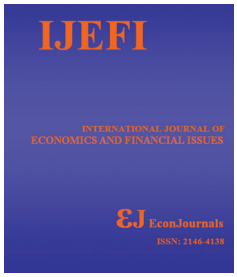

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Inflation and Growth of SMEs in Nigeria: A Pre and Post Fuel Subsidy Period Analysis

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ABSTRACT

The focus of this research is on inflation and growth of SMEs in Nigeria: A pre and post fuel subsidy period analysis. This study set out to achieve the specific objectives of investigating the relationship between inflation rate, exchange rate, interest rate, average fuel pump price and SMEs output in Nigeria before and after fuel subsidy removal periods. The data were collected monthly from 2022M01 to 2024M12. The month of May 2023 was observed as the structural break period in the analysis. The Structural break analysis was conducted using the Chow breakpoint test and the result revealed that there was structural break in SMEs output at the specified break point (2023:M05) as a result of the inflation effect resulting from fuel subsidy removal. The Chow forecast estimates further revealed that inflation rate and fuel price exerted positive effects on SMEs output before and after fuel subsidy removal periods while exchange rate and interest rate had a significantly negative effect on SMEs output before and after fuel subsidy removal. The study concluded that inflation effect of fuel subsidy removal was not severe on SMEs in Nigeria because they have monopolistic tendencies which make them transfer the increasing cost of production on to consumers hence hedging against inflationary trends. The only strain experienced by SMEs was from exchange rate fluctuations and rise in capital acquisition (interest rate). The study recommended interest rate reduction for SMEs, foreign exchange provision for export trades and stable fuel price to ease SMEs operation in Nigeria.

Keywords: Exchange Rate, Fuel Subsidy, Inflation Rate, Interest Rate, Small and Medium Scale Enterprises
JEL Classifications: E31, L81, E4

1. INTRODUCTION

The Nigerian economy has largely driven by oil since the 1960s. In late 1950s, Shell-BP which is a British-Dutch owned oil company (multinational) made the first commercial discovery of oil in the Niger Delta region and its exploration commenced almost immediately (Majekodunmi, 2013). The Nigerian government made substantial amount of earnings from oil in the 1970s amounting to nearly N10 billion (CBN, 2024). The huge amount of earnings received from oil trade led the Nigerian government to start the fuel subsidy regime where the government funds certain percentage of the cost of importing refined petroleum products so as to ease the price and make the products more affordable to the citizens (Price Water Cooper, 2024). PricewaterhouseCoopers (2024) further noted that fuel subsidy became institutionalized in 1977, following the promulgation of the Price Control Act which made it illegal for some products (including petrol) to be sold above the regulated price. Businesses especially SMEs have long been benefitting from the regulated price of fuel which appears to be the one commodity that determines the price of several other commodities. According to NBS-SMEDAN National Survey (2017), the Nigerian business landscape is predominantly made up of small and medium scale enterprises constituting about 96% of total businesses, employing 84% of the labour force and adding

approximately 48% to Nigeria's gross domestic product. As an oil-dependent economy, SMEs in Nigeria are mostly affected by changes in oil prices, especially changes in fuel price. What this implies is that in Nigeria, changes in fuel price affects SMEs by increasing their operating cost which reflects in their output cost and this spreads to several other industries and businesses leading to strain in the economy.

Fuel subsidies weighed heavily on the Nigerian economy over time. According to Ilodigwe (2023), the government was spending a considerable percentage of its budget on gasoline subsidies, which created budgetary issues. Nigeria's gasoline subsidy system was plagued by corruption and fuel smuggling, with subsidized petroleum being illegally sold in neighboring nations at a higher price (McCulloch et al., 2021). Several Nigerian governments sought to alter the gasoline subsidy system in an effort to minimize the government's burden and promote transparency. These initiatives were met with resistance and protests by the people. In 2020, the Nigerian government announced intentions to completely deregulation the downstream sector of the oil business, including the elimination of gasoline subsidies. This strategy aims to let market forces decide fuel prices while reducing government spending on subsidies (Iroanusi, 2021). According to Ilodigwe (2023), the federal government of Nigeria finally removed subsidy payments on fuel importation into Nigeria in May 2023 signaling a new era for businesses in the country that is largely driven by oil and premium motor spirit (PMS).

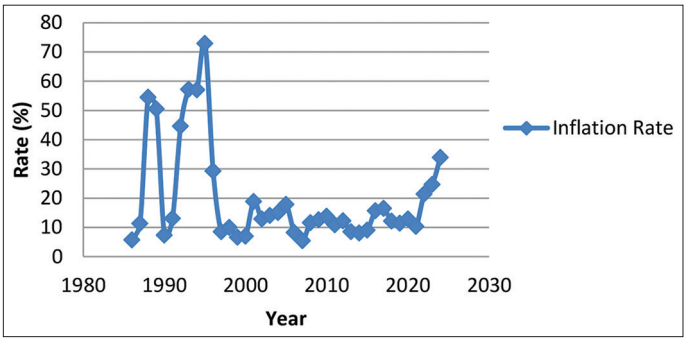
Gasoline subsidies have historically been used to stabilize gasoline prices, manage inflation, and alleviate the financial burden on the general public. Fuel subsidies have helped SMEs lower operational expenses, making transportation more inexpensive and guaranteeing that energy is available at a reasonable price for production and distribution (Adeniran, 2016). According to the World Bank (2024), Nigeria's total income in 2000 was USD 10.8 billion. By 2024, this figure had risen to USD 18.3 trillion. However, the Nigerian government has spent more than USD 1 trillion on gasoline subsidies over the last 30 years. This has had a severe influence on funding for crucial infrastructure and other critical areas like as education, health, and defense (PwC, 2024). Small and medium-sized enterprises (SMEs) have benefited from these subsidies since the prices of most economic items have remained stable over time. However, the total removal of fuel subsidy in May 2023 sparked widespread hike in prices occasioned by rising cost of fuel and transportation (KPMG, 2023; Ilodigwe, 2023). With inflation rate of 10.3% in 2021, the fuel subsidy removal saw the surge in inflation rate to 33.9% as at end of 2024.

However, the 33.9% inflation in 2024 was not the highest in the history of price surge in the Nigerian economy. Figure 1 above shows that Nigeria's inflation rate was highest in 1995 when it reached 72.8% which Mordi et al. (2007) attributed largely to excessive money supply, scarce foreign exchange and political unrest in Nigeria at the time. The lowest inflation rate for the period of analysis was recorded in 2007 when inflation rate dropped to 5.39% and continued on a steady spiral for the years 2008 through 2019. The year 2021 marked a significant period in Nigeria's price surge as inflation rate increased sharply from 10.34% in 2020 to 21.34% in 2022. According to Ihugba et al. (2024), the COVID-19 pandemic contributed to the price surge at the time.

For SMEs in Nigeria, Ilodigwe (2023) observed that small and medium scale enterprises (SMEs) are faced with lots of challenges in Nigeria, the latest being the total removal of fuel subsidy by the Federal Government of Nigeria. Small and medium scale enterprises, unlike large enterprises, leverage on opportunities and resources from fuel subsidy to grow and sustain their businesses. In the situation where fuel subsidy, a major leverage to SMEs, is removed, it poses great threat and risk to the existence of SMEs (Ilodigwe, 2023).

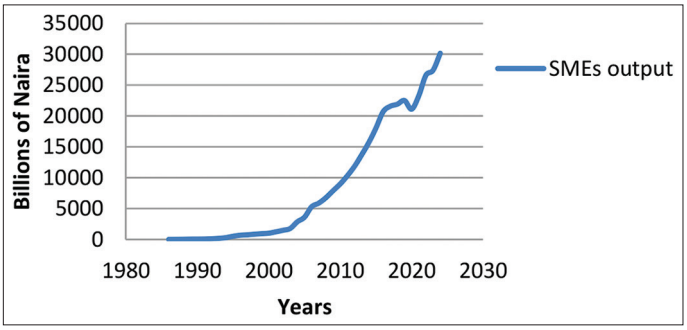
Figure 2 above shows that the output of SMEs in Nigeria has been on a gradual increase since 1986. SMEs contributed an average of N6.924 trillion to Nigeria's GDP over the period 1990 through 2019. There was a slight decline in SMEs output in 2020 occasioned by the pandemic as noted by Ihugba et al. (2024). SMEs output reached N30.16 trillion as at end of 2024. The removal of fuel subsidy automatically led to increase in the price of fuel which directly led to increase in cost of production or rendering services (KPMG, 2023). Inflation rate jumped to 33.88% in 2024 just 1 year after the Nigerian government stopped paying subsidy for refined fuel importation (CBN, 2024). However, the effect of this high inflation on SMEs growth remains a subject of intense debate amongst academics and other stakeholders in the Nigerian business environment. One cannot say with certainty that the removal of fuel subsidy has positively or negatively impacted SMEs growth given how inflation rate has been spiraling since the total fuel subsidy removal in the country. This uncertainty on whether fuel subsidy removal actually impacted inflation rate,

Figure 1: Nigeria's inflation rate, 1986-2024



Source: CBN Statistical Bulletin, 2024

Figure 2: SMEs output in Nigeria, 1986-2024



Source: CBN Statistical Bulletin, 2024

coupled with the need to carry out a research to check how the resulting inflation rate affected SMEs output serves as motivation for this study.

Consequently, the main objective of this research is to analyze the relationship between inflation and growth of SMEs in Nigeria by conducting a pre and post fuel subsidy regime analysis. This main objective is further divided into specific objectives and they are: To investigate the relationship between monthly inflation rate and SMEs output before and after fuel subsidy; determine the effect of monthly exchange rate changes on SMEs output before and after fuel subsidy; analyze the extent to which monthly interest rate affects SMEs output before and after fuel subsidy; and to determine the effect of monthly average fuel pump price on SMEs output in Nigeria before and after fuel subsidy. This study uses time series data and as a result the scope is from January 2021 to December 2024. This period is selected because 2023 marks the year fuel subsidy was totally removed and this study takes equal periods before and after the fuel subsidy removal i.e. 24 months each.

2. LITERATURE REVIEW

2.1. Conceptual Review

Fuel subsidy is a government strategy in which the government offers financial help to refinery importers in order to lower gasoline prices for local consumers (Ilodigwe, 2023). This is often accomplished by selling fuel at a lower price than the market rate, with the government paying the difference via subsidies. Soremekun (2023) states that the primary purpose of fuel subsidies is to make fuel more accessible to residents and to stabilize domestic pricing. Invariably, fuel subsidy removal implies the government's decision to eliminate or reduce payments made on petroleum products importation. Fuel subsidy removal can result in increased costs for consumers and businesses, potentially causing inflation and impacting lower-income individuals and organisations disproportionately. The resultant effect of fuel subsidy removal can be rise in interest rate, exchange rate and other macroeconomic variables. Mgbomene and Igben (2023) defined interest rate as the cost of capital acquisition while exchange rate is the rate at which one currency is exchanged for another (Mgbomene and Nnamocha, 2023).

SMEDAN (2013) defines a small scale firm as one that employs between 10 and 49 people and has an asset base of 5 million naira but <50 million naira (excluding land and buildings). Medium-sized firms are those with 50-199 employees and an asset base of at least 500 million naira, excluding land and buildings (Ufua et al., 2020). Thus, the conceptualization of small and medium scale enterprises above implies that businesses with asset base of 5 million naira-500 million naira are jointly classified as an SME. Given this huge amount of capital at the disposal of SMEs in Nigeria, the potential effect of rising inflation rate can hamper their continued existence as noted by Ashakah, Mgbomene, Metieh and Opara (2025). This study intends to shed empirical light into this nexus between inflation and SMEs output in Nigeria.

2.2. Theoretical Framework

According to the inflation dichotomy hypothesis, inflation does not have a horizontal influence on enterprises. This hypothesis was popularized by Kalecki (1971). According to the idea, the effect of inflation on enterprises is determined by the type of product produced, the market structure, the strength of the firm's "brand," and its size. According to Kalecki (1971), contemporary economies are characterized by a strong dichotomy, with a "core" consisting of monopolistically or oligopolistically organized product marketplaces where prices are regulated by corporations. On the other side, there is a "periphery" that is more competitive and serves as a shock absorber for the monopolistic sector. The peripheral comprises of enterprises with less market dominance, restricted capacity to implement new technology, longer payback times, and lower profitability. In summary, competition exists on the outside but not in the center of the economic system (Kalecki, 1971). Ioannidis and Giakoulas (2023) posited that when inflation occurs, firms in the "core" can raise prices and increase their profit margins. However, this puts pressure on small firms in the periphery, which face higher production costs but cannot raise their prices because they operate in more competitive markets.

In addition, Ioannidis and Giakoulas (2023) said that enterprises that provide fundamental goods/services are less likely to be harmed by inflation due to inelastic demand. Firms that provide goods/services with higher elasticity, on the other hand, are predicted to suffer when demand shifts to fundamental items. In addition, inflation affects the kind of commodities marketed as well as the market structure. Carlton (1982) contends that the uncertainty induced by inflation diminishes long-term contracts and hence the security they give. It also minimizes spending on non-standard (customized) goods/inputs while increasing pressure to internalize manufacturing at the price of outsourcing. This has two effects on SMEs: first, it limits their access to specialized inputs, which is required for competitiveness, and second, only larger enterprises may internalize sections of the production chain (Ioannidis, 2023). Thus, the application of this theory to the current research is dependent on the outcome of the linear model. If the effect of inflation on SMEs production is positive in any of the examined periods, it indicates that Nigerian SMEs are functioning in the "core," which means they raise pricing despite rising prices. However, if the effect of inflation on SMEs production turns out to be negative in any of the examined years, it means that SMEs in Nigeria are operating in the "periphery," which implies higher competitiveness.

2.3. Empirical Review

Ejiogu et al. (2017) investigated the correlation between currency rates and the performance of Nigerian manufacturing enterprises. Using Spearman's rank order correlation coefficient, the study discovered that trade is helpful and positively connected with manufacturing business performance. According to Owolabi (2017), lending rates, inflation rates, currency rates, and government expenditure all have a major negative impact on the performance of Nigerian SMEs. According to Oyewale et al. (2020), the COVID-19 epidemic and government-imposed migration restrictions greatly harmed SMEs in the agricultural and non-agricultural sectors. Their findings are consistent with previous research, which has shown that the COVID-19 epidemic had a significant impact on the operations and sustainability of Nigerian medium-sized firms. Nnenna et al. (2020) investigated how economic factors such as inflation, interest rates, and currency

values impact small and medium-sized businesses. The study employed a cross-sectional survey with 296 individuals. Multiple regression results demonstrated that inflation harms SMEs in south-east Nigeria, whereas negative interest rates impacted SMEs in the region.

Okeke et al. (2020) investigated the influence of economic variables on the performance of small and medium-sized enterprises in Nigeria, with a focus on the south-eastern region. The research examined indicators such as inflation rate, interest rate, and currency rate to assess the performance of small and medium-sized firms. Multiple regression analysis found that inflation had a significant negative effect on the performance of SMEs in South-East, Nigeria, interest rates had a significant negative effect on the performance of SMEs, and the exchange rate had a significant negative effect on the performance of SMEs. Egbulonu et al. (2018) found that economic recession can result in downward trend in SMEs output which affects the industrial sector.

Atayi et al. (2020) investigated how fluctuations in currency rates influence Nigerian SMEs. The dependent variable was SMEG GDP, whereas the independent variables were the MPR, inflation, currency rates, reserve requirements, commercial bank lending rates to SMEs, commercial banks' total private sector credit, and SMEs' share of loans. The autoregressive distribution lag (ARDL) model revealed that lending rates to SMEs reduce SMEGDP. Specifically, inflation rises by 1% but SMEGDP falls by 1.6%. SMEGDP grows by 0.005% with a 1% increase bank reserve requirements.

Emeh (2021) investigated the relationship between inflation rates and the growth of entrepreneurship in an emerging economy like Nigeria. The study evaluated the moderating influence of inflation on job creation using the Analysis of Moment Structures (AMOS). The findings revealed a negative moderating effect of inflation on employment creation.

Ilodigwe (2023) explored the harmful effects of gasoline subsidy reduction on SMEs in Anambra State, Nigeria. The study employed a mixed method research approach, gathering data from 105 SMEs systematically selected among the state's 21 Local Government Areas using structured questionnaires and in-depth interviews (IDIs). Descriptive statistics (frequency tables, charts, and graphs) and Chi-square statistics revealed that the elimination of gasoline subsidies had a significant negative impact on SMEs in Anambra State. The study also discovered that the negative impact of fuel subsidy withdrawal on SMEs includes an increase in production costs (inflation effect), lower profit as a consequence of high overhead expenses, poor sales and revenue resulting from low patronage, and financial pressure in the general operations of SMEs.

Schito et al. (2023) examined the impact of rising inflation on European SMEs. According to the data, inflation has climbed the greatest in the energy and agriculture sectors. Rising energy prices and raw material shortages, as well as pandemic-related byproducts (such as supply chain disruptions and labor shortages), were important causes. In terms of impact, greater inflation was most closely connected with longer payment collection durations, ambiguous effects on green investments, and increased difficulty in acquiring skilled labor. Its impact on SMEs' profitability is determined by their capacity to pass on increased expenses to customers, with some enterprises reporting record profits while others battled to stay alive.

Ozili and Obiora (2023) used discourse analysis to analyze the effects of Nigeria's elimination of gasoline subsidies in 2023. The study discovered that the withdrawal of gasoline subsidies had the following negative consequences: Lower short-term economic growth, higher inflation, increased poverty, increased fuel smuggling, increased criminality, increased petroleum product costs, and job losses in the informal sector. According to Goddey et al. (2014), the elimination of gasoline subsidies had a major influence on the financial performance of small enterprises in Nigeria, as well as a negative impact on market performance due to inflation. Ibenyenwa et al. (2023) investigated the influence of macroeconomic conditions on the performance of small and medium-sized firms (SMEs) in Nigeria during a 30-year period (1992-2021). The multiple regression analysis found a substantial association between GDP and SME performance in Nigeria. Furthermore, exports showed a negative and negligible link with SMEs' success in Nigeria, but inflation rates had a positive but small relationship. The study revealed that, despite growing inflation in Nigeria, the inflation rate had a minor influence on the performance of SMEs in Nigeria.

Ihugba et al. (2024) explored the challenges faced by SMEs due to the COVID-19 pandemic, which resulted in disruptions to both demand and supply. The study employed a pair Granger causality test to investigate if loans from banks to SMEs influenced SME development over the research period. The variables examined included the proportion of SME contribution to GDP as an indicator of SME progress, bank loans extended to SMEs, the inflation rate (INF), and the exchange rate. The data demonstrated that neither commercial bank loans nor inflation had any influence on SME development, with no indication of causality. However, there was a correlation between exchange rates and SME growth. The study showed that the interruptions created by COVID-19 led in revenue losses and a drop in market confidence, increasing SMEs' cash problems.

Onakoya et al. (2024) investigated how inflation, loan rates, and currency rates have influenced SMEs' growth in Nigeria. The Error Correction Model (ECM) research found that interest rates had a favorable and substantial effect on Nigerian SMEs' funding. In contrast, inflation had a negative influence on Nigerian SME finance. The exchange rate had little impact on SME finance. The study revealed that inflation, interest, and currency rate significantly impacted Nigeria's SMEs liquidity ratio.

Adamu et al. (2024) examined the influence of loan, interest rates, and inflation on small and medium-sized firm productivity in Nigeria using yearly time series data from 1986 to 2023. The statistics collected included gross domestic product, commercial bank total credit to the private sector, small and medium-sized firms' contribution to GDP, inflation rate, and interest rate. According to the Error Correction Model (ECM), loans to the

private sector and small and medium-sized firms contributed positively and significantly to GDP growth. The results further demonstrated that inflation and interest rates had a negative and minor influence on GDP.

Akinbo and Oladeji (2024) explored how economic environmental variables affect the productivity of small and medium-sized firms (SMEs) in the manufacturing sector of Oyo State, Nigeria. The multiple regression study found that inflation rate and interest rate have a considerable negative influence on SMEs productivity, whereas exchange rate and money supply considerably enhance SMEs productivity in Oyo state. According to the findings of this study, inflation and interest rates have a detrimental impact on the productivity of SMEs in Oyo State. Akinola et al. (2024) observed that the elimination of fuel subsidies harmed SMEs, notably those in the blockmaking business. They said that removing gasoline subsidies raised operational expenses, inflation, and unemployment, while also encouraging corruption in Nigeria.

2.4. Development of Research Hypotheses

The review of literature has shown different findings on how inflation affect SMEs output (Owolabi, 2017; Nnenna et al., 2020; Schito et al., 2023; Emeh, 2021; Ibenyenwa et al., 2023). The variables that were used by these previous researchers in addition to inflation rate were interest rate (Okeke et al., 2020; Onakoya et al., 2024; Adamu et al., 2024; Akinbo and Oladeji, 2024) and exchange rate (Ejiogu et al., 2017; Atayi et al., 2020; Okeke et al., 2020; Ihugba et al., 2024). Given these empirical evidence, the hypotheses for this study is developed with emphasis on monthly changes in inflation, exchange and interest rates in addition to introduction of average fuel price:

H_{01}: There is no significant relationship between monthly inflation rate and SMEs output before and after fuel subsidy removal in Nigeria.

H_{02}: There is no significant relationship between monthly exchange rate and SMEs output before and after fuel subsidy removal in Nigeria.

H_{03}: Monthly interest rate has no significant relationship with SMEs output before and after fuel subsidy removal in Nigeria.

H_{04}: Monthly average fuel pump price has no significant effect on SMEs output in Nigeria before and after fuel subsidy removal.

2.5. Gap in Literature

Evidently, research on inflation and SMEs performance and growth have been conducted by numerous researchers but the underlying gap identified is the obvious missing link on the mediating role of fuel subsidy in the inflation and SMEs growth nexus. According to Akinola et al. (2024), fuel subsidy removal led to inflation and unemployment but there is little knowledge on how the inflation effect of fuel subsidy removal has affected SMEs in Nigeria. This gap in literature is what this present study intends to fill by carrying a pre and post analysis of inflation effect on SMEs in Nigeria.

3. METHODOLOGY

This research is leverages on secondary data and as a result the quasi-experimental research design is adopted. This research design enables the test of relationship between a set of independent variables and a given dependent variable. The data are subjected to econometric analysis of unit root, cointegration and ordinary least square estimation. Data are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the Petroleum Product Pricing and Regulatory Agency of Nigeria (PPPRA) now called Nigerian Upstream Regulatory Commission (NURC). The data are standardized by taking their natural logarithm in order to avoid a spurious regression. The model to be estimated is specified below:

3.1. Model Specification

The model specified in this research is an adaptation from the work of Onakoya et al. (2024). They specified a linear regression using SMEs growth (measured as SMEs liquidity ratio) as the dependent variable while using inflation rate, interest rate and exchange rate as their independent variables. By way of modification and to provide an updated knowledge on this topic, this research introduces SMEs share of GDP as the dependent variable. The independent variables are maintained but with addition of monthly average fuel pump price as the fourth independent variable. It is important to note that the data are collected monthly in order to provide an adequate period of observation given the need to carry out a pre and post fuel subsidy removal analysis. Thus, the model for this study modifies the specification of Onakoya et al. (2024) and specifies as follows:

$$SME = f(INF) \quad (i)$$

Where SME is SMEs share of GDP, INF is inflation rate

We further expand the right hand side of the functional equation (1) by introducing the inflation variables as follows:

$$SME = f(INF, EXR, INT, AFP) \quad (ii)$$

Where EXR is monthly exchange rate, INT is monthly interest rate and AFP is monthly average fuel pump price. The functional equation (2) is expressed in linear econometric form to capture the coefficients and error term as stated below:

$$SME_t = \alpha_0 + \beta_1 INF_t + \beta_2 EXR_t + \beta_3 INT_t + \beta_4 AFP_t + \varepsilon_t \quad (iii)$$

Where α_0 is the intercept of the model, β_1-β_4 represent the unknown coefficients of the model to be estimated, ε_t is the stochastic error term and 't' is the time period i.e. January 2022 through December 2024 (48 observations). The estimation is carried out using Eviews software version 10.

Given that there are two possible time periods observed in the analysis i.e. period before the fuel subsidy removal (pre-subsidy removal) and the period after the fuel subsidy removal (post-subsidy removal), the model is split into the two periods:

Pre-fuel subsidy removal: $SME_{1t} = \alpha_0 + \beta_1 INF_{1t} + \beta_2 EXR_{1t} + \beta_3 INT_{1t} + \beta_4 AFP_{1t} + \varepsilon_{1t}$ (iv)

Post-fuel subsidy removal: $SME_{2t} = \alpha_0 + \beta_1 INF_{2t} + \beta_2 EXR_{2t} + \beta_3 INT_{2t} + \beta_4 AFP_{2t} + \varepsilon_{2t}$ (v)

Where '1t' is the period before the fuel subsidy removal (January 2022-April 2023) and '2t' is the period after the fuel subsidy removal (May 2023-December 2024). However, the month of May 2023 is taken as the split month or the break point and the Chow breakpoint test will be used to ascertain if there is breakpoint in SMEs output and inflation model at that month given the effect of the fuel subsidy removal.

The a-priori expectation from the model is such $\beta_1<0$, $\beta_2>0$, $\beta_3>0$ and $\beta_4>0$, i.e. the coefficient of inflation is expected to be negative or have negative effect on SMEs output, exchange rate, interest rate and average fuel price are expected to have positive coefficients or have positive effect on SMEs output.

4. DATA ANALYSIS AND DISCUSSION OF RESULTS

The analysis starts with the descriptive statistics of the data. This is followed by the test for stationarity and cointegration on the data for the entire period of study. These tests confirm the suitability of the time series data for the analysis.

4.1. Data Analyses

The results of the analyses are summarized below:

Table 1 show that SMEs output averaged N28.1 trillion for the period January 2022-December 2024. Within the same period, inflation rate averaged 26.6%, exchange rate averaged N859/dollar, interest rate averaged 12.6% and fuel price averaged N571.7/L. The standard deviation of exchange rate (EXR) and average fuel price (AFP) depicts high dispersion from the mean and greater variability within the two data sets. Conversely, the standard deviations of SME output, inflation rate (INF) and interest rate (INT) are low which entails that the data points are clustered closely around the mean. This creates a dissimilar data set hence the need for standardization through conversion of the data sets to logarithm forms.

Furthermore, the data are all positively skewed as shown in the Skewness statistic. The Jarque Bera statistics have probability values that are all >0.05 critical value. As such, there is clear evidence that the data come from a normal distribution and that the data are evenly spread around the mean with non-negative Skewness.

The stationarity test in Table 2 shows that the data are all stationary at level i.e. I(0). This implies that the data have their statistical properties unchanged within the time period under study portraying no need for differencing of the data. Again, the cointegration test shows four cointegrating equations represented by the probability values that <0.05 critical value. Thus, there is long run relationship between inflation and SMEs growth in Nigeria for the period under study.

In order to test for the possibility of structural break in SMEs output given the influence of inflation before the fuel subsidy removal, this study conducted the Chow breakpoint test (Table 3). As earlier explained, the Chow breakpoint test ascertains whether there is abnormal movement in the dependent variable (SME output) given the influence of a government policy (fuel subsidy removal) on the dependent variable. The test is summarized below:

The result from Table 3 shows that the F-statistic value is 36.73 with P = 0.0000 is statistically significant at 5% level. This implies that we reject the null hypothesis of no structural break at the specified period. The alternate hypothesis is accepted. Thus, the assertion here is that there is structural break in SMEs output at the specified break point (2023:M05) as a result of the inflation effect resulting from fuel subsidy removal. Having found that inflation severely affected SMEs output after the fuel subsidy removal, this study now carries out a Chow forecast test to find out whether the inflation effect after the fuel subsidy removal was positive or negative on SMEs output. This post-effect is also compared with the pre-effect in order to balance the findings and make appropriate deductions there-from.

The Chow forecast test is conducted for the post-fuel subsidy removal period while the pre-fuel subsidy period was estimated using the ordinary least square regression method. Both results are summarized in Table 4. The outcome shows that inflation rate exerted positive and significant effect on SMEs output before

Table 1: Descriptive statistics

Descriptive statistics	SME	INF	EXR	INT	AFP
Mean	28058.54	26.62750	859.1231	12.60861	571.6664
Median	27329.79	24.42000	619.1950	13.04000	536.1550
Maximum	31990.83	39.83000	2088.760	14.13000	1209.480
Minimum	26520.43	21.09000	391.7300	8.870000	64.69000
Std. Dev.	1693.836	5.857073	521.8683	1.464916	346.1093
Skewness	0.925057	0.834396	0.969994	0.923197	0.248102
Kurtosis	2.555056	2.400161	2.641819	2.911293	1.848034
Jarque-Bera	5.431342	4.717011	5.837767	5.125555	2.359866
Probability	0.066161	0.094561	0.053994	0.077090	0.307299

Table 2: Unit root test

Variable	ADF test stat (P-value)		Order of integration
	Level	First difference	
SME	−7.345 (0.0001)*	−7.122 (0.0001)	I (0)
INF	−9.754 (0.0001)*	−4.702 (0.0001)	I (0)
EXR	−8.827 (0.0000)*	−9.783 (0.0001)	I (0)
INT	4.501 (0.0021)*	9.086 (0.0002)	I (0)
AFP	−5.408 (0.0000)*	−7.912 (0.0001)	I (0)

Variable	Cointegration Test		Probability value
	Trace statistic	Max-eigen statistic	
None*	1499.886	682.5679*	0.0000
At most 1*	817.3180	425.5286*	0.0001
At most 2*	391.7894	305.1794*	0.0001
At most 3*	86.61000	86.44875*	0.0000
At most 4	0.161249	0.161249	0.6880

Table 3: Chow breakpoint test (specified break period=2023:M05)

Equation Sample: 2022M01 2024M12			
F-statistic	36.72543	Prob. F (5,26)	0.0000
Log likelihood ratio	75.14043	Prob. Chi-square (5)	0.0000
Wald statistic	183.6272	Prob. Chi-square (5)	0.0000

Table 4: Inflation and SMEs output (post-fuel subsidy removal period, 2023M05-2023M12)

Variables	Pre-fuel Subsidy removal		Post-fuel subsidy removal	
	Coefficient	T-statistic (P-value)	Coefficient	T-statistic (P-value)
Constant	9.4913	11.5509* (0.0000)	9.3715 (0.0000)	13.1103* (0.0000)
Inflation rate	0.3306	13.8497* (0.0000)	0.3812	58.735* (0.0000)
Exchange rate	−0.0256	−4.3305* (0.0012)	−0.0525	−17.342* (0.0000)
Interest rate	−0.0908	−9.5917* (0.0000)	−0.0673	−30.534* (0.0000)
Average fuel price	0.0116	8.7025* (0.0000)	0.0225	15.702* (0.0000)
Adjusted R−squared	0.8999		Adjusted R−squared	0.8357
F-statistic	0.8199 (0.0000)		F-statistic	25.8915 (0.0000)
DW-statistic	1.9349		DW-statistic	1.8461

*indicates significance at 5% level; Natural log of the data were used

Table 5: Test of hypotheses

Hypotheses	t-stat (P-value)	Decision
H_{01}: There is no significant relationship between monthly inflation rate and SMEs output before and after fuel subsidy removal in Nigeria.	Pre=13.8497 (0.0000) Post=58.735 (0.0000)	P<0.05: Monthly inflation rate significantly affected SMEs output before and after fuel subsidy removal.
H_{02}: There is no significant relationship between monthly exchange rate and SMEs output before and after fuel subsidy removal in Nigeria.	Pre=−4.3305 (0.0012) Post=−17.342 (0.0000)	P<0.05: Monthly exchange rate significantly affected SMEs output before and after fuel subsidy removal.
H_{03}: Monthly interest rate has no significant relationship with SMEs output before and after fuel subsidy removal in Nigeria.	Pre=−9.5917 (0.0000) Post=−30.534 (0.0000)	P<0.05: Monthly interest rate has significant relationship with SMEs output before and after fuel subsidy removal.
H_{04}: Monthly average fuel pump price has no significant effect on SMEs output in Nigeria before and after fuel subsidy removal.	Pre=8.7025 (0.0000) Post=15.702 (0.0000)	P<0.05: Monthly average fuel pump price has significant effect on SMEs output before and after fuel subsidy removal.

*Decision on the hypotheses was based on comparison with 0.05 critical value

and after the fuel subsidy removal period. Prior to fuel subsidy removal, inflation rate averaged 22% and this was found to have positive and significant effect on SMEs in Nigeria increasing their output by 0.3306 units. However, after fuel subsidy was removed in May 2023, inflation rate maintained positive and significant effect on SMEs output increasing it by 0.3812 which is 15.3% increase in SMEs output as a result of the inflation effect.

Exchange rate exerted significant negative effect on SMEs output in the pre- and post-fuel subsidy removal periods decreasing it by 0.0256 and 0.0525 units respectively. Interest rate followed similar pattern as it exerted significant negative effect on SMEs output decreasing it in both periods by 0.0908 and 0.0673 units respectively. The coefficient of average fuel price for both periods is 0.0116 and 0.0225. This implies that average fuel price increased SMEs output significantly by 0.0116 and 0.0225 units before and after the fuel subsidy removal periods respectively. There was increase in SMEs output as shown in the intercept of both models which implies that SMEs output continue to increase even when inflation effect is kept at a constant rate. This is a positive indication for the Nigerian economy because SMEs are the bedrock of the economy and they strive to grow notwithstanding the effect of negative externalities such as inflation. The adjusted R-squared and F-statistic for both models indicate that inflation and its associated variables have joint significant effects on SMEs output and jointly accounted for approximately 90% of the changes in SMEs output before fuel subsidy removal, and 84% of the changes in SMEs output after fuel subsidy removal (See Table 4).

Table 5 is a summary of the hypotheses testing. The test led to the rejection of all the null hypotheses (H01, H02 H03 and H04). Thus, the hypotheses test concludes that monthly inflation rate, exchange rate, interest rate and average fuel pump price all have significant effects on SMEs output before and after fuel subsidy removal.

4.2 Discussion of Findings

The nexus between inflation and growth of SMEs in Nigeria has been empirically established in this study. Literature shows that the Nigerian business landscape is comprised of 96% small and medium scale enterprises, according to the NBS-SMEDAN National Survey (2017). This means that SMEs are the backbone of the Nigerian economy and they are largely driven by other economic units (transportation, export, import). This makes SMEs to be responsive to shocks to oil prices especially refined product from oil (fuel). The Nigerian government in May 2023 removed subsidy payments on imported refined premium motor spirit (fuel) and this presented serious implications for SMEs growth in the country. This study takes monthly data on inflation rate, interest rate, exchange rate and average fuel price as explanatory variables and modeled a pre and post fuel subsidy removal analysis using the Chow forecast test. The initial Chow breakpoint test revealed that there was structural break in SMEs output at the specified break point (May 2023) as a result of the inflation effect resulting from fuel subsidy removal. This finding corroborated the findings made in Ozili and Obiora (2023), Goddey et al. (2014), Ilodigwe (2023). These studies pre-empted negative consequences of fuel subsidy removal on SMEs growth. However, there is a consensus that fuel subsidy removal significantly shocked SMEs in Nigeria as was the result in the Chow breakpoint test.

Further analysis revealed that before the fuel subsidy removal, inflation rate exerted positive and significant effect on SMEs output and after the fuel subsidy removal, the same was the case as seen in Table 4. The implication of this is that SMEs have found a way to absorb inflation shocks resulting from fuel subsidy removal. According to Schito et al. (2023), passing rising costs on to consumers has been a potent way for SMEs to hedge against inflation effect and this is what was found in this study. The inflation dichotomy theory of Kalecki (1971) is upheld in this study since the effect of inflation on SMEs output is positive in both observed periods. Thus, SMEs in Nigeria are operating in the "core" where they increase prices even in the face of rising prices. SMEs in Nigeria operate in the "core" which enables them to raise prices of the basic goods and further increase their profit margins thereby passing the inflation effect on to consumers (Giakoulas, 2023). This explains the positive and significant effect of inflation on SMEs output before and after the fuel subsidy removal periods.

The analysis further revealed that exchange rate and interest rate both exerted negative effects on SMEs output and the negative effect was significant in both periods. This negative effect aligns with the findings of Owolabi (2017), Okeke et al. (2020), Atayi et al. (2020), Onakoya et al. (2024), Akinbo and Oladeji (2024), Adamu et al. (2024). These studies concluded that exchange rate and interest rate were the two macroeconomic variables that impacted negatively on the performance of SMEs in Nigeria. Ozili and Obiora (2023) went further to identify the negative implications of fuel subsidy removal which included increased inflation and increase in currency rate. According to Ilodigwe (2023), the negative impact of fuel subsidy removal on SMEs include increase in production cost (inflation effect), reduced profit as a result of high overhead costs (interest rate effect), low sales and income resulting from low patronage and financial strain in the general activities of SMEs. Thus, SMEs in Nigeria have been negatively affected by exchange rate and interest rate notwithstanding the fuel subsidy removal and this present study has proven this assertion.

For average fuel price, the fuel subsidy removal increased the price of fuel from <N500 i.e. $1.2 to a little over N1000 which represents more than 100% increase (NURC, 2024). The resultant effect, according to Ozili and Obiora (2023), Ilodigwe (2023), Akinola et al. (2024) included increased operating costs, inflation, and rise in cost of capital acquisition (interest rate) for SMEs. However, this present study found positive and significant effect of average fuel price on SMEs output which gives the impression of cost adjustment of SMEs as was already explained earlier in the inflation effect. The positive trend in SMEs growth notwithstanding the rising cost of operation necessitated by increased fuel price is explained aptly by the Kalecki (1971) inflation dichotomy theory. Given that SMEs in Nigeria have been found to be operating at the "core" consisting of monopolistically or oligopolistically structured product markets where prices are controlled by firms, it entails that there are very few SMEs operating at the 'periphery' and thus the theoretical proposition of Kalecki (1971) justifies the increasing effect of inflation and average fuel price on SMEs output in Nigeria.

5. CONCLUSION

The study concludes that SMEs in Nigeria are partially affected by the fuel subsidy removal in May 2023. This is because inflation continued to exert positive and significant effect on SMEs output despite the removal of fuel subsidy likewise fuel price. Despite the structural break in SMEs output occasioned by fuel subsidy removal, the only strain experienced by SMEs was not from inflation or rising cost of production but it was from exchange rate fluctuations and rise in capital acquisition (interest rate). As a result of fuel subsidy removal, the negative effect of interest rate and exchange rate already experienced by SMEs in Nigeria became more prominent. The effect of inflation rate was not so severe as SMEs in Nigeria have monopolistic tendencies which makes them transfer the increasing cost of production on to consumers hence hedging against inflationary trends.

In order to ensure that SMEs in Nigeria continue to increase their output in the face of dynamic effect of fuel subsidy removal, it is pertinent to consider one or a combination of these recommendations:

a) There is need for the monetary authority in Nigeria to consider specialized interest rate for SMEs so as to ease the rising cost of acquiring capital for business operation. The negative effect of interest rate on SMEs output does not augur well for the economy dominated by SMEs and so if interest rate is considered below 10%, it will drive SMEs to ease their capital needs thus decreasing the rising cost of goods.
b) The monetary authority in Nigeria should also consider exchange rate stabilization policies such as provision of foreign exchange for exporters and also promotion of local SMEs who are in the business of production. When foreign exchange is provided, SMEs will have less hassle accessing foreign goods and given the huge market available in Nigeria, local goods production will augment foreign goods and this will make prices to be competitive thus driving down the negative effect of exchange rate on SMEs output.
c) The government through the regulatory authority (Nigerian Upstream Regulatory Commission, NURC) should strive to maintain a fixed fuel pump price so as to ease the stress on SMEs who are dependent on electricity from fuel-powered electricity generating set. Making electricity available will also ease the demand for fuel and make SMEs to be self-sufficient in terms of power generation and this increases their contribution to Nigeria's GDP.
d) The increasing effect of inflation rate on SMEs output in Nigeria is a result of the monopolistic and oligopolistically structured SMEs. There is need to increase competition in prices by providing stable interest rate, stable exchange rate, decrease in fuel price. These will reduce the rate of inflation and make SMEs to be consumer-oriented through the provision of affordable goods and services to the people.

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