Reflecting on the appetite for borrowing and the volatility of crude prices for rapid post-COVID economic recovery initiatives in Nigeria: Implications for Per capita income using a Dynamic ARDL simulation approach

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Abstract

The emphasis is on attaining a swift post-COVID economic recovery in Nigeria. This paper attempts to objectively analyze the complicated link between excessive borrowing, fluctuations in international crude oil prices, and its effect on income per capita in Nigeria. This study offers important insights into the factors influencing income levels in Nigeria by looking at an extensive number of macroeconomic variables, such as capital expenditure, recurrent expenses, domestic and external debt, money supply, crude oil price, inflation, interest rates, GDP growth, and income per capita. The study estimates the model parameters and investigates both long-run and short-run equilibrium relationships using the novel autoregressive distributed lag (ARDL) simulation technique, a method renowned for its dependability and consistency in time series analysis. The result shows that present per capita income is strongly impacted by lagged per capita income. The findings demonstrate the stability of income levels across time. Additionally, there are notable short-term impacts of interest rates and the GDP growth rate on per capita income, demonstrating the significance of monetary and fiscal policies in promoting economic expansion and revenue generation. The result emphasizes how inflation and the volatility of crude oil prices affect per capita income, highlighting how susceptible Nigeria's economy is to changes in oil prices and how important it is to control inflation. The analysis finds no evidence of a substantial correlation between capital formation, spending patterns, debt stock, and per capita income, indicating the necessity for a thorough evaluation of resource allocation and debt management strategies. The research results highlight the significance of sustainable economic growth, diversified portfolios, effective debt management, and synchronized fiscal and monetary strategies in order to raise per

capita income and advance the well-being of Nigerians. These findings have important ramifications for policy formulation and post-COVID economic recovery efforts in Nigeria.

Key words: Reflecting, Appetite, Borrowing Volatility, Crude, Rapid, Post-COVID, Recovery, Nigeria, Implications, Per capita Income, Dynamic, ARDL, Simulation, Approach

Introduction

Background

Nigeria benefits from fluctuations in crude oil prices since it is a traditional export commodity and exports the bulk of its money. This implies that rising oil prices would spur economic growth, while falling prices would result in lower revenue. The global COVID-19 epidemic also worsened economic conditions, stalling growth in certain nations and sending others with weak economic underpinnings into recession. The impact was seen in the microeconomic conditions across the different countries as well as in the macroeconomic outlook, especially in Nigeria. The international economy is predicted to contract this year before recovering due to the impact of the pandemic, the conflict between Ukraine and Russia, and the struggle to keep up with the demands of a stable economy (Gourinchas, 2023). In addition to constituting an imminent threat to humanity, COVID-19 also significantly impacted global supply chains, output, and livelihoods. compelling nations to take extraordinary steps, including lockdowns, restrictions, and other safety precautions, which halted all financial and commercial activity for weeks and months.

The first shift in the price of WTI crude oil occurred on March 21, 2020, when it increased from $17 to almost $37 per barrel (Wang *et. al.,* 2023). It had a major impact on global financial markets, affecting both oil importers and exporters. The impact was catastrophic for Nigeria's economy, which was still emerging from recession in 2016, and it seriously impeded the nation's chances for economic development and investment. The recession caused the most populous country in

Africa's income per capita to drop to an all-time low between 2017 and 2019, (British International Investment, 2022). A global phenomenon that restricted capital flows and cross-border economic activity resulted in a decline in foreign direct investment, compounding the country's catastrophic financial challenges. The segments of the economy that were most affected by the abrupt halt of economic activity brought on by the countrywide lockdown were manufacturing, retail, and real estate, (Wang *et al.,* 2023).

The fall also affected other commodities, like coal. For example, according to Liu *et al.,* (2022), the price of coal, which is interchangeable with crude, plummeted as well, falling from $69.54 on April 1 to $48.65 on April 26. Between the years 2019 and 2020, the price of crude oil plunged to its lowest level in more than three decades, reaching as low as $11 a barrel and sending shockwaves through the market. Meaning that in 2020, Nigeria's expected oil revenue flow will decrease from 5.5 trillion to 1.1 trillion. A sudden fiscal crisis was sparked, driving the government into a negative balance of payments and bringing about some very significant economic issues. Countries with strong fiscal policies, like the US government, unveiled a new set of energy policies in an effort to restore equilibrium in the financial system and mitigate the impact associated with this tragic effect (Wang *et al*., 2023). Most oil-producing nations faced an enormous economic burden as a result of the low price of crude oil, even worse for Nigeria, which derives a substantial amount of revenue from abroad from the export of crude oil.

Nigeria's economy has a centralized fiscal structure and is heavily reliant on oil exports. According to Ogbonna (2018), 95% of government revenue is earned through oil exports, making up a significant portion of the government's expenditure portfolio. Arguing that Nigeria must strive to maintain its maximum oil output with rising global oil prices in order to raise revenue to fund national spending, (Adi, 2023). In accordance with the aforementioned circumstances, a downward adjustment to the global oil market in the form of a decline in oil demand or price would have catastrophic negative effects on the state of the economy (Aladejare, 2023). An appreciation in oil price will result in a rise in the foreign reserve, which will enhance the inflow of foreign currency. It will also stimulate interest from foreign investors in stocks, bonds, and equities issued by the country (Aladejare, 2023). However, a decline in oil prices will cause the foreign reserve to be depleted, which will cause the exchange rate of the local currency to decline and cause foreign investors to withdraw their interest in the country's stocks and bonds (Adi *et al*., 2022).

On its list of the ten countries with the highest debt exposure in 2021, the World Bank ranked Nigeria fifth. The decline in oil revenue has necessitated an overreliance on borrowing to fund the national budget. Consequently, the World Bank indicated that Nigeria utilized 96.3 percent of its 2022 earnings to service debt and, furthermore, that the country's ongoing fiscal imbalance has increased the level of its public debt, as published by Vanguard News Nigeria on the 17th of April 2022. The entirety of the national debt in Nigeria, according to the Nigerian Debt Management Office, was 46,250,367.94 trillion Naira as of December 31, 2022, but by May 2023, it had nearly doubled to 77 trillion naira, prompting concerns about its sustainability and the negative impact on the country's economy. The debt compensation to revenue ratio for Nigeria has occasionally reached as high as 97%, even while the country's debt to GDP varies between a healthy 30 and 35% and the country's tax and revenue share of GDP is between 6 and 8%, according to KPMG (2023).
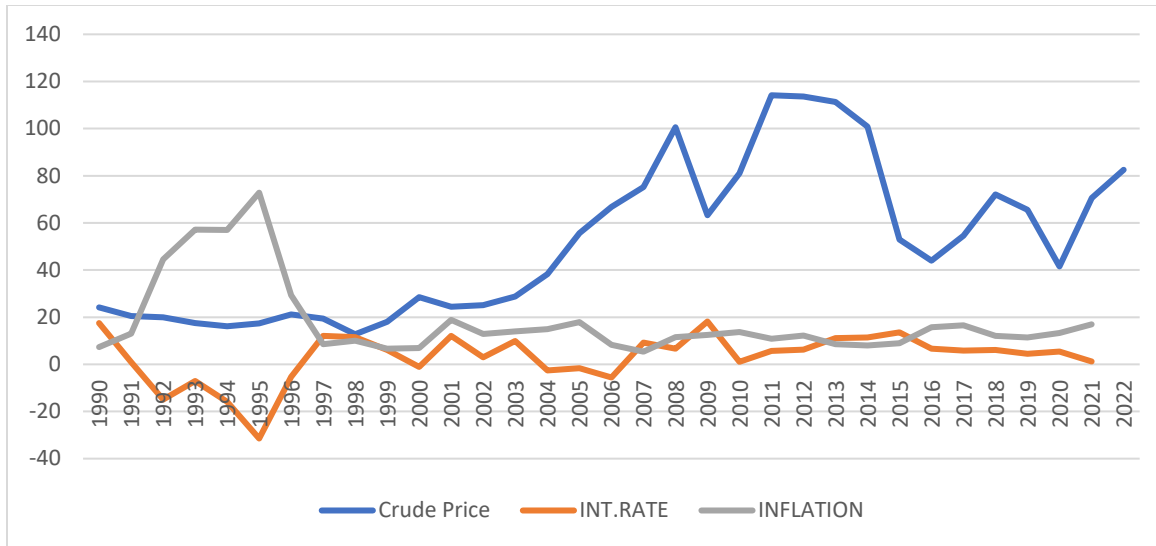
Fig. 1: Connecting the fluctuations in crude prices, interest rates and inflations

Source: OPEC, Nigeria bureau of statistics, and World Bank data bank 2023.

The pattern seen above is consistent with basic assumptions and theory; for instance, data indicate that when oil prices rise, which increases the country's revenue, interest rates and inflation are lower than when crude prices fall. As a result, in order to channel capital from foreign investors into the local economy to stimulate it, governments have been forced to take on debt, especially when the price of crude falls. The main issue is whether public debt is helpful or harmful to economic progress, and policymakers have long been concerned about the total amount of debt owed by African countries (Otovwe, 2019). An ever-increasing debt load considerably limits a country's ability to build its economy. Additionally, during COVID's peak moments, the price of oil fell sharply as a result of supply chain interruptions and decreased demand for petroleum. At this point, Nigeria and most countries turned to loans as a major source of funding for developmental projects.

The republic's economy endured severe repercussions from the drop-in oil revenue inflow brought on by kidnapping, insurgency, and oil theft, compounded by the COVID-19 epidemic restrictions, (Okwuwada 2023). The restriction did not only affect personal liberties; it also exposed a precarious economic situation for developing countries, exacerbating poverty and economic inequality through increased unemployment. The intensity of the outbreak, however, curtailed the fiscal policies of countries, causing a ripple effect on micro and macro consumption patterns that

resulted in contractions in economies (Wang et al., 2023). The epidemic crippled the Nigerian economy, resulting in a sharp decrease in oil income and a protracted halt in international economic activity. Although crude oil provides for over 90% of Nigeria's foreign exchange revenue, statistics show that at the peak of the pandemic, it only accounted for less than 10% of the GDP, (Bello & Gidigbi, 2022).

The global pandemics halted the demand for crude oil, which is the main bane of the Nigerian economy, forcing the government to review macroeconomic variables in an attempt to increase consumption and steer the economy away from collapse; for example, it reduced the interest rate in 2020. According to Obienusi & Chikwendu, (2021), oil output decreased to 1.67 million barrels per day from 1.81 million barrels in the previous quarter, the lowest level since the third quarter of 2016, when the economy last went through a recession. Regardless of whether a country functions as a traditional exporter or an importer, the effect of the reduction in oil prices has a variety of repercussions for all countries. The COVID-19 crisis brought attention to the possible role of global financial interdependence as a factor in fluctuations in prices and systemic vulnerability (Mensi *et al*., 2020). Making nations susceptible to the economic health of their international partners; for instance, the price and quantity of a commodity that a nation is willing and able to pay for are largely determined by the economic health of that nation. Evidence may be found during the peak of COVID-19, when the majority of production lines were shut down, mobility was restricted, and the price of oil slightly decreased since the need for fuel was suspended.
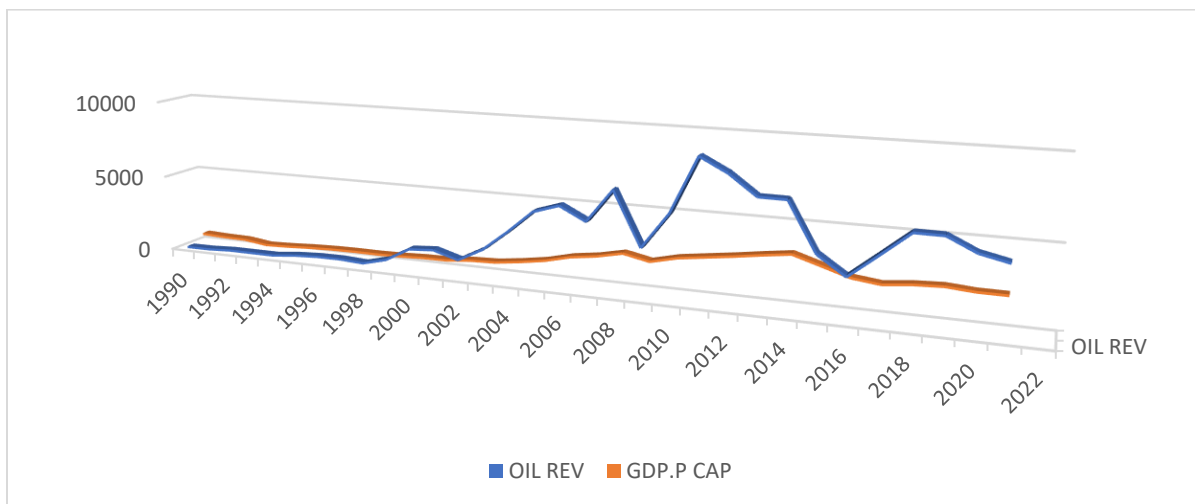
Fig.2: Total Oil Revenue and the GDP per capita trend

Source: Central Bank of Nigeria Bulletin World Bank Data catalogue

Figure 2 illustrates the obvious and symbiotic link between oil revenue and gross domestic product per capita, showing that when oil revenue rises, income per capita likewise rises while maintaining all other variables constant. The result show that the government makes more money and invests the same amount in the economy, which has a multiplier effect on the residents' well-being as measured by income per capita. However, as oil revenues decline, the government will be forced to compete with enterprises for bank financing, endangering both the economy and the citizens' ability to borrow. This immediately lowers a company's ability to expand and hire workers in order to increase economic growth, lower unemployment, and raise people's standards of living. Also, Pro-cyclical fiscal policy is more challenging to adopt when there is high public debt, which can worsen instability and slow growth, (Arestis *et al*.,2022).
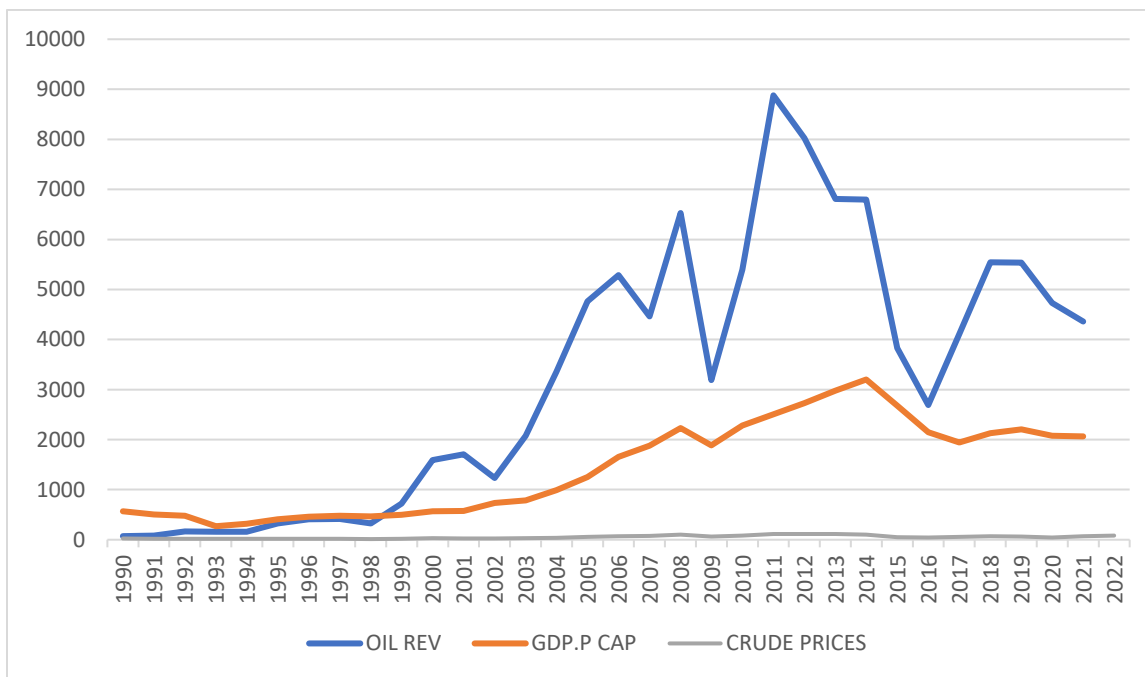
Fig 3: Crude oil Price, GDP and Crude Oil Revenue of Nigeria

Source: Central bank of Nigeria, World Bank and OPEC

The chart above demonstrates how revenue and gross domestic product (GDP) per capita increase as crude oil prices rise and decrease as prices decrease. Citizens are significantly affected by the consequences of rising inflation and interest rates, among other things. Due to the negative consequences of excessive borrowing on the country's inflation and exchange rate, even after the COVID pandemic has ended, the effects still persist. This is due to the previous effects it had on the economy. In light of the aforementioned scenario, adjustments to the global oil market in the form of a decline in oil demand while maintaining the same level of supply would have severe negative effects on the health of the economy (Mensi *et al.,* 2022). Interestingly, net oil exporters would be substantially more affected than net oil importers by an oil price shock in the form of a price decline. The foundation of economic recovery is the hunt for a more determined strategy to reduce debt while sustaining traditional developmental advancements.

1.2 The problem statement

The challenges that are confronting Nigeria are great and too numerous to count. They include, among other things, the depletion of foreign reserves, a massive rise in inflation, a rise in the cost of living, budget deficits, unemployment, an acceleration of the crime rate, and an increase in the amount of public debt. If a shock occurs in one area or channel of the economy, it might have a domino effect that makes the fiscal space more unstable (Olanipekun *et al.,* 2022). This consequence has affected the need to fund Nigeria's enormous budget deficit and capital development projects; as a result, Nigeria's debt profile has skyrocketed, raising questions about its capacity to be serviced and the effects it would have on the country's economy. The purpose of this essay is to investigate how excessive borrowing affects economic growth and how this impacts Nigerians' standard of living and consumption patterns.

According to Oyadeyi, (2022), Nigeria was ranked fifth by the World Bank in 2021 among the ten countries with the highest exposure to debt. The increase in borrowed funds over the last decade has created such a huge debt burden for the country that even multinational partners are concerned because Nigeria will have to spend almost 90% of its income to service debt. According to

President Muhammadu Buhari, the goal of borrowing is for development projects that will enhance people's lives and standard of living. However, this goal has proven to be elusive because the majority of Nigerians continue to live in poverty and have limited access to economic opportunities. According to Jolliffe & Lakner (2023), Nigeria was home to approximately twelve percent of the world's people who lived in extreme poverty in 2023, with the poverty threshold set at $1.90 USD per day. "63% of persons living within Nigeria (133 million people) are multidimensionally poor," the National Bureau of Statistics reports. Contrary to the justification for borrowing, this study is necessary to demonstrate how rising debt stocks affect economic growth and living standards.

Many studies have found a significant relationship between crude oil prices and economic growth (Wang *et al.,* 2023; Ogbonna, 2018; Sule-Iko & Nwoye, 2023). Others have also investigated the effects of COVID on the economy (Obi *et al.,* 2020; Abbas *et al.,* 2023; Farayibi & Asongu, 2020). These studies have demonstrated the effect of COVID on the economy. Based on their economic growth, countries are ranked according to their income per capita, given that the economic statistic of income per capita quantifies the economic output of a nation divided by its population. Investigating the impact of excessive borrowing and crude price volatility on income per capita would help estimate how debt, changing oil prices, and excessive borrowing have impacted the general level of welfare of Nigerians, which is lacking in previous literature.
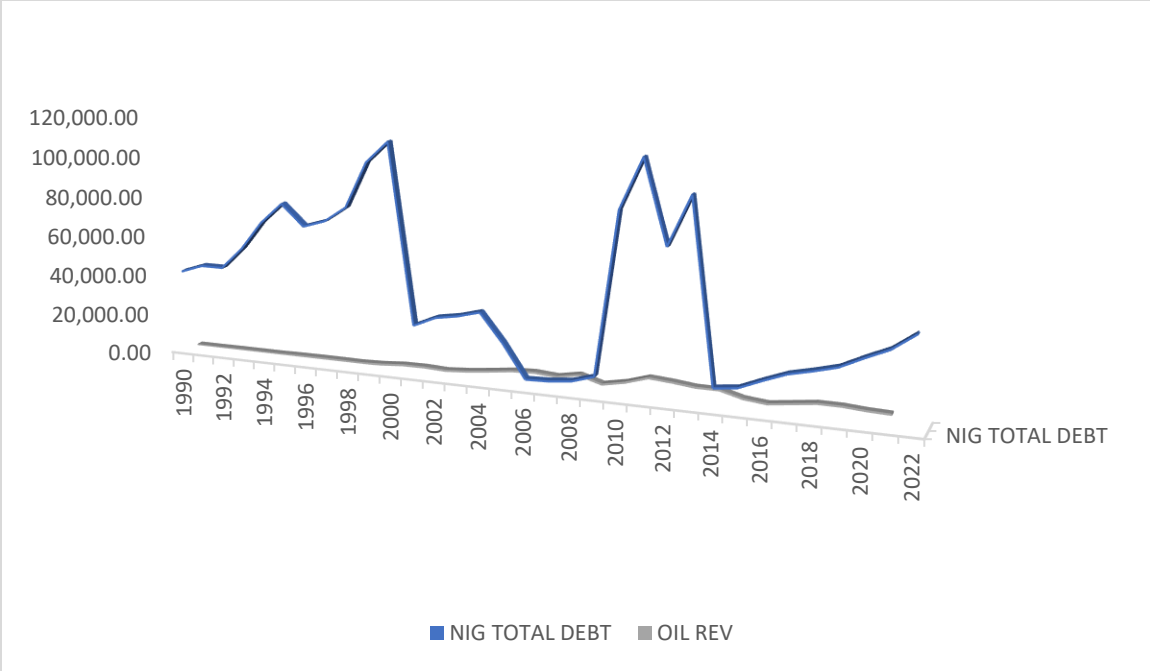
Fig 4: Debt and Oil Revenue of Nigeria

Source: CBN bureau of statistics.

Figure 4 above shows an upward rise in national debt in Nigeria, which is occasioned by a decline in oil revenue. As a result of the repercussions on livelihood and spending, the nation's over-reliance on oil as its primary source of income portends a very bleak future. The sensitivity of debt load indicators to rising inflation, currency rate volatility, the pursuit of import substitution, and industrialization are significant drivers for the growth of foreign debt in West Africa, particularly Nigeria (Aladejare,2023). The export of crude oil is the main source of revenue for the nation, but COVID and the fluctuation in the price of oil have forced a substantial budget deficit that has to be covered. The government exists to facilitate growth and narrow the wealth gap through programs and policies. This has been significantly impeded by the lack of revenue, which has raised doubts about Nigeria's future prospects and its economic viability among important stakeholders, with implications for Nigerians and residents of the subregion as a whole.

The nation of Nigeria, one of the oil-rich developing nations whose economies significantly depend on income from oil exports, confronts "multiple shocks" from the epidemic and the drop-in oil prices (Adedeji *et al.,* 2021). How this shock affects ordinary citizens in Nigeria is both important and crucial for the consolidation of economic prosperity and growth. Although there are

studies on similar topics, studies revealing the impacts of rising debt profiles on income per capita, which is a measure of economic growth, have been lacking in recent studies. For example, most of the studies have been more concerned with the consequences of COVID-19 on economic growth in Nigeria (Farayibi & Asongu, 2020; Inegbedion, 2021; Obi *et al.,* 2020; Awofeso & Irabor, 2020; Otache, 2020). Others have evaluated the impact of fluctuations in crude prices on the economy of Nigeria (Ogbonna & Ichoku, 2023; Raifu & Oshota, 2023; Sule-Iko & Nwoye, 2023). However, this study will empirically assess the effect of rising debt stock and crude oil price volatility on income per capita, with an emphasis on the expenditure patterns of the government for policy recommendations. The study data was obtained from the World Bank, the Central Bank of Nigeria, the Nigeria Bureau of Statistics, and the Organization of Petroleum Exporting Countries' data catalog.

1.3 Objectives of study

The study's main objective is to objectively examine how high borrowing and volatile crude oil prices affect per capita income in order to facilitate Nigeria's quick post-COVID economic recovery.

1. To investigate the effects on income per capita of an increasing debt stock, fluctuations in the price of crude oil, patterns of spending, inflation, and interest rates.
2. Estimate how growing debt levels will affect per capita income in the short run and long run.

Literature Review

- The burden of debt, crude oil, and economic growth

Studies have demonstrated the detrimental effects of excessive borrowing on the national economy and populace (Chuku *et al.,* 2023; Popa *et al*., 2023; Bianchi, 2011). Meaning that credit constraints, which link debt to a price determined by the market, are a systemic credit externality that separates competing and constrained ethically optimal equilibria and encourages excessive borrowing by the government. Conversely, achieving the goals of the Sustainable Development Goals necessitates a large financial commitment to the development of infrastructure, human

resources, and investment (Yusuf & Mohd, 2023). Alberola *et al.,* (2021) contend that public debt may also be used as a safety net in the event of an unpredictable and temporary crisis to decrease the need to quickly increase taxes to finance higher spending since borrowing also offers advantages for national growth. This study will not only increase knowledge but may also aid in guiding policy decisions by examining the question of how much borrowing impacts economic growth and citizen lifestyles. It will do this by using residual factors to explain why rising debt in Nigeria has not improved standards, which were inclusive in other previous studies.

Societies that rely extensively on one commodity that has its rates defined outside their jurisdiction and control are prone to instability, particularly in the event of unfavorable price swings. According to Adi *et al.,* (2022), Nigeria often has fiscal difficulties anytime the price of oil falls globally and flourishes when the price of crude oil increases. The need for loans to finance projects in Nigeria has been made necessary by the economy's entire reliance on the interaction between the supply and demand of petroleum products on the international market. Typically, the issue gets complicated due to the nation's heavy reliance on consumer and capital goods imports to meet the demands of its over 200 million inhabitants and domestic manufacturing (Adi *et al.,* 2022). The result is the multi-level borrowing occurring in Nigeria presently, specifically the sustainability of a nation's debt, which is often evaluated by economists using two indicators: the first is the ratio of debt to gross domestic product (GDP) in a nation, and the second is the ratio of debt payments to the export of goods, services, and primary income (Oyadeyi 2022).

According to Oyedeyi (2022), less than 15% is considered an acceptable ratio for debt service to exports. However, Nigeria has far exceeded that ratio, recording an almost 38% debt-to-GDP ratio (take-profit.org, 2023). According to a World Bank forecast, the federal government's earnings in 2023 will be consumed by debt servicing to the tune of 123.4% (Muhammad & Abdullahi, 2020). The reason for this is due to the fact that Nigeria's repayment of debt grows significantly when expressed as a percentage of the money the nation is producing. For instance, Nigeria's debt service to revenue ratio in the first quarter of 2018 was 118%, by extension; the nation spends N1.18 of every N1 it earns to service debt (Oyadeyi 2022). Additionally, the authorities are experiencing financial difficulties as a result of the resulting deficit between recurring expenses and government revenue, with financing anticipated to gulp almost all of the projected 2023 revenue.

Nigeria's government, like that of any other country, is responsible for safeguarding the rights of individuals, supporting businesses (both state and commercial), providing employment opportunities, and reducing inequality by implementing successful fiscal management. Nevertheless, even in industrialized nations, which have immense material, human, institutional, and financial resources, the aforementioned has not been fully realized (Addison *et al.,* 2020). The government typically cites this task as the justification for its excessive borrowing, but data from the Nigeria Bureau of Statistics indicates that the country's population is getting poorer, which makes it necessary to empirically investigate the link between the debt stock, crude price volatility on the global market, and income per capita as a measure to reveal its effect on economic growth. For the purpose of holistic estimation, the study will incorporate pertinent variables that are required to identify the reasons why borrowing has not yielded the desired impact on residents.

One of the various ways to generate money for a project is by borrowing, but there are some concerns about its sustainability and the terms that come with it from foreign lenders. A number of the conditions require the borrowing country to give up a sizeable portion of its national assets as collateral. So that failure to pay the debt may result in the seizure of the collateralized assets, which has raised concern among interested parties about Nigeria's desire for commercial loans. Countries have lost key national assets because they defaulted on payments for facilities. Though loans provide temporary relief for the government to finance projects, they can also make the government complacent about increasing internally generated revenue. When this happens, the government can also crowd out the private sector from gaining access to funds for expansion, which is the very reason the government moves away from consolidating the taxation instruments. The resultant effect is a high rate of unemployment, poverty, and resentment.

According to Aladejare (2023), public financing helps with the deficit, but it comes with consequences and can even be dangerous if not used effectively on projects that yield the necessary returns to defray the debt at maturity. The probability of repayment depends largely on the expenditure patterns of the government; for Nigeria, the ability to defray the debt will be highly dependent on the price of crude and the quantity of barrels supplied. These factors are essentially affected by several externalities, which portend grave danger if there is a halt in demand for the product, as happened during the peak of lockdown across the international space. A country's overall growth can be hampered by inefficient debt management, which can also undermine plans

for future infrastructural development and employment creation (Aladejare 2023. In Nigeria, poor resource management, an insufficient food supply, an undifferentiated economy, and an excessive dependence on exports of raw materials have the potential to render government initiatives to increase lifespan via improved standards of living ineffective and futile.

Income per capita is a vital tool used to estimate the socio-economic welfare of citizens (Palvia *et al*., 2018). A nation needs to boost its per capita income since both the affluent and the poor benefit from increased per capita income. Economic growth is essential as the foundation for any long-term human development plan, and the primary motivation for the government's desire to borrow money is to fund projects that promote economic growth. Yet, given Nigeria's expanding debt stock and volatile petroleum prices, it is vital for the country to comprehend the link between rising debt and income per capita. Considering a long history of foreign loans to finance the growth of industries, social intervention, transportation, health, capital projects, and educational infrastructure, government borrowing may have had a short-term and long-term benefit over time, depending on expenditure patterns. Due to poor prioritization, mismanagement, corruption, and spending behavior, the benefit of this massive borrowing becomes an illusion. Affecting the sustainability of economic growth and development of small and medium enterprises in Nigeria, owing to external shocks experienced by trading partners (Wang *et al.,* 2023),

Numerous low-income countries (LICs) are once again at risk from excessive debt levels, more than 25 years after the Heavily Indebted Poor Countries (HIPC) debt reduction effort was introduced (Chuku *et al.,* 2023). The COVID-19 shock intensified these weaknesses, which had been accumulating for roughly over a decade. In addition to decreased revenues from oil sales as a result of the volatility of global crude prices, the economic situation has forced Nigeria and many other countries that rely heavily on the export of crude oil to reevaluate the execution of their fiscal policies, leaning more on commercial loans. With debt overhangs and debt traps, high levels of government debt have a significant and long-lasting impact on the economic prospects of many emerging and developing nations (Yusuf & Mohd, 2023). Likewise, clearing off loans is expensive since it uses up extremely limited assets. As a consequence, debt repayment takes precedence over prospects for development.

According to Sule-Iko & Nwoye (2023), the following elements must be considered when analyzing oil prices: the market demand for oil alternatives, the effectiveness of transportation and industrial equipment, the state of the stock market, the quantity of established oil reserves, and global socio-political difficulties. Affected by these externalities, coupled with the inability of the government to diversify the economy from its reliance on oil exports, the nation is left with borrowing as the final alternative to finance projects across the country. The nation's rising debt is a dual-edged weapon that can be advantageous if, in the long term, the earnings from investments fully offset the debt or, at the very least, the resulting welfare benefits exceed the cost (Yusuf & Mohd, 2023). Even though it is acknowledged that public borrowing is necessary in Nigeria for the financing of fiscal expenditures, more restraint is needed to avoid debt traps. If not, the result will be a debt trap that is difficult to contain, (Martin & Aleš, 2020)

Arthur Laffer developed the Laffer curve theory in 1974 to depict the correlation between tax rates and the total amount of revenue the government receives and how they are affected by taxes. According to economic theory, a developing country's ability to borrow money at reasonable rates would certainly help it thrive economically (Pattillo et al., 2002; Yusuf & Mohd, 2023). According to the hypothesis, moderate amounts of public debt can boost economic growth. This premise is also in line with conventional ideas, such as the theory of public expenditure, which serves as the foundation for government spending. However, Mhlaba & Phiri (2019), are quick to suggest that unsustainable public debt reduces a nation's economic strength and makes its financial markets more vulnerable to global shocks. Although the theory suggests that expanded public debt will engender economic growth, the current total debt stock of Nigeria has not really had its effects on the population, bringing the questions of 'why' and 'how' into scrutiny. The pitfall is that a debt crisis occurs when a government lacks the resources to pay off its obligations, leading to default or inflation of the loans. Leading to a myriad of economic restructuring and financial instability, which follow difficult stages that have major repercussions on society and the economy for both micro and macroeconomic indices.

To ensure communal consumption and improve the standard of living, the government must act through public expenditure to ensure inclusiveness in economic decision-making processes (Nsirimovu 2022). Financing public expenditure is crucial because micro and macro indicators are both affected by the multiplier effects of public spending. According to Samuelsson's description

of the pure theory of public expenditure theory, citizens forsake initiatives that benefit the community out of self-interest but invest in those that boost ego and prestige (Patel & Annapoorna 2019). The Samuelsson studies on the pure theory of public expenditure, which were conducted in 1954, were an extension of Richard Musgrave's theory (Desmarais-Tremblay, 2014). The justification for government spending is explained by the pure theory of public expenditure. The government's attempts to continuously fund the budget through the acquisition of loans have rather resulted in a frightening debt profile for the nation as a result of a growing budget deficit due to decreased revenue. The vast bulk of the declining revenue will be used for debt servicing, which will put the nation on a debt hamster wheel.

According to the Dutch Disease theory of economic growth, increased oil prices often alter the industrial structure of an oil-exporting nation, concentrating it more on the oil industry and non-oil sectors (Florence & Chioma, 2019). The Dutch disease is a phrase used to describe the negative effects of significant growth in a country's natural resources (Udemba & Yalçıntaş, 2022). The argument goes on to claim that nations like Nigeria that have a wealth of natural resources suffer from challenges like underdevelopment and a high debt profile, among others. When "North Sea oil" was discovered, the Dutch sickness theory was developed to explain why the Netherlands' economy was doing so poorly (Sule-Iko & Nwoye, 2023). According to this hypothesis, a country's exchange rate will increase as a result of a boom in its natural resources, making its industrial exports less competitive. Therefore, the larger oil profit causes the local currency to appreciate, which then results in a rise in consumer goods imports. As a result, the high concentration of imports tends to undermine the competitiveness of the local producers (Florence & Chioma, 2019). That is why Miguel de Cervantes Saavedra once said that "the gratification of wealth is not found in mere possession or in lavish expenditure, but in its wise application," as cited in Ebrahim -Zadeh (2023).

2.2. Empirical Review

The COVID epidemic amplified the effects of long-standing crude price volatility on the global market, resulting in a decline in revenue for the nations that have crude as their major export commodity. The shrinkage in national revenue has its own consequence on the national budgets, with a multiplier effect on the economy and the social welfare of citizens. According to a study by

Sule-Iko & Nwoye (2023) on the Effect of International Crude Oil Prices on Nigeria's Gross Domestic Product from 1985–2020, real GDP is positively impacted by oil prices in the short term, and this effect is statistically significant at the one percent level. Applying the ordinary least squares approach, Farayibi & Asongu (2020), on the COVID-19 Pandemic in Nigeria and Its Economic Repercussions, demonstrate that the COVID-19 pandemic has no significant impact on fundamental macroeconomic indicators in Nigeria, which include GDP growth, employment, inflation, and currency rates. The application of the GARCH model and its variants by Abdulhakeem & Abdulhakeem (2016), while examining Nigeria's macroeconomic volatility in light of the oil price, revealed that all of the macroeconomic variables taken into account (real gross domestic product, interest rate, exchange rate, and oil price) are extremely volatile; asymmetric models (TGARCH and EGARCH) perform better than symmetric models (GARCH (11) and GARCH-M), signaling that the oil price is a significant contributor to macroeconomic volatility in Nigeria.

In the context of a study by Yusuf & Mohd (2023) on the nonlinear influence of government debt on economic growth in Nigeria, the findings showed that while debt service payments supported the debt, the overhang hypothesis activated a symmetric effect that stifled growth, and foreign borrowing had a substantial beneficial and oriented impact on economic growth in both the long and short run. This result is consistent with the findings of Arvian *et al.,* (2022), Aladejare (2023), and Wang *et al.,* (2023). The studies further concluded that short-term economic growth was impeded by inflation and domestic loans to the private sector. Imports, gross savings, industrial value added, and oil rents, on the other hand, have a favorable impact. Adi *et al.,* (2022) examined the relationship between the oil price and the currency rate in Nigeria. The analysis found a substantial relationship between present volatility in financial markets for currencies and oil prices and historical shocks and variability.

Additionally, there is a transfer of shock and unpredictability in both directions between the markets for the United States dollar and Naira and the effective dollar and Naira exchange rates, and the price of oil is affected by the transfer of shock and unpredictability in both directions between the markets for the United States dollar and Naira and the effective dollar and Naira rates. (Adi *et al.,* 2022) These studies indicate the negative consequences of excessive borrowing on the economy, while others show the negative effects of oil price volatility on the economy without

considering income per capita, a crucial indicator of how much each individual in Nigeria is affected by these fluctuations. However, using data obtained from the World Bank, the Central Bank of Nigeria, and the Organization of Petroleum Export statistics, this study will evaluate the combined impact of crude oil price volatility and the growing debt profile on income per capita, a measure of citizens. To understand the variation in income per capita in Nigeria, the following independent variables will be employed: Capital expenditure, recurrent expenditure, domestic debt, external debt (total debt), money supply, crude oil price, GDP growth, GDP per capita, inflation, and interest rate

3.0. Methodology

The following independent variables will be used to analyze the variance in income per capita in Nigeria: Capital expenditure, recurrent expenses, domestic and external debt, money supply, Price of crude oil, inflation, interest rates, GDP growth, and income per capita as dependent variables. Data obtained from the Central Bank statistical bulletin, the World Bank, and the organizations of oil-exporting countries ranging from 1980 to 2021

Data Estimation Methodologies and Model Specification

The novel dynamic ARDL simulation approach was used to estimate the parameters in the study due to its consistency and reliability in time series analysis. For evaluating cointegration and long- and short-run equilibrium connections at both levels and differences, the unique dynamic ARDL Simulations method is effective (Sarkodie & Owusu, 2020). Recent studies to apply this method are et al. (Udeagha, & Ngepa 2022; Ahakwa, *et.al.,* 2023). The advantage of the new dynamic ARDL simulations is that they provide a graphical interface that allows users to explore potential counterfactual changes to the target variable using the ceteris paribus concept (Sarkodie & Owusu, 2020).

The ARDL's defined empirical model is provided by;

$$y_t = \beta_0 + \sum_{1=1}^{p} \theta_i y_{t-1} + \sum_{i=0}^{q} \gamma_i x_{t-1} + \alpha z_t + \mu_t$$

Where y_t represents the dependent variable, x are the main explanatory variables, z is the exogenous variable which has predictive power to affect short-term fluctuations in y. $\beta_0, \theta_i, \alpha$ are the intercepts, coefficients of explanatory variables, and coefficients of the exogenous variables in the model. The ARDL model is dynamic in addressing spurious regression in the sense that all variables are stationary, which yields stationary error terms.

.4.0 Results

4.1 Descriptive Analysis

Table 4.1 displays the descriptive statistics for the study's variables. The mean standard deviation and range of values for GDP, capital formation (CAP), borrowing or debt (DBT), crude prices (CRD), inflation (INF), interest rate (INT), and income per capita (IPC) from the years 1980 to 2020 are displayed in the table. The findings demonstrate that all the variables, with the exception of GDP and interest rates, have positive values, suggesting negative economic growth and interest. The highest rate of inflation, at 72%, was also demonstrated by the findings, with an average of 18.7%. Over the course of 42 years, the GDP has averaged 3.07%, with the greatest recorded at 15% and the lowest at -13.1%. There have been negative interest rates as low as -65.8%.

Table 4. 1: Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
IPC	42	1335.831	870.8964	270.0275	3200.953
DBT	42	5485127	9796491	13.5238	3.80E+07
CRD	42	43.29743	30.7381	12.28	114.15
EXP	42	538.7949	627.5335	4.1001	2522.468
INF	42	18.73532	16.51315	5.388008	72.8355
INT	42	0.842118	14.07661	-65.8572	18.18
GDP	42	3.069167	5.322386	-13.1279	15.32916
CAP	42	37.25268	20.26439	14.90391	89.38105

The graphs of the many variables utilized in the ARDL model are displayed in graphic 4.1, which is the graphic that is shown below. To make sure the variables are stationary, they have been

transformed. None of the variables were log transformed, with the exception of IPC, DBT, and EXP. This is to guarantee their various levels of stationarity. Figure 4.1's chart illustrates the progression of each variable from 1980 to 2020. All of the variables exhibit a consistent trend of movement, with the exception of CRD, which began to shift after 2000. This suggests that these variables could eventually be merged and exhibit an identical pattern.
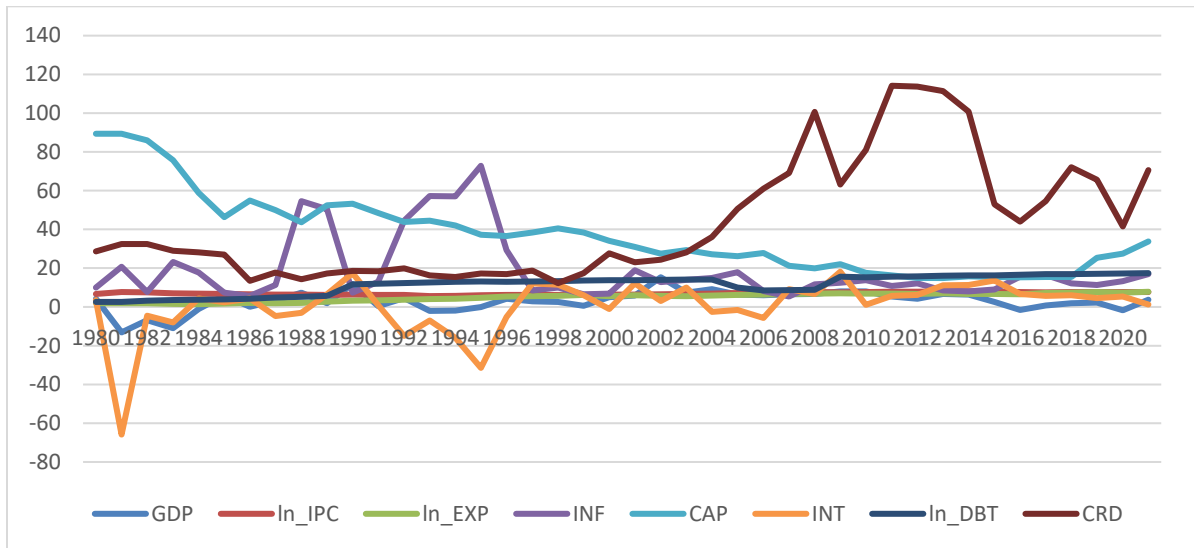
Figure 4. 1The graph of Trend of Variables

4.2 Stationarity Test

The test statistics for the variables being studied are shown in Table 4.2 below. Based on the several orders of integration (I(0), I(1), I(2), I(3), and I(4)), the variables are classified. The table displays three critical values (1%, 5%, and 10%) that are used to evaluate the significance of the test results. The variable is stationary at a given significance level if the test statistic's absolute value is greater than the critical value. The findings demonstrate that the test statistics for IPC and EXP are higher than the critical values, suggesting that they are stationary after second differencing and that their logs are 1(2) stationary. Nevertheless, after fourth differencing, EXP is stationary according to its log, which is I(4) stationary. However, CRD, INF, INT, GDP, and CAP are I (0). The specification for the ARDL is therefore (1, 1, 4), with CRD, INF, INT, GDP, and CAP as the

exogenous components, EXP and DBT as the primary explanatory variables, and IPC as the dependent variable.

Table 4. 2: Stationarity Results

	I(0)	I(1)	I(2)	I(3)	I(4)
ln_IPC (trend)	-1.502	-3.477	-	-	-
Ln DBT (drift)	-1.542	-1.693	-	-	-
ln_EXP	-0.764	-0.881	-1.076	-1.517	-2.117
CRD (drift)	-1.473	-1.688	-	-	-
INF	-3.094	-	-	-	
INT	-4.869	-	-	-	-
GDP	-3.682	-	-	-	-
CAP	-3.184	-	-	-	-

1% Critical Value		5% Critical Value		10% Critical Value	
-2.431		-1.687		-1.305	

4.3 ARDL result

As shown in Table 4.3, an analysis of the effects of several variables on income per capita yields a few fascinating findings. The current income per capita (IPC) is significantly positively impacted by the lag of the log of IPC (coef = 0.818, t-stat = -0.0664), suggesting that previous per capita income has a favorable influence on current per capita income. Additionally, the GDP exhibits a positive influence (Coef = 0.0194, t-stat = 0.00662), while the interest rate exhibits a negative impact (Coef = -0.00871, t-stat = 0.00338). Conversely, at a 10% level, the price of crude oil (coef = 0.00236, t-stat = 0.00127) and inflation (coef = -0.00362, t-stat = 0.00196) significantly affect per capita income, indicating a positive correlation for the former and a negative correlation for

the latter. On the other hand, the amount of debt, spending trends, and capital formation have minimal impact on per capita income.

Table 4. 3: ARDL result and Error Correction Model Representation: ARDL(1,1,4)

VARIABLES	ARDL model Log_IPC	Error Correction Model ADJ	LR	SR
L.log_IPC	0.818***	-0.182**		
	(-0.0664)	-0.0664		
log_DBT	-0.00978			
	(-0.0145)			
L.log_DBT	0.00223		-0.0415	
	(-0.0162)		-0.0535	
log_EXP	0.0599			
	(-0.0624)			
L.log_EXP	0.00631		0.282	
	(-0.0823)		-0.208	
L2.log_EXP	-0.0167			
	(-0.0804)			
L3.log_EXP	-0.0556			
	(-0.0819)			
L4.log_EXP	0.0575			
	(-0.0662)			
CRD	0.00236*			0.00236*
	(-0.00127)			(-0.00127)
INF	-0.00362*			-0.00362*
	(-0.00196)			(-0.00196)
INT	-0.00871**			-0.00871**
	(-0.00338)			(-0.00338)
GDP	0.0194***			0.0194***
	(-0.00662)			(-0.00662)

CAP	-0.00176			-0.00176
	(-0.00438)			(-0.00438)
D.log_DBT				-0.00978
				(-0.0145)
D.log_EXP				0.0599
				(-0.0624)
LD.log_EXP				0.0148
				(-0.0681)
L2D.log_EXP				-0.0019
				(-0.071)
L3D.log_EXP				-0.0575
				(-0.0662)
Constant	1.063*			1.063*
	(-0.577)			(-0.577)
Observations	38	38	38	38
R-squared	0.986	0.754	0.754	0.754

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4 Long Run and Short Impact

Further insights are provided by examining the long- and short-term implications, as shown in Table 4.3, Error Correction Model. The speed of adjustment coefficients, or how fast the dependent variable (IPC) adapts to shifts in its long-run equilibrium with the explanatory variables, is shown in the ADJ column. The speed of adjustment coefficient in this study is determined to be 0.182, and at the 5% significance level (t-stat=-0.0664), it is considered significant. In reaction to changes in debt and spending, income per capita is expected to shift slowly and gradually, correcting by 18% within a year to reach its long-run equilibrium.

All of the explanatory factors have no noticeable long-term influence on per capita income in the long-run connection seen in the LR column of Table 4.3. In contrast, the crude oil price and

inflation only have a 10% influence on income per capita in the near run, whereas the interest rate and GDP both have notable effects on IPC at a 5% level. Nonetheless, IPC is not greatly impacted by shifts in debt stock or expenditure patterns. The robustness of the coefficient estimates is further reinforced by the lack of serial correlation, as shown by the Breusch-Godfrey test for autocorrelation in Table 4.4.

Table 4. 4:Breusch-Godfrey for Autocorrelation

lags(p)	chi2	Df	Prob > chi2
1	0.002	1	0.9662

H0: no serial correlation

Table 4. 5: Pesaran, Shin, and Smith bounds test

H0: no level relationship							F =	3.258
							t =	-2.743
	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	3.23	4.491	4.024	5.491	5.964	7.921	0.098	0.234
t	-2.487	-3.166	-2.856	-3.576	-3.616	-4.413	0.062	0.187

Do not reject H0 if either F or t are closer to zero than critical values for I(0) variables
(if either p-value > desired level for I(0) variables)
Reject H0 if both F and t are more extreme than critical values for I(1) variables
(if both   p-values < desired level for I(1) variables)

The figure in 4.5 uses the Pesaran, Shin, and Smith limits test (Pesaran *et al.,* 2001) to determine if there is a level of relationship among the variables that are being investigated. With this test, the null hypothesis (H0), according to which there is no level of association, may be investigated. The F-statistic as well as the t-statistic are provided in Table 4.5, which illustrates the test results (Pesaran *et al.,* 2001). Pesaran *et al.*, (2001) used estimated p-values and Kripfganz & Schneider's (2020) critical values to evaluate the data's statistical significance. At three distinct significance

levels—10%, 5%, and 1%—the crucial values are presented. Based on the comparison of the test results with the critical values and p-values, the Pesaran, Shin, and Smith limits test offers insights into whether a level relationship exists among the variables taken into consideration in the study (Pesaran, et al., 2001). The findings demonstrate that, at both the 5% and 1% significance levels, the null hypothesis is not rejected. This indicates that the variables under study do not have a level relationship.

4.5 Discussions

The study's conclusions shed important light on the relationship between Nigeria's per capita income, the volatility of crude oil prices, and excessive borrowing. A more thorough comprehension of the factors influencing income per capita is established by looking at a variety of macroeconomic variables, such as capital expenditure, recurrent expenditure, domestic debt, external debt, money supply, crude oil price, GDP growth, GDP per capita, inflation, and interest rate.

The findings demonstrate the long-term stability of income levels by demonstrating a strong positive correlation between the past per capita income and the current per capita income. This result is consistent with previous studies by Sule-Iko and Nwoye (2023), who found that the short-term impact of global crude oil prices on Nigeria's GDP was positive. Nigeria's overreliance on oil exports as a major source of revenue renders it vulnerable to volatility in oil prices, which may have an effect on the country's residents' total income levels. Generally speaking, rising oil prices should inevitably result in rising income per capita; however, this is not the case in Nigeria because of corruption, revenue leaks, and the actions of terrorists and oil thieves in the Niger Delta.

Additionally, the analysis shows that GDP and interest rates have a major short-term influence on per capita income. This is made feasible by the expectation that rising oil revenues will spur economic growth and GDP expansion, which will compel the government to lend money at reduced interest rates. Nevertheless, long-term economic growth is not guaranteed due to changes in the price of crude oil internationally. Also, interest rates and per capita income are found to be negatively correlated, suggesting that higher interest rates may impede economic growth and the creation of income. On the other hand, GDP positively affects income per capita, indicating that the state of the economy as a whole is a major factor in determining each person's level of income.

The findings show that, at a 10% level of significance, the price of crude oil and inflation have a considerable effect on per capita income. Income levels can fluctuate as a result of the volatility of crude oil prices, which is a frequent feature of economies dependent on oil. However, if inflation is not controlled, it can reduce people's purchasing power and have a detrimental impact on their income. These results are in line with the study of Abdulhakeem & Abdulhakeem (2016), which demonstrated the importance of oil price volatility in contributing to macroeconomic volatility in Nigeria.

Surprisingly, the analysis finds no evidence of a substantial relationship between income per capita and capital production, spending habits, or debt stock. Contrary to Yusuf & Mohd's (2023) results, which showed that government debt had a nonlinear impact on Nigeria's economic development. The lack of a substantial correlation might imply that other variables, such as the effectiveness of debt repayment, broad money supply, and the state of the economy generally, have a greater influence on per capita income.

Additionally, the examination of both short- and long-term effects indicates significant dynamics. In response to changes in debt and spending, the speed of adjustment coefficient shows a slow and gradual adjustment process of income per capita towards its long-run equilibrium. This result suggests that income levels could not immediately stabilize and match the underlying economic reasons. The findings also highlight how crucial it is to consider both immediate and long-term impacts when developing policies meant to raise per capita income.

The Pesaran limits test was used to verify the results' robustness. The test verifies that there isn't a discernible relationship between the variables being examined. This is consistent with the results of Adi *et al*. (2022), who showed that there are shocks and volatility in Nigerian financial markets related to oil prices and currency exchange fluctuations.

Conclusion

This study's empirical research sheds light on the relationship between Nigeria's per capita income and the fluctuations in crude oil prices, as well as the effects of excessive borrowing. The results

clarify the intricate processes influencing income levels and have important ramifications for the creation of public policy. These informed policies have the potential to improve the circumstances and living standards of every Nigerian for a speedy economic recovery effort in the post-COVID era.

The findings demonstrate the durability of income levels across time by showing that previous per capita income has a positive and substantial influence on current per capita income. This emphasizes the need for steady economic growth and the necessity of diversifying Nigeria's economy to reduce its reliance on oil exports. The analysis highlights the significance of monetary and fiscal policies that support lower interest rates and strong economic performance by revealing the substantial short-run effects of GDP and interest rates on income per capita. Although considerable at the 10% level, inflation and the volatility of crude oil prices have an impact on per capita income that is both beneficial and negative. The results show how susceptible Nigeria's economy is to changes in oil prices and how crucial it is to successfully control inflationary pressures in order to preserve people's buying power. These findings highlight the necessity of taking proactive steps to improve price stability, encourage sustainable economic diversification, and lessen reliance on oil exports.

More so, the research finds little evidence of a substantial relationship between income per capita and capital production, spending habits, and debt stock. This necessitates a thorough evaluation of debt management strategies and the effective use of available funds to guarantee that public borrowing results in real economic gains. Policymakers should prioritize investing in industries that directly contribute to income production and improving the efficiency and transparency of public spending.

Recommendations

The following suggestions are put forth in order to support sustained income per capita growth in Nigeria and expedite the country's economic recovery following the COVID-19 pandemic.

The economy has to be more diversified by relying less heavily on oil exports. This may be accomplished by encouraging the growth of non-oil industries, including manufacturing, services, and agriculture. Nigeria may increase its resilience to fluctuations in oil prices and diversify its

sources of revenue by diversifying its economy. This would result in more steady and long-term economic growth.

The government, through the relevant agencies and stakeholder groups, must work towards reducing crude oil theft and oil-related corruption that derails the dividends of crude oil production and exportation.

Additionally, in order to boost investment and economic activity, monetary policy must be improved. It is necessary to put policies in place to keep interest rates low and steady so that both individuals and enterprises may obtain credit at affordable rates for expansion and job creation. The conservative monetary policies that the central bank has been pursuing are important for controlling inflation and fostering economic growth since they make credit availability easier for the productive sectors.

Furthermore, improving financial self-control is necessary for efficient debt management. Prioritizing profitable investments and ensuring the transparent and effective use of borrowed money are important. Complete fiscal changes will increase revenue creation and decrease reliance on debt financing. Nigeria may reduce the danger of a debt overhang and establish a more sustainable fiscal climate by managing its public debt well.

Also, in order to preserve price stability and safeguard people's purchasing power, it is imperative to put in place efficient inflation control mechanisms. This entails establishing structural changes to increase production, enacting prudent monetary policies, and encouraging competitiveness in crucial sectors. This would enhance the general well-being of the population and allow for a more stable economic environment. Additionally, it is crucial to encourage economic diversity through policies and incentives. This entails opening up financial resources, developing improvements to the infrastructure, boosting the atmosphere for doing business, and encouraging creative thinking and entrepreneurship.

Limitations and future studies

Future research could think about expanding the data period and adding other explanatory factors.

COMPETING INTERESTS

The author has declared that there are no competing interests.

Research data policy and data availability statement

The data that supports the findings of this study are openly available in the Central bank of Nigeria Statistical Bulletin 2022 available at (https://www.cbn.gov.ng) and World bank development data repository at (https://api.worldbank.org). The data is freely available and can be assessed by all.

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