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A Comparative Analysis of Declining Oil Revenue Implications on Oil Exporting Countries: An ARDL Bound Test Approach for Nigeria, Venezuela, and Norway

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Abstract— One of the most dynamically transacted commodities across the globe is crude oil whose price is constantly changing. The magnitude of the effect in the oil price fluctuation differs across nations, depending on whether the country is oil-importer or oil-exporter. Oil serves as a good source of revenue to oil exporting countries and also serves as a vital input to oil importing nations. However, this study entails a comparative analysis of declining oil revenue on three oil-exporting countries, Nigeria, Venezuela, and Norway. Yearly timeseries data for 41 years were analyzed, using ARDL estimation technique. Results reveal that government revenues of these oil-exporting countries have dropped substantially. Contrary to expectation, decreasing oil price yields a positive and significant effect on Nigeria and Venezuela's government expenditures, financed through seigniorage and borrowing as they are overwhelmingly dependent on oil exports while Norway is not affected by the resource curse syndrome. Norway is serving as a reference to best practice as they manage their natural resources effectively. To close the revenue gaps, it is recommended that Nigeria and Venezuela adapt Norway's fiscal rule, fix their refineries, restore security to attract foreign investors, diversify and effectively harness other natural resource.

Index Terms— Autoregressive Distributed Lag (ARDL) Model, Borrowing, Comparative Analysis, Declining Oil Revenue, Oil Price, Seigniorage

I. INTRODUCTION

Crude oil is one of the dynamically traded commodities all over the world, and oil revenues play a very significant role in the structure of the oil exporting countries [31], [30], [25], [4], [33], [34]. Over the years, the interest in the causes and consequences of oil price fluctuations has been on the increase among different researchers, policymakers, academics, and market practitioners [37], [103], [8]. Changes in oil price have been a constant phenomenon since February 1946 when the oil price was as low as $1.17 per barrel to July 2008 when oil price reached its peak of $145.31 per barrel. Oil price as at the 9th of March, 2020 was trading at $36.32[1] per barrel and declined further to $20.48[2] per barrel by the end of March, 2020 [97], [19]. As at the 14th of July, 2024 WTI was sold at $82.21 per barrel while the Brent crude was sold at $84.75 per barrel [77]. Although, the magnitude of the changes in oil price differs across countries, depending on whether the economy is oil-importer or oil- exporter as oil serves as a crucial input to oil importing nations and a good source of revenue generation to oil exporters.

However, the focal point of this research is on Nigeria, Venezuela, and Norway for a comparative analysis. Nigeria has abundant natural resources, with oil and gas as the highest gifted mineral in the country. Nigeria is the highest oil producer in Africa and the sixth largest producer of petroleum in the world as oil accounts for over 85% of its government revenues and more than 98% of the exports. The Nigerian economy is experiencing serious exchange rate depreciation and volatility, deteriorating growth, downward review of the budget benchmark and drastic reduction in government expenditures due to the slump in crude oil prices [1], [38], [52], [3]. The declining oil revenue has brought about fiscal imbalance and serious macroeconomic instability in Nigeria due to the nations' overdependency on oil export. More so, over 70% of the populace are living below the poverty line and irrespective of the high proceeds the economy has gained from oil for over three decades, Nigeria is still struggling with many issues, such as poor infrastructural development, low level of production, high level of unemployment and high level of insecurity [57], [51], [3].
Venezuela is the founding member of OPEC and has the highest oil reserves in the world. The economy is overwhelmingly dependent on oil as it accounts for more than 96% of Venezuela's export earnings. The decline in oil price has brought

about increase in foreign debt, increase in poverty level, and increasing political tension due to economic instability. The Venezuelan economy is falling apart as residents lack access to basic food. The country has also laid off thousands of its oil workers and crapped off multibillion-dollar worth projects due to shortages of funds [101], [102], [80], [65], [91].
The Norwegian economy on the other hand is a small open economy which has been tremendously transformed through the discovery of oil [78], [58] as the oil sector constitute about 57% of the Norwegians exports in 2014 and about 16% of its gross domestic product [44]. The oil sector also accounts for over $40 billion annually, being the largest portion of export earnings in the economy [88], [13]. Norway depends so much on oil for more than half of its exports. The present slump in crude oil has reduced Norway's profitability to the extent that about 3 offshore rigs are under suspension, more than 10,000 Norwegian oil workers have been laid off while over $150,000 million worth of investments were also suspended [15].

The three economies are examined and compared while necessary lessons drawn from the Norwegian economy as it serves as a reference to best practice in this scenario. The recent and incessant decline in the oil price also led to the decline in oil revenue of most of the oil-exporting countries and has widened the budget deficit gaps. Oil revenues constitute a major part of income for most of these oil exporting countries while the significant drop in government revenue was due to the decrease in oil price and the recessionary trend in these economies highly dependent on oil income [61]. There is indeed a wide gap between oil prices at which ail producers break even [32]. Oil price needs to be above $100 per barrel for most of these oil exporting economies to balance their national budgets [32], [87]. Nevertheless, fluctuating oil prices are usually driven by various supply and demand factors. These changes in oil price affect the global economy in diverse ways depending on the main factor(s) generating the change. [18] contend that the traditional demand and supply shocks have not fully explained the recent drop in oil prices in recent time but that the unexplained part entails variations in expectations and uncertainty of oil demand and supply.

As the oil price continued to decline, the major concern therefore, is the ability of these oil-exporting countries, to continue with their economic development aspirations in this new paradigm shift to oil revenue, necessitated by the decreasing crude oil price. The power of OPEC[3] known as "Call-on-OPEC"[4] in petroleum economics has always been to shore up prices, but in this new price shock, the collusive power of these oligopoly has failed as OPEC could no longer control the production quotas of its members which has also contributed to the recent persistent fall in oil price due to excess supply of crude oil in the world's oil market. The discovery and improvement in the US shale production through technological advancement in horizontal drilling and hydraulic fracturing is also a contributory factor to high oil production which has inadvertently led to the drastic reduction of the quantity of US oil-importation from OPEC [89]. More so, given that the world is progressively undergoing transition, from a hydrocarbon-based economy to the one based on a more sustainable form of energy as most economies of the world are embracing the renewable sources of energy which is assumed to be environmentally friendly [12]. All these have attributed to the persistent decrease in oil price which is adversely affecting the revenues of these oil exporting countries, as such, the main purpose of the research is to evaluate the consequences of declining oil revenue on the economic performance of Nigeria, Venezuela and Norway for a comparative analysis. It also examined the effect of declining oil revenue on the macroeconomic variables of these economies and also contributes immensely to the existing literature.

This research, however contributes to existing literature in diverse ways because the relationship between oil price and economic activity have been examined by different researchers using various economic techniques but most of the related studies center mainly on the impact of increasing oil price on the examined economies [74], [10], [9], [98], [53], [106], [43], [42], [41], [40], [39], [55], [66]. These authors arrive at the same conclusion that high oil prices adversely affect economic activities while decreasing oil prices have positive impact on businesses, which then shows that the economies examined by these studies are developed and oil importing nations.

However, the main emphasis of other related studies is on causative issues and the relationship between government revenue and government expenditures [5], [68], [86], [61], [54], [71].

Other related studies are mainly historical in nature such as: [30], [47], [46], [43], [95], [65] who examined the impact of declining oil price on the Venezuela's macro economy, they concluded that declining oil price has adverse effect on Venezuela but there was no statistical analysis carried out to support such claim.
Methodologically, most of the previous related empirical studies mainly employed the use of Structural Vector Autoregression (SVAR) Models for the analysis of oil price fluctuations [98], [21], [26]. The SVAR estimation technique is revealed to be inadequate because of its inability to capture the effect of declining oil price [79], [59].

However, the above outlined among others are the areas in which this research contributes to existing literature on the comparative analysis of the impact of declining oil revenue on net oil producers/exporters that are highly oil dependent nations across the globe: Nigeria (West Africa), Venezuela (North America) and Norway (Northern Europe). The period under study is for 41 years (1981-2021) which has coincided with the period of persisted changes in oil prices all over the world. Hence, is considered to be the best period to examine in this study.

LITERATURE REVIEW

Among economists and politicians alike, the crucial role of oil in the global economy has attracted lots of consideration [31], [34], [14]. Many studies are addressing the issue as to whether there is a link between oil price fluctuations and macroeconomic variables. The pioneering work on the US economy was carried out by [39], who found that oil was the most vital instrument responsible for almost all the recessions in the US, while [16] found no relationship between oil price and macroeconomic variables [34]. Some decades ago, the fluctuations in oil price had coincided with most of the global economic changes like the global recessions, inflation and others [40]. It has caused most researchers to examine the relationship existing among these variables over time. The changes in these variables are highly unpredictable as both the oil importers as well as the oil exporters are affected differently [4]. The related empirical studies are examined under the following sub-sections: government revenues and expenditures linkage; increasing oil revenues in oil-exporting countries and oil revenues decline in oil-exporting countries.

A. Government Revenues and Expenditures Linkage

In line with the Keynesian paradigm, the role of government is paramount to any nation. Unlike the classical paradigm where a minimum level of government intervention in an economy prevails. Revenues, expenditures and fiscal policy are the most fundamental instruments of government intervention in an economy [63], [25]. [96] supports the above philosophy and believes that the economies that succeed without giving credence to its government are highly insignificant. The increasing budget deficits in both developed and developing economies has culminated into a serious debate between economists and politicians alike. Several economists such as [17], [83] and [36] have argued the need to investigate the causal relationship between revenue and expenditure in an economy.

Although, there is no consensus among numerous empirical studies available on the linkage between these two variables. There is evidence of unidirectional causality in some studies which runs from revenue to expenditure which aligns with the revenue-spend-hypothesis. [68] examined the causality between income and expenses in Botswana and found that there is a negative and unidirectional causality running from revenues to expenditures which support the revenue-and-spend hypothesis. Consistently, [67] investigated this relationship for the Pakistan economy, and the result supports the revenue-and-spend hypothesis. In using the Autoregressive Distributed Lag (ARDL) test for the Nigerian economy, [7] confirmed the revenue-and-spend hypothesis.

Similarly, [24] investigation for Sri Lanka reveals the existence of spend-and-revenue hypothesis. [61] examined the revenue and expenditure causality and found that a decrease in government spending would solve the problem of the budget deficit in Serbia. The result, however, supports the spend-and-revenue hypothesis. Using Grander causality and VECM for the Jordan economy, [5] found a bidirectional causality running between revenues and expenditures in Jordan, which implies that the government make its income and expenditure decisions simultaneously. However, the main emphasis of most of these studies is on causative issues and the relationship between the variables (government revenues and government expenditures) and not on the effect of declining oil revenue of oil exporting countries.

B. Increasing Oil Revenues in Oil Exporting Countries

The net impact of increasing oil revenues on the real GDP is mainly an empirical issue due to its opposite effects on both oil-importing and oil-exporting economies [22]. The highest percentage of the government revenue is mainly from oil, and

as such, the volatility of oil revenues is highly driven by oil price fluctuations [92]. Most oil-exporting countries depend mainly on oil revenues for the finance of government spending and importation of goods and services [21], [33]. Most of the studies concluded that, increasing oil revenues, due to increasing oil prices led to economic growth acceleration in most of the oil-exporting countries [62], [53], [6], [25], [49], [70], [105], [2], [82], [45] and [26], in using the SVAR analysis, found both positive and negative oil shock have opposite effects on the output growth of the Iranian economy. The real shock has a positive but limited effect on the economy while the negative shock hurts the Iranian economic performance.
On the contrary, [22] explored this relationship for the GCC states and the Iranian economy using panel cointegration approach. The study reveals that the long-run oil elasticities for the GCC countries exceed those of the Iranian economy. It is an indication that the high oil revenues may not have been wisely utilized to yield the expected growth in Iran. Also, [33] carried out an analysis of the dynamic effects of oil shocks in Iran for 48 years (1959-2007) and found that the military and security expenditures respond promptly to oil revenue shocks, but the impact on the growth of the economy was not specified. Using a multivariate VAR approach, [23] found that oil price shocks have a significant effect on economic growth and inflation in the Chinese economy.
The main period under consideration in the studies is the period of increasing oil revenue due to oil price increase, which centers mainly on causative issues and relationships among variables. Although the studies relates to oil exporters, but the effects of declining oil revenues on the budgets of oil exporters and how these nations would be able to meet with the economies budgetary requirements were not under consideration.

C. Oil Revenues Decline in Oil Exporting Countries

From the perspective of decreasing oil price leading to oil revenue decline, [31], {30], [28], [29], [27], [22] maintain that as increasing oil price leads to oil revenue increase, decreasing oil price on the other hand drastically reduce the base of income of oil-exporting economies whose primary source of income lies on oil export. The fall in oil prices causes severe strain to the oil exporters' finances as it causes a significant loss in revenues [35]. Consequently, the monthly price of Brent crude oil price fell to an average of 65% between June 2014 and March 2016. It continues fluctuating and declining even till date (17th of July, 2024) which remain an issue of concern for most oil-exporting countries.
In related literature, there is no consensus as to the fundamentals of the fall in oil price even though most studies concluded that many factors are responsible for the sharp decline. In that regard, [56] in examining the importance of oil revenues to oil-exporting countries, carried out a descriptive study on the impact of low oil prices of oil-exporting countries. The descriptive statistics indicate the vulnerability of oil-exporting countries to low oil prices. [69] concluded that increasing and decreasing oil prices have the opposite effect on oil-exporting economies. Consistently, [47] in the examination of the implications of lower oil prices found that lower oil prices are beneficial to net oil importers and leads to real income losses to net oil exporters. The study further outlined the trends and the causes of the fall in oil prices. In line with the above, [65] in examining the impact of oil price decline in Venezuelan economy maintain that the decline in oil revenue base brought about the increase in the economy's foreign debt, shortages of essential goods and high rate of political instability in the economy.

[90] examined the impact of falling oil revenue in Nigeria and found that the drastic decline in oil revenue has undermined economic progress as GDP growth rate dropped to its lowest level in fifteen years bringing the possibility of a recession in the country. [1] also examined the impact of the global fall in oil price on Nigerian oil revenues. The study concluded that the oil sector serves as the instrument of growth and development in the Nigerian economy and as such, the global fall in oil prices have a significant impact on the oil revenues and prices in Nigeria.
[105] examined the effect of oil price plunge on the Middle East and North African (MENA) countries and concluded that oil price decline leads to contraction of the economies and it is more likely to have a positive effect on inflation. [95] examined the declining oil revenues in Gulf Cooperation Council (GCC states) and concluded that the over-dependency on oil revenues brought about the chronic budget deficits and growing unemployment among the nationals. Other related descriptive and historical studies are those of [30], [60], [99]. All the series of studies by [43], [42], [41], [40], [39] concentrate more on the impact of increasing oil price on developed and oil importing nations.
However, the above studies are perfectly related as the emphasis is on the impact of declining oil revenues on oil-exporting economies, but the studies are mainly descriptive and historical.

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II. METHODOLOGY

The key variables inherent in this study are mainly time series of macroeconomic variables which include: Actual Government Revenue (AREV), Actual Government Expenditures (AEXP), Oil Price (OILP), Gross Domestic Product (GDP), External Reserves (EXTR), Inflation Rates (INFR), Exchange Rates (EXCR) and Unemployment Rates (UEMR). There are two exogenous variables in the model, OILP and EXCR. Oil price is the main independent variable while the exchange rate, which is also an independent variable serves more as a control variable in the model. These variables were sourced from the World Bank, Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), Banco Central De Venezuela, Venezuela National Institute of Statistics, and Statistics Norway. [73] demonstrated that most time series variables are usually non-stationary and capable of generating serious issues in the estimation relationships between economic variables.

The primary sources of non-stationarity are unit roots and so, engaging time series with unit roots in any regression analyses would undoubtedly yield misleading results. As a result of the above, the unit root properties of all the macroeconomic variables used for analyses in this study were tested first, using Augmented Dickey-Fuller (ADF), [20] and Phillip-Perron (PP), [85] for robustness which has enabled us to understand how many times some of the variables were differenced to become stationary. Although both methods produce similar results, the Augmented Dickey-Fuller (ADF) test is often considered to be more superior over the Phillips-Perron (PP) test mainly due to its simple applicability and popularity [73]. Hence, both were used for robustness.

The unit root tests for Nigeria, Venezuela and Norway are as presented in Appendix A.

A. Model Specification and Estimation Technique

As shown in the unit root tables for Nigeria, Venezuela and Norway, most of the series are either stationary at level "I (0)" or stationary at first difference, "I(1)" for each country. The stationarity of the variables at different orders (i.e. I(0) and I(1)) but not I(2) supports the use of the ARDL estimation technique. Eviews 10 statistical package was employed, which automatically determine the lag lengths using the Schwarz Information Criteria (SIC).

However, the Autoregressive Distributed Lag (ARDL) estimation technique is employed for the analysis based on the outcome of the unit root tests, due to the relatively small sample size of the data and also because of its numerous advantages. [84], [72] outlined several strengths, which the ARDL bounds test cointegration and ECM method have over the traditional Engel-Granger and Johansen approach. The method helps to prevent the endogeneity problem and also can produce both the long-run and the short-run estimates of the model concurrently. Also, [62], [84] maintain that the ARDL bounds methods are not affected when dummy variables are included in the model. More so, the variables of the model could have different lag lengths when using the ARDL technique, but this is not obtainable when using the conventional Johansen method of cointegration for analysis. It is also assumed that the sample size of the variables is relatively small for it to produce viable results.

B. Estimation of the Underlying ARDL Model

In general, ARDL can be derived from the following functional equations:

Given that:

$$Y_t = f(X_{1t} \text{ and } X_{2t}) \quad (1)$$

Where:

X_{1t}: is a vector of endogenous variables

X_{2t}: is a vector of exogenous variables

Y_t: is any dependent variable from the vector of endogenous variables (X_{1t})

A standard error correction model (ECM) is specified as follows:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta Y_{t-i} + \sum_{i=0}^{q_a} \beta_j \Delta X_{1t-i} + \sum_{i=0}^{r_b} \theta_k \Delta X_{2t-i} + \varphi ECT_{t-1} + \mathcal{U}_t \quad (2)$$

$(a = 1, 2, 3, .., n)$

$(b = 1, 2, 3, \dots, n)$
$(k = 1, 2, 3, \dots, n)$
$(j = 1, 2, 3, \dots, n)$

To specify the general ARDL, we replace the φECT_{t-1} with all variables in the model lagged once in level or log-level forms.

Let $X = X_{1t}$ & X_{2t}

∴

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta Y_{t-i} + \sum_{i=0}^{q_a} \beta_j \Delta X_{t-i} + \lambda_k X_{t-i} + \mathcal{U}_t \quad (3)$$

Hypothesis one

H_1 : (AREV and OILP) = α

$H_{1.0}$ $\alpha_3 \neq 0$

In functional form, the relationship between AREV and OILP could be specified as follows:

$AREV = f(AEXP, GDP, EXTR, INFR, UEMR; OILP, EXCR)$

Hypothesis two

H_2 : (AEXP and OILP) = β

$H_{2.0}$ $\beta_3 \neq 0$

$AEXP = f(AREV, GDP, EXTR, INFR, UEMR; OILP, EXCR)$

Hypothesis three

H_3 : (GDP and OILP) = β

$H_{3.0}$ $\beta_3 \neq 0$

$GDP = f(AREV, AEXP, EXTR, INFR, UEMR; OILP, EXCR)$

Hypothesis four

H_4 : (EXTR and OILP) = θ

$H_{4.0}$ $\theta_3 \neq 0$

$EXTR = f(AREV, AEXP, GDP, INFR, UEMR; OILP, EXCR)$

Hypothesis five

H_5 : (INFR and OILP) = π

$H_{5.0}$ $\pi_3 \neq 0$

$INFR = f(AREV, AEXP, GDP, EXTR, UEMR; OILP, EXCR)$

Hypothesis six

H_6 : (UEMR and OILP) = π

$H_{6.0}$ $\rho_3 \neq 0$

$UEMR = f(AREV, AEXP, GDP, EXTR, INFR; OILP, EXCR)$

The ARDL model for each of the variables are as specified below:

$$\begin{aligned}\Delta lnAREV_t = {} & \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta lnAREV_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta lnAEXP_{t-i} + \sum_{i=0}^{r} \alpha_3 \Delta lnOILP_{t-i} + \sum_{i=0}^{s} \alpha_4 \Delta lnGDP_{t-i} \\ & + \sum_{i=0}^{u} \alpha_5 \Delta lnEXTR_{t-i} + \sum_{i=0}^{v} \alpha_6 \Delta lnINFR_{t-i} + \sum_{i=0}^{w} \alpha_7 \Delta lnUEMR_{t-i} + \sum_{i=0}^{z} \alpha_8 \Delta lnEXCR_{t-i} \\ & + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} \\ & + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tI} \qquad (4)\end{aligned}$$

$$\Delta lnAEXP_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta lnAEXP_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta lnAREV_{t-i} + \sum_{i=0}^{r} \beta_3 \Delta lnOILP_{t-i} + \sum_{i=0}^{s} \beta_4 \Delta lnGDP_{t-i} + \sum_{i=0}^{u} \beta_5 \Delta lnEXTR_{t-i} + \sum_{i=0}^{v} \beta_6 \Delta lnINFR_{t-i} + \sum_{i=0}^{w} \beta_7 \Delta lnUEMR_{t-i} + \sum_{i=0}^{z} \beta_8 \Delta lnEXCR_{t-i} + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tII} \quad (5)$$

$$\Delta lnGDP_t = \gamma_0 \sum_{i=1}^{p} \gamma_1 \Delta lnGDP_{t-i} + \sum_{i=0}^{q} \gamma_2 \Delta lnAREV_{t-i} + \sum_{i=0}^{r} \gamma_3 \Delta lnOILP_{t-i} \sum_{i=0}^{s} \gamma_4 \Delta lnAEXP_{t-i} + \sum_{i=0}^{u} \gamma_5 \Delta lnEXTR_{t-i} + \sum_{i=0}^{v} \gamma_6 \Delta lnINFR_{t-i} + \sum_{i=0}^{w} \gamma_7 \Delta lnUEMR_{t-i} + \sum_{i=0}^{z} \gamma_8 \Delta lnEXCR_{t-i} + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tIII} \quad (6)$$

$$\Delta lnEXTR_t = \theta_0 \sum_{i=1}^{p} \theta_1 \Delta lnEXTR_{t-i} + \sum_{i=0}^{q} \theta_2 \Delta lnAREV_{t-i} + \sum_{i=0}^{r} \theta_3 \Delta lnOILP_{t-i} \sum_{i=0}^{s} \theta_4 \Delta lnAEXP_{t-i} + \sum_{i=0}^{u} \theta_5 \Delta lnGDP_{t-i} + \sum_{i=0}^{v} \theta_6 \Delta lnINFR_{t-i} + \sum_{i=0}^{w} \theta_7 \Delta lnUEMR_{t-i} + \sum_{i=0}^{z} \theta_8 \Delta lnEXCR_{t-i} + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tIV} \quad (7)$$

$$\Delta lnINFR_t = \pi_0 \sum_{i=1}^{p} \pi_1 \Delta lnINFR_{t-i} + \sum_{i=0}^{q} \pi_2 \Delta lnAREV_{t-i} + \sum_{i=0}^{r} \pi_3 \Delta lnOILP_{t-i} \sum_{i=0}^{s} \pi_4 \Delta lnAEXP_{t-i} + \sum_{i=0}^{u} \pi_5 \Delta lnGDP_{t-i} + \sum_{i=0}^{v} \pi_6 \Delta lnEXTR_{t-i} + \sum_{i=0}^{w} \pi_7 \Delta lnUEMR_{t-i} + \sum_{i=0}^{z} \pi_8 \Delta lnEXCR_{t-i} + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tV} \quad (8)$$

$$\Delta lnUEMR_t = \rho_0 \sum_{i=1}^{p} \rho_1 \Delta lnUEMR_{t-i} + \sum_{i=0}^{q} \rho_2 \Delta lnAREV_{t-i} + \sum_{i=0}^{r} \rho_3 \Delta lnOILP_{t-i} \sum_{i=0}^{s} \rho_4 \Delta lnAEXP_{t-i} + \sum_{i=0}^{u} \rho_5 \Delta lnGDP_{t-i} + \sum_{i=0}^{v} \rho_6 \Delta lnEXTR_{t-i} + \sum_{i=0}^{w} \rho_7 \Delta lnINFR_{t-i} + \sum_{i=0}^{z} \rho_8 \Delta lnEXCR_{t-i} + \lambda_1 lnAREV_{t-1} + \lambda_2 lnAEXP_{t-1} + \lambda_3 lnOILP_{t-1} + \lambda_4 lnGDP_{t-1} + \lambda_5 lnEXTR_{t-1} + \lambda_6 lnINFR_{t-1} + \lambda_7 lnUEMR_{t-1} + \lambda_8 lnEXCR_{t-1} + \lambda_9 D + \mathcal{U}_{tVI} \quad (9)$$

Where

$ECM = the\ error\ correction\ term\ lagged\ for\ one\ period;$

$\varphi = the\ coefficient\ for\ measuring\ the\ speed\ of\ adjustment$

$\Delta = the\ first\ differencing\ operator$

$\alpha, \beta, \gamma, \theta, \pi, \rho = the\ coefficients\ of\ the\ shortrun\ models$

$\lambda = the\ coefficient\ of\ the\ longrun\ models$

$D = the\ dummy\ variable\ used\ to\ capture\ oil\ price\ decline$

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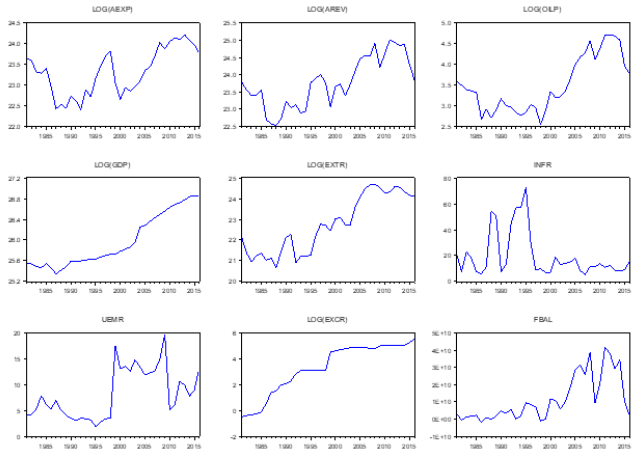
However, the Error Correction Models (ECM) are estimated in order to analyze the short run determinants of the effect of declining oil price on the macroeconomic variables outlined for each of the economies under study. It also helps in determining the speed of adjustment over time.

III. Empirical Results

A. Line Graphs and Descriptive Statistics of the Data

All the macroeconomic variables were analysed graphically to determine if there are pronounced visual trends or not and then subsequently, empirically tested using intercept only, intercept and trend depending on the visual analyses obtained [93], [94]. However, the line graphs for each of the economies as presented in Figure 4.1 for Nigeria; Figure 4.2 for Venezuela and Figure 4.3 for Norway indicate that all the variables of the models have intercepts on the vertical axis and are trending upwards as well; except the inflation rate, signifying that they are non-stationary at level. The line graphs and the descriptive statistics of the data are as presented below:

Figure 4. 1: Multiple Line Graphs for Nigeria



Source: Authors' construction using E-Views 10.0

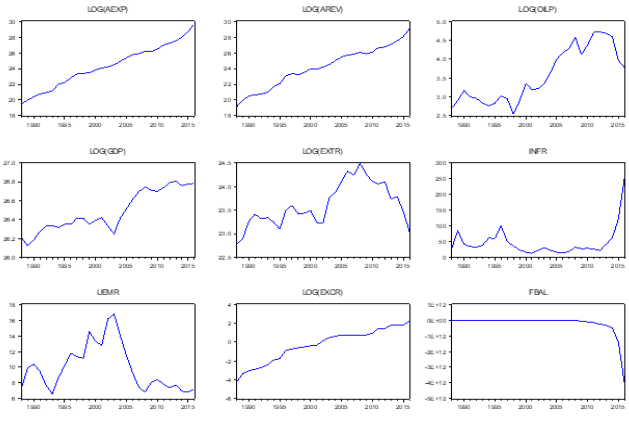
Table 4. 1: Descriptive Statistics of the Data for Nigeria

	Min	Max	Mean	Std. Dev.
OILP ($/barrel)	12.7	111.7	41.8	31.1
AEXP ($b)	5.4	33.0	15.5	8.4
AREV ($b)	6.1	72.3	27.0	19.7
GDP ($b)	101.0	464.0	217.0	121.0
EXCR (N/$)	0.6	253.5	76.5	71.9
EXTR($b)	0.9	53.6	16.6	18.2
INFR (%)	5.4	72.8	19.6	17.7
UEMR (%)	1.9	19.7	8.2	4.8

Source: Authors' construction using E-Views 10.0

The descriptive statistics of key macro indicators for Nigeria are presented in Table 4.1. From the table, oil price ranged from $12.7 per barrel to $111.7 per barrel. The large dispersion suggests that oil price fluctuated mainly over the past three decades. On average, the oil price was $41.8 per barrel with a standard deviation of $31.1 per barrel. Government expenditure ranged from $5.4 billion to $33 billion. The average expenditure incurred by the government over the past three decades stood at $15.5 billion, with a standard deviation of $8.4 billion. On the revenue side, it ranged from $6.1 billion to $72.3 billion, while the average revenue generated by the government was $27.0 billion with a deviation of $19.7 billion. This implies that the revenue generated over the past three decades exceeded average government spending. Gross Domestic Product (GDP) ranged from $101.0 billion to $464.0 billion. On average, GDP stood at $217.0 billion with a standard deviation of $121.0 billion. The minimum exchange rate was 0.9 N/$, and the maximum was 253.5N/$. The wide dispersion implies that the Naira has been largely devalued over the past three decades. The total reserves accumulation ranged from $0.9 billion to $53.6 billion. The average reserve accumulated over the past three decades was $16.6 billion with a deviation of $18.2 billion. Inflation ranged from 5.4% to as high as 72.8%. On average, consumer prices grew at 19.6%, with a deviation of 17.7%. The unemployment rate was low at 1.9% and high at 19.7%, over the past three decades. The average unemployment rate was 8.2%, with a deviation of 4.8%.

Figure 4. 2: Multiple Line Graphs for Venezuela



Source: Authors' construction using E-Views 10.0

Table 4. 2: Descriptive Statistics of the Data for Venezuela

	Min	Max	Mean	Std. Dev.
OILP ($/barrel)	12.7	111.7	45.5	33.5
AEXP ($b)	0.3	8260.0	559.0	1600.0
AREV ($b)	0.2	4150.0	319.0	809.0
GDP ($b)	221.0	438.0	326.0	71.4
EXCR (VEF/$)	0.0	9.3	2.0	2.4
EXTR ($b)	7.8	43.1	19.8	9.4
INFR (%)	12.5	254.9	46.7	47.7
UEMR (%)	6.6	16.8	9.9	2.9

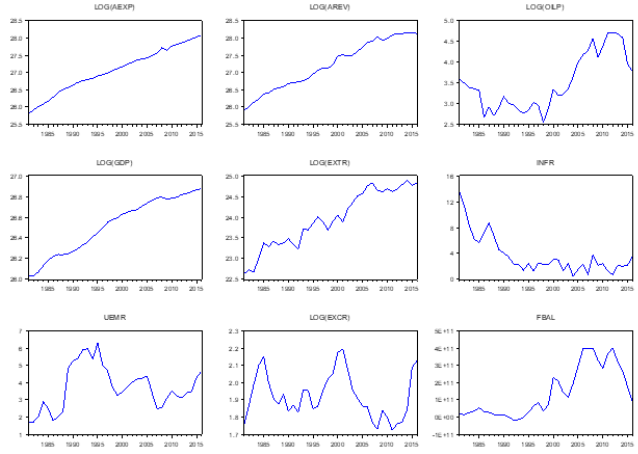
Source: Authors' construction using E-Views 10.0

Table 4.2 presents the descriptive statistics of key macro indicators for Venezuela. Global oil price ranged from $12.7 per barrel to $111.7 per barrel. On the average, oil price stood at $45.5 per barrel, with a deviation of $33.5 per barrel. The least government spending in Venezuela was $0.3 billion, and the highest was $8260 billion. On the average government spending was $559 billion, with a deviation of $1600 billion. This is lower compared to spending in Norway, but much

higher compared to spending in Nigeria. Government revenue ranged from $0.2 billion to $4,150 billion. On average, government revenue was $319 billion, with a deviation of $809 billion.

Similarly, Venezuelan government-generated less revenue compared to Norway, but much higher revenue compared to Nigeria. However, Venezuela's relatively high revenue could probably be as a result of its highest oil reserves in the whole world [80]. GDP ranged from $221 billion to $438 billion, with a mean and standard deviation of $326 billion and $71.4 billion. External reserve ranged from $7.8 billion to $43.1. On the average external reserves stood at $19.8 billion, with a deviation of $9.4 billion. Also, the exchange rate ranged from 0VEF/$ to 9.3VEF/$ and had an average of 2.0VEF/$ with a standard deviation of 2.4VEF/$. Inflation rate hovered around 12.5% to 254.9%, with the average and deviation of 46.7% and 47.7% respectively. The unemployment rate was low at 6.6% and high at 16.8%. The average unemployment rate was 9.9%, with a standard deviation of 2.9%.

Figure 4. 3: Multiple Line Graphs for Norway



Source: Authors' construction using E-Views 10.0

Table 4. 3: Descriptive Statistics of the Data for Norway

	Min	Max	Mean	Std. Dev.
OILP	12.7	111.7	41.8	31.1
AEXP ($b)	159.0	1560.0	684.0	409.0
AREV ($b)	176.0	1680.0	827.0	525.0
GDP ($b)	202.0	470.0	341.0	87.5
EXCR (Krone/$)	5.6	9.0	6.9	0.9
EXTR($b)	6.7	64.8	31.3	19.0
INFR (%)	0.5	13.6	3.7	3.0
UEMR (%)	1.7	6.3	3.7	1.3

Source: Authors' construction using E-Views 10.0

The descriptive statistics of the key macroeconomic indicators for Norway are presented in Table 4.3. Global oil price ranged from $12.7 per barrel to $111.7 per barrel. The large deviation suggests that oil price fluctuated largely over the last three decades. On the average global oil price stood at $41.8 per barrel, with a standard deviation of $31.1 per barrel. Government expenditure in Norway ranged from $159 billion to $1560 billion. On the average, the Norwegian government expended $684 billion, much higher compared to the average government expenditure in Nigeria and Venezuela. Government revenue was low at $176 billion and high at $1,680 billion, with an average and standard deviation of $827 billion and $525 billion respectively. It implies that the Norwegian government generated more revenue compared to the Nigerian government. Norwegian GDP ranged from $202 billion to $470 billion.

On the average, GDP was $341 billion, with a deviation of $87.5 billion. Domestic exchange rate ranged from 5.6 Norwegian Krone/$ to 9.0 krone/$. On the average, exchange stood at 6.9 krone/$ with a deviation of 0.9 Krone/$. The higher exchange rate relative to Nigerian Naira suggests that the Norwegian Krone was higher valued compared to the Nigerian naira. The external reserve was lowest at $6.7 billion and the highest at $64.8 billion. On the average, foreign reserves stood at $31.3 billion, with a deviation of $19.0 billion. The lowest inflation rate experience in Norway was 0.5%, and the highest was 13.6%. On average, the inflation rate was 3.7%, with a deviation of 3.0%. The unemployment rate was low at 1.7% and high at 6.3%, with the average and deviation of 3.7% and 1.3% respectively. This implies that Norway had a lower unemployment rate compared to Nigeria and Venezuela.

Averagely, both the government revenues and expenditures in Norway are higher relative to those of Nigeria and Venezuela. The descriptive statistics also reveal that the inflation and unemployment rates in Nigeria and Venezuela outweigh those of the Norwegian economy. The average reserves accumulation in Norway is higher when compared to those of Nigeria and Venezuela, which suggests that the Norwegian economy conserves its proceeds from their natural resources for future use. In addition, the average economic growth in Norway is also high relative to Nigeria and Venezuela which supports the findings of [46] that Norway does not fit into the categories of the countries identified with resource curse syndrome as the economy manages its petroleum resources effectively, leading to more economic growth and welfare of the populace.

B. Diagnostic Tests

In order to be consistent with the diagnosis of the econometric requirements before the estimation of the underlying ARDL model, all the diagnostic tests were adequately carried out. The diagnostic tests include structural and dynamic stability tests (CUSUM and CUSUM of Squares); Residual Diagnostics (Heteroscedasticity; Serial correlation, Normality tests); Coefficient Diagnostics (Long-Run Form and Bound Test, Error Correction Form (Short-Run Test)). The detailed results of all the diagnostic tests carried out in these analyses are presented in the appendix A.
The Stability tests shows that the regression equations are stable over time, during the sample period as the plotted graphs lie within the critical boundaries at 5% significant level; hence we cannot reject the null hypothesis (H_0) which states that all the coefficients of the Error Correction Models are stable at that level [100], [104] [11].

All the residual diagnostic tests which include the heteroscedasticity tests, the serial correlation tests and the normality tests were carried out. The results reveal that the variances of all the error term are constant over time while the Breusch-Godfrey LM test for serial correlation adopted shows that there is no serial correlation. [50] reveal that homoscedasticity and the independence of the observations of error term in any regression analysis would produce the wrong result under non-normality condition. Hence, the result reveal that there is no significant departure from normality was found.

In addition, the coefficient diagnostics entails both the long-run (Bound Test) and the Error Correction Form (Short-run Tests) which were carried out to empirically analyze the long-run relations and the short-run dynamics among the variables of the ARDL models of this research. The long-run relationship is based on the Wald-test (F-Statistics) with two critical values (lower and upper critical values), [84]. While the lower critical bound assumes that all the variables of the model are integrated at level I(0), indicating that there is no cointegration among the variables, the upper bound assumes that all the variables are integrated at first difference (1), which means that there is cointegration among the variables of the model. If the calculated F-Statistic is higher than the upper bound critical value, then it leads to the rejection of the null hypothesis (H_0), signifying that the variables of the model are cointegrated. Conversely, when the calculated F-statistic is below the lower bound critical value, then we cannot reject the null hypothesis (H_0), which indicate that there is no cointegration among the variables of the model. When the calculated F-statistic test lies between lower and upper bound critical values, the results are said to be inconclusive which means that the relationship between the variables of the model cannot be established [64].

The Error Correction Model (ECM), was developed in this study and this is to test for the speed of adjustment and to ascertain how the variables converge towards the equilibrium in the long run. All these tests were carried out and summarized in Appendix A4 for each of the countries.

C. Summary of Findings for the Nigerian Economy

For the Nigerian economy, the results reveal that declining oil revenues have a significant impact on government revenues, government expenditures and most of the macroeconomic variables of the nation. Specifically, declining oil revenue has a negative but significant impact on government revenue and external reserves in the short term while in the long run, a percentage increase in government expenditures exerts a positive and significant impact on government revenue which supports the spend-revenue hypothesis. Also, in the long run, the increasing oil price has a positive and significant impact on external reserves. However, this implies that the government revenue and external reserves of the Nigerian economy are highly responsive to oil price shocks and have direct proportionality. On the other hand, the declining oil price has a positive and significant impact on government expenditure in the short run. It implies that the economy either uses more of its reserves or resort to borrowing in order to finance its fiscal needs. In the long run, a percentage increase in government revenue also exerts a positive and significant effect on the government expenditures, which supports the revenue-spend hypothesis. On the contrary, declining oil price exerts a positive and insignificant effect on economic growth and unemployment in both the short run and long run. It also has a positive and insignificant effect on the inflation rate in the short run, while the exchange rate and external reserves were the main determinants of inflation in the long run.

D. Summary of Findings for the Venezuelan Economy

The results for the Venezuelan economy reveal that declining oil price have a negative and significant impact on government revenue, economic growth, and external reserves in the short run. While in the long run, unemployment is the main determinant of government revenue as government revenue decreases for a percentage increase in the rate of unemployment while external reserves and government revenue are the main determinants of economic growth. Also, a percentage increase in government expenditure shrinks the external reserves in the long run. The government, therefore, needs to adopt more alternative means of revenue generation rather than borrowing and depletion of its reserves in financing its budget deficits.

In addition, the results further show that declining oil revenue exerts a positive and significant effect on government expenditures and unemployment in both the short run and long run which also indicate that the government finance its budget deficits mainly through borrowing from both the internal and external sources. It also implies that declining oil revenue has a significant impact on the unemployment rate of the economy. More so, the result also shows that exchange rate and unemployment rate are the main determinants of inflation in both the short run and long run.

E. Summary of Findings for the Norwegian Economy

The results for the Norwegian economy reveal that declining oil revenue exhibits a dynamic impact on government revenue, government expenditure and on all the other macroeconomic variables inherent in the economic models, except the government expenditures which is insignificant in both the short run and long run. The findings further reveal that declining oil revenue has a negative and significant impact on government revenue and external reserves in the short run while in the long run, a percentage increase in oil price, exerts a positive and significant effect on both the government revenue and external reserves. It implies that oil price is directly proportional to government revenue and external reserves in Norway as an increase or decrease in oil price affects these variables proportionately. Also, the effect of declining oil price on the Norwegian's economic growth is insignificant in the short run, while external reserves and government revenues were the main determinants of growth in the long run. Nevertheless, the declining oil price has a positive and significant effect on inflation and unemployment in the short run. In the long run, its impact on the inflation rate is insignificant, while the inflation rate is the main determinant of the unemployment rate in the long run as well.

IV. Recommendations and Policy Implications

From the findings, the following policy implications and recommendations were deduced:

a. For Nigeria, Venezuela and Norway, the declining oil price has a negative but significant effect on government revenues. That is, the revenues of each of these economies dropped significantly due to the decrease in oil price. However, this calls for good policy reforms to promote economic diversification in all countries that are highly dependent on oil revenue.

b. The effect of declining oil price on the government expenditures of Nigeria and Venezuela is positive and significant but insignificant on the Norwegian government expenditures. The results further reveal that the budget deficits for Nigeria are mainly financed through internal and external borrowing while Venezuela carries out its deficit financing through borrowing and Seigniorage. However, just like the Norwegian economy, it would be necessary for governments in

countries like Nigeria and Venezuela to introduce some fiscal rules into the policy measures to help reshape the countries' spending habit to a specified percentage and ensure that such rules are strictly observed and implimented.

c. The literature and findings reveal that the Norwegian economy has the capacity of avoiding the Paradox of Plenty (Resource curse syndrome) which has invariably affected most of the abundant resource economies due to some institutions and policies Norway put in place. Therefore, this study recommends that countries like Nigeria and Venezuela should give priority to policies that address the enhancement of human and social capital which is more about administrative and human capacity building. This should help to minimise the negative impact of resource abundance in such countries.

d. Since Nigeria, Venezuela and Norway are blessed with other natural resources aside oil; it is recommended that the government of these countries encourage the development of other resources for the local industries. This could also help to reduce the rate of unemployment in countries like Nigeria, Venezuela and other similar countries.

e. From the literature, it is evident that Nigeria is the only member of OPEC that still imports fuel and have spent billions of dollars over the years on the importation of fuel, which in turn increases the government expenditures as revealed from the results. Therefore, there is need for Nigerian and similar countries to also give priority to policies that would be geared towards the encouragement of local refineries across different parts of the country. This would drastically reduce the importation of fuel if not completely eradicated. The resultant effect could also create employment opportunities and generate more revenues since these parameters are adversely affected as oil price declines.

f. Finally, since there is evidence of revenue-spend hypothesis and spend-revenue hypothesis, there is need for Nigeria and similar countries to consider determining the revenues and expenditures jointly since it could effectively help in restraining the budget deficits. Independent determination of the revenues and the expenditures would always metamorphose into high expenditures, which have been adversely affecting the oil-dependent economies.

V. APPENDICES

Table A.1 Unit Root Tests for Nigeria, Venezuela and Norway

Table A.1.1 Unit Root Test Results for Nigeria

		AUGMENTED DICKEY FULLER TEST (ADF)				PHILLIPS-PERRON TEST (PPT)			
		Intercept	SS	Intercept & Trend	SS	Intercept	SS	Intercept & Trend	SS
AEXP	Levels	-1.4287 (-0.5571)	I(1)	-2.5036 (0.3246)	I(1)	-1.6442 (-0.4500)	I(1)	-2.5483 (0.3047)	I(1)
	1st Diff (Δ)	-5.0703 (0.0002)***		-5.0615 (0.0013) ***		-5.0695 (0.0002) ***		5.0638 (0.0013) ***	
AREV	Levels	-1.5258 (0.509)	I(1)	-2.7351 (0.2296)	I(1)	-1.5555- 0.4942	I(1)	-2.7618- 0.22	I(1)
	1st Diff (Δ)	-5.6861 (0.0000)***		-5.5714 (0.0003) ***		-5.6847 (0.0000) ***		-5.5691 (0.0003) ***	
EXCR	Levels	1.3201 (0.9983)	I(1)	-1.3836 (0.8483)	I(1)	1.1539 (0.9972)	I(1)	-1.6077 (0.7694)	I(1)
		-3.6446 (0.0099)***		-3.9728 (0.0194) **		-3.6461 (0.0098) ***		-3.9535 (0.0203) **	
EXTR	Levels	-0.7569 (0.8188)	I(1)	-3.0458 (0.1353)	I(1)	-0.6412 (0.8484)	I(1)	-3.2476 (0.092)	I(1)
	1st Diff (Δ)	-5.3132 (0.0001)***		-5.1938 (0.0009) ***		-6.1528 (0.0000) ***		-5.9165 (0.0001) ***	
GDP	Levels	1.2298 (0.9977)	I(1)	-2.2842 (0.4311)	I(1)	1.0614 (0.9964)	I(1)	-2.2683 (0.4392)	I(1)
	1st Diff (Δ)	-4.3395 (0.0016)***		-4.6559 (0.0037) ***		-4.3264 (0.0017) ***		-4.6126 (0.0041) ***	
INFR	Levels	-3.2528 (0.0252)**	I(0)	-4.213 (0.0110) **	I(0)	-3.1537 (0.0316) **	I(0)	-3.064 (0.1304)	I(0)
	1st Diff (Δ)	-5.7672 (0.0000)***		-5.6834 (0.0003) ***		-9.1203 (0.0000) ***		-9.2336 (0.0000) ***	
OILP	Levels	-1.1285 (0.6934)	NS	-2.1248 (0.5147)	I(1)	-1.1657 (0.678)	I(1)	-2.159 (0.4965)	I(1)
	1st Diff (Δ)	-5.5017- 0.0001		-5.4213 (0.0005) ***		-5.5012 (0.0001) ***		-5.421 (0.0005) ***	
UEMR	Levels	-2.0115 (0.2808)	I(1)	-2.5197 (0.3173)	I(1)	-1.9036 (0.3269)	I(1)	-2.4906 (0.3305)	I(1)
	1st Diff (Δ)	-6.606 (0.0000)***		-6.4986 (0.0000) ***		-6.7082 (0.0000) ***		-6.5908 (0.0000) ***	

***, ** and *denote the significant level at 1%, 5% and 10% respectively

Source: Authors' Computation using E-Views 10.0

Table A.1.2 The Unit Root Test Result for Venezuela

		AUGMENTED DICKEY FULLER TEST (ADF)				PHILLIPS-PERRON TEST (PPT)			
		Intercept	SS	Intercept & Trend	SS	Intercept	SS	Intercept & Trend	SS
AEXP	Levels	0.7017 (0.99)	I(1)	-1.088- 0.9133	I(1)	0.6219 (0.9878)	I(1)	-1.4327 (0.8283)	I(1)
	1st Diff (Δ)	-3.3295 (0.0234)**		-3.3107 (0.0859)*		-3.3295 (0.0234)**		-3.3107 (0.0859)*	
AREV	Levels	-0.456 (0.8857)	I(1)	-2.4786- 0.3352	I(1)	-0.4613 (0.8847)	I(1)	-2.4786 (0.3352)	I(1)
	1st Diff (Δ)	-4.1843 (0.0031)***		-3.953 (0.0234)**		-4.132 (0.0036)***		-3.8762 (0.0275)**	
EXCR	Levels	4.3278 (1.00)	NS	2.6425 (1.00)	I(1)	4.0762 (1.00)	I(1)	1.7404 (1.00)	I(1)
	1st Diff (Δ)	-0.1182- 0.9362		-3.6448 (0.0469)**		-3.86 (0.0068)***		-5.3595 (0.0009)***	
EXTR	Levels	-1.7539- 0.3945	I(1)	-0.2861 (0.987)	I(1)	-1.909 (0.3236)	I(1)	-0.5557 (0.974)	I(1)
	1st Diff (Δ)	-3.9901 (0.0050)***		-4.5735 (0.0059)***		-3.9702 (0.0053)***		-4.5785 (0.0058)***	
GDP	Levels	-0.6605 (0.8409)	I(1)	-2.6619 (0.2586)	I(1)	-0.5882 (0.858)	I(1)	-2.3408 (0.4001)	I(1)
	1st Diff (Δ)	-4.4635 (0.0016)***		-4.3774 (0.0092)***		-4.4531 (0.0016)***		-4.3614 (0.0095)***	
INFR	Levels	-1.0922- 0.7039	I(1)	-0.4159- 0.9817	I(1)	-0.6204 (0.8506)	I(1)	-0.6471 (0.9676)	I(1)
	1st Diff (Δ)	-4.6278 (0.0010)***		-5.3797 (0.0009)***		-4.7046 (0.0009)***		-5.3214 (0.0010)***	
OILP	Levels	-1.3124- 0.6095	I(1)	-1.2191 (0.8868)	I(1)	-1.3531 (0.5903)	I(1)	-1.4665 (0.8171)	I(1)
	1st Diff (Δ)	-4.3832 (0.0019)***		-4.3613 (0.0095)***		-4.3384 (0.0021)***		-4.3212 (0.0104)**	
UEMR	Levels	-1.8178- 0.3643	I(1)	-1.8762 (0.6399)	I(1)	-1.4659 (0.5357)	I(1)	-2.036 (0.5572)	I(1)
	1st Diff (Δ)	-4.0688 (0.0041)***		-3.9024 (0.0260)**		-4.0506 (0.0043)***		-3.868 (0.0280)**	

Table A.1.3 Unit Root Test Result for Norway

		AUGMENTED DICKEY FULLER TEST (ADF)				PHILLIPS-PERRON TEST (PPT)			
		Intercept	SS	Intercept & Trend	SS	Intercept	SS	Intercept & Trend	SS
AEXP	Levels	-3.0372 (0.0411)**	I(0)	-3.2302 (0.0947)*	I(0)	-2.7417 (0.0770)*	I(0)	-3.568 (0.0471)**	I(0)
	1st Diff (Δ)	-6.9214 (0.0000)***		-7.9568 (0.0000)***		-6.8275 (0.0000)***		-7.9013 (0.0000)***	
AREV	Levels	-2.2276 (0.2005)	I(1)	-1.4003 (0.8439)	I(1)	-2.8199 (0.0655)*	I(0)	-1.3998 (0.844)	I(1)
	1st Diff (Δ)	-4.9323 (0.0003)***		-5.3479 (0.0006)***		-4.8439 (0.0004)***		-6.9206 (0.0000)***	
EXCR	Levels	-3.1465 (0.0322)**	I(0)	-3.1216 (0.1172)	I(1)	-2.5768 (0.107)	I(1)	-2.5831 (0.2897)	I(1)
	1st Diff (Δ)	-4.1244 (0.0028)***		-4.0486 (0.0160)**		-3.9669 (0.0042)***		-3.8692 (0.0243)**	
EXTR	Levels	-1.3258 (0.6069)	I(1)	-2.8316 (0.1959)	I(1)	-1.3258 (0.6069)	I(1)	-2.7933 (0.2088)	I(1)
	1st Diff (Δ)	-6.6245 (0.0000)***		-6.6748 (0.0000)***		-6.6376 (0.0000)***		-6.6955 (0.0000)***	
GDP	Levels	-1.8291 (0.3608)	I(1)	-1.4682 (0.8215)	I(1)	-2.2721 (0.1861)	I(1)	-0.5206 (0.9778)	NS
	1st Diff (Δ)	-2.9083 (0.0545)*		-3.3367 (0.0770)*		-3.0149 (0.0432)**		-3.1952- 0.1019	
INFR	Levels	-2.9556 (0.0489)**	I(0)	-3.8091 (0.0275)**	I(0)	-2.7903 (0.0697)*	I(0)	-3.9113 (0.0218)**	I(0)
	1st Diff (Δ)	-10.5441 (0.0000)***		-10.7476 (0.0000)***		-10.9633 (0.0000)***		-11.9205 (0.0000)***	
OILP	Levels	-1.144 (0.6875)	I(1)	-2.0783 (0.54)	I(1)	-1.179 (0.6728)	I(1)	-2.1202 (0.5176)	I(1)
	1st Diff (Δ)	-5.6267 (0.0000)***		-5.5531 (0.0003)***		-5.6263 (0.0000)***		-5.5529 (0.0003)***	
UEMR	Levels	-2.3965 (0.15)	I(1)	-2.325 (0.4103)	I(1)	-2.5911 (0.1041)	I(1)	-2.3364 (0.4048)	I(1)
	1st Diff (Δ)	-4.7694 (0.0005)***		-4.7123 (0.0031)***		-4.6832 (0.0006)***		-4.6077 (0.0040)***	

***, ** and *denote the significant level at 1%, 5% and 10% respectively

Source: Authors' Computation using E-Views 10.0

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Figure A.2 Structural and Dynamic Stability Tests for Nigeria, Venezuela and Norway (CUSUM Tests)

Fig. A.2.1 Nigeria

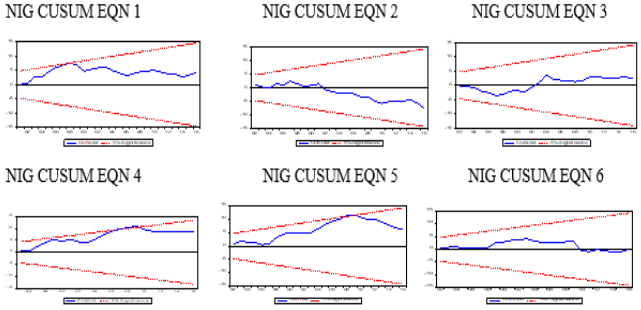


Fig. A.2.2 Venezuela

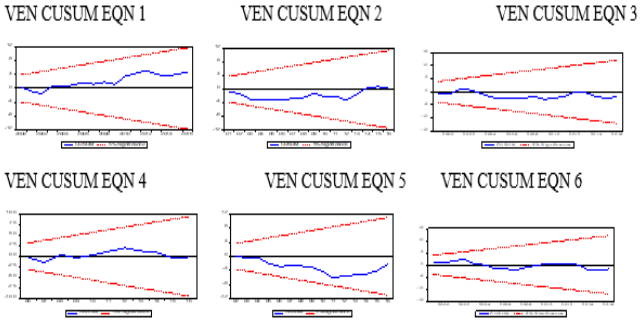
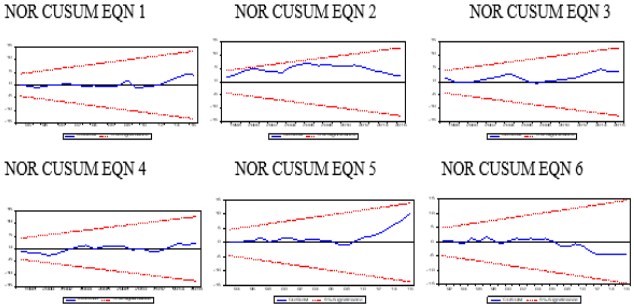


Fig. A.2.3 Norway



Source: Authors' Computation using E-Views 10.0

Figure A.3 Structural and Dynamic Stability Tests for Nigeria, Venezuela and Norway (CUSUM of Squares Tests)

Fig. A.2.1 Nigeria

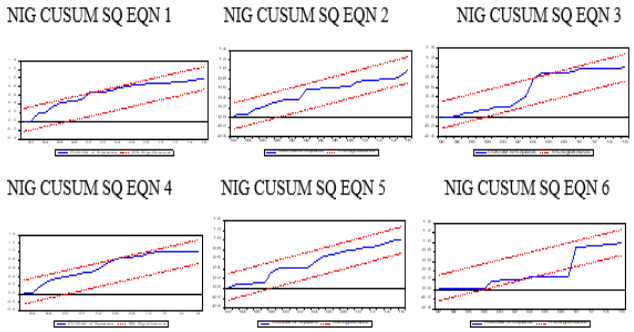


Fig. A.3.2 Venezuela

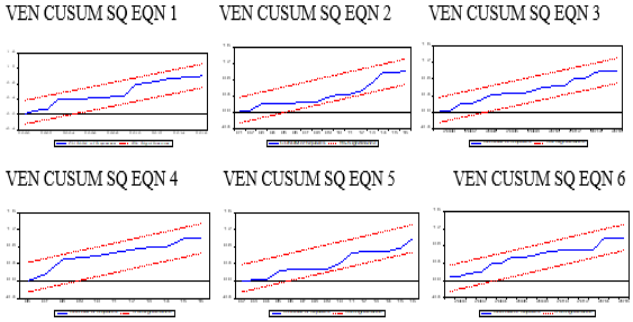
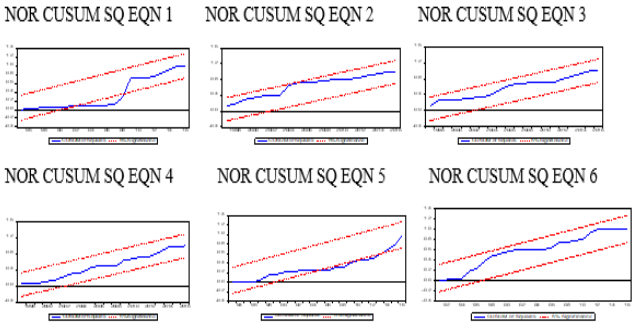


Fig. A.3.3 Norway



Source: Authors' Computation using E-Views 10.0

Tables A.4 Results

Table A.4.1 Long run regression estimates of the impact of declining oil price on key macroeconomic indicators in Nigeria

	AEXP	AREV	GDP	EXTR	INFR	UEMR
LOG(AREV)	1.065***(0.216)		-0.175(0.324)	-0.024(0.321)	-1.67(14.107)	4.482(8.779)
LOG(AEXP)		0.673***(0.187)	0.127(0.285)	0.288(0.29)	-4.037(12.827)	-3.401(6.952)
LOG(OILP)	-0.772***(0.23)	0.148(0.252)	0.38(0.227)	0.532*(0.307)	9.595(13.531)	5.374(6.075)
LOG(GDP)	0.784**(0.368)	0.232(0.74)		0.473(0.469)	30.954(23.688)	
LOG(EXTR)	0.282(0.2)	0.016(0.144)	0.126(0.209)		-31.514***(7.775)	2.329(3.932)
INFR	0.009(0.006)	-0.001(0.004)	0.001(0.005)	-0.015***(0.004)		0.007(0.106)
UEMR	-0.007(0.016)	-0.027*(0.015)	0.003(0.018)	0.021(0.015)	0.005(0.771)	
LOG(EXCR)	-0.289***(0.078)	0.195(0.195)	0.144(0.096)	0.298***(0.086)	9.553**(4.263)	1.967(2.225)
Oil dummy	No	No	No	No	No	No

Table A.4.2 Diagnostic test results for Nigeria

Diagnostics	AEXP	AREV	GDP	EXTR	INFR	UEMR
Normality test, JB- test	1.123(0.570)	2.289(0.318)	65.936(0.000)	1.140(0.566)	0.375(0.829)	3.315(0.191)
Heteroskedasticity	1.359(0.252)	0.116(0.736)	0.052(0.821)	0.230(0.635)	2.615(0.116)	0.011(0.917)
Serial Correlation	2.003(0.157)	0.883(0.433)	1.689(0.207)	1.554(0.235)	1.157(0.332)	1.414(0.265)

***, ** and *denote the significant level at 1%, 5% and 10% respectively. Source: Authors' computation from ARDL analyses using E-views 10.0

Table A.4.3 Short-run regression estimates of the impact of declining oil price on key macroeconomic indicators in Nigeria

	AEXP	AREV	GDP	EXTR	INFR	UEMR
C	-13.084*** (1.212)	1.024*** (0.131)	4.135*** (0.954)	1.529*** (0.174)	-0.061 (1.496)	285.019 (234.777)
DL(AEXP)		0.218* (0.108)		0.71*** (0.148)	17.331*** (6.167)	
DL(AEXP(-1))		-0.464*** (0.106)				
DL(OILP)		0.804*** (0.077)				
DL(OILP(-1))		0.359*** (0.1)				
OILD						
DL(EXCR)		-0.406*** (0.107)	-0.044 (0.030)			5.003*** (1.444)
DL(EXCR(-1))		-0.523*** (0.123)				
DL(EXTR(-1))				0.278*** (0.093)		
DL(AREV)						-2.954** (1.303)
Ect	-0.519*** (0.044)	-0.699*** (0.105)	-0.182*** (0.043)	-0.975*** (0.114)	-0.765*** (0.089)	-0.508*** (0.106)
R2	0.805	0.938	0.46	0.750	0.705	0.603
AdjR2	0.799	0.918	0.433	0.725	0.687	0.578
F-stat	136.315 (0.000)	47.245 (0.000)	13.974 (0.000)	30.005 (0.000)	38.300 (0.000)	

Source: Authors' computation from ARDL analyses using E-views 10.0

Table A.4.4 Long-run regression estimates of the impact of declining oil price on key macroeconomic indicators in Venezuela

	AEXP	AREV	GDP	EXTR	INFR	UEMR
LOG(AEXP)		0.328(0.348)	0.168*(0.092)	-4.367(4.141)	35.853(73.756)	3.34(3.746)
LOG(OILP)	0.038(0.124)	0.339(0.292)	**0.093**(0.036)**	2.787(3.03)	-56.887**(26.625)	-0.3(1.359)
LOG(GDP)	-1.335(1.148)	0.027(1.394)		-10.02(12.846)	-349.173(252.73)	-25.847***(4.502)
LOG(EXTR)	-0.422***(0.137)	0.058(0.245)	0.039(0.036)		-47.357(41.571)	-0.821(1.049)
INFR	0(0.002)	0.008*(0.004)	0(0)	0.019(0.027)		-0.031*(0.015)
UEMR	-0.102**(0.041)	0.01(0.058)	-0.026***(0.005)	-0.295(0.327)		
LOG(EXCR)	0.142(0.222)	0.803(0.487)	0.039(0.04)	3.272(3.604)	-18.855**(8.919)	-0.282(2.086)
LOG(AREV)	1.078***(0.178)		-0.007(0.073)	2.259(2.461)	11.013(79.197)	1.807(2.345)
Oil dummy	No	No	No	No	No	No

Table A.4.5 Diagnostic test results for Venezuela

Diagnostics	AEXP	AREV	GDP	EXTR	INFR	UEMR
Normality test, JB- test	6.850 (0.033)	0.355 (0.837)	0.186 (0.911)	1.095 (0.578)	1.368 (0.505)	1.878 (0.391)
Heteroskedasticity	0.410 (0.528)	0.357 (0.556)	0.713 (0.406)	0.049 (0.827)	0.002 (0.964)	0.629 (0.435)
Serial Correlation	1.758 (0.202)	2.002 (0.170)	0.861 (0.444)	2.116 (0.153)	1.930 (0.176)	1.101 (0.360)

***, ** and *denote the significant level at 1%, 5% and 10% respectively

Source: Authors' computation from ARDL analyses using E-views 10.0

Table A.4.6 Short-run regression estimates of the impact of declining oil price on key macroeconomic indicators in Venezuela

	AEXP	AREV	GDP	EXTR	INFR	UEMR
C	27.785***(1.919)	5.704***(0.631)	18.562***(1.101)	57.835***(5.77)	9639.788(6524.755)	540.747***(53.653)
DLOG(AEXP)		0.526***(0.082)	0.048***(0.015)			-0.891(0.566)
DLOG(OILP)		0.405***(0.051)				
OILD						
DLOG(GDP)						
DLOG(EXTR)			-0.068***(0.017)			
DLOG(EXCR)				0.113(0.087)		2.419***(0.589)
DLOG(AREV)					53.383***(6.265)	
@TREND	No	No	Yes	No	No	No
CointEq(-1)*	-0.621***(0.043)	-0.446***(0.049)	-0.833***(0.049)	-0.173***(0.017)	-0.515***(0.058)	-0.895***(0.089)
R-squared	0.887	0.952	0.926	0.809	0.814	0.868
Adjusted R-squared	0.883	0.946	0.913	0.793	0.807	0.852
F-statistic	204.117 (0.000)	160.087 (0.000)	71.868 (0.000)	52.822 (0.000)		52.734 (0.000)

***, ** and *denote the significant level at 1%, 5% and 10% respectively
Source: Author's computation from ARDL analyses using E-views 10.0

Table A.4.7 Long-run regression estimates of the impact of declining oil price on key macroeconomic indicators in Norway

	AEXP	AREV	GDP	EXTR	INFR	UEMR
LOG(AEXP)		0.532***(0.073)	-0.654***(0.18)	-4.831*(2.655)	2.899(2.792)	20.182**(9.269)
LOG(OILP)	-0.193**(0.08)	0.104***(0.017)	-0.033(0.031)	-0.182(0.395)	2.227**(0.981)	3.386(2.317)
LOG(GDP)	-1.414**(0.463)	1.066***(0.194)		-3.044(3.59)	0.721(8.679)	-37.402*(19.336)
LOG(EXTR)	-0.13(0.135)	0.056(0.033)	0.059(0.041)		3.385*(1.78)	9.206**(4.187)
INFR	0.011(0.026)	0.012**(0.006)	-0.021***(0.006)	-0.007(0.058)		-0.798**(0.293)
UEMR	0.013(0.015)	-0.008(0.008)	0.016(0.01)	0.141(0.097)	-0.361(0.268)	
LOG(EXCR)	-0.213(0.218)	0.095*(0.049)	0.116(0.083)	0.706(0.954)	7.036***(2.096)	21.073*(10.838)
LOG(AREV)	1.238*(0.606)		0.231*(0.11)	3.55(2.363)	-10.199*(5.161)	-17.991(10.458)
Control for oil dummy	No	No	No	No	No	No

Table A.4.8 Diagnostic test results for Norway

Diagnostics	AEXP	AREV	GDP	EXTR	INFR	UEMR
Normality test, JB- test	1.181 (0.554)	0.827 (0.661)	3.065 (0.216)	0.331 (0.848)	1.500 (0.472)	6.653 (0.036)
Heteroskedasticity	0.229 (0.635)	1.328 (0.258)	0.386 (0.539)	0.204 (0.654)	2.252 (0.143)	0.027 (0.870)
Serial Correlation	0.606 (0.572)	0.176 (0.840)	1.433 (0.268)	1.258 (0.309)	1.737 (0.200)	0.711 (0.512)
	No	No	No	No	No	No

***, ** and *denote the significant level at 1%, 5% and 10% respectively
Source: Authors' computation from ARDL analyses using E-views 10.0

Table A.4.9 Short-run regression estimates of the impact of declining oil price on key macroeconomic indicators in Norway

	AEXP	AREV	GDP	EXTR	INFR	UEMR
C	31.468*** (4.592)	-13.23*** (0.895)	10.327*** (0.707)	73.637*** (11.628)	69.89*** (7.614)	374.745*** (38.765)
DLOG(AEXP)			-0.056** (0.023)		16.894*** (3.242)	-1.07 (1.929)
DLOG(AEXP(-1))	0.029 (0.123)					-12.831*** (2.445)
DLOG(AREV)	0.76*** (0.109)			1.699*** (0.35)		
DLOG(AREV(-1))	-0.463*** (0.138)	0.162** (0.063)		-1.473*** (0.335)		
DLOG(OILP)	-0.113*** (0.025)	0.17*** (0.011)	0.003 (0.003)			3.039*** (0.385)
DLOG(OILP(-1))	-0.007 (0.026)	0.072*** (0.016)				1.618*** (0.355)
OILD						
DLOG(GDP)	-0.478 (0.391)				-41.954*** (8.305)	
DLOG(GDP(-1))	1.275** (0.432)		0.167** (0.066)			
DLOG(EXTR)	-0.089*** (0.022)		-0.002 (0.006)		0.075 (0.775)	-0.093 (0.412)
DLOG(EXTR(-1))	0.06** (0.026)					-3.84*** (0.487)
D(INFR)	0.003 (0.004)					-0.247*** (0.06)
D(INFR(-1))	-0.003 (0.003)					
D(UEMR)	0.004 (0.006)		-0.001 (0.001)	0.009 (0.03)		
D(UEMR(-1))	0.00 (0.005)		-0.006*** (0.001)			-0.455*** (0.115)
D(UEMR(-2))						-0.363*** (0.107)
DLOG(EXCR)	-0.109** (0.044)			0.01 (0.231)		6.199*** (0.891)
DLOG(EXCR(-1))	-0.049 (0.051)			-0.808*** (0.251)		-3.708*** (0.91)
CointEq(-1)*	-0.915*** (0.134)	-0.763*** (0.051)	-0.289*** (0.02)	-0.547*** (0.087)	-0.845*** (0.091)	-0.557*** (0.058)
R-squared	0.920	0.944	0.946	0.666	0.867	0.768
Adjusted R-squared	0.835	0.937	0.929	0.575	0.787	0.737
F-statistic	10.815 (0.000)	123.293 (0.000)	55.231 (0.000)	7.390 (0.000)	10.863 (0.000)	24.794 (0.000)

***, ** and *denote the significant level at 1%, 5% and 10% respectively
Source: Authors' computation from ARDL analyses using

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