector of Cameroon for over 20 years without any significant improvements. The Extractive Industries Transparency Initiative, which has been a good initiative, is also in high risk of capture. Thus, this study recommends that the government should improve its transparency and accountability as well as its governance. Changes in the incentives structure to reduce collusion and improve governance.

Jean (2017) examined the causal relationship between crude oil production and economic growth in Cameroon. In this endeavor use was made of time series data spanning from 1977–2010 (34years) and the vector autoregressive (VAR) model to estimate the variables. The paper revealed that there is no causal effect between crude oil production and economic growth. The paper suggest that the government should promote new energy policies as well provide licenses to farms so as to ease the exploitation of new crude oil and also make transparent the management of the crude oil sector so that future deposits of oil production will have a positive impact on economic growth of Cameroon.

Noula et al. (2013) examined the impact of agricultural export on economic growth in Cameroon. In this endeavor, used was made of time series data running spanning the period 1975-2009 (35) and it employed an extended generalized Cobb Douglas production function model to estimate the variable. The results revealed that coffee and banana export have a positive effect on GDP and it is statistically significant. The study further revealed that agricultural export has a mixed effect on GDP in Cameroon. Finally, the study revealed that cocoa export has an indirect relationship with GDP and its insignificant.

Syed et al. (2015) investigated the impact of agricultural export and economic growth in Pakistan. Their study employed time series data spanning from 1972-2008 (37years) and employed Johansen co-

integration technique to estimate the variables. The study disclosed that non-agricultural export has a positive relationship with GDP. It further disclosed that agricultural export has a negative effect on the gross domestic product of Pakistan.

Likita et al. (2018) evaluated the relationship between non-oil revenue and economic growth in Nigeria. Their study employed time series data spanning 1981-2016 (36years) and an error correction model to estimate the variable. The results revealed a long run relationship between the variables agricultural revenue contribution, Manufacturing Revenue Contribution, Solid Mineral Revenue Contribution, Services Revenue Contribution, Company Income Tax, Custom and Excise Duties Tax and economic growth in Nigeria. Among the variables agricultural revenue contribution, Manufacturing Revenue Contribution, Solid Mineral Revenue Contribution were found to have contributed substantially to the growth of the Nigerian economy. On the other hand, Solid Mineral Revenue Contribution and Company Income Tax were found to have negative relationship with GDP. Also, Solid Mineral Revenue Contribution and Custom and Excise Duties were statistically insignificant. The study recommended the promotion of policy measures that encourage the exploitation of non-oil resources and the diversification of the economy.

Olayungbo and Olayemi (2018) investigated the dynamic relationship among non-oil revenue, government spending, and economic growth in Nigeria. Using time series data from 1981 to 2015 (35years) and an error correction model, impulse responses were estimated as well as the granger causality test among the variables. The results revealed that there is government has a negative relationship with GDP. It also revealed that non-oil revenue has a positive effect with GDP. Finally, the results further revealed that government spending and non-oil have a positive and negative shock on GDP respectively. The causal test also disclosed that fiscal spending causes a change in economic growth and non-oil revenue, the finding is in line with the Keynesian hypothesis, the study therefor, recommended that diversification of other sectors of the economy instead of depending solely on oil revenue sector.

Ude and Agodi (2014) investigated the impact of non-oil revenue on economic growth in Nigeria. The study employed time series data spanning the period 1980-2013 (34years) and the error correction mechanism to estimate the variables. The study revealed that agricultural revenue, interest rate and manufacturing revenue all have a highly statistical effect on GDP. Thus, the study suggest that non-oil revenue have the potentials to unlock the economic growth of Nigeria.

Akwe (2014) investigated the impact of non-oil tax revenue on economic growth in Nigeria. The study made use of time series data from 1993-2012. He found that there exists a positive relationship between non-oil tax revenue and economic growth in Nigeria. Since non-oil tax revenue is one of the major sources through which non-oil revenue accrues, the study therefore recommended that efforts should be intensified by the government at all levels in ensuring that non-oil taxes collections are increased since it has the capacity to enhance growth. He further recommended that government should strengthen its administrative machinery with a view eliminating weaknesses and internal control lapses in the assessment and collection of Nonoil Taxes in Nigeria.

Fossong et al. (2021) investigated the implications of renewable and non-renewable energy consumption for economic growth in Cameroon. Use was made of time series data spanning the period 1971 – 2016 and an error correction (ECM) to estimate the long and short-term effects of energy consumption on economic growth (GDP). The results revealed that there is a long run relationship among the variables under study. The results also revealed that renewable energy, government spending and gross capital formation all had a positive and significant relationship with GDP while non-renewable energy had a negative relationship with GDP. The results further revealed that with the interaction of the two main independent variables the substitution effect was observed in enhancing the effect of each energy sources on economic growth in Cameroon. Finally, the study suggest that the government should invest more



on the exploitation and development of the renewable energy sector in Cameroon.

Nweze and Greg (2016) carried out an empirical examination of oil revenue and economic growth in Nigeria. The study made use of time series data between 1981- 2014 (34years) and an Error Correction Mechanism (ECM) was use to estimate the variables. The findings revealed that there exists a long run relationship among the variables. The study revealed that all the variables have a highly statistically significant effect on GDP while the lag of government spending was insignificant. Hence, in the long run all the variables had a negative effect with GDP with the exception of government spending which was positive while in the short run all variables exhibited their expected signs with GDP,

Shujaat (2012) examined the causal relationship between exports and economic growth in Pakistan. Used was made of time series data spanning form the period of 1975-2010 (35years) and Johansen test of Co-integration and Granger Causality were employed to determine short run and long run impact on economic growth. The results of Co-integration revealed one positive co-integrating equation. The paper also revealed that export growth in both short and long run is being caused by growth in production. The paper revealed that in both the short and long run the causality test runs from economic growth to export in Pakistan. Hence, the study recommends that the Pakistan state authority should improve its trade and production sector.

Anthony et al. (2015) examined the impact of non-oil export on economic growth in Nigeria. The study made use of time series data and the vector error correction model to estimate the variables. The results indicated that there is a long run relationship among the variables. The results also indicated that in both periods non-oil determine the economic growth from the vector error correction. The results further revealed that there is no causality relationship between non-oil export and economic growth from the Granger causality test. The following unidirectional relationship runs from capital stock to GDP as well from GDP to labor force. These two major findings are in line with the theory of export-led growth hypothesis. The study suggest that the government should improve its policies and invest more on the diversification of the non-oil sector in the economy.

Nwoba and Abah (2017) examine the impact of crude oil revenue on economic growth in Nigeria. The study made used of time series data running from 1960 to 2010 and an ex-post facto research design and a simple regression analysis to estimates its variables. The study revealed evidence of long run relationship among the variables under study. The results disclosed that oil revenue have a positive and significant relationship with the growth of the agricultural sector and further disclosed that there is an insignificant effect of government budget deficit on the performance of Nigeria. The study therefor suggest that the state of Nigeria should improve on its oil revenue policies so as to consolidate the budget discipline, accountability and transparency so as to improve the living standards of its population, increase income, improve education, increase income and cultural and human's values.

Anowor et al. (2013) investigated the impact of trade liberalisation on Nigeria agricultural sector. The study disclosed that the degree of agricultural openness and agricultural export to import price ratio have a statistical significant relationship in the economy. The study further revealed that trade has a positive relationship with agriculture, therefore free trade is a vital instrument in strengthening the agricultural sector of Nigeria. Bamwesigye and Pomazalova (2015) examined the socioeconomic development in context of economic changes in commodity chain of coffee in Uganda, the study laid emphases on the coffee sector liberalization since it plays a vital rule on the economy of Uganda. Due to previous studies made on exports trends, production and consumption, emphases were stressed on the fact that the boom in the trade liberalization sector was as a result of increase in competitiveness and openness. Revealing that trade liberalization has a positive relationship with agriculture. Salami et al. (2018) determined the empirical analysis of the impact of non-oil revenue on economic growth: Nigerian experience. The study made of used simple of regression analysis. The results revealed that there is a significant relationship between gross domestic product, real gross domestic product and non0oil revenue.

Gbadebo & Chinedu. (2009) investigated the relationship between energy consumption and economic growth in the Nigerian. In this endeavor use is made of time series data spanning from 1970 -2005 (36years) and applying the co-integration technique to estimate the variables. The study revealed that there is evidence of co-integration among the variables under study. Also, the results revealed that there is a negative relationship between the lagged values of energy consumption and economic growth. The results further revealed that since energy consumption is a vital determinant of economic growth having both the explicit and implicit effect and an implicit effect in the lagged period of Nigeria. The study suggest that the government should pay more attention on the energy sector of Nigeria.

## 5. Methodology and Data Used

### 5.1. Econometric Model

In other to achieve the objectives of this work, a linear multiple regression model would be formulated and the auto distributed lag (ARDL) will be used to estimate the variables. The model can be stated as follows:

$$LGDP = \beta_0 + \beta_1 OIL_{t-1} + \beta_2 LAVAt_{-1} + \beta_3 LGCF_{t-1} + \beta_4 LGGET_{-1} + \sum \beta_1 \Delta OIL_{t-i} + \sum \beta_2 \Delta LAVAt_{-j} + \sum \beta_3 \Delta LGCF_{t-i} + \sum \beta_4 \Delta LGGET_{-i} + ECT_{t-1} + \mu_t$$

$$\beta_0 > 0, \beta_1 > 0 \text{ or } \beta_1 < 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0,$$

Equation above represents the economic growth equation. GDP (a proxy of economic growth) is expressed as a function of oil revenue, agriculture value added (proxy for non-oil revenue), gross capital formation, and general government expenditure. It is assumed theoretically that GDP is positively related to agricultural value added, oil revenue, gross capital formation, and general government expenditure

#### 5.1.1. Definition of Variables

GDP = Gross Domestic Product

OIL = Oil Revenue

AVA = Agricultural Value Added

GCF= Gross Capital Formation

GGE= General Government Expenditure

$\mu$  = Stochastic or Error Term:

$i = 1, 2, \text{ and } 3$

$j = 1$

$t$  =time.

L= It denotes natural logarithm.

All variables are in natural logarithm except oil since its already in percentage of GDP. The scale has been reduced already. The scale of the variable is being reduce or compresses the scale in which the variable is measured so as to avoid the problem of heteroscedasticity, thereby reducing a tenfold difference between two values to a twofold difference (Gujarati, 1995).

### 5.2. Estimation Procedures



**5.2.1. Model Estimation Procedures**

To empirically examine the long-run relationships and dynamic interactions among the variables of interest, the model was estimated using an autoregressive distributed lag bounds testing co-integration procedure, brought forth by Pesaran et al. (2001). The following reasons justify why we chose to use the ARDL to run our analysis. Initially this model was chosen because it has a simple bound test procedure as compared to the other bound test procedure such as Johansen & Juselius (1990) and also permits the OLS to estimates the co-integration relationship once the lag order of the model is identified. Furthermore, the autoregressive distributed lag bound test does not require any pre-test of the variables in the model for unit root test unlike other models such as the Johansen approach and the ARDL is applicable irrespective of the level of integration of the variables. Finally, the test is more efficient in finite and small sample data sizes as the case in this paper.

**5.3. Data Used**

The study employed secondary data from the World Development Indicators (WDI) spanning the period 1980 to 2018 (39years).

**6. Presentation of the Findings**

**6.1. Test for Stationarity**

**Table 1. Augmented Dickey Fuller (ADF) Unit Root Test.**

Variable	Test statistic (Z)	1% Critical value	5% Critical value	10% Critical value	order of integration
LGDP	-3.486	-3.655	-2.961	-2.613	I (1)
	MacKinnon approximate p-value for Z (t) = 0.0084				
LGCF	-6.067	-3,655	-2.961	-2.613	I (1)
	MacKinnon approximate p-value for Z (t) = 0.000				
LAVA	-4.740	-3.655	-2.961	-2.613	I (1)
	MacKinnon approximate p-value for Z (t) = 0.0001				
LGGE	-5.403	-3.655	-2.961	-2.613	I (1)
	MacKinnon approximate p-value for Z (t) = 0.0079				
OIL	-4.900	-3.645	-2.958	-2.612	I (0)
	MacKinnon approximate p-value for Z (t) = 0.000				

*Source: Computed by the authors using STATA 14*

The null hypothesis for stationarity test states that the variable of interest is not stationary and the alternative holds that the variable is stationary. These hypotheses can be verified using either the critical value approach or the p-value approach (Mackinnon approximate p-value). For instance, taking LGDP, we can observe that the calculated Z statistic (-3.486) is greater than the 5% critical value (-2.961), rejecting the null hypothesis. The last column of Table 1 hosts the level of integration of each variable, indicating the level of stationarity as well. The variable, like LGDP, has the level of integration I (1) indicating that it has achieved stationarity at first difference. OIL has the level of integration I (0) indicating that oil is stationary at levels. More essentially, the Mackinnon approximate p-values are less than 1%, thus, we reject the null hypothesis of the presence of a unit root and conclude that the variable was generated by a stationary process except oil revenue.

**6.2. Descriptive Statistics**

**Table 2. Represents the Descriptive Statistics of the Variables Used in the Paper**

Variable in billions of US\$	Obs	Mean	Std. Dev.	Min	Max
GDP	39	8940	2960	4900	15500
AVA	39	1170	449	587	2080
GCF	39	3.78	2.38	1.35	8.97
GGE	39	2	1.22	0.647	4.73
OIL (%of GDP)	39	5.973528	2.349176	1.35157	13.1864

Source: Computed by the authors using Stata 14

The table above presents the descriptive statistics of the five variables under study in terms of their mean, standard deviation, minimum and maximum values. From the table above we observe that GDP on average stood at 8940 billion US\$ which is close to the maximum value of 15500 billion US\$ indicating that over the years GDP have been improving.

Secondly, on an average, agricultural value added (AVA) stood at 1170 billion US\$ which is close to its maximum value of 2080 billion US\$ indicating that agricultural value added have been increasing over the years.

Furthermore, the average mean value of gross capital formation is 3.78 billion US\$ which is close to its maximum value of 8.97 billion US\$ indicating that gross capital formation have been increasing over the years.

Also, the mean value of general government expenditure is 2 billion US\$ which is close to its maximum values of 4.73 billion US\$ implying that the government have been increasing its general expenditure over the years.

Finally, oil has an average of 5.67% with a deviation from the mean value by 2.56%. it is observed that the variables also have a minimum and maximum values of 0.09% and 13.19% respectively.

**6.3. Presentation of Regression Results**

The Table below represents the auto-regressive distributed lag bounds test for co-integration. It is used to test for evidence of a long run relationship among the variables under the study.

**Table 3. ARDL Bound Test for Co Integration**

Null Hypothesis: No long run relationship exist		
F- Statistics	4.669	3
Critical value of the bound test level of significance	Lower Bound, I (0)	Upper Bound, I (1)
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Computed by the authors using Stata 14

The F-statistic of the bounds test is used to verify if co-integration exists between variables. From the table above we compare the value of the F-statistic with that of the critical values of the bounds test. If the value of the F-Statistics (4.669) is greater than that of the upper bounds test, we therefore reject the null hypothesis of no co-integration and if the F-Statistics (4.669) is below the lower bounds test, we fail to reject the null hypothesis. Hence, if the value of the F-statistic falls in between the upper and lower bounds, the results becomes inconclusive about co-integration (Pesaran et al, 2001). Since the computed value of the F-Statistic for the bounds test is 4,668 which is greater than the upper bounds

critical values of 10%, 5%, and 2.5% significance using unrestricted intercept and no trend, we therefore reject the null hypothesis of no long run relationship and conclude that there is evidence of co-integration among the variables under study. With the existence of co-integration, we proceed to the long and short run regression of ARDL estimates which are presented in Table 4 below.

**6.3.1 Presentation of ARDL Regression results**

Recall that the analyses are conducted using the Auto-regressive Distributed Lag estimation technique. In the first stage the long and short-run estimations are conducted. The use of the interactive variable is intended to verify if there exists a complementarily or competitive effect between the use of oil and non-oil revenue. Complementarily effect implies that using the two simultaneously should increase economic growth; if this is the case then sign of the interactive variable is expected to be positive. However, if the sign is negative, then the variables are competitive in demand though not being perfect substitutes.

**Table 4. ARDL Regression Short- and Long-Term Results**

VARIABLES	(1) ADJ	(2) LR Coefficient (Standard Error)	(3) SR Coefficient (Standard Error)
LAVA		-2.6172*** (0.5379)	
LGCF		0.7921* (0.3950)	
LGGE		1.0204*** (0.3099)	
OIL		0.1981 (1.0864)	
INTER (OIT*AVA)		-0.02126 (0.0504)	
ECT	-0.1672*** (0.0484)		
D.LAVA			0.6040*** (0.1023)
LD.LAVA			0.2141** (0.0908)
D,LGCF			-0.1217 (0.1042)
LD.GCF			-0.3206*** (0.1088)
L2D.GCF			-0.3740*** (0.1043)
L3D.LGCF			-0.5270*** (0.0788)
D.LGGE			-0.3159*** (0.0923)
LD.LGGE			0.0286 (0.0844)
L2D.LGGE			0.1513* (0.0774)
L3D.LGGE			0.3924*** (0.0709)
D.OIL			0.0312*** (0.0100)
LD.OIL			0.0241***



			(0.0076)
L2D.OIL			0.0098* (0.0051)
L3D.OIL			0.0079** (0.0037)
Constant			7.1458*** (1.906)
Number of observation	38	38	38
R-squared	0.8810	0.8810	0.8810
Adjusted R-squared	0.7410	0.7410	0.7410

Note: \*\*\*, \*\*, and \* represent 1%, 5% and 10% levels of significance respectively.

Source: computed by authors using STATA 14

Table 4 above presents the ARDL results, column 2 hosts the long-term results and column 3 the short-term results. Following the long run results, the coefficient of agricultural value added (proxy for non-oil revenue) is negative. This means an increase in agricultural value added will lead to a decrease in GDP. Specifically, 1% change in agricultural value added will result to 2.6172% decrease in GDP since it is negative. This relationship is significant at 1% level of significance.

The coefficient of gross capital formation is positive, implying that an increase in gross capital formation in the long term will lead to an increase in GDP. Specifically, a 1% increase in gross capital formation will lead to a 0.792% increase in GDP; this result is significant at 10%.

General government expenditure is positively related to GDP. This indicates that an increase in general government expenditure in the long run will lead to an increase in GDP. Specifically, a 1% increase in general government expenditure will lead to a 1.02% increase in GDP; this result is significant at 1%.

Oil revenue relates positively to GDP. This is indication that an increase in oil revenue in the long term will lead to an increase in GDP. Specifically, a unit increase in oil revenue will lead to a 0.198%\*100 increase in GDP.

Looking at short run results, agricultural value added of the previous year have the capacity to increase GDP in the short term. Specifically, if there is a 1% increase in agricultural value added in the previous year, GDP will increase by 0.604% in the short term; this result is significant at 1%. This is indication that agricultural value added is very potent for economic growth in Cameroon. This result has implication for agricultural processing and manufacturing. Conversely a gross capital formation of the previous year has the capacity to decrease GDP in the short term. Specifically, if there is a 1% increase in gross capital formation in the previous year, GDP will decrease by 0.122% in the short term; this result is insignificant.

Furthermore, general government expenditure of the previous year has the capacity to decrease GDP in the short term. Essentially, if there is a 1% increase in general government expenditure in the previous year, GDP will decrease by 0.316% in the short term; this result is significant at 1%.

Finally, oil revenue of the previous year has the capacity to increase GDP in the short term. Specifically, a unit increase in oil revenue in the previous year is expected to increase GDP by 3.1%; this result is significant at 1%. Thus, revenue from oil sources is very instrumental in improving economic growth.

The Error Correction Term (ECT) of -0.167 indicates that there are significant adjustments in the system since the coefficient of the ECT is negative and statistically significant at 1%. The estimated ECT measures the speed at which GDP adjusts in the long term. Our empirical estimations of the error correction mechanism suggest that about 16.7% of adjustment in GDP occurs towards long run equilibrium within 1 year.

Worthy of note the interaction of the two revenue sources, which is the joint effect of oil and non-oil revenue, is negative. The result specifically showed that, when oil revenue interacts with agricultural



value-added economic growth decreases by 0.021%, though not statistically significant. The main implication of the result is that, both revenue sources are not complementing each other, that is, the complementarity effect is absent. Instead, the two revenue sources are competitive to each other, meaning that, the increase use of one can only be done at the detriment of the other. The adjusted R-squared is 0.741; this implies that 74% variation in GDP is explained by the independent variables in this model. Thus, the model was well specified. Furthermore, it can be concluded that the results were reliable as the White test for heteroscedasticity reveals that the variance of the error term was constant over time, the test for correlation and VIF show no multicollinearity among independent variables and Breusch-Godfrey test for autocorrelation indicating that there is no serial autocorrelation.

This finding is in accordance with the resource curse theory which forms a major theoretical base of this research. The results of this research are in line with the findings of other researchers such as Nweze and Greg (2016) who carried out an empirical examination of oil revenue and economic growth in Nigeria, Idowu (2016) who analysed the effect of oil and non-oil exports on economic growth in Nigeria, Ude and Agodi (2014) who investigated the impact of non-oil revenue on economic growth in Nigeria, Anthony et al. (2015) who examined the impact of non-oil export on economic growth in Nigeria, and Okezie et al (2016) who evaluated the contribution of non-oil revenue to government revenue and economic growth in Nigeria.

## 7. Conclusion and Policy Implications

The desire of every country is to strive toward economic growth and Cameroon is not left out. We will hardly talk of economic growth without alluding to economic development; this is because there is no economic development without economic growth. This study has attempted to provide theoretical and empirical evidence in investigating the effect of oil and non-oil revenue on economic growth in Cameroon. This research established long relationship between the four variables (oil, non-oil, gross capital formation, general government expenditure) and the growth of the Cameroonian economy. In effect, increased oil and non-oil revenue should be given more priority since there are vital determinants for economic growth and therefore, more emphases should be given in these sector so as to help in the exploitation of these resources so as to improve on economic growth in Cameroon.

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