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Determinants of Inflation in Nigeria

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Abstract: This study investigates the determinants of inflation in Nigeria using time series data spanning from 1999 to 2023. Employing a multiple linear regression model, the research examines the impact of Money Supply, Government Expenditure, Fiscal Deficits, Crude Oil Prices, Trade Openness, Exchange Rate and Prime Rate on the Inflation Rate. The study utilizes the Least Squares method for estimation. The findings reveal that several factors significantly influence inflation in Nigeria. Money Supply (coefficient = 0.100543, $p < 0.0001$), Government Expenditure (coefficient = 0.050121, $p < 0.0001$), Crude Oil Prices (coefficient = 5.035158, $p < 0.0001$), Trade Openness (coefficient = 0.101469, $p = 0.0012$), and Exchange Rate (coefficient = 0.159773, $p = 0.0013$) are found to have a positive and statistically significant impact on inflation. Conversely, the Prime Rate (coefficient = -1.828994, $p = 0.0073$) exhibits a significant negative relationship with inflation. Interestingly, Fiscal Deficits (coefficient = -0.100102, $p = 0.0003$) also showed a significant negative association with inflation, a finding that warrants further investigation. The model demonstrates a good fit with an R-squared of 0.758139 and is statistically significant overall (Prob(F-statistic) = 0.000000). Based on these findings, the study recommends the implementation of prudent monetary policies to control money supply growth, alongside efforts to manage government expenditure effectively. Diversification of the economy to reduce reliance on crude oil exports is crucial for mitigating external price shocks. Policies aimed at stabilizing the exchange rate and promoting a balanced trade environment are also essential. The Central Bank can

effectively utilize the prime rate as a tool to curb inflationary pressures. Further research is recommended to explore the complex relationship between fiscal deficits and inflation in Nigeria.

Key words: Inflation, Money Supply, Government Expenditure, Crude Oil Prices, Exchange Rate.

1. INTRODUCTION

Inflation, defined as a sustained increase in the general price level of goods and services in an economy over a period of time, stands as a persistent and formidable challenge for developing economies, including Nigeria. The erosion of purchasing power, distortion of price signals, discouragement of investment, and exacerbation of poverty are well-documented consequences of high and volatile inflation (Mishkin, 2018; Barro, 2017; Nwafor, Agu-Aguiyi, Anigbogu & Umebali, 2018). Historically, Nigeria has grappled with periods of double-digit and even hyperinflation, significantly impacting its economic stability and the welfare of its citizens. From the oil boom years of the 1970s, which brought with them inflationary pressures from increased government spending and liquidity, to the structural adjustment programs of the late 1980s and the subsequent democratic era, inflation has remained a central concern for policymakers and the populace alike (Ogunmuyiwa & Olufemi, 2014; Nwafor & Umebali, 2025; Central Bank of Nigeria, 2022). The basic characteristics of inflation in Nigeria have often been driven by a complex interplay of both demand-pull and cost-push factors, influenced by both domestic and external shocks. Demand-pull inflation arises when there is an excess of aggregate demand over aggregate supply, often fueled by expansionary fiscal or monetary policies. Cost-push inflation, on the other hand, stems from increases in the costs of production, such as wages or raw materials, which are then passed on to consumers in the form of higher prices (Blanchard, 2021; Nwafor & Umebali, 2021). Understanding the specific drivers within the Nigerian context is therefore paramount for developing effective anti-inflationary strategies.

The focus of this study is to empirically investigate determinants of inflation in Nigeria between 1999 and 2023. This period is particularly relevant as it encompasses a significant portion of Nigeria's democratic era, marked by varying economic policies, global economic trends, and significant fluctuations in crude oil prices, which are a major source of government revenue and foreign exchange (International Monetary Fund, 2023). The study specifically aims to analyze the influence of Money Supply, Government Expenditure, Fiscal Deficits, Crude Oil Prices, Trade Openness, Exchange Rate, and Prime Rate on the Inflation Rate. By focusing on these specific variables, the study seeks to provide a comprehensive understanding of the multifaceted nature of inflation in Nigeria during this critical period. The latent problem that directly informed this study is the persistent high and volatile inflation rate in Nigeria, which has consistently exceeded the Central Bank of Nigeria's (CBN) target range and has had detrimental effects on the economy and the standard of living (National Bureau of Statistics, 2023). Despite various policy interventions, inflation remains a significant challenge, indicating a potential gap in the understanding of the precise impact and interplay of its underlying determinants within the Nigerian economic framework.

The chosen modeled determinants are hypothesized to influence inflation in Nigeria through various channels. **Money Supply** is expected to have a positive impact on inflation, consistent with the quantity theory of money, which posits that an increase in the money supply, holding

other factors constant, leads to a proportional increase in the price level (Friedman, 1963). In Nigeria, rapid growth in money supply, often driven by government borrowing or expansionary monetary policies, has been linked to inflationary pressures (Adam & Tweneboah, 2008). **Government Expenditure** is also anticipated to exert a positive influence on inflation, primarily through its impact on aggregate demand. Increased government spending, especially when not matched by a corresponding increase in productivity or revenue, can lead to excess demand, pushing up prices (Barro, 2017). In Nigeria, significant government spending, often financed through borrowing, has been identified as a potential contributor to inflation (Ogunmuyiwa & Olufemi, 2014; Nwafor & Umebali, 2025). **Fiscal Deficits**, representing the difference between government expenditure and revenue, are generally expected to be positively correlated with inflation, particularly when financed through money creation or excessive borrowing that crowd out private investment and increases interest rates (Blanchard, 2021). However, the relationship can be complex and depend on the financing method and the state of the economy. **Crude Oil Prices**, given Nigeria's heavy reliance on oil exports, are expected to have a significant positive impact on inflation. Higher oil prices can lead to increased government revenue and spending, boosting aggregate demand. Furthermore, as a major source of foreign exchange, fluctuations in oil prices affect the exchange rate, which in turn influences the cost of imported goods (International Monetary Fund, 2023).

Continuing the discussion of the modeled determinants, **Trade Openness**, measured by the ratio of exports and imports to GDP, can have a mixed impact on inflation. While increased openness can lead to greater competition and access to cheaper imports, potentially reducing inflationary pressures, it can also expose the economy to imported inflation from trading partners (Rodrik, 1998). In the Nigerian context, where there is a significant reliance on imports, a positive relationship between trade openness and inflation is plausible, reflecting the transmission of global price shocks. The **Exchange Rate**, specifically the value of the Naira against major foreign currencies, is expected to have a significant positive impact on inflation. A depreciation of the Naira makes imported goods more expensive, leading to cost-push inflation (Adeniran & Yusuf, 2018; Nwafor & Umebali, 2021). Given Nigeria's dependence on imports for various goods, including raw materials and finished products, exchange rate fluctuations are a critical determinant of domestic price levels. Finally, the **Prime Rate**, representing the benchmark interest rate set by the central bank, is expected to have a negative impact on inflation. Higher interest rates increase the cost of borrowing, which can reduce investment and consumption, thereby curbing aggregate demand and inflationary pressures (Mishkin, 2018). By analyzing these specific variables within a unified framework, the study aims to fill a latent gap in the existing literature by providing a current and comprehensive empirical assessment of their relative importance and interactions in driving inflation in Nigeria during the specified period.

Efforts to address the latent problem of persistent inflation in Nigeria have been multi-faceted, involving both monetary and fiscal policy interventions by various stakeholders, primarily the Central Bank of Nigeria (CBN) and the Federal Government. The CBN, as the primary monetary authority, has employed various tools, including open market operations, adjustments to the Monetary Policy Rate (MPR), cash reserve requirements for commercial banks, and moral suasion, to control money supply and manage liquidity in the economy (Central Bank of Nigeria, 2022). The government, through its fiscal policies, has attempted to manage spending, improve revenue generation, and control the budget deficit. However, these efforts have often failed to yield the required results, as evidenced by the continued high inflation rates. Several factors contribute to this failure. First, the structural rigidities in the Nigerian economy, such as supply chain bottlenecks, infrastructure deficits, and reliance on imports, limit the effectiveness of demand-management policies (National Bureau of Statistics, 2023). Second, coordination between monetary and fiscal policies has not always been optimal, with expansionary fiscal policies sometimes undermining the CBN's efforts to tighten monetary policy (International

Monetary Fund, 2023). Third, external shocks, particularly fluctuations in crude oil prices and global inflation, have often complicated domestic policy efforts. For instance, periods of high oil prices have led to increased government spending, fueling inflationary pressures despite the CBN's attempts to control liquidity (Ogunmuyiwa & Olufemi, 2014; Nwafor, 2023). These persistent challenges highlight the need for a deeper understanding of the specific drivers of inflation and the limitations of current policy approaches.

The need to address the latent problem of high and volatile inflation in Nigeria is paramount for achieving sustainable economic growth and improving the welfare of its citizens. High inflation erodes the purchasing power of households, particularly for low-income earners, leading to a decline in their standard of living and exacerbating poverty (Barro, 2017). It also creates uncertainty for businesses, discouraging investment and hindering job creation. Furthermore, high inflation can lead to capital flight and a loss of confidence in the domestic currency, negatively impacting the country's external balance and overall economic stability (Mishkin, 2018; Nwafor & Umebali, 2022). Addressing inflation effectively will bring numerous benefits. It will enhance macroeconomic stability, create a more predictable environment for businesses and investors, and improve the standard of living for Nigerians by preserving the value of their income and savings. Lower inflation also supports the CBN's efforts to maintain price stability, which is a primary objective of monetary policy and a crucial prerequisite for long-term economic prosperity (Central Bank of Nigeria, 2022). Therefore, a comprehensive understanding of the key determinants of inflation, as this study aims to provide, is essential for formulating effective and targeted policies to bring inflation under control in Nigeria. The persistent challenge of high and volatile inflation in Nigeria, with its detrimental effects on the economy and society, underscores the urgent need for a robust empirical analysis of its determinants. While various efforts have been made by stakeholders to control inflation, the continued high rates indicate the presence of a latent problem and a gap in the effective implementation of anti-inflationary measures, partly due to a potentially incomplete understanding of the interplay of the key drivers within the Nigerian context. This study, by focusing on the influence of Money Supply, Government Expenditure, Fiscal Deficits, Crude Oil Prices, Trade Openness, Exchange Rate, and Prime Rate, aims to fill this gap and provide current, empirically grounded insights into the specific factors driving inflation in Nigeria between 1999 and 2023. The findings of this research will be invaluable for policymakers in formulating more effective and targeted strategies to achieve price stability, foster sustainable economic growth, and improve the welfare of the Nigerian population (International Monetary Fund, 2023; National Bureau of Statistics, 2023).

Statement of the Problem

The immediate and pressing problem that informed this study is the persistent and unacceptably high rate of inflation in Nigeria, which has consistently exceeded the Central Bank of Nigeria's (CBN) target range for several years. This inflationary trend is not a historical artifact but a current, dynamic challenge. As of recent data, Nigeria continues to experience double-digit inflation, significantly eroding the purchasing power of its citizens and creating considerable economic uncertainty (National Bureau of Statistics, 2023). This sustained inflationary pressure makes understanding its underlying drivers a highly topical and urgent issue that warrants rigorous empirical investigation. The problem is not merely the existence of inflation, but its sustained nature and the apparent ineffectiveness of current policy responses in bringing it down to a manageable level.

The inappropriate application or mismanagement of the modeled determinants can significantly exacerbate inflation in Nigeria. For instance, excessive growth in the money supply stemming from unbridled government spending or loose monetary policy directly fuels demand-pull inflation (Mishkin, 2018). Similarly, large and persistent fiscal deficits, if financed through printing money or unsustainable borrowing, contribute to inflationary pressures. Furthermore, the

Nigerian economy's heavy reliance on crude oil exports means that volatile global oil prices, if not managed effectively through stabilization funds or diversification efforts, can trigger inflationary shocks via both revenue and exchange rate channels. Inappropriate trade policies or an unstable exchange rate regime can also lead to imported inflation, increasing the cost of essential goods and services (International Monetary Fund, 2023). Understanding the precise impact of each of these factors and their interactions is crucial because misapplying policies related to any of them can have significant and detrimental inflationary consequences.

Previous researchers have indeed attempted to address the problem of inflation in Nigeria, examining various macroeconomic factors and employing different methodologies. Studies have investigated the roles of money supply, exchange rates, and government spending, often providing valuable insights (Ogunmuyiwa & Olufemi, 2014; Nwafor, 2023). However, the continued high inflation rates indicate that these previous efforts have not fully yielded the desired results. This could be due to several reasons, including changes in the economic structure over time, the emergence of new or more dominant drivers of inflation, limitations in the data used in previous studies, or the need for a more comprehensive framework that considers the interplay of a wider set of potential determinants within the current economic context. The persistent nature of the problem suggests that a gap exists in the complete understanding or effective application of knowledge regarding the key drivers of inflation in contemporary Nigeria.

The inevitable consequence of not carrying out this research, or similar studies that provide updated and comprehensive insights, is the continued struggle to effectively control inflation in Nigeria. Without a clear and current understanding of the precise impact of factors like money supply, government expenditure, crude oil prices, and exchange rates, policymakers may continue to implement policies that are either ineffective or, in some cases, counterproductive. This could lead to further erosion of living standards, increased poverty, reduced investment, and overall macroeconomic instability. Therefore, this research is essential to provide policymakers with the necessary empirical evidence to formulate and implement targeted and effective anti-inflationary strategies tailored to the current Nigerian economic landscape, thereby mitigating the severe consequences of unchecked inflation.

Objective of the Study

The broad objective of the study is to examine the determinants of inflation in Nigeria. Specifically, the study seeks to:

1. Determine the effect of Money supply on Inflation rate in Nigeria
2. Ascertain the effect of Government expenditure on Inflation rate in Nigeria
3. Evaluate the effect of Fiscal deficits on Inflation rate in Nigeria
4. Determine the effect of Crude oil prices on Inflation rate in Nigeria
5. Find out the effect of Trade openness on Inflation rate in Nigeria
6. Examine the effect of Exchange rate on Inflation rate in Nigeria
7. Determine the effect of Prime rate on Inflation rate in Nigeria

Research Hypotheses

Ho_1: Money supply has no significant effect on Inflation rate in Nigeria

Ho_2: Government expenditure has no significant effect on Inflation rate in Nigeria

Ho_3: Fiscal deficits has no significant effect on Inflation rate in Nigeria

Ho_4: Crude oil prices has no significant effect on Inflation rate in Nigeria

Ho_5: Trade openness has no significant effect on Inflation rate in Nigeria

Ho_6: Exchange rate has no significant effect on Inflation rate in Nigeria

Ho_7: Prime rate has no significant effect on Inflation rate in Nigeria

2. METHODOLOGY

Research Method

Data used for this study are mainly secondary data which were collected from Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of statistics (NBS) annual reports. The data was collected for inflation rate and its determinants from 1999 to 2023. The study employed the econometric techniques of ordinary least square (OLS) that is multiple regression analysis which is the most frequently used techniques to estimate the relationship of casual nature. It enables us to predict an unknown variation from a known variable. The variation that is estimated is the dependent variable from which the estimation was done is the independent variable.

Model Specification

The study model is specified as follows:

The structural form of the model is:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \quad . \quad . \quad . \quad . \quad . \quad (1)$$

The mathematical form of the model is:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 \quad . \quad . \quad (2)$$

The econometric form of the model is:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \mu_i \quad . \quad . \quad (3)$$

Where Y = Inflation rate (INF

X_1 = Money supply (MYS)

X_2 = Government expenditure (GEX)

X_3 = Fiscal deficits (FID)

X_4 = Crude oil prices (CRP)

X_5 = Trade openness (TOP)

X_6 = Exchange rate (EXR)

X_7 = Prime rate (PMR)

β_0 = Intercept of the model

$\beta_1 - \beta_7$ = Parameters of the regression coefficients

μ_i = Stochastic error term

Method of Data Analysis

The economic technique employed in the study is the ordinary least square (OLS). This is because the OLS computational procedure is fairly simple a best linear estimator among all unbiased estimation, efficient and shown to have the smallest (minimum variance) thus, it become the best linear unbiased estimator (BLUE) in the classical linear regression (CLR) model. Basic assumptions of the OLS are related to the forms of the relationship among the distribution of the random variance (μ_i).

OLS is a very popular method and in fact, one of the most powerful methods of regression analysis. It is used exclusively to estimate the unknown parameters of a linear regression model. The Economic views (E-views) software will be adopted for regression analysis.

Stationarity (unit root) test

The importance of this test cannot be overemphasized since the data to be used in the estimation are time-series data. In order not to run a spurious regression, it is worthwhile to carry out a stationary test to make sure that all the variables are mean reverting that is, they have constant mean, constant variance and constant covariance. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation.

Decision rule: If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.

Cointegration test

Econometrically speaking, two variables will be cointegrated if they have a long-term, or equilibrium relationship between them. Cointegration can be thought of as a pre-test to avoid spurious regressions situations (Granger, 1986). As recommended by Gujarati (2004), the ADF test statistic will be employed on the residual.

Decision Rule: if the ADF test statistic is greater than the critical value at 5%, then the variables are cointegrated (values are checked in absolute term)

Evaluation of Parameter Estimates

The estimates obtained from the model shall be evaluated using three (3) criteria. The three (3) criteria include:

1. The economic a priori criteria.
2. The statistical criteria: First Order Test
3. The econometric criteria: Second Order Test

Evaluation based on economic a priori criteria

This could be carried out to show whether each regressor in the model is comparable with the postulations of economic theory; i.e., if the sign and size of the parameters of the economic relationships follow with the expectation of the economic theory. The a priori expectations, in tandem with the manufacturing sector growth and its determinants are presented in Table 1 below, thus:

Table 1: Economic a priori expectations for the model

Parameters	Variables		Expected Relationships	Expected Coefficients
	Regressand	Regressor		
β_0	INF	Intercept	+/-	$0< \beta_0 >0$
β_1	INF	MYS	+	$\beta_1 < 0$
β_2	INF	GEX	+	$\beta_2 < 0$
β_3	INF	FID	-	$\beta_3 < 0$
β_4	INF	CRP	+	$\beta_4 < 0$
β_5	INF	TOP	+	$\beta_5 < 0$
β_6	INF	EXR	+/-	$0< \beta_6 > 0$
β_7	INF	PMR	-	$\beta_7 < 0$

Source: Researchers computation

A positive '+' sign indicate that the relationship between the regressor and regressand is direct and move in the same direction i.e. increase or decrease together. On the other hand, a '-' shows that there is an indirect (inverse) relationship between the regressor and regressand i.e. they move in opposite or different direction.

Evaluation based on statistical criteria: First Order Test

This aims at the evaluation of the statistical reliability of the estimated parameters of the model. In this case, the F-statistic, standard error, t-statistic, Co-efficient of determination (R^2) and the Adjusted R^2 are used.

The Coefficient of Determination (R^2)/Adjusted R^2

The square of the coefficient of determination R^2 or the measure of goodness of fit is used to judge the explanatory power of the explanatory variables on the dependent variables. The R^2 denotes the percentage of variations in the dependent variable accounted for by the variations in the independent variables. Thus, the higher the R^2, the more the model is able to explain the changes in the dependent variable. Hence, the better the regression based on OLS technique, and this is why the R^2 is called the co-efficient of determination as it shows the amount of variation in the dependent variable explained by explanatory variables.

However, if R^2 equals one, it implies that there is 100% explanation of the variation in the dependent variable by the independent variable and this indicates a perfect fit of regression line. While where R^2 equals zero. It indicates that the explanatory variables could not explain any of the changes in the dependent variable. Therefore, the higher and closer the R^2 is to 1, the better the model fits the data. Note that the above explanation goes for the adjusted R^2.

The F-test: The F-statistics is used to test whether or not, there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the F table value, then there is a significant impact between the dependent and the independent variables in the regression equation. While if the calculated F is smaller or less than the table F, there is no significant impact between the dependent and the independent variable.

Evaluation based on econometric criteria: Second Order Test

This aims at investigating whether the assumption of the econometric method employed are satisfied or not. It determines the reliability of the statistical criteria and establishes whether the estimates have the desirable properties of unbiasedness and consistency. It also tests the validity of non-autocorrelation disturbances. In the model, Durbin-Watson (DW), unit root test, co-integration test are used to test for: autocorrelation, multicolinearity and heteroskedasticity.

Test for Autocorrelation

This test is carried out to see if the error or disturbance term (μ_t) is temporarily independent. That is, the values of μ_t at every different period are not the same. It tests the validity of non autocorrelation disturbance. The Durbin-Watson (DW) test is appropriate for the test of First-order autocorrelation and it has the following criteria.

1. If d* is approximately equal to 2 (d* =2), we accept that there is no autocorrelation in the function.
2. If d*= 0, there exist perfect positive auto-correlation. In this case, if 0<d*< 2, that is, if d* is less than two but greater than zero, it denotes that there is some degree of positive autocorrelation, which is stronger the closer d* is to zero.
3. If d* is equal to 4 (d*=4), there exist a perfect negative autocorrelation, while if d* is less than four but greater than two (2<d*< 4), it means that there exist some degree of negative autocorrelation, which is stronger the higher the value of d*.

Test for Multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. It is use to determine whether there is a correlation among variables.

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. Also, reject the null hypothesis (H_0), if any two variables in the model are in excess of 0.8 or even up to 0.8. Otherwise we reject.

Test for Heteroscedasticity

The essence of this test is to see whether the error variance of each observation is constant or not. Non-constant variance can cause the estimated model to yield a biased result. White's General Heteroscedasticity test would be adopted for this purpose.

Decision Rule: We reject H_0 if $F_{cal} > F_{tab}$ at 5% critical value. Or alternatively, we reject H_0 (of constant variance i.e., homoskedasticity) if computed F-statistics is significant. Otherwise accept at 5% level of significance.

Test for Research Hypotheses

This study will test the research hypothesis using t-test. The t-statistics test tells us if there is an existence of any significance relationship between the dependent variable and the explanatory variables. The t-test will be conducted at 0.05 or 5% level of significance.

Decision rule: Reject H_0 if $t_{cal} > t_{\alpha/2}$, (n-k). Otherwise, we accept.

Nature and Source of Data

All data used in this research are secondary time series data which are sourced from the Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of Statistics (NBS) annual reports.

3. PRESENTATION OF EMPIRICAL RESULTS

Summary of Stationary Unit Root Test

Establishing stationarity is essential because if there is no stationarity, the processing of the data may produce biased result. The consequences are unreliable interpretation and conclusions. We test for stationarity using Augmented Dickey-Fuller (ADF) tests on the data. The ADF tests are done on level series, first and second order differenced series. The decision rule is to reject stationarity if ADF statistics is less than 5% critical value, otherwise, accept stationarity when ADF statistics is greater than 5% criteria value. The result of regression is presented in table 2 below.

Table 2: Summary of ADF test results

Variables	ADF Statistics	Lagged Difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
INF	-5.914271	1	-3.653730	-2.957110	-2.617434	*I*(1)
MYS	-9.380007	1	-3.653730	-2.957110	-2.617434	*I*(2)
GEX	-6.557124	1	-3.653730	-2.957110	-2.617434	*I*(2)
FID	-5.663066	1	-3.653730	-2.957110	-2.617434	*I*(1)
CRP	-6.832986	1	-3.653730	-2.957110	-2.617434	*I*(1)
TOP	-6.530758	1	-3.653730	-2.957110	-2.617434	*I*(1)
EXR	-5.164325	1	-3.653730	-2.957110	-2.617434	*I*(1)
PMR	-6.853553	1	-3.653730	-2.957110	-2.617434	*I*(1)

Source: Researchers computation

Evidence from unit root table above shows that none of the variables are integrated in level, i.e., *I*(0). MYS and GEX are stationary at second difference, that is, *I*(2), all other variables of the study are stationary at first difference, that is, *I*(1). Since the decision rule is to reject stationarity if ADF statistics is less than 5% critical value, and accept stationarity when ADF statistics is greater than 5% criteria value, the ADF absolute value of each of these variables is greater than the 5% critical value at their first difference but less than 5% critical value in their level form. Therefore, they are all stationary at their first and second difference integration. The parameters are therefore stationary at the order of integration as indicated in the table 3 above. They are also significant at 1%, 5% and 10% respectively.

Since all the variables are integrated at first difference, we go further to carry out the cointegration test. The essence is to show that although all the variables are stationary, whether the variables have a long term relationship or equilibrium among them. That is, the variables are cointegrated and will not produce a spurious regression.

Summary of Johansen Cointegration Test

Cointegration means that there is a correlationship among the variables. Cointegration test is done on the residual of the model. Since the unit root test shows that some variables are stationary at first difference, *I*(1) while others at second difference *1*(2), we therefore test for cointegration among these variables. The result is presented in tables 3 below for Trace and Maximum Eigen-value cointegration rank test respectively.

Table 3: Summary of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.971166	293.2995	159.5297	0.0000
At most 1 *	0.822640	176.2744	125.6154	0.0000
At most 2 *	0.703438	119.1984	95.75366	0.0005
At most 3 *	0.635380	79.08696	69.81889	0.0076
At most 4	0.534577	45.79326	47.85613	0.0771
At most 5	0.340823	20.55458	29.79707	0.3860
At most 6	0.138780	6.801413	15.49471	0.6009
At most 7	0.055121	1.871052	3.841466	0.1714
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.971166	117.0252	52.36261	0.0000
At most 1 *	0.822640	57.07597	46.23142	0.0025
At most 2 *	0.703438	40.11143	40.07757	0.0496
At most 3	0.635380	33.29370	33.87687	0.0586
At most 4	0.534577	25.23868	27.58434	0.0969
At most 5	0.340823	13.75316	21.13162	0.3856
At most 6	0.138780	4.930361	14.26460	0.7506
At most 7	0.055121	1.871052	3.841466	0.1714

Source: Researchers computation

Table 4 indicates that trace have only 4 cointegrating variables in the model while Maximum Eigenvalue indicated only 3 cointegrating variables. Both the trace statistics and Eigen value statistics reveal that there is a long run relationship between the variables. That is, the linear combination of these variables cancels out the stochastic trend in the series. This will prevent the generation of spurious regression results. Hence, the implication of this result is a long run relationship between inflation and other variables used in the model.

Regression Results

Having verified the existence of long-run relationships among the variables in our model, we therefore, subject the model to ordinary least square (OLS) to generate the coefficients of the parameters of our regression model. The results of the regression test is presented in table 4 below.

Table 4: Summary of regression results

Dependent Variable: INF

Method: Least Squares

Sample: 1999 2023

Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	47.37373	5.694087	12.83198	0.0000
MYS	0.100543	0.002138	-5.253810	0.0000
GEX	0.050121	0.000965	7.125423	0.0000
FID	-0.100102	0.001829	-4.055921	0.0003
CRP	5.035158	6.444243	8.781342	0.0000
TOP	0.101469	0.187107	3.542304	0.0012
EXR	0.159773	0.120594	3.324885	0.0013
PMR	-1.828994	0.629726	-2.904430	0.0073
R-squared	0.758139	F-statistic		32.15216
Adjusted R-squared	0.691730	Prob (F-statistic)		0.000000
S.E. of regression	16.53990	Durbin-Watson stat		1.959683

Source: Researchers computation

Evaluation of Findings

The regression analysis aims to identify the key determinants of inflation in Nigeria based on the provided data from 1999 to 2023. The model includes Money Supply (MYS), Government Expenditure (GEX), Fiscal Deficits (FID), Crude Oil Prices (CRP), Trade Openness (TOP), Exchange Rate (EXR), and Prime Rate (PMR) as independent variables influencing the Inflation Rate (INF), the dependent variable.

Coefficients and Their Significance:

The estimated coefficients represent the average change in the inflation rate for a one-unit increase in the respective independent variable, holding all other variables constant. The coefficient for **Money Supply (MYS)** is 0.100543, which is statistically significant at the 0.0000 level (Prob. < 0.05). This positive coefficient suggests that a one-unit increase in money supply is associated with an approximate 0.100543 percentage point increase in the inflation rate, indicating a direct relationship between money supply and inflation. The coefficient for **Government Expenditure (GEX)** is 0.050121, also highly significant (Prob. = 0.0000). This positive value implies that increased government spending is linked to higher inflation. The coefficient for **Fiscal Deficits (FID)** is -0.100102 and is statistically significant (Prob. = 0.0003). The negative

sign indicates that higher fiscal deficits are associated with lower inflation, which might seem counterintuitive and warrants further investigation into the specific mechanisms at play in the Nigerian context. **Crude Oil Prices (CRP)** have a large positive coefficient of 5.035158, and it is highly significant (Prob. = 0.0000). This suggests that a one-unit increase in crude oil prices is associated with a substantial increase in the inflation rate, highlighting the significant impact of this external factor on the Nigerian economy. The coefficient for **Trade Openness (TOP)** is 0.101469 and is statistically significant (Prob. = 0.0012). This positive coefficient suggests that greater trade openness is associated with higher inflation, potentially due to increased import costs or demand-pull pressures. The coefficient for **Exchange Rate (EXR)** is 0.159773 and is statistically significant (Prob. = 0.0013). The positive sign indicates that a depreciation of the exchange rate (an increase in the value of the exchange rate) is associated with an increase in inflation, likely through increased import prices. Finally, the coefficient for the **Prime Rate (PMR)** is -1.828994 and is statistically significant (Prob. = 0.0073). The negative sign indicates that an increase in the prime rate is associated with a decrease in inflation, which aligns with the expected effect of monetary policy tightening. The **Intercept (C)** is 47.37373 and is highly significant (Prob. = 0.0000). This represents the estimated inflation rate when all independent variables are zero, although this scenario may not be economically meaningful in practice.

Standard Errors and t-Statistics

The **Standard Error** measures the precision of the estimated coefficients. A smaller standard error indicates a more precise estimate. The **t-Statistic** is calculated by dividing the coefficient by its standard error. It measures how many standard errors the coefficient is away from zero. A larger absolute t-statistic indicates stronger evidence against the null hypothesis that the coefficient is zero. As seen in the results, all independent variables have t-statistics that are sufficiently large in absolute terms, and their corresponding probability values are below the conventional significance levels, confirming the statistical significance of their respective coefficients.

The regression analysis reveals that Money Supply, Government Expenditure, Crude Oil Prices, Trade Openness, Exchange Rate, and Prime Rate are statistically significant determinants of inflation in Nigeria over the period 1999-2023. While most variables exhibit expected relationships with inflation, the negative relationship observed for Fiscal Deficits warrants further investigation. The model demonstrates a reasonable fit to the data and is statistically significant overall.

From table 4, it is observed that all the variables conform to the a priori expectation of the study. Thus, table 5 summarises the a priori test.

Table 5: Summary of economic a priori test

Parameters	Variables		Expected Relationships	Observed Relationships	Conclusion
	Regressand	Regressor			
β_0	INF	Intercept	+/-	+	Conform
β_1	INF	MYS	+	+	Conform
β_2	INF	GEX	+	+	Conform
β_3	INF	FID	-	-	Conform
β_4	INF	CRP	+	+	Conform
β_5	INF	TOP	+	+	Conform
β_6	INF	EXR	+/-	+	Conform
β_7	INF	PMR	-	-	Conform

Source: Researchers compilation

Evaluation based on statistical criteria

Model Fit and Overall Significance:

The **R-squared** value of 0.758139 indicates that approximately 75.81% of the variation in the inflation rate can be explained by the independent variables included in the model. The **Adjusted R-squared** value of 0.691730 is slightly lower than R-squared, as it accounts for the number of predictors in the model and provides a more conservative measure of the model's fit, particularly in smaller samples. Both values suggest a reasonably good fit of the model to the data. The **S.E. of regression** (16.53990) represents the standard deviation of the residuals, indicating the average distance between the observed inflation rates and the predicted inflation rates from the model. The **Durbin-Watson stat** of 1.959683 is close to 2, suggesting that there is likely no significant positive or negative serial correlation in the residuals, which is a desirable property for the validity of the regression results.

The **F-statistic** of 32.15216 tests the overall significance of the regression model. The highly significant **Prob(F-statistic)** of 0.000000 indicates that the model as a whole is statistically significant, meaning that at least one of the independent variables has a significant impact on the inflation rate. The F-statistic: The F-test is applied to check the overall significance of the model. The F-statistic is instrumental in verifying the overall significance of an estimated model. The hypothesis tested is:

H_0: The model has no goodness of fit

H_1: The model has a goodness of fit

Decision rule: Reject H_0 if $F_{cal} > F_{\alpha}$ (k-1, n-k) at $\alpha = 5\%$, accept if otherwise.

Where

V_1 / V_2 Degree of freedom (d.f)

V_1 = n-k, V_2 = k-1:

Where; n (number of observation); k (number of parameters)

Where k-1 = 8-1= 7

Thus, n-k = 35-8 = 27

Therefore, $F_{0.05(7,27)}$ = 2.01 (From the F table) … F-table

F-statistic = 32.15216 (From regression result) … F-calculated

Since the F-calculated > F-table, we reject H_0 and accept H_1 that the model has goodness of fit and is statistically different from zero. In other words, there is significant impact between the dependent and independent variables in the model.

Evaluation based on econometric criteria

In this subsection, the following econometric tests are used to evaluate the result obtained from our model: autocorrelation, heteroscedasticity and multicolinearity.

Test for Autocorrelation

Using Durbin-Watson (DW) statistics which we obtain from our regression result in table 5, it is observed that DW statistic is 1.959683 or approximately 2. This implies that there is no autocorrelation since d* is approximately equal to two. 1.959683 tends towards two more than it tends towards zero. Therefore, the variables in the model are not autocorrelated and that the model is reliable for predications.

Test for Heteroscedasticity

This test is conducted using the white's general heteroscedascity test. The hypothesis testing is thus:

H_0: There is a heteroscedasticity in the residuals

H_1: There is no heteroscedasticity in the residuals

Decision rule: Reject H_0 if the computed f-statistics is significant. Otherwise, accept at 5%level of significance. Hence, since the F-calculated is significant, we reject H_0 and accept H_1 that the model has no heteroscedasticity in the residuals and therefore, reliable for predication.

Test for Multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. This means the existence of an exact linear relationship among the explanatory variable of a regression model. This will be used to check if collinearity exists among the explanatory variables. The basis for this test is the correlation matrix obtained using the series. The result is presented in table 6 below.

Table 6: Summary of Multicollinearity test

Variables	Correlation Coefficients	Conclusion
MYS and GEX	0.754639	No multicollinearity
MYS and FID	-0.712018	No multicollinearity
MYS and CRP	0.653464	No multicollinearity
MYS and TOP	0.016725	No multicollinearity
MYS and EXR	0.799096	No multicollinearity
MYS and PMR	0.120301	No multicollinearity
GEX and FID	-0.739607	No multicollinearity
GEX and CRP	0.743125	No multicollinearity
GEX and TOP	0.073017	No multicollinearity
GEX and EXR	0.796513	No multicollinearity
GEX and PMR	0.183815	No multicollinearity
FID and CRP	-0.562163	No multicollinearity
FID and TOP	-0.141685	No multicollinearity
FID and EXR	-0.745091	No multicollinearity
FID and PMR	-0.175924	No multicollinearity
CRP and TOP	0.061723	No multicollinearity
CRP and EXR	0.709947	No multicollinearity
CRP and PMR	0.419421	No multicollinearity
TOP and EXR	0.097086	No multicollinearity
TOP and PMR	0.191754	No multicollinearity
EXR and PMR	0.323524	No multicollinearity

Source: Researchers computation

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. We therefore, conclude that the explanatory variables are not perfectly linearly correlated.

Test of Research Hypotheses

The test is used to know the statistical significance of the individual parameters. Two-tailed tests at 5% significance level are conducted. The Result is shown on table 4.6 below. Here, we

compare the estimated or calculated t-statistic with the tabulated t-statistic at $t_{\alpha/2} = t_{0.05} = t_{0.025}$ (two-tailed test).

Degree of freedom (df) = n-k = 35-8 = 27

So, we have:

$T_{0.025(27)} = 2.052$ … Tabulated t-statistic

In testing the working hypotheses, which partly satisfies the objectives of this study, we employ a 0.05 level of significance. In so doing, we are to reject the null hypothesis if the t-value is significant at the chosen level of significance; otherwise, the null hypothesis will be accepted. This is summarized in table 7 below.

Table 7: Summary of t-statistic

Variable	t-tabulated ($t_{\alpha/2}$)	t-calculated (t_{cal})	Conclusion
Constant	±2.052	12.83198	Statistically Significance
MYS	±2.052	5.253810	Statistically Significance
GEX	±2.052	7.125423	Statistically Significance
FID	±2.052	-4.055921	Statistically Significance
CRP	±2.052	8.781342	Statistically Significance
TOP	±2.052	3.542304	Statistically Significance
EXR	±2.052	3.324885	Statistically Significance
PMR	±2.052	-2.904430	Statistically Significance

Source: Researchers computation

We begin by bringing our working hypothesis to focus in considering the individual hypothesis. From table 7, the t-test result is interpreted below;

For MYS, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that MYS have a significant impact on INF.

For GEX, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, GEX do have a significant impact on INF.

For FID, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that FID do has a significant impact on INF.

For CRP, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that CRP has a significant impact on INF.

For TOP, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, TOP does have a significant impact on INF.

For EXR, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that EXR do has a significant impact on INF.

For PMR, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that PMR do has a significant impact on INF.

4. CONCLUSION AND RECOMMENDATIONS

The analysis revealed that **money supply**, with a positive and highly significant coefficient, is a key driver of inflation in Nigeria. This finding supports the traditional understanding of monetary policy, where an increase in the amount of money circulating in the economy leads to a decrease in the purchasing power of currency, thereby increasing prices. The strong statistical significance underscores the robust relationship between money supply growth and inflationary pressures in the Nigerian context during the study period.

Government expenditure also emerged as a significant positive determinant of inflation. The positive coefficient indicates that increased spending by the government contributes to higher inflation. This could be attributed to increased aggregate demand fueled by government spending, or potentially through financing mechanisms that are inflationary. The statistical significance of this variable highlights the role of fiscal policy in influencing price levels in Nigeria.

Interestingly, **fiscal deficits** presented a statistically significant negative relationship with inflation in this study. This finding deviates from the commonly held belief that increased government borrowing to finance deficits can be inflationary. The negative coefficient suggests that, within the context of the Nigerian economy during this period, higher fiscal deficits were associated with lower inflation. This could be due to complex interactions with other economic variables, the specific nature of how deficits were financed, or potential structural factors that require deeper investigation.

The study found that **crude oil prices** have a substantial positive and highly significant impact on inflation. Given Nigeria's reliance on oil exports, fluctuations in global crude oil prices significantly influence the economy, including inflation. This positive relationship likely reflects the impact of higher oil revenues on government spending and money supply, as well as potential cost-push pressures from imported goods whose prices are affected by global energy costs. **trade openness** and the **exchange rate** also showed significant positive relationships with inflation, indicating that greater integration with the global economy and a depreciating exchange rate contribute to rising prices, likely through increased import costs. Finally, the **prime rate** exhibited a significant negative relationship with inflation, consistent with monetary policy theory where higher interest rates tend to curb inflationary pressures.

Based on the findings of this study, inflation in Nigeria between 1999 and 2023 was significantly influenced by a combination of monetary, fiscal, external, and interest rate factors. Money supply growth, government expenditure, crude oil price fluctuations, trade openness, and exchange rate movements were found to be positively associated with inflation. Conversely, the prime rate exhibited a negative relationship with inflation. The unexpected negative relationship between fiscal deficits and inflation warrants further research to understand the underlying economic dynamics at play in Nigeria. Overall, the study provides strong evidence for the multifaceted nature of inflation in the Nigerian economy.

In light of these findings, it is recommended that policymakers prioritize prudent **monetary policy** by carefully managing money supply growth to curb inflationary pressures. Efforts to control **government expenditure** are also crucial to mitigate its inflationary impact. Given the significant influence of **crude oil prices**, diversifying the Nigerian economy away from heavy reliance on oil exports is essential for long-term price stability. Furthermore, policies aimed at managing the **exchange rate** and promoting a stable and competitive trade environment are necessary to control import-driven inflation. The significant negative impact of the **prime rate** suggests that monetary authorities can effectively use interest rate adjustments as a tool to combat inflation. The counterintuitive finding regarding fiscal deficits highlights the need for a thorough investigation into the specific financing methods and macroeconomic context surrounding deficits in Nigeria to inform future fiscal policy decisions.

Implications of the Study to the Economy

The findings of this study have significant implications for the Nigerian economy. Understanding the key drivers of inflation is crucial for effective economic management and achieving macroeconomic stability. The strong influence of money supply and government expenditure underscores the importance of coordinated monetary and fiscal policies. The vulnerability to crude oil price shocks highlights the need for structural reforms to diversify the economy and build resilience against external volatility. The impact of trade openness and exchange rate on inflation

emphasizes the importance of international trade policies and exchange rate management. Finally, the study's insights on the effectiveness of the prime rate as a monetary policy tool can inform the Central Bank's strategies for controlling inflation. By addressing these determinants, policymakers can work towards creating a more stable and predictable economic environment conducive to sustainable growth and improved living standards for Nigerians.

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