

Effect of Crude Oil Prices and Production on the Performance of Nigerian Gross Domestic Product: A Conceptual Framework

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Abstract

The Nigerian economy heavily relies on crude oil exports as a major source of revenue, and fluctuations in crude oil prices. This study aims to examine the relationship between crude oil prices and production on the performance of Nigerian Gross Domestic Product. The conceptual review was used as the methodology for this study which involves a thorough review of relevant literature on the impact of crude oil prices and production on the Nigerian economy. This conceptual review examines the effect of crude oil prices and production on the performance of Nigerian Gross Domestic Product (GDP) from economic, social, and environmental perspectives. The impact on foreign exchange earnings, trade balances, and fiscal balances are some of the economic dimensions that can be observed. In terms of social dimensions, the oil industry provides direct and indirect employment opportunities for millions of people in Nigeria. Therefore, fluctuations in crude oil prices and production can affect employment opportunities and living standards. The environmental dimension is also reviewed, and the negative impacts of crude oil exploration, production, and transportation activities on the environment are considered. This framework suggests that understanding the effect of crude oil prices and production on the performance of Nigerian GDP is crucial for policymakers and investors to make informed decisions and ensure sustainable development in Nigeria.

Keywords

Crude Oil Prices, Crude Oil Production, Gross Domestic Product (GDP), Economic Growth, Nigeria, Econometric Analysis, Time Series Analysis, Autoregressive Distributed Lag (ARDL), Vector Error Correction Model (VECM), Foreign Direct Investment (FDI), Foreign Exchange Earnings, Balance of Trade, Oil Revenue, Public Spending, Macroeconomic Factors, Conceptual Framework, Literature Review

1. Introduction

The Nigerian economy is heavily reliant on crude oil production and exportation. The country is the largest producer of crude oil in Africa and the sixth largest producer in the world. The Nigerian government relies heavily on revenue from crude oil exports to finance its budgetary obligations and support economic growth. As a result, fluctuations in the global crude oil market have a significant impact on the Nigerian economy, particularly on the performance of the Gross Domestic Product (GDP). In recent years, the Nigerian economy has experienced a series of economic challenges that have affected its growth and development. One of the major challenges facing the country is the volatility of crude oil prices in the global market. The country's overdependence on crude oil exports has made it vulnerable to fluctuations in global oil prices, which can lead to a decline in government revenue and affect economic growth. The impact of crude oil prices and production on the Nigerian economy has been a topic of discussion among scholars and policymakers. Various studies have examined the relationship between crude oil prices and GDP growth in Nigeria. Some studies have argued that there is a positive correlation between crude oil prices and economic growth in Nigeria, while others have found a negative correlation.

Given the importance of crude oil to the Nigerian economy, it is important to understand the relationship between crude oil prices and production and the performance of the Nigerian GDP. This conceptual framework aims to provide a background on the effect of crude oil prices and production on the performance of Nigerian GDP. The framework will examine the various factors that influence the relationship between crude oil prices and production and GDP performance in Nigeria (Adeniyi, Omisakin, & Egwaikhide, 2019).

This study provides policymakers with a comprehensive framework to understand the complex relationship between crude oil prices and production and the performance of the Nigerian GDP. By identifying the factors that influence this relationship, policymakers can develop effective strategies to mitigate the negative impact of fluctuations in crude oil prices and production on the Nigerian economy (Abdurrahaman & Osman, 2017). This study is therefore crucial for promoting sustainable economic growth and development in Nigeria, reducing the country's vulnerability to global market volatility, and diversifying the Nigerian economy (Alhaji & Idris, 2019).

According to Emehelu (2021) over the years, unstable policies have occasioned the fluctuations in crude oil prices and production on the performance of the Nigerian Gross Domestic Product. The over-dependence on crude oil exports has made the Nigerian economy vulnerable to global market volatility, which can lead to a decline in government revenue and affect economic growth. Therefore, understanding the relationship between crude oil prices and production and the performance of the Nigerian GDP is crucial for policymakers to develop effective strategies to promote economic growth and development in Nigeria (Adesola, Ewa, & Edem, 2020).

The 2020-2021 period, Nigeria's economy contracted by 3.6% due to the impact of the COVID-19 pandemic on global oil prices and domestic economic activity. The first quarter of 2021, Nigeria's GDP contracted by -1.87% due to the impact of the COVID-19 pandemic on global oil prices and domestic economic activity. The second quarter of 2021, Nigeria's GDP contracted by -3.62% due to the impact of the COVID-19 pandemic on global oil prices and domestic economic activity. This has resulted in low GDP growth, increase in importation and balance of payment deficit.

Most studies have looked at crude oil production and economic growth (Gbatu, Wangz, Wesseh, & Tutdel, 2017; Djelloul & Talbi, 2017; Igbinedion, 2019; Gbahabo & Oduro-Afriye, 2017) while other studied the impact or effect of crude oil price fluctuation on economic growth (Ewing & Thompson, 2016; Tamba, 2017; Bokenov, 2018), however, no studies have combined the effect of oil price and production on economic growth in Nigeria which is the gap of this research. Furthermore, previous studies were limited in scope in terms of number of years covered by the study and in contents.

The essence of this article is to demonstrate the conceptual framework for effect of crude oil prices and production on the performance of Nigerian gross domestic product, first by assessing the relevant variables and then drawing up the conceptual framework. The remainder of this study will be done in chapters: Chapter 2; Literature Review, Chapter 3; Methodology and the conclusion.

2. Literature Review

Oil is a crucial energy source for modern economies and remains a major energy commodity traded in the international market. The demand and supply of oil depends on the internationally determined market price which can be affected by unpredictable global events (Nwosu, Anumudu, & Nnamchi, 2020). Thus, the price and production of crude oil remains an important component influencing the world's economic development, modern turn of events, food cost, poverty, and other financial factors, other than its elements is the primary list exhibiting oil market conditions (Jiménez-Rodríguez, 2008; Naranpanawa & Bandara, 2012; Sule-Iko & Nwoye, 2023). Crude oil in this study is believed to be the main driver of the economic condition of developing countries especially Africa continents Nigeria to be precise such that a rise in the price of crude oil significantly improves the country's revenue and a fall also affects the nation's revenue negatively (Sule-Iko & Ibrahim, 2021).

According to Baumeister and Kilian (2016), oil price fluctuations are an unanticipated component of a substantial change in the price of oil, defined as the difference between the expected and realized oil prices. In the simplest term, a change in oil price could boost economic growth in that it could make the price of crude oil in the international market appreciate at the expense of domestic oil prices. However, the general impact of crude oil price fluctuations on enterprises and economic growth is mainly determined by how the government manages its

previous and current revenue (Ighosewe, Akan, & Agbogun, 2021). The Nigerian economy has been heavily reliant on the production and export of crude oil as its main source of foreign exchange earnings and government revenue. Thus, changes in crude oil prices and production have a significant impact on the performance of the Nigerian Gross Domestic Product (GDP) (Igbodika, Jessie, & Andabai, 2016).

According to the *World Bank Report (2023)*, Nigeria's projected current account deficit will remain at an average of 0.3% of Gross Domestic Product (GDP) in 2013-25 due to declining prices and stagnant oil production. Despite oil prices trading at an average of \$101 per barrel per year, the decline in oil production in 2022 exposed Nigeria's fragile state, as real growth of the country's oil GDP stood at -19.2% at the end of the year (*National Bureau of Statistics, 2022*). Before corona pandemic, Nigeria's oil sector alone accounted for about 9% of the country's gross domestic product (GDP). Between October and December 2020, the oil industry contributed 5.9% to the total real GDP, a decrease of roughly three percentage points compared to the previous quarter in July-September (Sasu, 2023). Fluctuations in crude oil production levels also have a significant impact on the performance of Nigeria's economy. Nigeria is the largest oil producer in Africa and the sixth-largest oil-producing country in the world (*World Bank, 2022; Olofinbiyi et al., 2021*). Attacks on oil infrastructure in the Niger Delta region, pipeline vandalism, and oil theft have led to significant disruptions in crude oil production, leading to a decline in government revenue and negatively affecting the country's GDP (Iwayemi et al., 2019).

Effects of crude oil price as well as its production on Nigeria economy (GDP) since its discovery in 1956 in Oloibiri, Niger Delta after half a century of exploration by Shell B. P. cannot be over emphasized following that Nigeria's economy since the 1970s is incomplete without recounting the swings in crude oil prices (BudgIT, 2014). Apart from unrest and insecurity issues the oil price glut globally has become one of the biggest challenges deterring the Nigerian economy (Akinlo, 2012; Udoh & Umoh, 2014; Adugbo, 2016).

Umoru et al. (2023) proofed in their study that crude oil price volatility has a significant negative impact on the Nigerian economy using Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. In the same vein (Obi & Nwezeaku, 2021) affirmed that the relationship between crude oil production and the Nigerian GDP is positively significant using Johansen cointegration test and error correction model. The study concludes that crude oil production has a significant impact on the Nigerian economy. The above findings supported (Oyewole & Oloni, 2019) found out that Nigerian economy was more responsive to changes in crude oil prices than changes in production levels using vector auto-regression model approach to the impact of crude oil prices and on Nigerian GDP.

The impact of oil price fluctuation is different between oil-importing and exporting countries. Hence, through transmission mechanisms of demand and supply, oil prices have a significant effect on the economic activities of oil-pro-

ducing nations. From the supply side effects, crude oil serves as the primary input to production, and a sudden increase in its price may result in a rise in the production costs of firms, resulting in lower output. Therefore, from the demand side effects, oil price changes affect consumption and investment. Thus, consumption is affected indirectly through its positive relationship with the amount of money that households have available for spending and saving after income taxes have been accounted for (i.e. disposable income). For example, a report shows that oil price fall contributed to economic slump in 2015 with an estimated 2.8% GDP growth rate in Nigeria (Manasseh et al., 2019).

The impact of crude oil prices and production levels on Nigeria's economy is not limited to the oil sector alone. The oil sector contributes significantly to government revenue, which, in turn, supports other sectors of the economy. Therefore, fluctuations in crude oil prices and production levels can have a ripple effect on the performance of other sectors of the economy, such as manufacturing, agriculture, and services (Adejumo et al., 2021). Changes in crude oil prices and production can have either positive or negative effects on the Nigerian economy. Thus, there is a need for the Nigerian government to diversify the economy and reduce its reliance on crude oil as its main source of revenue to mitigate the effects of fluctuations in crude oil prices and production (Jayathilaka et al., 2022).

3. Methodology

The Nigerian economy heavily relies on crude oil exports as a major source of revenue. Therefore, fluctuations in crude oil prices and production can have significant effects on the country's economic performance, particularly on the Gross Domestic Product (GDP). Understanding the impact of crude oil prices and production on the Nigerian economy is crucial for policymakers and investors to make informed decisions (Kress, Su, & Wang, 2016). In this regard, this study proposes a conceptual framework to investigate the effect of crude oil prices and production on the performance of Nigerian GDP. To analyse the relationship between crude oil prices and GDP, various econometric models have been used in previous studies (Nwanna & Eyedayi, 2016). For instance, the autoregressive distributed lag (ARDL) approach has been used to investigate the short and long-run effects of crude oil prices on GDP (Adeniyi, Omisakin, & Egwaikhide, 2019). Additionally, other studies have employed the Vector Error Correction Model (VECM) to estimate the dynamic relationship between crude oil prices and GDP (Alhaji & Idris, 2019; Ezeoha & Onwuka, 2017).

Furthermore, to examine the impact of crude oil production on GDP, previous studies have used various methods such as the ordinary least square (OLS) regression (Oriavwote & Oghogho, 2019) and the Granger causality test (Akinlo, 2014).

Only peer-reviewed articles were considered for this selection; only high-quality articles were chosen and presented below (Table 1 and Table 2).

This study proposes a conceptual framework to investigate the effect of crude oil prices and production on the performance of Nigerian GDP. The study will

Table 1. Selection of articles.

Articles selected from databases	Assessing suitability of article
Elsevier	✓ Using keywords on the journal webpage to check for availability.
Springer	✓ Assessing suitability by going through literature reviews and introduction sections of articles to determine suitability for crude oil prices and production.
Wiley	
Emerald	

(Source: Author).

Table 2. Number of articles selected from databases (Source: Author).

Dimensions Crude Oil Prices & Production	Number of articles selected	% increase in publication
Crude Oil Prices	32	20.3
Crude Oil Production	18	11.29
GDP	12	8.23
FDI	32	20.3
Foreign Exchange Earnings	26	18.36

utilize various econometric models, including ARDL and VECM, to estimate the short and long-run effects of crude oil prices on GDP, and OLS regression and Granger causality test to examine the impact of crude oil production on GDP. By employing these methodologies, this study aims to provide empirical evidence to inform policymaking and investment decisions in the Nigerian economy.

3.1. Dimensions of Crude Oil

In order to measure the effect of crude oil prices and production on the performance of Nigerian Gross Domestic Product (GDP), several proxies can be used.

3.1.1. Crude Oil Prices

Crude oil prices can be used as a proxy for the impact of international market conditions on Nigeria's economy. Changes in crude oil prices are indicative of fluctuations in demand and supply in the global market, which ultimately affect Nigeria's export earnings from crude oil. In this regard, the West Texas Intermediate (WTI) and Brent crude oil prices are commonly used as proxies for crude oil prices. The oil industry experienced a major transformation due to the oil boom that occurred in some part of the world. In the 1950's, the international body of the oil industry outside China, Canada, United States and the USSR had a dominant position in various large multinational oil companies called the Majors or the Seven Sisters (Fattouh, 2011). The Seven Oil Sisters consist of five different American companies, an English-Dutch Company, and English Company. The host government only acted as the seller of license and did not partic-

ipate in the pricing and production of the crude oil (Nyakuwanika & Mhaka, 2021).

However, the host government made profit via income taxes and royalties. The control of both the downstream operations and upstream operations were dictated by the Seven Sister (Metcalf, 2016). The struggle for the control of the oil pricing lingered for couple of years and oil exporting countries were looking for ways to eradicate the whole monopoly system of the Seven Sisters. Finally, at the end of the four-day summit of Baghdad Conference, a permanent petroleum organization called OPEC (Organization of Petroleum Exporting Countries) was created in 1960 (Ebghaei, 2007). The various oil barrels include; Brent Blend, West Texas Intermediate (WTI), New York Mercantile Exchange (NYMEX) and the OPEC basket price (Ogboru, Rivi, & Idisi, 2017). The Nigerian crude oil falls under the OPEC Price Basket. It serves as the mean value of prices gotten from Nigeria and other countries like Indonesia, Dubai, Saudi Arabia, Algeria, Mexico, and Venezuela (Ogbu, 2019).

3.1.2. Crude Oil Production

Crude oil production can be used as a proxy for the direct impact of oil activities on the Nigerian economy. Changes in crude oil production reflect changes in the level of activity in the oil industry, which in turn affect Nigeria's export earnings, government revenue, and employment opportunities (Okonkwo & Mojekwu, 2018). The Nigerian National Petroleum Corporation (NNPC) provides data on crude oil production in Nigeria, which is commonly used as a proxy for crude oil production. According to OECD (2021) crude oil production can be defined as the quantities of oil that is extracted from the ground after the removal of inert (impurities). The oil production is focused on the exploration and processing of the crude oil. After the discovery of oil in Niger Delta around 1956, Nigeria started oil exploration. Shell-BP was a sole concessionaire when it discovered the crude oil in Nigeria. In 1958, Nigeria became part of the oil producing countries with 5100 bpd initial production (Akinyetun, 2016). The exploration and production of the crude oil soar higher every year due to the operations of the streams like the Upstream, Mid-stream and downstream sector. Crude oil production refers to the extraction and processing of raw, unrefined petroleum from underground reservoirs. This process typically begins with the drilling of exploratory wells to locate and assess the size and quality of an oil deposit. Once a deposit is found and deemed economically viable, production wells are drilled to extract the crude oil. The extracted crude oil is then transported to a processing facility, where it is refined into various products such as gasoline, diesel fuel, and jet fuel (Olalekan, Afees, & Ayodele, 2016).

3.1.3. Gross Domestic Product (GDP)

Gross Domestic Product (GDP) can be used as a proxy for the overall economic performance of Nigeria. Changes in GDP reflect changes in the level of economic activity in Nigeria, including the oil industry. A higher GDP indicates a

stronger economy, while a lower GDP indicates a weaker economy. GDP data is available from the National Bureau of Statistics (NBS) and is commonly used as a proxy for economic performance (Olalekan, Afees, & Ayodele, 2016). Economic growth is defined as an increase in the amount of goods and services that are produced per head of the population over a certain period. In an economic theory, the concept of economic growth is focused on the annual increase of the total material produced in the country (Acemoglu, 2009). GDP is defined as the market value of all the final goods and services produced within a country within a time period (Wolla, 2013). It helps measure the total market value of the total economic activities carried out within the country. GDP is measured in two ways: the real GDP and nominal GDP. The nominal GDP is the total money value of goods and services that are produced in the economy over a certain period (like a year). The real GDP is the total quantity of all the goods and services produced over a period. The nominal GDP is calculated in money terms. For instance, if the price of a commodity is $i(P_i)$ and the quantity of i is Q_i , then the money value of the nominal GDP is $Y_i = Q_i * P_i$ (Fix et al., 2019). When aggregating the money value in terms of n commodities which are produced in the economy, the nominal GDP would be:

$$\text{Nominal GDP} = \sum_{i=1}^n Y_i = \sum_{i=1}^n Q_i * P_i \quad (1)$$

As seen in Equation (1) above, the nominal GDP can contract or grow for two reasons which are price changes (deflation or inflation) and quantity changes (lesser or greater production). According to macroeconomists, if the effect of deflation or inflation is removed, it would generate the real GDP. Therefore, the multiplication of each commodity by its current money price (P_i) is replaced by the price usually in a particular base year (Pb_i) (Fix et al., 2019). The equation is shown below:

$$\text{Real GDP} = \sum_{i=1}^n Q_i * Pb_i \quad (2)$$

This paper would focus on the real GDP as the yardstick of computing the growth rate for the effect of oil pricing and production on the Nigeria economy.

3.1.4. Foreign Exchange Earnings

Foreign exchange earnings can be used as a proxy for the impact of crude oil prices and production on Nigeria's balance of trade. Changes in foreign exchange earnings reflect changes in the level of export earnings from crude oil, which in turn affect Nigeria's balance of trade. The Central Bank of Nigeria (CBN) provides data on foreign exchange earnings, which is commonly used as a proxy for the impact of crude oil prices and production on the balance of trade (Oludimu & Alola, 2022).

3.1.5. Foreign Direct Investment

International Monetary Fund, IMF (2022a, 2022b), defines Foreign Direct Investment (FDI) to reflect the aim of obtaining a lasting interest by a resident entity of one economy (direct investor) in an enterprise that is resident in another

economy (the direct investment enterprise). The “lasting interest” implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the latter. Direct investment involves both the initial transaction establishing the relationship between the investor and the enterprise and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated. It should be noted that capital transactions which do not give rise to any settlement, e.g. an interchange of shares among affiliated companies, must also be recorded in the Balance of Payments and in the IIP.

Different researchers have written on the relationship between foreign direct investment FDI and Economic growth using different methodology, [Ajibola et al. \(2019\)](#). Investigate the impact of FDI in the manufacturing, mining, oil, and telecommunications sectors on economic growth in Nigeria using a theoretical framework based on standard growth accounting theory, as well as a detailed examination of sectorial FDI (which is only accessible for the period 1986-2009). The descriptive analysis, unit roots test, Johansen co-integration test, error correction mechanism, and fully modified least squares technique were all used in this. Over the period 1981 to 2017, the correlation analysis of aggregate FDI on sectorial GDP growth shows that only the oil sector GDP has a substantial positive association with aggregate FDI. [Okegbe, Ezejofor, Oforun \(2019\)](#) The researchers looked at how much Foreign Direct Investment (FDI) contributed to Nigeria’s Gross Domestic Product (GDP) From 2000 to 2017. Three hypotheses were developed during the course of this investigation in order to meet the study’s objectives. [Sabuur and Ismaila \(2020\)](#) investigated the impact of foreign direct investment on Nigerian economic growth through time. The study uses the ordinary least square approach to analyse annual time series data from 1981 to 2018. The evaluation demonstrates that foreign direct investment has been quite important and fundamental to the economy’s growth process over time. [Giwa, George, Okodua, and Adeniran \(2020\)](#) carried out a study on the empirical analysis of the effect of foreign direct investment inflow on Nigeria real economic growth: implication for sustainable development goal-17.

3.1.6. Conceptual Framework of the Study

To reiterate, this study aims to investigate the effect of oil price and oil production on economic development in Nigeria. As can be seen in [Figure 1](#), achieving real economic development requires both the oil production, oil price and oil price volatility. It depends on foreign direct investment which is a control variable.

Inward FDI is seen as major stimulant of real GDP, though researchers believe it generally depends on the types of FDI. In this research, it is expected that an increase in FDI inflow will generate more output for export and economic development which is expected not to be different in Nigeria ([Muhammad, Azu, Oko, 2018](#)) FDI is used as a control variable.

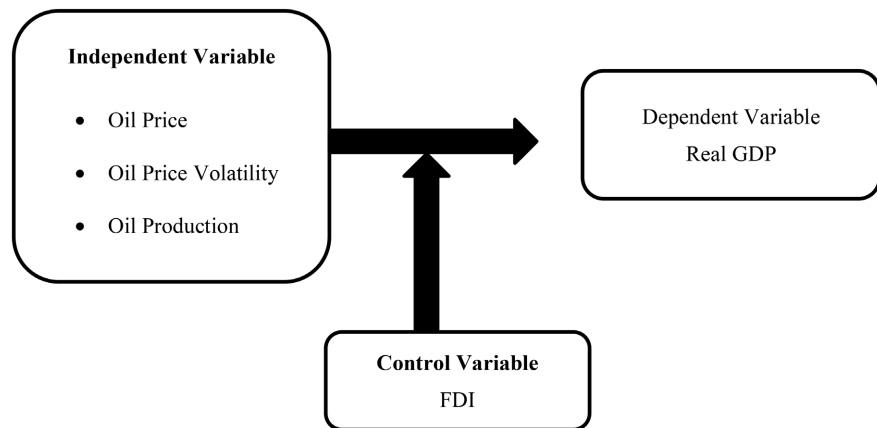


Figure 1. Conceptual model.

4. Conclusion

This conceptual framework highlights the significant impact of crude oil prices and production on the performance of Nigerian Gross Domestic Product (GDP) from various dimensions. The Nigerian economy heavily relies on crude oil exports, making it susceptible to fluctuations in global oil prices and production levels. As stated by [International Monetary Fund \(2020\)](#), the volatility of crude oil prices and production levels in Nigeria has led to economic challenges such as high inflation rates, high debt levels, and fiscal imbalances. The social dimension highlights the impact of the oil industry on employment opportunities and living standards as stated by [Aregbeyen, & Kolawole, \(2015\)](#); [Daramola and Abiola \(2017\)](#). Additionally, the environmental dimension is also important, as oil exploration, production, and transportation activities have negative impacts on the environment, as noted by [\(Bello & Nwaeke, 2023\)](#). Therefore, this framework emphasizes the need for policymakers and investors to prioritize sustainable development by diversifying the economy, promoting non-oil sectors, and adopting environmentally friendly practices [\(Sertoglu, Ugural, & Bekun, 2017\)](#). In conclusion, understanding the effect of crude oil prices and production on the performance of Nigerian GDP is crucial for sustainable development in Nigeria, and this conceptual framework provides valuable insights for policymakers and investors to make informed decisions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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