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Impact Analysis of Fossil Fuel Subsidy on Economic Growth in Nigeria

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Abstract
In this research, we explore the dynamic interplay between fossil fuel subsidies and per capita income in Nigeria. Employing graphical analysis, Block Exogeneity Wald Tests, variance decomposition, and impulse response analysis, we scrutinize the relationship between these variables. Our findings refute the null hypothesis suggesting no significant impact of fossil fuel subsidies on per capita income, instead favouring the alternative hypothesis that such subsidies indeed exert a noteworthy influence on per capita income levels in Nigeria. This suggests that fossil fuel subsidies have played a pivotal role in shaping both the magnitude and trajectory of per capita income in Nigeria over the studied period. Nevertheless, it's crucial to acknowledge that the responsiveness of per capita income to fluctuations or shocks in fossil fuel subsidies underscores the limitations of relying solely on such subsidies as a driver of economic growth in Nigeria.

Key Words: Fossil Fuel Subsidy, Economic Growth, Nigeria.

I. Introduction

The subsidy for petrol is ostensibly designed to ease the burden of petrol costs on the economy, but in practice its benefits overwhelmingly accrue to the wealthy, as the poor purchase only an estimated three percent of subsidized petrol. The cost of the subsidy rose from four percent of Federation oil and gas revenue captured by the NNPC in 2020 to 42 percent in 2021, an untenable fiscal burden for a country with Nigeria's enormous infrastructure deficit and vast underserved population. Lessons from international experience make it clear that no government action can effectively stop such diversion of a subsidized fuel as long as large price differences remain. Following the expansion of social protection policies during the pandemic, the government has an opportunity to phase out the petrol subsidy while utilizing cash transfers to safeguard the welfare of poor and middle-class households (World Bank, 2022). Of the 54 countries in Africa, the Nigeria's economy is the largest (Statistica, 2021). Unlike most developed countries in the west, Nigeria's main source of foreign exchange earnings and fiscal revenues is oil. This amount to over 80% of total export earnings and about 70% of fiscal revenues (CBN, 2021).

With the dwindling foreign exchange earnings, devaluation of the Nigerian currency and increasing inflation (CBN, July 2022), discuss in Nigeria for the past years and especially in recent times has focused on fuel subsidy. The reemergence of fuel scarcity in most parts of the country and claims of government that it cannot continue the burden of continuing subsidizing Primum Motor Spirit (PMS) and Household Kerosene (HHK) has made the issue more contemporary and of great and

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urgent attention. Worldwide, fossil fuel subsidies exist, estimated at N325 billion in 2015 (International Energy Agency, 2019). This amount is twice the value of aids for the same period which is estimated as $163 billion (McCulloch N. , 2017).

Middle East and Africa appears to have more cases of energy subsidies. In sub-Saharan Africa the median country has energy subsidies of over 1 percent of GDP (McCulloch & Dom, 2019), making subsidies larger than some important sources of domestic revenue in several countries. In Nigeria, within the last 12 years (2008 to 2020), Nigeria has spent over N10 trillion on petroleum products subsidy (Dataphyte, 2022). This is 200% more than what it spent on education, 240% more than what it spent on security, 240% more than what was spent on infrastructures and 290% more than what was spent on health (Dataphyte, 2022). Between 2019 and 2021, subsidy grew from N350 billion to N1.57 trillion (over 349% increase). In the last 12 years, Nigeria has spent over N10 trillion on petroleum products subsidy. This has come at a huge cost to the country. Hence, the objective of this study is to examine the effects of fuel subsidy on Nigeria's economic growth.

II. Literature Review

2.1 The Nigerian Context of Fuel Subsidy

Fossil fuel subsidies exist in Nigeria because the government fixes the price of PMS for consumers below the international price and uses government resources to pay for the difference. Subsidies were first introduced in Nigeria in the 1970s in response to the oil price shock in 1973 (Neil, Tom, & Joonseok, 2020). It all started with the government selling petrol to Nigerians at below cost which most Nigerians were not aware of. In 1977, fuel subsidies became institutionalized when the Price Control Act was passed, "which makes it illegal for some products (including petrol) to be sold above the regulated price". Important to note that the law was passed to reduce the adverse effects of global increase in energy prices (Onyeiwu, 2021).

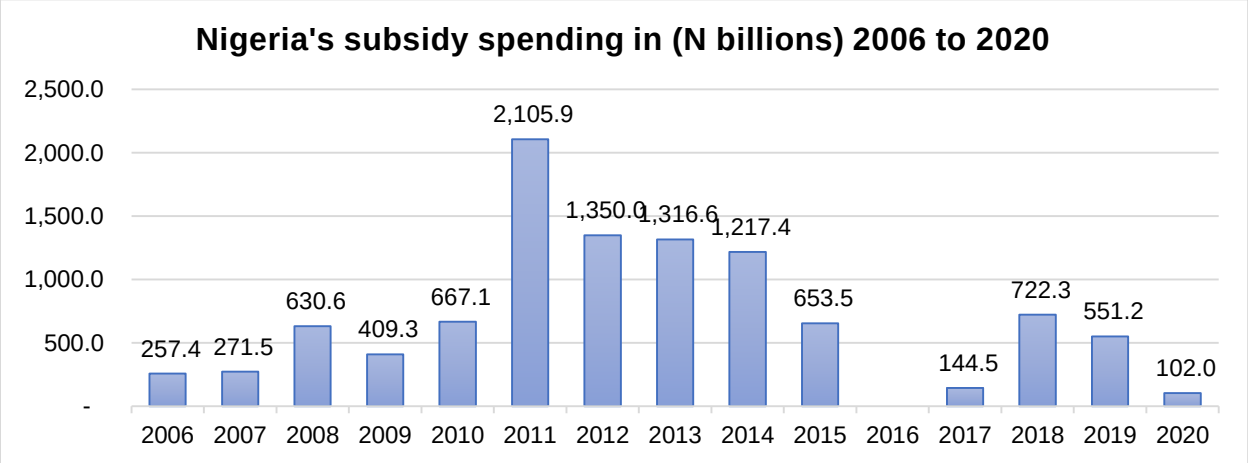

Figure 2.1: Nigeria's subsidy spending in (₦ billions) 2006 to 2020

Source: NNPC, PPPRN and Dataphyte resources.

The opponents of fuel subsidy removal feel it does not exist any longer in Nigeria. Removal of fuel subsidy to the opponents will lead to rapid increase in cost of living and reduce access to quality of life. In other words, removal of fuel subsidy will only drive more people into poverty, expanding the pool of those considered extremely poor. "Alexander Gas and Oil Connections 2005 did not believe the reasons given by the government of Nigeria for pushing forward the idea of removal of fuel subsidy in Nigeria. It disagrees with government's intention of removal of subsidy for the purpose of reviewing the domestic price level upwards as the panacea required to restoring supply-demand equilibrium". The question they put forward was what did the government do with previous fuel subsidy removed? To them, the removal only caused the government considerable loss of credibility and worsen the lives of the average Nigerian. "It described the argument of supporters of removal of fuel as not only persuasive, but fallacious". Similarly, Ola (1998) totally disagreed with the government on the existence of fuel subsidy; he described the claim as a decoy for upward review of fuel prices. He argues that upward review of prices will not achieve efficiency in supply of petroleum

products. According to him "it is wrong to consider removal of purported fuel subsidy when the nation's refineries are operating far below their installed capacities (Ola, 1998). The low production cannot be used to determine prices as the advantages of economy of scale will be missing. Until the nation's refineries are repaired and made to work at full capacity, one should not talk of appropriate pricing of fuel".

Government and key proponents of the removal of fuel subsidy including the World Bank and International Monetary Fund (IMF), on the other hand, strongly believe that fuel subsidy exists. They opine that fuel scarcity and wide variation in fuel prices across the country suggest that subsidy measure has not been effective and hardly benefits the target group. In response to critics of fuel subsidy removal, the Nigerian National Petroleum Corporation (1993) asserts that "the issue does not require sentimental arguments, but a close look at the major facts and figures both in domestic economy and comparative economies of other countries of the world" (Nigerian National Petroleum Corporation, 1993). It suggests that there is need to remove subsidy on fuel price in order to minimize the excruciating effects of fuel scarcity by improving the supply and delivery system. It suggested that fuel subsidy is not fair to all because it favours the rich who own cars and use more of fuel. According to it "the subsidy that would be beneficial would be in health care, mass transit and education". Soyode (2001) disagrees with the argument of the opponents of fuel subsidy removal that there is no longer subsidy since official prices of fuel cover the cost of production. He asserts that the argument is expression of pure sentiment and lacks economic sense. He opines that it is ridiculous to expect the nation's resources to be invested in oil production only for just recovering the cost of production at the end of the day. According to him "the cost of producing crude oil is irrelevant in the calculation of fuel subsidy". He describes fuel subsidy as the loss of revenue that should have accrued to the federation account if the crude oil allocated for domestic consumption were to be sold at international market prices instead of the price at which it is sold to the Nigerian National Petroleum Corporation (NNPC). He concluded that removal of fuel subsidy will ultimately guarantee success and bring permanent solution to lingering fuel scarcity problem in Nigeria (Soyode, 2001). Aminu and the Nigerian National Petroleum Corporation argue that fuel subsidy exists and that its removal will benefit the nation. This is because it will discourage wasteful consumption and smuggling. The amount of money realized from it will be used to provide world class mass transit and road systems, improved health care, good schools, food security and new job opportunities, among others.

Several attempts have been made by the Nigeria government to remove fuel subsidies. While in absolute terms, it appears there has been increase in fuel subsidy, but as a proportion of total cost of fuel, the proportion has been on the decline. For example, in the 1970s, fuel subsidy was around 70% of the entire cost but today it is less than 50%. The size of subsidy largely depends on quantity used and also, the international oil prices. In years when the price of oil increases, subsidies also increase. In 2016 when the international price of oil dropped, reported amount spent on fuel subsidy was zero.

Strong opposition by political parties and coalition of interest groups has made it very challenging to outrightly remove fuel subsidies (Nwachukwu & Mba, 2012). Important to also note that most subsidy reforms were done simply by increasing to a new regulated price instead of introducing a market- based pricing mechanism. As a result, fuel subsidies always reemerged particularly following currency depreciation and related increase in inflation.

The average price of petrol (premium motor spirit -PMS) around the world is 572.16 Nigerian Naira per litre. However, there is substantial difference in these prices among countries. The differences in prices across countries are due to the various taxes and subsidies for PMS. All countries have access to the same petroleum prices of international markets but then decide to impose different taxes. As a result, the retail price of PMS is different. Cost per litre of PMS in Nigeria is ninth lowest among 168 countries (Valev, 2023).

2.2 Conceptual review

2.2.1 Fossil Fuel

Fossil fuel, any of a class of hydrocarbon-containing materials of biological origin occurring within Earth's crust that can be used as a source of energy. Fossil fuels include coal, petroleum, natural gas, oil shales, bitumen, tar sands, and heavy oils. All fossil fuel contain carbon and were formed as a result of geologic processes acting on the remains of organic matter, a process that began in the billions of years ago.

All fossil fuels can be burned in air or with oxygen derived from air to provide heat. This heat may be employed directly, as in the case of home furnaces, or used to produce steam to drive

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generators that can supply electricity. In still other cases—for example, gas turbines used in jet aircraft—the heat yielded by burning a fossil fuel serves to increase both the pressure and the temperature of the combustion products to furnish motive power.

Since the beginning of the Industrial Revolution in Great Britain in the second half of the 18th century, fossil fuels have been consumed at an ever-increasing rate. Today they supply more than 80 percent of all the energy consumed by the industrially developed countries of the world.

2.2.2. Subsidy

It has sometimes been argued that "the concept of a subsidy is just too elusive" to even attempt to define and that the "definition of a subsidy, like that of beauty, varies with the beholder whose eye is focused on the object under scrutiny" (U.S. Congress, House Committee on Agriculture, 1972)). Much in the same vein, Break (1972) has suggested that "whereas for most government spending programs it is only the benefits that are elusive and difficult to quantify, for subsidy programs it is frequently both benefits and costs." (Break, 1972).

In the most general terms, a subsidy can be defined as any government assistance, in cash or in kind, to private sector producers or consumers for which "the government receives no equivalent compensation in return, but conditions the assistance on a particular performance by the recipient" (U.S. Congress, Joint Economic Committee, 1972). It includes government operations that result in producers receiving higher returns than suggested by competitive market outcomes ("producer subsidies"), and consumers obtaining goods or services below their economic cost ("consumer subsidies"). This broad definition extends beyond the more narrowed subsidy concepts that are employed in government budgets or national accounts, and it leaves room for a wide range of government activities to be defined as subsidies.

Subsidies often have effects that are unintended by policymakers. Two examples may illustrate this point. Price subsidies generally affect the quantities demanded. For instance, introducing subsidies for imported foodstuffs that lower the consumer price for these goods may require a large increase in imports to avoid shortages; this, in turn, will also affect the availability of foreign exchange. Generalized subsidies for normal goods waste resources because they are not targeted, but they may also have distributive effects that are quite different from those intended by policymakers. For instance, price controls on agricultural products that lower the price below the competitive market equilibrium, will, in all likelihood, result in shortages if imports are not allowed to fill this gap. The shortage will provide opportunities to earn economic rents to well-placed groups that: have privileged access to the product at its controlled price. The poor--presumably, the group that the price control seeks to protect--may frequently not be in a position of having privileged access the subsidized product at its controlled price. The net result may be that, on average, consumers end up paying a price that is higher than the competitive market price, with the benefit of the price control policy accruing to traders.

2.3 Theoretical Framework

The Endogenous Growth Theory

The endogenous growth theory was developed as a reaction to omissions and deficiencies in the Solow-Swan neoclassical growth model. It is a new theory which explains the long run growth rate of the economy on the basis of endogenous factors as against exogenous factors of the neoclassical growth theory. The Solow-Swan neoclassical growth model explains the long run growth rate of output based on two exogenous variables: the rate of population growth and the rate of technical progress and that it is independent of savings rate. As the long run growth rate depended on exogenous factors, (Romer, 1989) observed that the neoclassical theory had few policy implications. According to Romer, in models with exogenous technical change and exogenous population growth, it never really mattered what the government did. The new growth theory does not simply criticize the neoclassical growth theory. Rather it extends the neoclassical growth theory by introducing endogenous technical progress in growth models. The endogenous growth models have been developed by Kenneth J. Arrow, Paul M. Romer, and Robert E. Lucas among other economists.

In the theories of endogenous growth, technological progress is not the only possible cause of economic growth in the long term. The value of intensive, high-quality determinants of economic growth (parameter A in neoclassical theory) is defined in the theories of endogenous growth with the following factors: The quality of human capital, which depends on investment in human development (education, health); Creation of the necessary conditions and prerequisites for the protection of intellectual property rights in the conditions of imperfect competition; State support for the development of science and technology; The

role of government in creating a favourable investment climate and attracting new technologies. The theories of endogenous growth in contrast to neoclassical ones are in favour of state's intervention in the development process. In these theories, human capital emerges as an important determinant of economic growth.

2.4 Empirical review

Several studies have been carried out on the issue of fuel subsidy in other countries of the world. However, many of these studies are highly descriptive in nature while some have employed different econometric and statistical techniques to evaluate the distributional impacts and effectiveness of subsidies and subsidy policies on the welfare and expenditures of the intended beneficiaries.

Gangopadhyay et al (2005) examined the impact of reducing energy subsidies on the welfare of the poor in India, using data from nationally representative surveys of over 100,000 households. The results show that there is a strong case for reducing subsidies on liquified petroleum gas (LPG) and kerosene. The study opined that subsidy is an inefficient means of subsidizing fuel use by the poor.

A number of studies have tried to examine subsidies from the perspective of development using methodology such as the social-cost-benefit (SCB) analysis which assesses the impacts of changes in energy subsidies on social welfare. This method permits a socio-economic appraisal of changes in policy and regulatory framework, identifying, measuring and then discounting future costs and benefits in order to calculate the net economic merit of a particular policy option. Shafie-Pour Motlagh and Farsiabi (2007) employed a typical Environmental Cost- Benefit Analytical Model (ECBA) incorporating environmental damage costs of energy consumption to estimates the trend of total energy subsidies in Iran. Generally, the ECBA model adopted internalises energy cycle externalities and computes the Cost/Benefit ratio for implementing price reform policy under different scenarios. A major limitation of the social costs-benefits analysis is that the costs and benefits may apply to goods and services that have a simple and visible measure in a suitable unit such as prices in monetary terms which is seldom the case particularly in the case of the social and environmental impacts.

The price-gap method is one approach that has been used widely owing to its robustness and transparency, but the method can only explain specific impacts of subsidies. The theoretical foundation of the price gap methodology was established by Corden (1957) in calculating the cost of protection while McCrone (1962) applied the framework to study agricultural subsidies in the United Kingdom. A landmark effort at estimating global fossil fuel subsidy by Larsen and Shah (1992) adapted and publicised this price gap approach.

The partial equilibrium models consider merely the energy product market where subsidy reform is taking place and based on simple economic assumptions attempt to estimate changes in fossil fuels price, demand and production as a result of subsidy removal. However, according to Von Moltke et al. (2004), the sizes of these changes will be reasonably influenced by the price elasticity of demand and supply and underlying assumptions. Though the use of partial equilibrium models can offer some valuable insights into the impacts of subsidy reform, they are very restrictive as regard information on other economic sectors with considerable use of energy as input as well as other macroeconomic effects about international competitiveness.

This study uses a different and more robust data and methodology in analysing the impact of fossil fuel subsidy in the Nigeria economy.

III. Methodology

3.1 Model Specification

In this research work an unrestricted Vector Autoregressive model (VAR) is employed to examine the response of selected socio-economic variables to changes in domestic petroleum prices in Nigeria. VAR is a system regression model used where there is more than one dependent variable. This model has been used by Farzanegan and Markwardt (Farzanegan & Markwardt, 2009) to measure the effect of oil price shocks on the Iranian economy. VAR was also used by Olomola and Adejumo (Olomola & Adejumo, 2006) to examine the effects of oil price shocks on output, real exchange rate, money supply and inflation in Nigeria. An important advantage of VAR is that all variables are considered as endogenous, therefore the problem of specifying which variable is exogenous or endogenous does not arise, so this has solved the problem of identification because for simultaneous equations structural model to be estimable, the requirement is that all equations in the system are identified (Asteriou & Hall, 2007).

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$y_t = A_o + \sum A_1\, y_{t-i} + \mu_t$ ……..……3.1

Where:

y_t is a 6x1 vector of variables determined by p lags of all nine variables in the system,

μ_t is a 6x1 vector of error terms,

A_o is a 6x1 vector of constant term coefficients and

A_1 are 6x6 matrices of coefficients on the ith lag of y.

y_t = [FSD, PCI, UNEMP, PVT, LFEXP, U_5M]. ……..….3.2

The vector specification of the VAR model in 3.2 is explicitly stated as:

$$FSD_t = \alpha_{10} + \sum_{i=1}^{n} \alpha_{11i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{12i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{13i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{14i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{15i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{16i} PVT_{t-i} + \mu_{1t} \ldots\ldots\ldots\ldots (3.3)$$

$$PCI_t = \alpha_{20} + \sum_{i=1}^{n} \alpha_{21i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{22i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{23i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{24i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{25i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{26i} PVT_{t-i} + \mu_{2t} \ldots\ldots\ldots\ldots (3.4)$$

$$LFEXP_t = \alpha_{30} + \sum_{i=1}^{n} \alpha_{31i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{32i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{33i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{34i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{35i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{36i} PVT_{t-i} + \mu_{3t} \ldots\ldots\ldots\ldots (3.5)$$

$$UNEMP_t = \alpha_{40} + \sum_{i=1}^{n} \alpha_{41i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{42i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{43i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{44i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{45i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{46i} PVT_{t-i} + \mu_{4t} \ldots\ldots\ldots\ldots (3.6)$$

$$U\_5M_t = \alpha_{50} + \sum_{i=1}^{n} \alpha_{51i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{52i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{53i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{54i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{55i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{56i} PVT_{t-i} + \mu_{5t} \ldots\ldots\ldots\ldots (3.7)$$

$$PVT_t = \alpha_{60} + \sum_{i=1}^{n} \alpha_{61i} FSD_{t-i} + \sum_{i=1}^{n} \alpha_{62i} PCI_{t-i} + \sum_{i=1}^{n} \alpha_{63i} LFEXP_{t-i} + \sum_{i=1}^{n} \alpha_{64i} UNEMP_{t-i} + \sum_{i=1}^{n} \alpha_{65i} U\_5M_{t-i} + \sum_{i=1}^{n} \alpha_{66i} PVT_{t-i} + \mu_{6t} \ldots\ldots\ldots\ldots (3.8)$$

Where:

FSD = Fossil fuel subsidy

PCI = Log of gross domestic product

LINF = Per capita income

UNEMP = Unemployment rate

LFEXP = Life expectancy

PVT = Poverty rate

ɥ = Stochastic error term.

α_{10}- α_{66}, are coefficients of variables.

n = maximum lag length

Since all the variables of the model are integrated of the same order, that is, I (1), then a VECM is estimated in which all variables enter the above model in their first differences.

3.2 Nature and Sources of Data

Data for the study were sourced from the World Bank: (https://data.worldbank.org/country/nigeria); The International Monetary Fund IMF (https://www.imf.org/external/datamapper/profile/NGA); Macrotrend: <a href='https://www.macrotrends.net/countries/NGA/ Nigeria, Centre Bank of Nigeria (CBN) and National Bureau of Statistics (NBS).

3.3 Methods of Data Analysis

Unit and cointegration test is conducted to first identify if there is possible problem of non-stationarity of the data considering that the dataset is a time series date. These will be followed by the impulse response function where the impulse response of the estimated VAR will be considered to assess the responsiveness of the dependent variables to changes to each variable and the effect on the VAR system over time. Finally Forecast Error Variance Decomposition will be considered to analyse the significance of changes in the independent variable on the dependent variables.

3.4 Variance Decomposition

With the use of variation decomposition, conclusions may be reached about the fraction of a time series' movement that was caused by its own prior "shocks" as opposed to "shocks" brought on by other variables in the VAR. Once the VAR has been estimated, the effect of a "shock" in one variable is followed through the system of equations to calculate the influence on all other variables, including potential future values of the "shocked" variable. It is feasible to determine which variables are severely affected and which ones are not by using an approach that breaks out the variance of the forecast errors for each variable after a "shock" to a specific variable (Enders, 2010).

3.5 Impulse Response Functions (IRF)

In the error terms, such as u_{1t} and u_{2t}, the IRF maps out how the dependent variable in the VAR system reacts to shocks. The IRF forecasts the effects of such shocks over a number of time periods. This IRF analysis is an important part of the VAR analysis (Enders, 2010). The analysis of impulse response functions shows the temporal evolution of the impact of "shocks" of other VAR variables on a specific variable. To put it another way, the goal of this method is to find out how each

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variable reacts over time to a previous "shock" in that variable as well as to "shocks" in other variables.

3.6 Justification of the Model

The model's validity depends on how well it captures the dynamic characteristics of fuel subsidies and their interactions with crucial economic performance indicators in Nigeria during the evaluation period. As a result, the model is thought to be suitable for attaining the research aim and objectives. The VAR model enables the integration of both the present and lagged values of the variables of interest taken into consideration for this study while analysing the effects of fossil fuel subsidies on the Nigerian economy. The set of equations that made up the VAR model will also take into account the interdependencies between the variables. The model's ease of use as a basis for justification is also noteworthy. All variables will be included as endogenous variables in the VAR model.

IV. Data Presentation and Analysis of Results

4.1 Descriptive Statistics

This section shows the descriptive statistics and trend analysis of the variables used for regression analysis. The descriptive statistical indicators of interest include the arithmetic mean, the maximum value, minimum value, the standard deviation, as well as the standard error. The descriptive statistics provide the basic insights into the variables of interest as a basic precursor to the rigorous bivariate and multivariate analysis carried out in subsequent sections of this study.

Table 4.1 Descriptive statistics of selected variables

Descriptive Statistics	FSD	PCI	U_5M	UNEMP	PVT	LFEXP
Mean	439.4222	2002.065	159.7125	4.847969	45.74922	49.23531
Median	246.8500	1981.699	152.5500	4.007000	50.27920	48.35000
Maximum	2105.920	2679.555	210.0000	9.788000	58.42000	55.12200
Minimum	8.140000	1429.012	113.8000	3.700000	30.86000	45.87000
Std. Deviation	531.9036	464.1733	34.32096	1.909791	9.612752	3.292347
Skewness	1.563215	0.066417	0.222357	1.732128	-0.401828	0.449282
Kurtosis	4.725911	1.354537	1.508997	4.280100	1.376791	1.682636

Source: Author's Computation

Table 4.1 shows the descriptive statistics regarding fossil fuel subsidy, per capita income, under five mortality rate, unemployment rates, poverty rates, as well as life expectancy. The mean value of fossil fuel subsidy (FSD) is 439.4222 throughout the periods under consideration, with maximum and minimum values of 2105.920 and 8.140000 respectively. The standard deviation of fossil fuel subsidy is 531.9036 during the same period. The implications of this are evaluated based on the results of regression analysis.

The mean value of per capita income (PCI) is 2002.065, with maximum and minimum values of 2679.555 and 1429.012 respectively. Also, the associated standard deviation of per capita income in Nigeria during the periods under consideration is 464.1733.

Given the results of descriptive statistics presented in Table 4.1, it could be deduced that some degree of variability is attributable to the variables under consideration. Further analysis of the time series properties of the variables are carried out in subsequent sections.

4.2 Unit Root Tests

Table 4.2: Summary of Augmented Dickey-Fuller (ADF) Unit Root Test Results

At Level				At first Difference			
variable	ADF statistic	5% level	Prob. Value	ADF statistic	5% level	Prob. Value	Order of Integration
FSD	0.366727	-1.955020	0.7828	-3.757973	-1.955020	0.0006	I(1)

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PCI	0.943976	-1.952473	0.9040	-2.565918	-1.952473	0.0121	I(1)
LFEXP	1.698675	-1.952473	0.9756	-4.943489	-4.443649	0.0103	I(1)
U_5M	1.824280	-3.574244	1.0000	-5.137691	-4.443649	0.0100	I(1)
UNEMP	2.089863	-1.952066	0.9895	-4.130976	-1.952473	0.0002	I(1)
PVT	-0.814444	-2.960411	0.8010	-6.432505	-2.963972	0.0000	I(1)

Source: Author's Computation based on output from E-VIEWS10 software.

In a bid to avoid the phenomenon of spurious regression often associated with non-stationary time series data, the unit root test was carried out to ascertain the time series properties of the variables under consideration. The stationarity is obtained by comparing test statistics with the critical values at the chosen level of significance. In absolute terms, if the calculated value of the ADF statistic is greater than the critical value at the chosen level of significance, the null hypothesis of unit root is rejected indicating that the time series data under consideration is stationary. On the other hand, if the calculated value of the ADF statistic is less than the critical value in absolute terms, the null hypothesis of a unit root is not rejected at the chosen level of significance, indicating that the time series data under consideration is not stationary. The summary of ADF unit root tests presented in Table 4.2 shows that the time series data regarding all the time series data under consideration were not stationary at level but became stationary at first difference.

The outcome of the test of stationarity is consistent with the theoretical postulation that the time series data regarding most economic variables are usually not stationary at level but become stationary after first differencing. Since the variables are not stationary at level, it is imperative to examine the variables for Cointegration. The Johansen test of Cointegration is applied to test for Cointegration since the outcome of the unit root test is consistent with the underlying assumption of the Johansen test of Cointegration.

4.3 Test of Cointegration

Table 4.3A: Unrestricted Cointegration Rank Test (Trace-Statistic)

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**P-Value**
None *	0.905686	185.2889	95.75366	0.0000
At most 1 *	0.788538	114.4552	69.81889	0.0000
At most 2 *	0.664319	67.84394	47.85613	0.0002
At most 3 *	0.489855	35.09613	29.79707	0.0112
At most 4	0.309709	14.90434	15.49471	0.0612
At most 5	0.118534	3.785076	3.841466	0.0517

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* Denotes rejection of the hypothesis at the 0.05 level

Source: Author's Computation

From the result in table 4.3A, the value of the calculated Trace statistic (35.09613) is more than the five percent (5%) critical value of the trace statistic (29.79707) and the corresponding P-value (0.0112) is less than 0.05. Hence, we reject the null hypothesis that there are at most three (3) cointegrating equation and accept the alternative hypothesis that there are at most four (4) Cointegrating equation. Trace test therefore indicated four (4) cointegrating equation at the 0.05 level of significance.

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Table 4.3B: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	P-Value
None *	0.905686	70.83371	40.07757	0.0000
At most 1 *	0.788538	46.61127	33.87687	0.0009
At most 2 *	0.664319	32.74781	27.58434	0.0099
At most 3	0.489855	20.19179	21.13162	0.0673
At most 4	0.309709	11.11926	14.26460	0.1483
At most 5	0.118534	3.785076	3.841466	0.0517

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* Denotes rejection of the hypothesis at the 0.05 level

Source: Author's Computation

Similarly, the Max-Eigen statistics conforms to the result of the Trace statistics. From Table 4.3B, the value of the calculated Max-Eigen statistics (32.74781) is more than the 5% critical value (27.58434) and the corresponding P-value (0.0099) is less than 0.05. Hence, we reject the null hypothesis that there are at most two (2) cointegrating equations and accept the alternative hypothesis that there are at most three (3) Cointegrating equations. The Max-Eigen test therefore indicated three cointegrating equations at the 0.05 level of significance.

The results of the Johansen Cointegration test indicated the presence of Cointegration which implies the existence of a long-run relationship among the variables. The outcome of the test of Cointegration implies that there is long run relationship between fossil fuel subsidy and selected socio-economic indicators in Nigeria during the period under review.

4.4 VAR Lag Selection Criteria

Table 4.5: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-691.7361	NA	6.41e+12	46.51574	46.79598	46.60539
1	-416.4819	422.0564	798699.6	30.56546	32.52714	31.19302
2	-353.8823	70.94625*	185871.3*	28.79215*	32.43527*	29.95762*

* indicates lag order selected by the criterion (each test at 5% level)

LR: sequential modified LR test statistic

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author's Computation

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Table 4.5 comprises the results of the lag order selection criteria conducted on the Vector Autoregressive (VAR) system. This is with a view to determining the appropriate lag length for the vector error correction model (VECM) estimation. The appropriate lag length recommended by sequential modified LR statistic, Final Prediction Error (FPE), Akaike Information Criterion (AIC), as well as Hannan-Quinn information criterion (HQ) is two (2) lags. Therefore, a lag length of two (2) is considered appropriate and has been selected for the estimation process based on the results of the lag selection criteria. Hence the Vector Error Correction Model (VECM) was estimated using two (2) lags, which is consistent with the optimal lag length recommended by the lag selection criteria.

4.5 Vector Error Correction (VECM) Model Estimation Results

Table 4.5: Long run Model

Cointegrating Eq:	CointEq1
FSD(-1)	1.000000
PCI(-1)	14.33862
	(3.15976)
	[4.53788]
U_5M(-1)	552.6663
	(52.8520)
	[10.4569]
UNEMP(-1)	-110.8988
	(161.333)
	[-0.68739]
PVT(-1)	77.81451
	(30.9961)
	[2.51046]
LFEXP(-1)	3584.831
	(588.994)
	[6.08636]
C	-296191.5

Source: Author's Computation

Table 4.5 comprises the long run equation of the vector error correction model. Based on the long run model, the estimated coefficient of per capita income is positive and statistically significant at 5% level of significance. Since the t-value (4.53788) corresponding to the lagged coefficient of per capita income (PCI) is greater than 1.96, the null hypothesis is rejected at 5% level of significance. Hence, fossil fuel subsidy has a long run impact on per capita income in Nigeria. It should be noted that the long run impact of fossil fuel subsidy on per capita income is consistent with a-priori expectation and the impact is statistically significant. The short run dynamics of the interaction between fossil fuel subsidy and per capita income is further evaluated using the short run model, the variance decomposition, as well as the impulse response function.

Based on the long run model presented in Table 4.7A, the estimated coefficient of under- five mortality (U_5M) is positive and statistically significant at 5% level of significance. The t-value (10.4569) corresponding to the lagged coefficient of under- five mortality (U_5M) is greater than 1.96 indicating a rejection of the null hypothesis at 5% level of significance. Hence, fossil fuel subsidy has a long run impact on under-five mortality (U_5M) in Nigeria. It should be noted that the long run impact of fossil fuel subsidy on under-five mortality is not consistent with a-priori expectation. The short run dynamics of the interaction between fossil fuel subsidy and under-five mortality is further evaluated

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using the short run model, the variance decomposition, as well as the impulse response function.

Table 4.6: Vector Error Correction Model

Error Correction:	D(FSD)	D(PCI)	D(U_5M)	D(UNEMP)	D(PVT)	D(LFEXP)
CointEq1	-0.084108	-0.066209	-0.000231	4.81E-05	0.001278	-1.16E-05
	(0.14767)	(0.01232)	(0.00027)	(0.00017)	(0.00145)	(2.1E-05)
	[-0.56959]	[-5.37565]	[-0.86162]	[0.27753]	[0.88193]	[-0.55512]
D(FSD(-1))	-0.368797	0.076777	0.000658	-0.001389	-0.000304	-0.000119
	(0.32594)	(0.02719)	(0.00059)	(0.00038)	(0.00320)	(4.6E-05)
	[-1.13150]	[2.82417]	[1.11116]	[-3.63320]	[-0.09495]	[-2.59726]
D(FSD(-2))	-0.142385	0.003230	9.27E-05	-0.001006	-0.000704	-5.93E-05
	(0.27774)	(0.02317)	(0.00050)	(0.00033)	(0.00272)	(3.9E-05)
	[-0.51266]	[0.13944]	[0.18364]	[-3.08786]	[-0.25830]	[-1.51296]
D(PCI(-1))	-1.038868	0.404378	-0.002681	-0.003755	-0.034305	-0.000349
	(1.77268)	(0.14786)	(0.00322)	(0.00208)	(0.01739)	(0.00025)
	[-0.58605]	[2.73495]	[-0.83216]	[-1.80585]	[-1.97269]	[-1.39641]
D(PCI(-2))	-3.531892	-0.064016	0.000336	0.003777	-0.005200	0.000974
	(2.15166)	(0.17947)	(0.00391)	(0.00252)	(0.02111)	(0.00030)
	[-1.64148]	[-0.35670]	[0.08603]	[1.49628]	[-0.24635]	[3.20995]
D(U_5M(-1))	542.9933	54.54690	2.044063	-0.682623	-2.375493	0.048789
	(390.181)	(32.5443)	(0.70907)	(0.45772)	(3.82772)	(0.05504)
	[1.39164]	[1.67608]	[2.88273]	[-1.49135]	[-0.62060]	[0.88635]
D(U_5M(-2))	-421.2431	105.5516	-0.512948	0.638769	-1.041714	-0.042987
	(632.874)	(52.7868)	(1.15011)	(0.74242)	(6.20855)	(0.08928)
	[-0.66560]	[1.99958]	[-0.44600]	[0.86038]	[-0.16779]	[-0.48147]
D(UNEMP(-1))	-61.78614	-14.91243	0.037133	-0.374898	-1.609677	0.022035
	(187.160)	(15.6107)	(0.34012)	(0.21956)	(1.83606)	(0.02640)
	[-0.33012]	[-0.95527]	[0.10917]	[-1.70752]	[-0.87670]	[0.83457]
D(UNEMP(-2))	49.37112	-5.851699	-0.043951	-0.162814	-1.008008	0.048080
	(182.874)	(15.2532)	(0.33233)	(0.21453)	(1.79401)	(0.02580)
	[0.26997]	[-0.38364]	[-0.13225]	[-0.75894]	[-0.56187]	[1.86366]
D(PVT(-1))	-54.07642	8.955604	0.056286	-0.015475	-0.564453	-0.001434
	(33.8630)	(2.82445)	(0.06154)	(0.03972)	(0.33220)	(0.00478)
	[-1.59692]	[3.17074]	[0.91464]	[-0.38955]	[-1.69914]	[-0.30027]
D(PVT(-2))	9.253663	9.608310	0.090447	-0.101377	-0.237546	-0.010785
	(34.9014)	(2.91107)	(0.06343)	(0.04094)	(0.34239)	(0.00492)
	[0.26514]	[3.30062]	[1.42602]	[-2.47607]	[-0.69380]	[-2.19036]
D(LFEXP(-1))	-584.8338	-117.9932	0.347056	-0.527454	15.53752	0.435014
	(1171.14)	(97.6825)	(2.12830)	(1.37386)	(11.4890)	(0.16522)
	[-0.49937]	[-1.20793]	[0.16307]	[-0.38392]	[1.35238]	[2.63298]
D(LFEXP(-2))	-388.0686	-245.7341	-1.232457	2.667520	-2.628465	0.059583
	(1095.53)	(91.3763)	(1.99090)	(1.28517)	(10.7473)	(0.15455)
	[-0.35423]	[-2.68926]	[-0.61905]	[2.07562]	[-0.24457]	[0.38552]
C	911.5762	659.8858	2.222984	-0.578590	-14.63122	0.154096
	(1538.08)	(128.289)	(2.79514)	(1.80433)	(15.0887)	(0.21698)
	[0.59267]	[5.14376]	[0.79530]	[-0.32067]	[-0.96968]	[0.71017]
R-squared	0.541162	0.883869	0.900239	0.693179	0.417861	0.957051
Adj. R-squared	0.143503	0.783221	0.813779	0.427267	-0.086659	0.919829
Sum sq. resids	2328321.	16197.96	7.689378	3.204153	224.0732	0.046338
S.E. equation	393.9815	32.86128	0.715978	0.462180	3.864998	0.055581
F-statistic	1.360869	8.781840	10.41225	2.606802	0.828235	25.71178

Source: Author's Computation.

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The vector error correction model (VECM) estimates presented in Table 4.6 comprise one Cointegrating equation and a system of six equations with respect to six endogenous variables. The endogenous variables included are the differenced values of fossil fuel subsidy (FSD), per capita income (PCI), under five mortality rate (U_5M), unemployment rates (UNEMP), life expectancy (LFEXP) and poverty rates (PVT). Each variable was estimated with two lags each as determined by the lag selection criteria. The estimated VECM model also comprises the standard errors and t-statistics for each of the lagged coefficients.

The results of the vector error correction model presented in table 4.6B shows that the lagged coefficients of fossil fuel subsidy are positive with reference to per capita income. This is an indication that fossil fuel subsidy imposes a positive effect on Nigeria's per capita income in the short run.
The results of the vector error correction model presented in table 4.6B shows that the lagged coefficients of fossil fuel subsidy are positive with reference to under-five mortality. This is an indication that fossil fuel subsidy imposes an escalating effect on Nigeria's under-five mortality rates in the short run.

The results of the vector error correction model presented in table 4.6B shows that the lagged coefficients of fossil fuel subsidy are negative with reference to unemployment rates. This is an indication that fossil fuel subsidy imposes a dampening effect on Nigeria's unemployment rates in the short run.

The results of the vector error correction model presented in table 4.6B shows that the lagged coefficients of fossil fuel subsidy are negative with reference to poverty rates. This is an indication that fossil fuel subsidy imposes a dampening effect on Nigeria's poverty rates in the short run. However, these effects are not statistically significant.

The results of the vector error correction model presented in table 4.6B shows that the lagged coefficients of fossil fuel subsidy are negative with reference to life expectancy. This is an indication that fossil fuel subsidy also imposes a dampening effect on Nigeria's life expectancy in the short run.

The adjusted coefficient of determination with respect to per capita income (PCI) shows that about 78 percent of the total changes in per capita income is explained by the lags of fossil fuel subsidy, under five mortality, unemployment rates, poverty rates and life expectancy. This implies that the regression equation with respect to per capita income (PCI) has a very good fit.

The adjusted coefficient of determination with respect to under-five mortality (U_5M) shows that about 81 percent of the total changes in under-five mortality (U_5M) is explained by the lags of fossil fuel subsidy, per capita income (PCI), unemployment rates, poverty rates and life expectancy. This implies that the regression equation with respect to under-five mortality (U_5M) has a very good fit.

The adjusted coefficient of determination with respect to unemployment rates (UNEMP) shows that about 42 percent of the total changes in unemployment rates (UNEMP) is explained by the lags of fossil fuel subsidy, under five mortality, per capita income, poverty rates and life expectancy. This implies that the regression equation with respect to unemployment rates (UNEMP) has a moderate fit.

The adjusted coefficient of determination with respect to poverty rates (PVT) shows that about 0 percent of the total changes in poverty rates (PVT) is explained by the lags of fossil fuel subsidy, under five mortality, per capita income, unemployment rates and life expectancy. This implies that the regression equation with respect to poverty rates (PVT) has a very poor fit.

The adjusted coefficient of determination with respect to life expectancy (LFEXP) shows that about 91 percent of the total changes in life expectancy (LFEXP) is explained by the lags of fossil fuel subsidy, under five mortality, per capita income, unemployment rates and poverty rates. This implies that the regression equation with respect to life expectancy (LFEXP) has a very good fit. Further evaluation of the estimated model is done using the Vector Error Correction Granger Causality/Block Exogeneity Wald Tests.

4.6 Post Estimation Diagnostic Tests

4.6.1 Block Exogeneity Wald Tests

The statistical significance of the vector error correction model (VECM) estimates presented in Table 4.6 were evaluated using the vector error correction Granger causality test otherwise known

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as the Block Exogeneity Wald Tests. This is with a determining the statistical significance of interdependencies among the variables in the restricted VAR system. The summaries of Block Exogeneity Wald Tests results are presented in Table 4.7.

Table 4.7: Block Exogeneity Wald Tests (Per capita income)

Dependent variable: D(PCI)

Excluded	Chi-sq	df	Prob.
D(FSD)	9.781910	2	0.0075
D(U_5M)	28.93499	2	0.0000
D(UNEMP)	0.956919	2	0.6197
D(PVT)	13.74166	2	0.0010
D(LFEXP)	20.18112	2	0.0000
All	35.69175	10	0.0001

Source: Author's computation

The results of the vector error correction granger causality test with reference to per capita income as a dependent variable is presented in Table 4.7A. The estimated chi-square (9.781910) and p-values (0.0075) corresponding to the differenced lag coefficients of fossil fuel subsidy (FSD) indicate a rejection of the null hypothesis, at 5% level of significance, that there is no short run causality running from fossil fuel subsidy (FSD) to per capita income. This implies that fossil fuel subsidy (FSD) does have significant influence on the short run dynamics of per capita income during the period under review.

This result provides a valid empirical evidence for addressing the objective of this study relating to the contribution of fossil fuel subsidy (FSD) to per capita income in Nigeria. The results indicated that fossil fuel subsidy (FSD) has contributed significantly to per capita income in Nigeria during the period under consideration.

Table 4.8: Response of Per Capita Income

Response of PCI:						
Period	**FSD**	**PCI**	**U_5M**	**UNEMP**	**LFEXP**	**PVT**
1	-15.52901	28.96055	0.000000	0.000000	0.000000	0.000000
2	2.344345	20.31907	9.749825	10.28589	-7.058017	11.07407
3	50.95921	2.438930	51.57401	21.80600	-18.56412	15.67382
4	120.5182	-17.75803	76.14403	14.87667	-17.60345	13.11816
5	150.3822	-27.91227	95.93027	4.019929	-9.475388	12.73154
6	134.9679	-33.12807	80.35010	-0.291107	3.497292	14.05472
7	48.43687	-14.89721	22.15163	-8.363415	11.42794	10.55650
8	-80.61937	22.88566	-76.73686	-13.38390	12.84509	-0.418077
9	-220.5445	69.02915	-185.7528	-7.616457	0.929291	-10.24480
10	-322.2224	105.3979	-274.6801	9.353530	-27.13839	-25.40421

Source: Author's Computation

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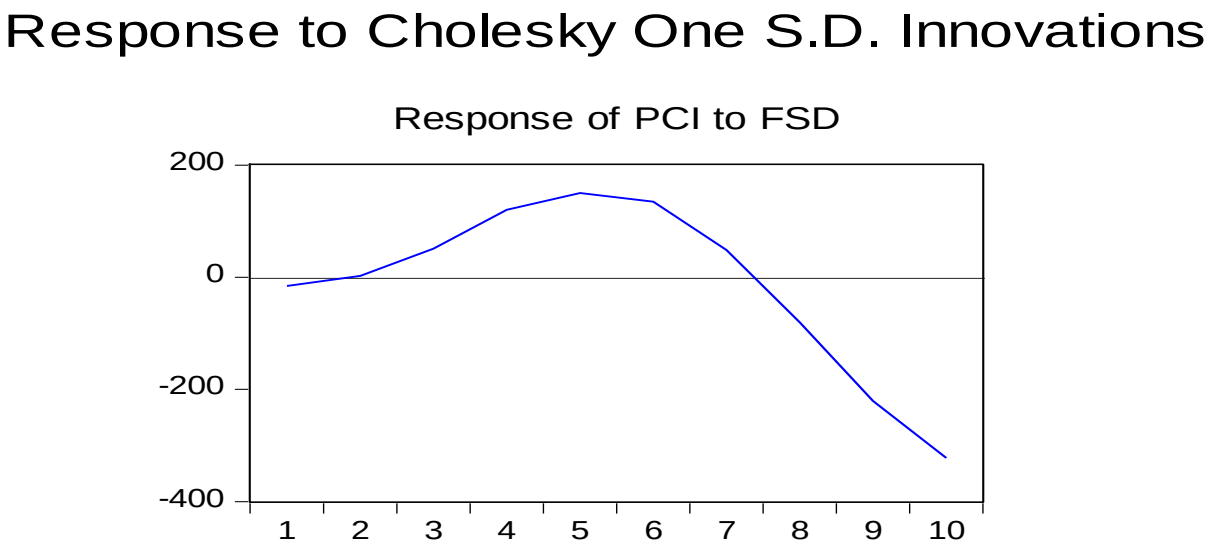

Figure 4.8: Response of Per Capita income to shocks in Fossil Fuel Subsidy (FSD)
Source: Author's Computation.

The results of the impulse response analysis with reference to the response of per capita income to shocks in fossil fuel subsidy (FSD) are presented in Table 4.8A and Figure 4.8. Using a Choleski decomposition on a Vector Error Correction model, the results of the impulse response indicate that one standard deviation shock or innovation to fossil fuel subsidy (FSD) results in a positive reaction in per capita income until after the first five periods and falls afterwards to below zero afterwards. The reaction per capita income in the economy to innovations or shocks in fossil fuel subsidy is an indication that there is a limit to the potential of fossil fuel subsidy as a driver of per capita income in the Nigerian economy. Hence, policy interventions in this regard need to take into cognizance the limitations associated with effect of fossil fuel subsidy in the achievement of increased per capita income.

4.7 Test of Hypotheses

The hypotheses stated for the purpose of this study are subjected to evaluation and testing based on the findings of the study.

H_{01}: Fossil fuel subsidy does not have any significant effect on per capita income in Nigeria.

In testing the research hypothesis regarding the dynamic relationship between fossil fuel subsidy and per capita income in Nigeria, the evaluation of relevant variable on the bases of graphical analysis, Block Exogeneity Wald Tests, variance decomposition and impulse response analysis, we reject the null hypothesis that fossil fuel subsidy does not have any significant impact on per capita income in Nigeria and accept the alternative hypothesis that fossil fuel subsidy has a significant impact on per capita income in Nigeria. This implies that fossil fuel subsidy has significantly influenced the magnitude and direction of per capita income in Nigeria during the period under review. However, it should be noted that the reaction of per capita income in the economy to innovations or shocks in fossil fuel subsidy indicates a limit to the potential of fossil fuel subsidy as a driver of per capita income in the Nigerian economy.

4.8 Discussion of Findings

The empirical findings from the estimated regression model reveal the fundamental dynamics of fossil fuel subsidy in stimulating critical socio-economic indicators in the Nigerian economy. Specifically, the findings have provided evidence regarding the interactions between fossil fuel subsidy and per capita income. The justification for introducing and maintaining fossil fuel subsidy has been a subject of debates, especially with reference to its sustainability and implications for economic development. The evidence generated from this study are therefore profound in shaping the understanding of the dynamics of fossil fuel subsidy in relation to income generation.

Based on the findings of the study, per capita income in Nigeria is significantly influenced by fossil fuel subsidy. However, the reaction of per

capita income to changes in fossil fuel subsidy is restricted to the first five periods as indicated by the impulse response function. The reaction of per capita income in the economy to innovations or shocks in fossil fuel subsidy is an indication that there is a limit to the potential of fossil fuel subsidy as a driver of per capita income in the Nigerian economy. Although this finding is consistent with the empirical findings of Masih et al (2011), and Arze del Granado et al (2010), further evidence provided by the impulse response analysis and variance decomposition indicate that policy interventions targeted at enhancing per capita income need to take into account the limitations associated with effectiveness of fossil fuel subsidy in the achievement of increased per capita income.

Based on the comprehensive study conducted, it has been determined that the per capita income in Nigeria is heavily influenced by the presence of fossil fuel subsidies. These subsidies have a significant impact on the overall economic prosperity of the country. However, the study also reveals an interesting pattern regarding the response of per capita income to changes in fossil fuel subsidies. The impulse response function, which measures the reaction of per capita income to various shocks or innovations, indicates that the effect of changes in fossil fuel subsidies on per capita income is only observed within the initial five periods. This suggests that the influence of these subsidies on economic growth and per capita income is limited to a specific timeframe.

The study emphasizes the need for diversification and the exploration of alternative avenues for economic development. By reducing dependency on fossil fuel subsidies and encouraging the development of other sectors, such as renewable energy, agriculture, manufacturing, and technology, Nigeria can potentially unlock new sources of economic growth and enhance per capita income in a more sustainable manner.

V. Conclusion and Recommendations

The study's findings draw attention to a crucial element of the Nigerian economy. While subsidies for fossil fuels may temporarily increase per capita income, their long-term effects appear to be limited. This restriction suggests that it may not be feasible over the long term for Nigeria to rely entirely on subsidies for fossil fuels as a source of economic growth and per capita income. These findings cast doubt on the viability of fossil fuel subsidies as a long-term means of promoting economic growth. While they can give the economy a short-term boost, it seems that other aspects and regulations must be taken into account if Nigeria is to see long-term and sustainable economic progress.

The study's findings shed light on the relationship between fossil fuel subsidies and per capita income in Nigeria as well as on how these subsidies affect the unemployment rates in that nation. The study's findings make it clear that fossil fuel subsidies had a significant impact on Nigeria's unemployment rates during the study period. However, the study's analysis of the impulse reaction makes an intriguing finding about how long this impact lasts. The first five eras are the only ones where the dampening effect of fossil fuel subsidies on unemployment rates is seen to be significant yet transient. This shows that the initial installation of fossil fuel subsidies may result in a brief decrease in unemployment rates, but their impact diminishes with time.

Based on the findings of the study, the following recommendations were made:

i. The study emphasises the necessity for Nigeria to reduce its reliance on fossil fuel subsidies and encourage private investments into other sectors, as doing so can help the country achieve sustainable economic development and lessen its vulnerability to changes in the price of fossil fuels.

ii. It is critical to implement all-encompassing poverty reduction initiatives given the limited impact of fossil fuel subsidies in lowering poverty rates. Investments in social welfare programmes, healthcare, infrastructure, and education that directly combat poverty's underlying causes and encourage inclusive growth should be part of these measures.

iii. The study finds that subsidies for fossil fuels have limited and temporary effects on unemployment rates, and that policies should prioritise job creation through programmes like skill development, entrepreneurship support, and investments in industries with high employment potential.

iv. The detrimental effects of fossil fuel subsidies on life expectancy and the inverse relationship between these subsidies and health outcomes highlight the significance of shifting the money spent on fuel subsidies towards practical and effective health interventions that can support the best possible health outcomes for the Nigerian economy.

v. Considering under-five mortality rates and life expectancy, the study emphasises the need for increased healthcare access and quality. To lower child mortality rates and improve overall health outcomes, instead of expending resources on fuel

subsidy, policies should give priority to investments in healthcare infrastructure, professional training, and the provision of vital healthcare services.

vi. The study stresses the significance of doing thorough impact studies and making decisions using the best available data. On the basis of empirical data and new socio-economic trends, policymakers should regularly assess the efficacy of current regulations, including subsidies for fossil fuels.

vii. The results of the study emphasise the necessity of long-term planning and socioeconomic indicator monitoring. In order to assure progress and solve new difficulties, policies should be created with a long-term perspective and their effects on metrics like per capita income, unemployment rates, poverty rates, and life expectancy should be routinely assessed.

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