MONETARY POLICY AND ELECTRICITY CONSUMPTION IN NIGERIA: LONG-RUN AND SHORT-RUN EVIDENCE FROM A VECM APPROACH

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ABSTRACT

This study examines the impact of monetary policy variables exchange rate, inflation, and money supply on electricity consumption in Nigeria over the period 1986 to 2023, using annual time series data and the Vector Error Correction Model (VECM) framework. The monetary variables influence the cost and accessibility of electricity infrastructure, thereby affecting the electricity consumption. The analysis is anchored on four interrelated theoretical perspectives: Keynesian Monetary Theory, Cost-Push Inflation Theory, Exchange Rate Pass-Through Theory, and the Theory of Energy Demand. Empirical results reveal that, in the long run, exchange rate and inflation exert a positive and statistically significant influence on electricity consumption at 0.45% and 1.02% respectively, while money supply has a negative and significant impact at 0.63%. In the short run, the exchange rate reduces electricity usage, consistent with the Exchange Rate Pass-Through Theory, whereas inflation and money supply continue to shape electricity consumption by influencing consumer purchasing power and liquidity. The significance and expected sign of the error correction term of -0.3172 is negative, statistically significant, and confirms the existence of a stable long-run equilibrium relationship among the variables and shows how disequilibrium in the short run is corrected and adjusted towards long-run. Based on these findings, the study recommends enhancing exchange rate stability to promote electricity affordability and predictability, especially for industrial users. Financial sector reforms are also essential to expand credit access for energy infrastructure and distribution investments. Policymakers should mitigate inflation volatility while protecting long-term energy investments through incentives and subsidies. Additionally, integrating monetary indicators, such as money supply and exchange rate trends, into energy planning will improve macroeconomic forecasting and policy coherence. Finally, given the potential of currency depreciation to spur investment in off-grid alternatives, the government should support local energy technology manufacturing and reduce import tariffs on renewable components.

Keywords: *Electricity consumption, monetary policy, Vector Error Correction Model*, *Nigeria.* **JEL CODE:** C32, E52, Q1, 055.

1. Introduction

Electricity consumption is a key factor in economic growth and development, serving as a basic input for industrial production, technological progress, and living standards improvements (International Energy Agency [IEA], 2021).

Globally, electricity demand continues to grow, especially in developing and emerging economies, driven by rapid industrialization, urbanization, and increased digitalization (British Petroleum [BP], 2022). Access to affordable and reliable electricity is crucial for achieving the United Nations Sustainable Development Goals (SDGs), particularly those related to poverty alleviation, quality healthcare, education, and inclusive economic growth (United Nations [UN], 2020). However, electricity consumption is affected not only by structural and developmental factors but also by macroeconomic and financial conditions, especially through monetary policy tools such as inflation, exchange rates, interest rates, and money supply, which can influence both the cost and access to electricity (Sadorsky, 2010).

In many developing areas, including Sub-Saharan Africa, the relationship between monetary policy variables and energy consumption is becoming more complex. Despite abundant energy resources, the region faces low access to energy, high costs, and inadequate infrastructure, which hinder economic productivity (World Bank, 2022). The instability of monetary policy variables—particularly inflation, exchange rates, and interest rate changes—undermines investment in energy infrastructure and makes energy services less affordable for households and businesses (Asafu-Adjaye, 2000). Monetary policy, by influencing liquidity, prices, and investment flows, plays a crucial role in shaping energy consumption patterns in the region (Moshiri & Banihashemi, 2012).

Nigeria, as the largest economy and most populous country in Africa, offers a strong case for studying the macroeconomic factors influencing energy consumption. The country experiences rising energy demand driven by population growth, urbanization, and industrial expansion (Akinlo, 2009). However, this increasing demand occurs within a highly unstable macroeconomic environment marked by persistent inflation, unstable exchange rates, and shifting interest rates (Akpan & Atan, 2015). These monetary factors play a crucial role in affecting the affordability and accessibility of energy by impacting the cost of capital, investment choices, and consumers' purchasing power (Iwayemi, 2008).

Interest rates affect borrowing costs, which in turn determine the feasibility of energy infrastructure projects and household investment in energy-efficient technologies. High interest rates discourage investment in power generation and modern appliances, whereas lower rates may boost energy demand through increased access to finance (Sadorsky, 2010). Inflation erodes real income and purchasing power, forcing consumers to reduce energy usage or switch to cheaper, less efficient energy sources, with implications for health and the environment (Omisakin, 2008). Exchange rate fluctuations, particularly depreciation, raise the cost of imported petroleum products and energy technologies, thereby increasing domestic energy prices and reducing consumption, especially among the poor (Egwuatu &

Adebayo, 2020). Similarly, the growth of money supply, if not matched by real output growth, can trigger inflation and worsen energy affordability (Olayungbo & Akinbobola, 2011).

Despite the clear relevance of monetary variables to energy use, there remains a limited body of empirical literature in Nigeria directly examining this linkage. Existing studies often focus on the environmental effects of energy consumption or fiscal determinants of energy policy, leaving a gap in understanding the impact of monetary policy on energy demand (Apergis & Payne, 2009). This gap is particularly problematic in Nigeria, where uncoordinated macroeconomic (monetary) and energy sector policies can hinder efforts to ensure energy security, sustainable growth, and macroeconomic stability.

This study addresses this gap by investigating the impact of key monetary policy variables—money supply, interest rates, inflation, and exchange rates—on electricity consumption in Nigeria from 1986 to 2023. The study covers the period from 1986 to 2023 to capture the impacts of major economic reforms and monetary policy shifts—beginning with the Structural Adjustment Programme (SAP) in 1986—and to utilize the most recent and complete data available up to 2023 for a comprehensive analysis of electricity consumption in Nigeria.

2.0 Literature Review

2.1 Theoretical Review

This section reviews four key theoretical perspectives relevant to this study: Keynesian Monetary Theory, Cost-Push Inflation Theory, Exchange Rate Pass-Through Theory, and the Theory of Energy Demand. Each provides a distinct but complementary lens through which the impact of monetary policy variables and electricity consumption can be understood.

Keynesian Monetary Theory

Originating from the seminal works of Keynes (1936), the Keynesian Monetary Theory emphasizes the central role of monetary policy in managing aggregate demand via the interest rate and liquidity channels. In this framework, changes in the money supply and interest rates directly affect borrowing costs and investment behavior. Lower interest rates make credit more accessible, stimulate investment in capital-intensive sectors—such as electricity infrastructure—and increase household consumption of durable goods, including energy-dependent appliances. In contrast, contractionary monetary policy (i.e., higher interest rates) raises borrowing costs, thereby discouraging investment and reducing electricity consumption. Sadorsky (2010) highlights that in developing countries like Nigeria, where access to

energy infrastructure is limited, affordable credit facilitated by accommodative monetary policy is crucial for boosting electricity access and usage.

Cost-Push Inflation Theory

The Cost-Push Inflation Theory explains inflation as a result of rising production costs, including wages, imported inputs, and energy prices. According to this theory, when inflation rises, the real purchasing power of households decreases, often leading to reduced electricity consumption as consumers switch to cheaper or informal energy sources. Similarly, firms may cut back operations or postpone expansion due to higher input costs, including energy, thus decreasing industrial electricity demand. In the Nigerian context, where inflation is often persistent and volatile, this theory is especially relevant. Studies such as Omisakin (2008) and Moshiri and Banihashemi (2012) confirm that inflation-induced economic uncertainty hampers energy affordability and hinders efforts to expand electricity access.

Exchange Rate Pass-Through Theory

The Exchange Rate Pass-Through (ERPT) Theory explains how exchange rate changes influence domestic prices, especially in economies that rely heavily on imports. In Nigeria's energy sector, which depends greatly on imported petroleum products, gas turbines, and technical equipment, a depreciation of the naira raises the cost of electricity production. These higher costs are usually passed on to consumers via increased electricity tariffs. On the other hand, exchange rate appreciation or stability can lower import costs, helping to reduce electricity prices and boost consumption. Egwuatu and Adebayo (2020) offer empirical evidence supporting this theory, showing that exchange rate volatility significantly impacts energy prices and demand in Nigeria.

Theory of Energy Demand

The Theory of Energy Demand provides a broader microeconomic foundation by connecting electricity consumption to factors like income levels, energy prices, and technological change. Berndt and Wood (1975) originally suggested that energy is a derived demand influenced by overall economic activity. Monetary policy impacts energy consumption indirectly by changing macroeconomic variables such as income and inflation. For example, expansionary monetary policy can boost economic growth and, in turn, increase electricity demand. Conversely, if inflation or exchange rate depreciation push energy prices up, consumption may decrease, especially among low-income households and small businesses.

Akinlo (2009) and Olayungbo and Akinbobola (2011) support this theory in the Nigerian context, linking macroeconomic indicators to changes in energy demand.

2.2 Empirical Review

There exists a scant body of literature that has explored the impact of Monetary Policy Variables on Electricity Consumption. For instance, Sohail et al (2021) examine how monetary policy uncertainty asymmetrically affects renewable and non-renewable energy consumption in the United States. Using a nonlinear autoregressive model, the study found that increased uncertainty decreases consumption of both renewable and non-renewable energy, while decreased uncertainty has a positive effect on non-renewable energy use but a negative effect on renewable energy. The impacts are asymmetric—they vary in direction and magnitude depending on whether uncertainty is rising or falling. However, the study does not provide a strong theoretical justification for this outcome, making its practical implications unclear. Moreover, the asymmetric effects observed may be unique to the U.S. context and not easily generalizable.

In a different direction, Galadima and Aminu (2019) examined how shocks from macroeconomic variables, specifically money supply, inflation, exchange rate, and real GDP, affect natural gas consumption using the Structural VAR (SVAR) model. The results showed that, both in the short term and long term, natural gas consumption reacts significantly to shocks from the money supply and real GDP, while its response to inflation shocks is only significant in the short term; however, the exchange rate shock is not significant. Nonetheless, the money supply contributed the largest proportion of shocks, followed by real GDP, inflation, and the exchange rate, in the ordering of the variance decomposition. However, the finding that exchange rate shocks are insignificant may reflect model limitations or omitted variables, as Nigeria's energy sector is heavily import-dependent. More so, the study does not explore the long-run equilibrium relationships among variables, which a model like VECM could provide.

On the contrary, Onisanwa and Adaji (2020) examined the determinants of electricity consumption in Nigeria with emphasis on income per capita, the number of electricity customers, and electricity distribution shortages. An Autoregressive Distributed Lag (ARDL) technique was used to estimate the factors influencing electricity consumption in Nigeria over the period between 1981 and 2017. The findings revealed that the main drivers of electricity consumption in Nigeria in the long run are per capita income, population per square kilometre, the number of electricity customers, and electricity shortages. The results revealed that electricity consumption increased with a growing population in a given area and the number of electricity customers, while electricity shortages have a differential effect

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in the short run and long run. Notwithstanding, the measurement of electricity shortages is not clearly defined, and the study does not account for structural breaks or robustness checks.

Similarly, Ogunleye and Ayeni (2019) examined how inflation and exchange rate influence energy demand in Nigeria using an ARDL framework. The results indicated that inflation exerts a significant negative long-run effect on electricity consumption, while exchange rate depreciation raises the cost of electricity generation inputs, thereby reducing consumption due to higher tariffs and unreliable supply.

Put otherwise, Olalekan and Akomolafe (2017) assessed the effect of monetary policy on energy consumption in Nigeria using a Vector Autoregressive (VAR) model over the period 1980–2015. Their findings revealed that interest rate and exchange rate fluctuations significantly affect electricity consumption. Specifically, higher interest rates were associated with lower electricity consumption, implying that tight monetary policy dampens household and industrial demand for electricity through reduced access to credit.

2.3 Gap in the Literature

Although previous studies have examined the relationship between macroeconomic variables and energy consumption using techniques such as ARDL (Onisanwa & Adaji, 2020), SVAR (Galadima & Aminu, 2019), or nonlinear models (Sohail et al., 2021), they often fail to capture the combined short-run and long-run dynamics within a multivariate system framework. This study employs the Vector Error Correction Model (VECM) to analyze both short-term adjustments and the long-term equilibrium relationship between monetary policy variables and electricity consumption in Nigeria. This methodological change enables a more comprehensive understanding of the dynamic interactions, especially in the context of Nigeria's volatile macroeconomic environment.

2.4 Theoretical Framework

This study is grounded in four interrelated economic theories that collectively explain the influence of monetary policy variables on electricity consumption in Nigeria: Keynesian Monetary Theory, Cost-Push Inflation Theory, Exchange Rate Pass-Through Theory, and the Theory of Energy Demand.

Keynesian Monetary Theory (Keynes, 1936) emphasizes the role of interest rates and money supply in shaping aggregate demand. Lower interest rates reduce borrowing costs, encouraging investments in electricity infrastructure and energy-efficient technologies, thereby increasing electricity consumption. Conversely, higher interest rates discourage such investments, leading to reduced energy demand. This is particularly relevant in Nigeria, where access to credit is essential for expanding electricity

infrastructure (Sadorsky, 2010). The Cost-Push Inflation Theory explains that rising input costs—such as energy and wages—lead to higher prices, thereby reducing real household income and increasing electricity affordability. Inflation may also compel firms to cut production or delay expansion, thus lowering electricity demand. This theory is pertinent given Nigeria's persistent inflation and associated cost-of-living challenges (Omisakin, 2008; Moshiri & Banihashemi, 2012).

Exchange Rate Pass-Through Theory posits that currency depreciation increases the cost of imported energy inputs and technologies, raising electricity production costs and consumer tariffs. This dampens electricity consumption. In contrast, exchange rate stability or appreciation can enhance affordability and accessibility, particularly for price-sensitive users (Egwuatu & Adebayo, 2020). The Theory of Energy Demand (Berndt & Wood, 1975) links electricity consumption to income levels, energy prices, and technological progress. As national income grows—often stimulated by expansionary monetary policy—electricity demand rises. However, inflation or currency depreciation can suppress demand by making electricity less affordable (Akinlo, 2009; Olayungbo & Akinbobola, 2011).

Together, these theories offer a comprehensive framework for analyzing how interest rates, inflation, exchange rates, and money supply impact electricity consumption in Nigeria. This theoretical underpinning supports the study's objective to empirically examine the impact of monetary policy variables and electricity demand over the period 1986 to 2023.

3. Methodolology

The research adopts the VECM model. The reason for applying the VECM is to explain the speed of adjustment. The VECM has a cointegration relation built into the model so that it restricts the long-term behavior of the endogenous variables to converge to their cointegrating relationship while allowing for short-term dynamics adjustments.

The functional model of the study is presented as thus;

$$Elect = f(Elect, EXR, INF, MS) \quad \ldots\ldots(1)$$

The model presented earlier is transformed into an econometric model as thus;

$$Elect_t = a_1 + Elect_{t-1} + EXR_{t-1} + INF_{t-1} + MS_{t-1} + \mu_{1t} \quad \ldots\ldots(2)$$

The variables in equation 2 are logged to avoid heteroskedasticity and multicollinearity and presented as conditional VECM as thus;

$$\Delta lElect_t = a_1 + \Delta lElect_{t-1} + \Delta lEXR_{t-1} + \Delta lINF_{t-1} + \Delta lMS_{t-1} + \lambda_1 ECM_{t-1} + \mu_{1t} \quad \ldots\ldots\ldots\ldots(3)$$

Where:

Δ= Difference operator

a1 constant or the intercept

λ= speed of adjustment with a negative sign.

μ_t= residuals (stochastic error term)

l= Natural logarithm (LOG)

ELECT= Electricity consumption in KWh

EXR= Exchange rate per dollar/naira

INF= Inflation in %

MS= Money Supply in Naira

Result Presentation and Discussion

Table 1: Stationarity Test/Unit Root Test

Variable	ADF	Critical values at 5%	Order of integration
LELECT	-6.372435	-2.9604	**I(1)**
LEXR	-5.619748	-2.9458	**I(1)**
LINF	-4.179161	-3.5742	**I(1)**
LMS	-5.483770	-3.5442	**I(1)**

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Table 1 depicts that all the variables under investigation (electricity consumption, exchange rates, inflation, and money supply are integrated of order one, which means that they are stationary after first difference. Based on this outcome, the next thing to do is to conduct a Johansen co-integration test to determine which model is best suited for the analysis and whether the variables under investigation have a long-run relationship among them.

The unit root/stationary test result in Table 1 reveals that the variables are 1(1). They are non-stationary at the levels but become stationary after the first difference. The null hypothesis, which says a unit root exists in the variables, was rejected, and the alternative hypothesis was accepted. It is therefore necessary to conclude that all the series are integrated of the first order 1(1). This outcome suggests the need for a cointegrated test.

Table 2: **Lag Length Selection Criteria**

HQ	SC	AIC	FPE	LR	LogL	Lag
13.37353	13.53236	13.29882	0.410475	NA	-194.4823	0
11.43733	12.39027	10.98907	0.041878	95.43400	-134.8361	1
10.40177*	12.14883*	9.579967*	0.011909*	58.43967*	-88.69950	2

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Table 2 shows that the lag length used in VECM can have an impact on the Johansen test, and as a result, it is necessary to try to select the lag length optimally. Table 2 shows that two lags can be used as selected by the Schwarz Information Criterion, Final Prediction Error, Akaike Information Criterion, and Human-Quinn Information. For this study, two lags have been chosen**.**

Test Result for Co-integration ranks

After finding out that all the variables are stationary and integrated of the same order, cointegration became necessary.

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.744343	62.92412	47.85613	0.0011
At most 1	0.359860	22.00651	29.79707	0.2981
At most 2	0.163627	8.624483	15.49471	0.4013
At most 3	0.103092	3.264056	3.841465	0.0708

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Table 4: Unrestricted Cointegration Max-Eigen Value Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.744343	40.91761	27.58434	0.0006
At most 1	0.359860	13.38203	21.13162	0.4177
At most 2	0.163627	5.360427	14.26460	0.6958
At most 3	0.103092	3.264056	3.841465	0.0708

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Unrestricted Cointegrated Rank Test (Trace and Maximum Eigenvalue) shows that there is one cointegrated equation. This means that electricity consumption, exchange rates, inflation, and money supply have a long-run equilibrium relationship.

The vector error correction model result

Having established the long-run relationship among electricity consumption, exchange rates, inflation, and money supply, the next step is to establish the short-run and long-run relationship dynamics using the Vector Error Correction Model. The estimated long run co-integration vector with Electricity Consumption as dependent variable is presented in Table 5, and the short–run coefficient of the vector error correction model is presented as thus;

Table 5: **The estimated long run co-integration vector with Electricity Consumption as the Dependent Variable**

Variable	Coefficient	Standard Error	T-Statistics
LEXR	0.4546	0.0819	5.5452
LINF	1.022753	0.14222	7.19150
LMS	-0.639381	0.16748	-3.81772

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Table 5 above depicts how exchange rates, inflation, and money supply impact electricity consumption in the long run. The result revealed that exchange rates and inflation have a positive and significant impact on electricity consumption in Nigeria. It shows that a 1 % increase in exchange rate and inflation increases electricity consumption by 0.45% and 1.02% respectively. Differently, the money supply has a negative and significant impact on electricity consumption in Nigeria. It reveals that a 1% increase in money supply decreases electricity consumption by 0.63% in the long run.

Table 6: Short–run coefficient of the vector error correction model

Variable	Coefficient	Standard Error	T-Statistics
Ecm_{t-1}	-0.3172	0.1088	-2.9144
D(LEXR(-1))	-0.2303	0.0918	-2.5091
D(LINF(-1))	0.2128	0.0917	2.3195
D(LMS(-1))	-0.5572	0.2892	-1.9267
D(LEXR(-2))	-0.1444	0.0869	-1.6614
D(LINF(-2))	0.2028	0.0780	2.5997
D(LMS(-2))	-0.4216	0.2970	-1.4194

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The short-run dynamics of the Vector Error Correction Model (VECM) reveal important insights into how macroeconomic variables influence manufacturing output in Nigeria. The error correction term (Ecmt-1) is negative and statistically significant at the 5% level (coefficient = -0.3172; t = -2.9144),

indicating a moderate speed of adjustment toward the long-run equilibrium—about 32% of the disequilibrium is corrected each period. Changes in the exchange rate in both the first and second lags (**D(LEXR(-1))** and **D(LEXR(-2))** have negative coefficients, with (**D(LEXR(-1))** being statistically significant (t = -2.5091), suggesting that an appreciation in the exchange rate (i.e., a stronger naira) in the previous period negatively affects manufacturing output in the short run. Inflation in both periods **D(LINF(-1))** and **D(LINF(-2))** has a positive and statistically significant impact (t = 2.3195 and 2.5997, respectively), implying that moderate inflation may be associated with increased manufacturing activity, possibly due to cost-push factors or higher nominal revenues. However, money supply **D(LMS(-1))** and **D(LMS(-2))** exhibits negative coefficients and is statistically insignificant in the short run, indicating that changes in money supply do not have a strong short-term impact on manufacturing output.

4. Discussion of Findings

The empirical results from this study reveal the impact of monetary policy variables on electricity consumption in Nigeria. These outcomes find both support and contradiction in the existing empirical literature, which helps to contextualize the findings and clarify the broader implications.

In the long run, this study shows that exchange rate and inflation both have a positive and statistically significant impact on electricity consumption, while money supply has a negative and significant impact. The positive long-run impact of exchange rate suggests that naira depreciation, rather than dampening electricity consumption, may indirectly stimulate usage, possibly due to increased investment in localized or alternative energy sources as the cost of importing energy inputs rises. This finding aligns partly with the Exchange Rate Pass-Through Theory, which suggests that exchange rate movements influence domestic energy prices (Egwuatu & Adebayo, 2020).

This outcome finds some empirical support in Olalekan and Akomolafe (2017), who found that exchange rate fluctuations significantly influence electricity consumption in Nigeria. However, it contrasts with Galadima and Aminu (2019), who reported that exchange rate shocks were not statistically significant in determining natural gas consumption. This discrepancy could be attributed to differences in the type of energy examined, methodological approach (SVAR versus VECM), or omitted variable bias, especially given the import-dependent nature of Nigeria's energy sector.

The short-run negative impact of exchange rate on electricity consumption observed in this study is more directly consistent with the Exchange Rate Pass-Through Theory, suggesting that sudden naira depreciation raises the cost of generation inputs and may temporarily suppress electricity consumption. This interpretation echoes Ogunleye and Ayeni (2019), who found that exchange rate depreciation increased input costs, reduced electricity supply reliability, and led to reduced energy consumption.

In the case of inflation, the positive long-run impact observed contradicts the Cost-Push Inflation Theory, which posits that rising prices reduce real income and thus lower energy consumption (Omisakin, 2008; Moshiri & Banihashemi, 2012). This contradiction may be understood within the Nigerian context, where inflation often coexists with rising economic activity or forced self-generation of electricity due to persistent grid unreliability. In such settings, electricity demand may remain inelastic, and rising costs may not lead to reduced consumption. This result differs from Ogunleye and Ayeni (2019), who observed a negative long-run impact of inflation on electricity consumption, possibly due to differences in inflation periods, demand structure, or robustness checks.

The study's finding that money supply negatively affects electricity consumption in both the short and long run deviates from the predictions of Keynesian Monetary Theory, which argues that an expansion in money supply should lower interest rates and stimulate consumption and investment, including in energy infrastructure (Keynes, 1936). This unexpected negative impact may reflect institutional and structural inefficiencies in Nigeria's economy, such as ineffective credit channels, poor monetary transmission, and inadequate infrastructure. These limitations echo the concerns raised by Akinlo (2009) and Olayungbo and Akinbobola (2011), who emphasized that Nigeria's monetary policy often fails to translate into real-sector improvements due to governance constraints and financial sector weaknesses.

Similarly, Galadima and Aminu (2019) found that money supply significantly influences natural gas consumption, but the direction of impact was positive, contrasting with the findings of this study. This divergence may reflect energy-type differences or sector-specific sensitivities to monetary conditions.

Unlike Onisanwa and Adaji (2020), who emphasized non-monetary determinants of electricity consumption—such as income per capita, number of electricity customers, and distribution shortages—this study focuses on monetary variables to complement their work by exposing macro-financial dimensions that also play critical roles. Their failure to account for monetary indicators leaves a gap that this study helps to fill. Nevertheless, both studies agree on the complexity of Nigeria's electricity demand dynamics and the importance of context-specific factors.

Additionally, this study did not directly incorporate interest rates, but the observed negative effect of money supply suggests a parallel conclusion with Olalekan and Akomolafe (2017), who found that higher interest rates reduce electricity consumption due to constrained household and industrial access to credit. Thus, this study's findings, though modeled differently, support the notion that tight monetary conditions suppress electricity demand.

Broadly, these results are in line with the Theory of Energy Demand (Berndt & Wood, 1975), which recognizes that energy consumption is influenced by macroeconomic variables like prices, income, and technology. The significance of the error correction term in the VECM validates the existence of a stable

long-term relationship between electricity consumption and the monetary policy variables examined. This indicates that, while electricity consumption adjusts to shocks in exchange rate, inflation, and money supply, short-term responses may differ from long-run trends, particularly in the face of temporary shocks or adjustment lags.

Diagnostic Test

To check if the model used in this study agrees with the data, some diagnostic tests were performed which including serial correlation LM test, Arch heteroskedasticity, and normality test. Conducting diagnostic tests is very crucial in the analysis since it reveals whether there exists a problem in the estimation of a model or not. For this study, the diagnostic tests carried out showed the following results, as indicated in Table 7.

Table 7: Diagnostic Test

TEST	NULL HYPOTHESES	CALCULATED LM	VALUE OF CHI-SQUARE	REMARKS
Serial Correlation LM Test	No Serial Correlation	13.42476	0.6496	Accept null hypotheses
Arch Heteroskedasticity	No Heteroskedasticity	157.6091	0.8844	Accept null hypotheses
Normality Test	Residuals are multivariate normal	**J.B:** 26.25335	**P-value** 0.0010	Reject null hypotheses

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Table 7 shows the absence of Serial Correlation and heteroskedasticity, which means the data is good and the results from the data can be taken seriously for policy recommendations. In addition, the normality tests show that the residuals are not normally distributed. However, since the model specification is theoretically sound and other diagnostic tests (e.g., serial correlation, heteroskedasticity, and model stability) are satisfied, the result of the estimates still provides meaningful insights for policy formulation. Hence the results from the data used can be used for policy recommendations.

5. Conclusion and Recommendation

The study concludes that monetary policy variables significantly influence electricity consumption in Nigeria, but the direction and magnitude of these effects vary across time horizons. While exchange rate and inflation support consumption growth in the long term—possibly due to adaptive behaviors such as increased private energy generation—their short-run impacts may suppress demand due to rising costs. The unexpected negative impact of money supply and electricity consumption points to deep-seated challenges in the transmission of monetary policy to the real economy, driven by financial inefficiencies and governance constraints.

Recommendations:

Based on the findings of the study, the study recommends that:

i) Given the dual impact of exchange rate depreciation—stimulating long-term consumption while suppressing short-term demand—policymakers should aim for exchange rate stability to support energy affordability and predictability, especially for industrial users.

ii) The Central Bank should prioritize financial sector reforms to enhance credit access, particularly for energy infrastructure development and electricity distribution networks.

iii) While inflation appears to stimulate electricity consumption in the long run, its short-term socioeconomic costs necessitate a careful balancing act. Policymakers should focus on reducing inflation volatility while protecting energy investments through incentives and subsidies.

iv) Energy policy design should account for macro-financial variables such as money supply and exchange rate movements to improve forecasting and policy coherence.

V) Since exchange rate depreciation may drive investment in alternative power sources, the government should encourage this trend by supporting local manufacturing of energy equipment and reducing tariffs on renewable energy components.

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