Effect of Macroeconomic Indices on Government Spending Efficiency: 1999-2022

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Abstract

This study investigated the impact of key macroeconomic indices on government spending efficiency. The research examines four primary macroeconomic determinants: Real GDP (RGDP), inflation (INFL), exchange rate (EXCR), and oil revenue (OREV). The study adopted the ex post facto research design and data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, spanning from 1999-2022. The unit root test used Augmented Dickey-Fuller (ADF) showing stationarity at 1(0) and 1(1). Using the OLS, the findings reveal that real GDP has a significant positive effect on total government expenditure, indicating that economic growth drives increased spending. In contrast, inflation and exchange rate fluctuations do not significantly affect government expenditure, suggesting that these factors may be mitigated by existing fiscal policies or structural adjustments. Oil revenue, despite its crucial role in Nigeria's fiscal policy, also shows no significant direct impact on government spending. Based on these findings, the study recommends leveraging economic growth to enhance public spending efficiency, implementing robust inflation control measures, adopting strategies to stabilize the exchange rate, and improving the management of oil revenues. These recommendations aim to ensure that government spending effectively supports national development goals and addresses persistent economic challenges. The study provides valuable insights for policymakers in Nigeria and other developing countries facing similar macroeconomic and fiscal challenges.

Keywords: *Total Government Expenditure; Real GDP; Inflation Rate; Exchange Rate; Oil Revenue.*

1.0 Introduction

Government spending efficiency is a vital aspect of public finance, impacting a nation's economic growth, income distribution, and overall well-being (Jibir & Aluthge, 2019). Governments worldwide have been faced with the challenge of ensuring that their expenditures deliver maximum public value while maintaining fiscal discipline. In most developing countries, the government is viewed as a catalyst for change (Aluthge et al., 2020). Consequently, the extent of government spending reflects the level of its participation in the economy (Jibir & Aluthge, 2019). Many developing and developed countries utilize public spending to enhance income distribution, steer resource allocation toward priority sectors, and shape the composition of national income (Assi et al., 2019; Vtyurina, 2020). Thus, government spending efficiency is crucial for developing countries, where public resources are often constrained by economic fluctuations, demographic pressures, and institutional weaknesses (Mawejje, 2024).

In the Nigerian context, the past few decades have witnessed significant growth in government expenditure driven by a variety of macroeconomic indices, including inflation, exchange rates, population growth, oil revenue, and trade openness (Aregbeyen & Akpan, 2013). The expenditure has steadily increased since 1999, following the country's return to democracy. This period marks significant shifts in economic policies and the introduction of reforms aimed at reducing poverty, improving infrastructure, and enhancing governance (Akanbi, 2014; Aladejare, 2019).

According to Aluthge et al. (2020), events such as the oil glut of the 1980s, the Structural Adjustment Programme (SAP) of 1986, the 2008/2009 global economic crisis, the oil booms of the 1970s and 2010-2014, and the advent of the Fourth Republic democracy in Nigeria have triggered sharp fluctuations in government spending. However, the efficiency of government is often questioned due to persistent challenges such as corruption, misallocation of resources, and the mismanagement of public debt. These inefficiencies are exacerbated by external factors like oil price volatility and inflation, which directly affect the government’s capacity to manage its fiscal obligations.

This study focuses on four main macroeconomic determinants influencing government spending efficiency: Real GDP, inflation rate, exchange rate, and oil revenue. The efficiency of government spending in Nigeria from 1999 to 2022 has been significantly shaped by macroeconomic indices. Inflation increases the nominal value of public spending, leading to higher costs for government projects and services and reduces the real purchasing power of public funds, thereby diminishing the value derived from government expenditures (Aluthge et al., 2020). Studies have demonstrated that inflation, in the long run, is positively associated with government expenditure, which supports the theoretical proposition that governments tend to increase spending to mitigate the adverse effects of rising prices (Olufemi et al., 2024). However, there are instances where inflation does not significantly correlate with spending growth, particularly in periods of macroeconomic stability. Another macroeconomic factor is the exchange rate (Effiong et al., 2024). Exchange rate depreciation tends to increase the cost of imported goods and services, thereby escalating government expenditure, especially in areas like infrastructure development and defense, where foreign inputs are substantial (Nyeche,

2024). The value of the Nigerian Naira has fluctuated significantly since the early 2000s (Aluthge et al., 2020). Currency depreciation reduces the real value of government revenues from oil exports, thus constraining the budgetary capacity to fund essential services (Effiong et al., 2024).

Oil revenue, as the cornerstone of Nigeria's fiscal policy, significantly influences government spending. Nigeria relies heavily on revenue from oil exports, but the volatility of global oil prices, coupled with the environmental and social impacts of oil extraction, significantly influences how revenue is generated and allocated within the public sector (Oyedokun et al., 2024). The volatility of global oil prices has led to fluctuations in government revenue, making it challenging to maintain consistent spending patterns (Olufemi et al., 2024). During periods of high oil prices, the Nigerian government has increased spending on social services and infrastructure development (Ogunjumo et al., 2024). However, these spending surges have not always translated into improved service delivery or development outcomes, due to inefficiencies and the mismanagement of funds.

Prior studies have identified several determinants of spending efficiency such as public debt (Eterovic & Eterovic, 2012), corruption (Mauro, 1998), population and urbanization (Ofori-Abebrese, 2012), inflation (Ezirim et al., 2008), foreign aid (Njeru, 2003), globalization (Dreher et al., 2008), and trade openness (Cameron, 1978), among others. However, many of these studies have focused on factors, such as inflation and exchange rate potentially overlooking variables such as oil revenue and real GDP, which have been shown to be significant in other countries (Aladejare, 2019; Uchenna & Evans, 2014). This issue is especially relevant in Nigeria, where, despite substantial increases in government spending persistent development challenges such as high poverty levels, unemployment, deteriorating infrastructure, and widespread insecurity continue to affect the economy and society (Jibir & Aluthge, 2019).

The Nigerian experience offers valuable lessons for other developing countries facing similar macroeconomic and fiscal challenges. Against this backdrop, the specific objectives of the study are as follows:

1. To ascertain the effect of real GDP (RGDP) on total government expenditure (TEXP).
2. To evaluate the effect of inflation (INFL) on total government expenditure (TEXP).
3. To determine the effect of Exchange Rate (EXCR) on total government expenditure (TEXP).
4. To examine the effect of Oil Revenue (OREV) on total government expenditure (TEXP).

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Government Expenditure (TEXP)

Government expenditure is a critical aspect of a country's fiscal policy, and its size, structure, and efficiency can significantly influence economic performance. It refers to the spending incurred by the government to maintain public administration and implement public policies. Government expenditure can broadly be classified into two categories: capital expenditure and recurrent expenditure. Capital expenditure refers to government spending on the acquisition of long-term assets such as infrastructure, buildings, and machinery that contribute to future productive capacity. Recurrent expenditure, on the other hand, covers routine expenses such as salaries, pensions, subsidies, and administrative costs necessary for the day-to-day functioning of the government (World Bank, 2008).

Both forms of expenditure are essential, but they serve different purposes. Capital expenditure is considered a key driver of long-term economic growth as it supports the expansion of physical and human capital. Recurrent expenditure, though critical for maintaining current services, can sometimes crowd out capital investments, especially in countries facing fiscal constraints (Assi et al., 2019).

The relationship between government expenditure and economic growth has been a subject of extensive debate in economics. Several theoretical frameworks and empirical studies have attempted to explain this relationship. Wagner's Law posits that as an economy grows, government expenditure increases because of the rising demand for public goods and services. Conversely, Keynesian theory suggests that government spending can stimulate economic growth, particularly during periods of economic downturn, by boosting aggregate demand (Keynes, 1936). The impact of government expenditure on economic growth depends on various factors, including the composition of spending, efficiency of resource allocation, and the overall macroeconomic environment. For instance, government spending on infrastructure, education, and healthcare is often associated with higher long-term economic growth due to improvements in productivity and human capital (Vtyurina, 2020). On the contrary, excessive recurrent spending, particularly on subsidies and unproductive public wages, can lead to fiscal imbalances, inflation, and lower economic growth (Aladejare, 2019).

In many developing countries, government expenditure is seen as a key driver of economic development and social progress. Governments in these regions often play a more active role in directing the allocation of resources, improving income distribution, and addressing market failures. Public expenditure on education, healthcare, and infrastructure is considered essential for reducing poverty, improving human capital, and fostering economic growth (Vtyurina, 2020).

However, the effectiveness of government spending in achieving these goals depends on the quality of governance, institutional capacity, and the ability to implement sound fiscal policies. In countries where corruption is prevalent and public financial management is weak,

government expenditure may not always translate into improved developmental outcomes (Uchenna & Evans, 2014). Misallocation of resources, inefficiencies in public service delivery, and lack of transparency often hinder the impact of government spending on economic growth and social development.

2.1.1.1 Efficiency of Government Expenditure

Government expenditure efficiency refers to how well public resources are allocated and utilized to achieve desired outcomes. In many developing countries, the inefficiency of public spending is a major challenge. Corruption, weak public financial management systems, and lack of accountability often result in the misallocation of resources and poor service delivery (Uchenna & Evans, 2014). As a result, even large increases in government expenditure may not lead to improvements in economic growth or development outcomes. Improving the efficiency of government expenditure requires strengthening public financial management systems, enhancing transparency and accountability, and reducing corruption. In addition, governments need to prioritize spending on sectors that have the greatest impact on long-term economic growth, such as infrastructure, education, and healthcare (Assi et al., 2019). Governments doing these can ensure that public resources are used more effectively to promote sustainable development and improve living standards.

2.1.2 Inflation Rate (INFL)

Inflation refers to the general increase in prices of goods and services over time in an economy, leading to a reduction in the purchasing power of money. The inflation rate is a critical economic indicator that reflects the percentage change in prices over a specified period, usually a year. Inflation can manifest in different forms depending on its causes and behavior in the economy:

i. Demand-Pull Inflation: This occurs when aggregate demand in an economy exceeds aggregate supply, leading to upward pressure on prices. It often happens when the economy grows too quickly, with increased consumer spending, business investments, and government expenditure driving prices upward. An example of this is during periods of economic expansion when consumers have more disposable income, leading to higher demand for goods and services (Blanchard, 2020).
ii. Cost-Push Inflation: This type of inflation arises from an increase in the cost of production, which firms pass on to consumers in the form of higher prices. It can be driven by rising wages, higher costs of raw materials, or supply chain disruptions. For instance, a sudden increase in oil prices can lead to higher transportation costs, affecting the prices of goods across various industries (Mankiw, 2019).
iii. Built-In Inflation: Sometimes referred to as wage-price inflation, built-in inflation occurs when businesses raise prices to cover higher wages, and workers demand higher wages to keep up with the rising cost of living. This creates a feedback loop, with wages and prices chasing each other upwards, contributing to a persistent inflationary cycle.

Several factors can cause inflation, including:

a. Monetary Policy: Central banks play a crucial role in controlling inflation through monetary policy. When a central bank increases the money supply too quickly or keeps interest rates too low for an extended period, it can fuel inflation by increasing demand without a corresponding rise in supply. Conversely, tight monetary policies can help control inflation by reducing money supply and demand (Friedman, 1968).
b. Supply Shocks: Sudden disruptions in the supply of essential goods, such as oil, food, or raw materials, can lead to inflation. A reduction in supply raises production costs, which firms pass on to consumers. Supply shocks are often temporary but can cause significant inflationary pressures, especially in industries reliant on affected goods.
c. Fiscal Policy: Government spending can also influence inflation. High levels of public spending, especially if financed by borrowing or increasing the money supply, can drive demand beyond the economy's productive capacity, leading to inflation. This phenomenon is particularly evident in situations where government spending increases faster than economic output (Blanchard, 2020).
d. Exchange Rates: Changes in exchange rates can affect inflation in economies that rely heavily on imports. A depreciating currency makes imports more expensive, raising the overall price level. This form of inflation is often referred to as "imported inflation."

2.1.3 Exchange Rate (EXCR)

The exchange rate is the price at which one currency can be exchanged for another. It plays a pivotal role in international trade, finance, and economics, influencing the cost of imports and exports, the flow of capital, and overall economic stability. The value of a country's currency in relation to others is crucial for determining the competitiveness of its goods and services in the global market and for the broader economic environment. There are different exchange rate systems or regimes used by countries to manage their currency in relation to others:

i. Fixed Exchange Rate: In a fixed (or pegged) exchange rate system, a country's currency is tied to another major currency, such as the U.S. dollar or the euro, or to a basket of currencies. The central bank maintains this rate by intervening in the foreign exchange market, buying or selling its own currency as needed to stabilize its value. Fixed exchange rates can provide stability and predictability for international trade but require significant foreign exchange reserves to maintain (Krugman & Obstfeld, 2017). Example: Saudi Arabia and many Gulf Cooperation Council (GCC) countries peg their currencies to the U.S. dollar to ensure stability given their reliance on oil exports, which are priced in dollars.
ii. Floating Exchange Rate: In a floating exchange rate system, the value of a currency is determined by the forces of supply and demand in the foreign exchange market without direct government or central bank intervention. Currencies fluctuate freely based on market conditions, such as interest rates, inflation, and economic performance. This system allows for automatic adjustment in response to economic changes, but it can lead to volatility (Mankiw, 2019). Example: The currencies of major economies like the U.S., the Eurozone, and Japan operate under a floating exchange rate system.
iii. Managed Float (Dirty Float): A managed float is a hybrid system where the currency largely floats in the market, but central banks occasionally intervene to prevent excessive volatility or to achieve specific economic goals. This system allows for flexibility while

still maintaining some degree of control over the currency's value. Example: India operates a managed float system where the Indian Rupee generally floats in the market but the Reserve Bank of India intervenes to manage excessive fluctuations.

iv. Currency Board: A currency board arrangement involves a country maintaining a fixed exchange rate with a foreign currency, while also committing to hold reserves of that foreign currency equal to the domestic money supply. This restricts monetary policy, as the central bank cannot independently alter interest rates or the money supply. Example: Hong Kong operates a currency board that pegs the Hong Kong dollar to the U.S. dollar.

Exchange rate volatility can create uncertainty for businesses, investors, and governments. For companies engaged in international trade, fluctuations in the exchange rate can affect profit margins, pricing strategies, and competitiveness. Multinational corporations, in particular, face foreign exchange risk due to the need to convert foreign earnings into their home currency. To mitigate this risk, businesses often engage in hedging strategies, such as using forward contracts or options to lock in exchange rates for future transactions. Central banks may also intervene in the foreign exchange market to stabilize their currencies and reduce volatility (Krugman & Obstfeld, 2017). Many developing countries face challenges in managing exchange rates due to structural weaknesses in their economies. Factors like high external debt, reliance on commodity exports, and underdeveloped financial systems make these countries more vulnerable to exchange rate shocks. In countries like Nigeria, for instance, the exchange rate is heavily influenced by global oil prices, as oil exports account for a large portion of government revenue and foreign exchange earnings. When oil prices decline, the Nigerian Naira depreciates, leading to higher import costs and inflation (Oyedokun et al., 2024). This volatility complicates monetary policy and economic planning, especially in economies dependent on a single commodity. Developing economies often use a combination of exchange rate regimes, such as managed floats or pegged systems, to stabilize their currencies while still allowing for some flexibility.

2.1.4 Oil Revenue

Oil revenue refers to the income generated from the extraction, production, and sale of oil. It is a significant source of income for oil-producing countries, especially those in the Middle East, Africa, and Latin America. The importance of oil revenue in these economies cannot be overstated, as it often represents a substantial portion of government income, foreign exchange reserves, and gross domestic product (GDP). However, the reliance on oil revenue also exposes these countries to the risks of price volatility, economic instability, and long-term challenges of diversification. In countries like Saudi Arabia, Venezuela, and Nigeria, oil accounts for a significant portion of government revenue, often exceeding 50% of total income (World Bank, 2020). This reliance on oil income makes these economies highly sensitive to fluctuations in global oil prices.

Oil revenue also plays a key role in funding foreign exchange reserves, enabling countries to stabilize their currencies and maintain favorable trade balances. The foreign exchange earned from oil exports is vital for paying for imports, servicing debt, and funding government expenditures.

Oil revenues can be a boon for economic growth, especially during periods of high oil prices. Increased revenue enables governments to invest in infrastructure, social services, and development projects. These investments can help spur economic growth by improving productivity, creating jobs, and enhancing living standards. Oil revenue can also fuel corruption and inefficient public spending, which undermines long-term economic development (Ross, 2012).

2.1.4.1 Oil Price Volatility and Its Impact

One of the primary challenges associated with oil revenue is the volatility of oil prices. Global oil prices are influenced by several factors, including geopolitical events, changes in supply and demand, technological advancements, and decisions made by major oil-producing organizations such as the Organization of Petroleum Exporting Countries (OPEC). Price fluctuations can have profound effects on oil-dependent economies. When oil prices are high, governments experience a revenue windfall that can lead to increased spending and economic growth. However, when prices fall, these countries often face fiscal deficits, budget cuts, and economic contraction. For example, the sharp decline in oil prices from 2014 to 2016 severely impacted oil-dependent economies like Nigeria, Angola, and Venezuela, leading to recessions, budget crises, etc. (IMF, 2017).

2.1.4.2 The Dutch Disease Phenomenon

A common issue faced by oil-dependent economies is the "Dutch disease," which refers to the negative impact of a booming natural resource sector on the rest of the economy. The term originated from the Netherlands in the 1960s, when the discovery of natural gas led to an appreciation of the Dutch currency, making non-oil exports less competitive in international markets.

In countries heavily reliant on oil, the influx of oil revenue can cause currency appreciation, making other sectors like manufacturing and agriculture less competitive. As a result, these sectors shrink, and the economy becomes overly dependent on oil exports. This over-reliance on a single commodity increases vulnerability to global price fluctuations and limits long-term economic development (Ross, 2012).

Countries such as Saudi Arabia and Nigeria have experienced Dutch disease, where booming oil revenues have negatively affected their non-oil sectors. To combat this, some oil-producing countries have implemented policies to encourage diversification, such as investing in other sectors like technology, tourism, and manufacturing.

2.1.4.3 Challenges of Oil Revenue Management

While oil revenue can be a significant source of income for governments, managing this wealth effectively presents several challenges:

1. **Corruption**: Oil wealth can fuel corruption, as the concentration of wealth in the hands of a few elites leads to rent-seeking behavior and misallocation of resources. In many oil-producing countries, the lack of transparency and accountability in how oil revenues are spent has led to widespread corruption and limited benefits for the broader population (Ross, 2012).
2. **Fiscal Instability**: Oil price volatility creates fiscal instability for oil-dependent governments. During periods of low oil prices, these countries face budget deficits, debt

accumulation, and cuts to public spending. Without proper fiscal management, oil revenues can lead to boom-bust cycles that harm long-term economic stability.

3. **Lack of Diversification**: Over-reliance on oil revenue can stifle the development of other sectors, leading to economic vulnerability. Countries that fail to diversify their economies are more exposed to global oil price fluctuations and face challenges in achieving sustainable growth.
4. **Environmental Impact**: Oil extraction often comes with significant environmental costs, including pollution, deforestation, and oil spills. These environmental impacts can harm local communities, disrupt livelihoods, and lead to social unrest. Governments must balance the economic benefits of oil revenue with the need to protect the environment and promote sustainable development.

2.1.5 Real GDP

Real Gross Domestic Product (Real GDP) is a measure of the value of all final goods and services produced within a country's borders, adjusted for inflation. Unlike nominal GDP, which is measured using current prices, real GDP reflects the true volume of economic activity by removing the effects of price changes over time. Real GDP is a fundamental metric used to gauge the performance of an economy. It provides a clearer picture of economic growth by comparing the value of goods and services produced across different time periods while accounting for inflation. This allows policymakers, economists, and analysts to understand whether an economy is truly expanding or contracting.

The benefits of real GDP are as follows:

a. Economic Growth: it adjust for inflation, real GDP provides a more accurate measure of an economy's growth rate. Positive growth in real GDP indicates that the economy is producing more goods and services, while negative growth suggests a decline in economic activity.
b. Comparison across Time: Real GDP enables comparisons of economic performance over different periods. This is important for analyzing trends, making economic forecasts, and assessing the impact of economic policies.
c. International Comparisons: Real GDP is used to compare economic performance between different countries by converting GDP figures into a common currency using purchasing power parity (PPP) adjustments. This helps in understanding relative economic sizes and standards of living.
d. Policy Making: Governments and central banks use real GDP data to formulate economic policies. For instance, if real GDP growth is slowing, policymakers may introduce stimulus measures to boost economic activity.

2.2 Theoretical Framework

2.2.1 Wagner's Theory (WT)

The earliest theory of public expenditure is attributed to Wagner (1883), a German political economist who introduced the concept of "the law of increasing state activity." Wagner proposed that as economies develop, there is a corresponding rise in government activities and

functions, which results in increased public expenditure. This model suggests that economic growth drives the expansion of government roles and responsibilities, leading to higher state spending.

Brown and Jackson (1994) further articulate Wagner's law, describing it as the increasing expansion of both public and state activities, particularly within decentralized and well-organized local governments. This expansion is driven by social progress and the shifting balance between private and public economies. Despite financial constraints that may limit state activity in the short term, the law posits that the long-term desire for development will overcome these barriers. Sagarik (2014) elaborates on Wagner's theory, emphasizing that industrialization, economic growth, and the management of natural monopolies like railroads contribute to increased public expenditure. Wagner's law thus highlights the connection between economic development and rising government spending on public services and welfare.

2.3 Empirical Review

Al-Bayati et al. (2022) examined the impact of exchange rate fluctuations (EXM and EXN) and inflation (INF) on Iraq's gross domestic product (GDP) from 1988 to 2020. Utilizing the ARDL model, the analysis revealed a long-term equilibrium relationship based on the Bound Test, with the error correction vector being negative and significant at less than 1%. The results indicate an inverse relationship between EXM and GDP, where a 1% increase in EXM leads to a 7.666% decrease in GDP, reflecting the recent currency devaluation approach in Iraq. Conversely, the relationship between EXN and GDP was positive, with a 1% increase in EXN corresponding to a 5.785% rise in GDP.

Aluthge et al. (2020) investigated the impact of government expenditure on economic growth in Nigeria. The employed using series data from CBN statistical bulletin from 1970 to 2019. The data were analysed with Autoregressive Distributed Lag (ARDL) model and incorporates structural breaks in both unit root tests and co-integration analysis to ensure result robustness. The findings indicate that capital expenditure significantly and positively affects economic growth in both the short and long term, while recurrent expenditure does not significantly impact economic growth in either timeframe.

Jibir and Aluthge (2019) modelled the determinants of government expenditure in Nigeria. This study employs a modified version of Wagner's Law using time series data from 1970 to 2017 and the Autoregressive Distributed Lag (ARDL) model, the findings show that oil revenue, GDP, population growth, trade openness, oil prices, taxation, and inflation are key determinants of Nigeria's government spending.

Bala and Chin (2018) examined the asymmetric effects of oil price fluctuations on inflation in Algeria, Angola, Libya, and Nigeria, using a balanced panel dataset that includes oil price, consumer price index (CPI), money supply (M2), food production index (FPI), exchange rate (E), and gross domestic product (GDP) over the period 1995–2014. The countries were selected due to their membership in OPEC and geographical proximity. Three types of oil price data were considered: actual spot prices, the OPEC reference basket price, and an average of Brent,

WTI, and Dubai oil prices. The study employed an Autoregressive Distributed Lag (ARDL) dynamic panel approach to analyze both short- and long-term effects. The results revealed that both positive and negative changes in oil prices contributed to rising inflation, with the impact being more pronounced when oil prices declined. Additionally, inflation was positively correlated with money supply, exchange rates, and GDP, while food production had a negative effect on inflation.

Olusi and Abiodun (2015) investigated the impact of fiscal variables, particularly government expenditure, on economic growth in oil-rich developing nations, specifically Nigeria, Indonesia, and Saudi Arabia, over the period from 1981 to 2013. The analysis utilized secondary data sourced from the 2014 edition of the World Development Indicators (WDIs) and Pen World Tables version 8.1. The study utilised time series econometric methods, the study found long-term equilibrium relationships between government spending and economic growth in all three countries. The results revealed that government expenditures had a positive and significant effect on economic growth, although the extent of this effect varied across the countries.

Aregbeyen and Kolawole (2015) analyzed the correlations between oil revenue, government spending, and economic growth in Nigeria. They used time series data from 1980 to 2012 analysed using econometric techniques, such as OLS, cointegration, VECM, and Granger causality. The results indicated that oil revenue Granger caused both total government spending and growth, whereas there was no causality observed between government spending and growth in the country.

3.0 Methodology

The study utilizes time series secondary data to analyze the impact of macroeconomic indices on government spending efficiency from 1999 to 2022. Data on key variables, such as oil revenue, real Gross Domestic Product, inflation rate and exchange rate are sourced from the Central Bank of Nigeria's Statistical Bulletin. Meanwhile, data on the government expenditure is obtained from the CBN Statistical Bulletin and the World Bank's World Development Indicators.

3.1 Methods of Data Analysis

The study conducts a unit root test and, for robustness, utilizes the Dickey-Fuller, Augmented Dickey-Fuller. However, as similar results were obtained from DF and P-P, the researchers presented ADF for brevity.

3.1.1 Model Specification

The empirical model in this study which is specified according to the formulated hypothesis is shown below:

$$TEXP = f(RGDP, INFL, EXCR, OREV) \quad \text{.....Eq. (1)}$$

Where: TEXP is the Total Government Expenditure; RGDP is the Real GDP; INFL is the Inflation Rate; EXCR is the Exchange Rate; and OREV is the Oil Revenue.

The econometric model equation form for the dependent variable can be written based on the above as follows.

The general model can be represented as:

$$TEXP_t = \beta_0+\beta_1 RGDP_t+\beta_2 INFL_t+\beta_3 EXCR_t+\beta_4 OREV_t+\epsilon t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq.\ (2)$$

Where:

$TEXP_t$	is the dependent variable (Total Government Expenditure) at time *t*
$RGDP_t$	is the real Gross Domestic Product at time *t*
$INFL_t$	is the inflation rate at time *t*
$EXCR_t$	is the real effective exchange rate at time *t*
$OREV_t$	is the oil revenue at time *t*
β_0	is the intercept (constant term)
β_{1-4}	are the coefficients for the respective IVs
ϵt	is the error term at time *t*

4.0 Data Analysis

The data spans 24 observations, providing a comprehensive snapshot of these variables' distributions and their statistical properties.

Table 1: Descriptive analysis of the model variables

	TEXP	RGDP	INFL	EXCR	OREV
Mean	1456.890	53132.98	13.13122	91.03926	4368.605
Median	1459.959	56824.85	12.00000	83.48541	4289.649
Maximum	3596.831	74752.42	23.80000	155.7536	8878.970
Minimum	209.1867	25430.42	6.600000	58.24839	724.4225
Std. Dev.	1062.304	17339.65	4.209509	27.37711	2118.703
Skewness	0.586231	-0.304959	0.754439	1.126444	0.206915
Kurtosis	2.256898	1.587070	3.275711	3.345961	2.499905
Jarque-Bera	1.926869	2.368372	2.352732	5.195195	0.421350
Probability	0.381580	0.305995	0.308397	0.074452	0.810037
Sum	34965.36	1275192.	315.1493	2184.942	104846.5
Sum Sq. Dev.	25955265	6.92E+09	407.5592	17238.64	1.03E+08
Observations	24	24	24	24	24

Source: E-Views 11

Key: TEXP-Total Government Expenditure; RGDP-Real GDP; INFL-Inflation Rate; EXCR- Exchange Rate; OREV-Oil Revenue.

The statistical summary is provided in Table 1, the mean of Total Government Expenditure (TEXP), is 1456.890 (median: 1459.959). TEXP displays a significant range between the minimum and maximum values, indicating substantial variability in expenditure. The positive skewness suggests that there are a few observations with extremely high expenditure values, pulling the distribution to the right. The kurtosis value close to 2.5, i.e., platykurtic, implies that the distribution is relatively flat compared to a normal distribution. The Jarque-Bera test (1.927 (p-value = 0.382)) indicates that the distribution of TEXP does not significantly deviate from normality.
The mean of Real GDP (RGDP) is 53132.98 (median: 56824.85). RGDP shows a relatively large dispersion with a mean substantially higher than the minimum value and close to the median. The negative skewness suggests a tendency for more observations to cluster at the higher end of the GDP range. The low kurtosis value implies a flatter distribution compared to a normal distribution. The Jarque-Bera statistic (2.368 (p-value = 0.306) indicates that the normality assumption for RGDP cannot be rejected, as the p-value is well above the conventional threshold.

The average Inflation Rate (INFL) is 13.131% (median: 12.000%). The data reveals moderate variability, with a value that is notably higher than the median. The positive skewness indicates instances of exceptionally high inflation rates, which skews the distribution to the right. The kurtosis value, close to 3, implies a distribution similar to the normal distribution. The Jarque-Bera test (2.353 (p-value = 0.308)) suggests that the distribution of INFL does not significantly deviate from normality.

The mean (median) of Exchange Rate (EXCR) is 91.039 (median: 83.485); and, that of Oil Revenue (OREV) is 4368.605 (median: 4289.649). The EXCR demonstrates considerable variability with a mean higher than the median, suggesting frequent periods of a higher exchange rate. OREV exhibits a mean close to the median, indicating a relatively symmetrical distribution of values around the center. The kurtosis of EXCR indicates a leptokurtic distribution, with more extreme values compared to a normal distribution. The Jarque-Bera statistic (5.195 (p-value = 0.074)), implies that there is evidence of normality. The kurtosis value of OREV is close to 2.5 implies a distribution close to normal, with no extreme outliers. The Jarque-Bera test (0.421 (p-value = 0.810)) indicates no significant deviation from normality.

4.1 Stationarity Test

A unit root signifies that the data is non-stationary, implying that the statistical characteristics of the series vary over time. The ADF test is an advancement of the original D-F is utilised in this study to deal with forms of stationarity. Table 2 displays the unit root test results for the individual series.

Null Hypothesis (H_o): The variable X has a unit root
Alternate Hypothesis (H_1): The variable X has no unit root

Table 2: ADF test for model variables

Variable			ADF	Prob*
TEXP	Level	1(0)	0.988755	0.9949
	First difference	1(1)	-3.847721	0.0084***
RGDP	Level	1(0)	-1.508710	0.5114
	First difference	1(1)	-3.222254	0.0322**
INFL	Level	1(0)	-3.475044	0.0184**
EXCR	Level	1(0)	-1.642866	0.4456
	First difference	1(1)	-3.956088	0.0066***
OREV	Level	1(0)	-2.369059	0.1608
	First difference	1(1)	-4.840268	0.0009***

Source: E-Views 11
Note: *, ** and *** denote significance levels at 10%, 5%, and 1% respectively.

Table 2 above summarizes the results of the Augmented Dickey-Fuller (ADF) test for checking the stationarity of model variables at different levels and differences. For TEXP at first difference: ADF statistic = -3.847721, p-value = 0.0084. This suggests that upon taking the first difference, the ADF statistic becomes significantly negative, and the p-value falls below the 0.01 threshold.
For RGDP at first difference: ADF statistic = -3.222254, p-value = 0.0322. Thus, after differencing the data once, the ADF statistic becomes significantly negative, and the p-value is less than 0.05. This result suggests that while RGDP is non-stationary at the level, it becomes stationary after first differencing. The Inflation Rate (INFL) at level showed ADF statistic = -3.475044, p-value = 0.0184; indicating that we can reject the null hypothesis of a unit root at the 5% significance level. EXCR showed: First Difference: ADF statistic = -3.956088, p-value = 0.0066. Thus, EXCR is non-stationary in its level form. OREV showed at First Difference: ADF statistic = -4.840268, p-value = 0.0009. The first difference yields a highly negative ADF statistic with a p-value significantly below 0.01, indicating that the series becomes stationary after differencing.
None of the variables is integrated of order 2 (i.e. I (2)) making it possible to employ OLS approach for regression analysis.

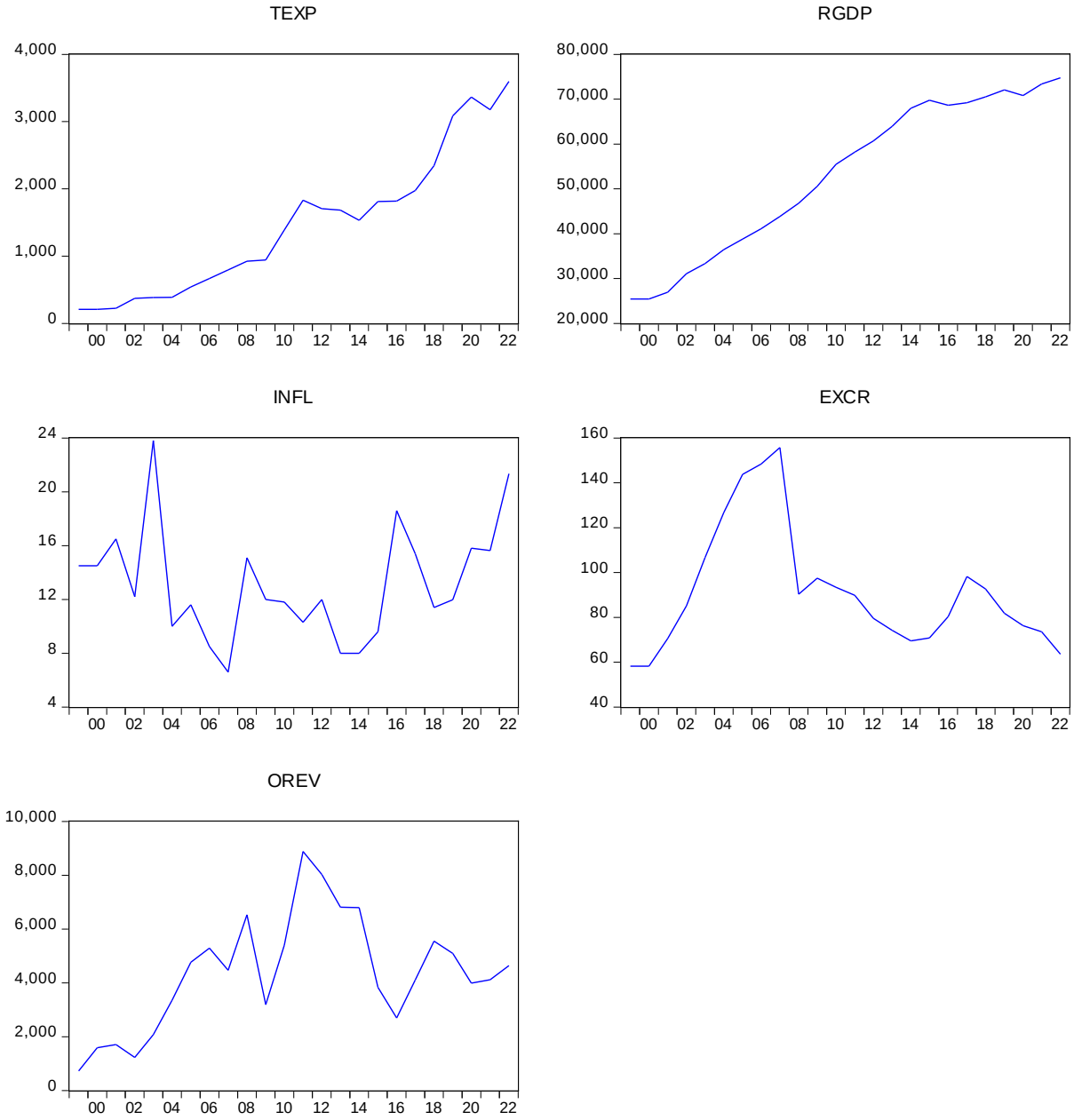

Figure 1: Line graph of model variables
Source: E-Views 11

4.2 Test of Hypothesis

Ho_1: There is no significant effect of real GDP (RGDP) on total government expenditure (TEXP).

Ho_2: There is no significant effect of inflation (INFL) on total government expenditure (TEXP).

Ho_3: There is no significant effect of Exchange Rate (EXCR) on total government expenditure (TEXP).

Ho_4: There is no significant effect of Oil Revenue (OREV) on total government expenditure (TEXP).

Table 3: OLS output for test of hypotheses

Dependent Variable: LOG(TEXP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.61474	1.434830	-13.67043	0.0000
LOG(RGDP)	2.359036	0.144705	16.30237	0.0000
LOG(INFL)	0.213025	0.120277	1.771118	0.0926
LOG(EXCR)	-0.029998	0.140744	-0.213135	0.8335
LOG(OREV)	0.077069	0.094600	0.814682	0.4253
R-squared	0.970182	Mean dependent var		6.949802
Adjusted R-squared	0.963905	S.D. dependent var		0.916138
S.E. of regression	0.174054	Akaike info criterion		-0.475851
Sum squared resid	0.575601	Schwarz criterion		-0.230423
Log likelihood	10.71021	Hannan-Quinn criter.		-0.410739
F-statistic	154.5524	Durbin-Watson stat		0.939042
Prob(F-statistic)	0.000000			

Source: E-Views 11

The Table above shows that R^2 and Adjusted R^2 indicate a high level of fit, with the model explaining approximately 96.39% (based on Adjusted R^2) of the variance in TEXP. The F-statistic is highly significant (p = 0.0000), indicating that the model is highly statistically significant. The Durbin-Watson Statistic value of 0.939042 suggests some positive autocorrelation in the residuals, though it is close to the range where it might not be a severe issue.

Hypothesis Testing Based on OLS Output

Ho_1: There is no significant effect of real GDP (RGDP) on total government expenditure (TEXP).

From the OLS results, the coefficient for LOG (RGDP) is 2.359 with a t-statistic of 16.302 and a p-value of 0.0000. The very low p-value (<0.05) indicates that we reject the null hypothesis (Ho_1). This suggests that real GDP (RGDP) has a statistically significant and positive effect on total government expenditure (TEXP). A 1% increase in RGDP is associated with approximately a 2.36% increase in TEXP, implying that as the economy grows, government spending tends to increase significantly.

Ho_2: There is no significant effect of inflation (INFL) on total government expenditure (TEXP).

The coefficient for LOG (INFL) is 0.213, with a t-statistic of 1.771 and a p-value of 0.0926. Given that the p-value is slightly higher than the conventional threshold of 0.05, we fail to reject the null hypothesis (Ho_2) at the 5% level. This implies that inflation has a weak positive

relationship with TEXP, but the evidence is not strong enough to conclude a significant effect at more stringent levels.

Ho_3: There is no significant effect of Exchange Rate (EXCR) on total government expenditure (TEXP).

The coefficient for LOG (EXCR) is -0.030 with a t-statistic of -0.213 and a p-value of 0.8335. The very high p-value (>0.05) indicates that we fail to reject the null hypothesis (Ho_3). This suggests that there is no statistically significant effect of EXCR on TEXP. The negative sign of the coefficient suggests a potential inverse relationship, but this relationship is not statistically significant.

Ho_4: There is no significant effect of Oil Revenue (OREV) on total government expenditure (TEXP).

The coefficient for LOG (OREV) is 0.077 with a t-statistic of 0.815 and a p-value of 0.4253. Since the p-value is significantly higher than 0.05, we fail to reject the null hypothesis (Ho_4). This indicates that OREV does not have a statistically significant impact on TEXP during the period. The positive coefficient suggests a possible direct relationship, but the effect is not robust or statistically significant.

Table 4: Heteroskedasticity test for model: Breusch-Pagan-Godfrey

	Statistic		p-value =0.05
F-statistic	2.035679	Prob. F(4,19)	0.1300
Obs*R-squared	7.199913	Prob. Chi-Square(4)	0.1257
Scaled explained SS	2.470863	Prob. Chi-Square(4)	0.6499

Source: E-Views 11

The Breusch-Pagan-Godfrey test examines whether the variance of the residuals is constant. The p-value for the F-statistic is 0.1300, is higher than conventional significance levels (0.01, 0.05, and 0.10). Therefore, we fail to reject the null hypothesis. The p-value for the Chi-square statistic is 0.1257, is also higher than conventional significance levels. Therefore, we fail to reject the null hypothesis. These indicate no significant evidence of heteroskedasticity in the residuals.

4.3 Discussion of Findings

The first hypothesis showed a significant positive effect of real GDP (RGDP) on total government expenditure (TEXP). The positive significant effect of real GDP (RGDP) on total government expenditure (TEXP) is supported by Olusi and Abiodun (2015), who found that government expenditures in oil-rich countries like Nigeria positively affect economic growth, which in turn drives higher government spending.

The second hypothesis showed no positive significant effect of inflation (INFL) on total government expenditure (TEXP). Al-Bayati et al. (2022) reported a negative effect of inflation rate on GDP. Regarding inflation, Ogunjobi et al. (2024) concluded that inflation has an

adverse effect on economic growth in Nigeria, recommending policies like spending caps to control inflationary pressures. This supports the finding of no significant effect of inflation on TEXP.

The third hypothesis showed a negative effect of Exchange Rate (EXCR) on total government expenditure (TEXP). Similarly, Al-Bayati et al. (2022) found that exchange rate fluctuations have a complex but notable impact on GDP, although in Iraq's case, this did not necessarily translate into direct effects on government expenditure.

Hypothesis four showed no significant positive effect of Oil Revenue (OREV) on total government expenditure (TEXP). Additionally, Bala and Chin (2018) demonstrated that oil prices significantly impact inflation, with declining oil prices exacerbating inflation. However, their findings suggest that while oil revenue affects inflation, it may not directly drive government expenditure. Finally, Hakro and Omezzine (2016) showed that oil price fluctuations affect exchange rates and inflation but noted that in fixed exchange rate economies like Oman.

5.0 Conclusion and Recommendations

The study concludes that macroeconomic indices play a crucial role in government spending efficiency in Nigeria. Based on the above, the study makes the following recommendations in the Nigerian context:

i. The Nigerian government should leverage economic growth to enhance public spending, particularly in areas that will sustain or further stimulate economic activity. Investment in infrastructure, education, and health can maximize the benefits of increased government expenditure and support continued economic growth.
ii. Given that inflation does not significantly impact government spending, it is crucial to implement robust inflation control measures. Policies such as targeted subsidies and price controls on essential goods could help manage inflationary pressures without adversely affecting government expenditure.
iii. The Nigerian government should adopt strategies to stabilize the exchange rate and mitigate its impact on government spending. This could involve diversifying the economy to reduce dependence on imports and strengthening foreign exchange reserves to buffer against currency fluctuations.
iv. To improve the efficiency of government spending, the Nigerian government should explore alternative revenue sources and improve the management of oil revenues. This could involve enhancing transparency in oil revenue allocation and investing in sectors that generate sustainable revenue streams beyond the oil sector.

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