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THE ASYMMETRIC EFFECT OF MONEY SUPPLY ON INFLATION IN NIGERIA

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Abstract
This empirical paper purposively aimed at investigating the asymmetric (non-linear) impact of money supply on inflation in Nigeria. The study utilised Non-Linear Autregressive Distributed Lag Model as its methodology and sourced data from the famous data bank, the World Development Indicators of World Bank, from 1970 to 2022. The research used Unit Root Test to check stationary of the variables, and show that the variables are not integrated in same order; it also used.Bounds Test of Cointegration toindicate the presence of long run relationships, and utilized the Test of Asymmetry to indicate that there exists non-linear ralationship on the concern variables. The post estimated diagnostic checks disclosed that the model, estimated, has no estimation issues, and at the same time, it is dymanically stable. The results revealed that positive effect of the supply of money differs from the negative effect on how it affects inflation in Nigeria. The positive effect is inflationary while the negative effect is deflationary. However, the negative shock outweighs the positive shock; and hence, policymakers are advised to be cautious, especially when implementing contractionary monetary policy to address inflation to avoid a natiobal direction towards a great deflation. The study findings are limited to Nigeria whose 1970-2022 data was used followingthe methodology utilized (NARDL).

Keywords: Asymmetry, inflation, money supply, NARDL, Nigeria

1. Introduction

There is a broad consensus that one major adverse consequence of money as a medium of exchange is the challenge many countries face in achieving sustainable price stability, which constrains the macroeconomic goal of sustaining higher economic growth (Danlami, 2024[a & b]; 2020; 2019). The discovery of money, even though withered away many problems of barter system, contributed to the emergence of inflation (rising prices of commodities) (Jalil *et al*., 2013; Danlami *et al*., 2020[a b & C]; 2019[a & b]; 2018[a & b]; 2017 [a & b]).

Despite the fact that there are numerous elements that cause prices to be fluctuating, especially rising generally, but monetarist and some other theorists believed that inflation everywhere is chiefly a consequence of means of exchange increments, and hence, they attributed it (inflation) solely to money supply. Nevertheless, other justifiable factors, such as exchange rate devaluation, low economic growth and corruption, could be proved as

causative agents of inflation (Zubair & Danlami, 2022; Musa *et al*., 2019 [a & b]). The effect of the role of increases in the stock of money in circulation in causing inflation cannot be disregarded, as the problem of rising prices of commodities started emerging only after the monetary invention.

Many studies believed in the direct effect of supply of money on inflation. Such studies include Mwajje and Lwanga (2016), Danlami, *et al*., (2020), and Bashir *et al*., (2011). They only concentrated on linear relationship (i.e. existence of direct influence of the supply of money on inflation rate as stressed that increase in the stock of money in circulation increases inflation rate and vice versa). Empirical researches on the asymmetric or non-linear effect of the stock of money in circulation on inflation are thus lacking. Therefore, this research intends to analyze the asymmetric effect of the supply of money on inflation rate in Nigeria from 1970 – 2022, using the Non-linear Autoregressive Distributed Lag (NARDL) Model.

2. Literature Review *Review of the Related Experiential Studies*

Macroeconomic policies are conducted by countries in order to avoid inflation rates escalating. The ability of countries to maintain price stability depends on the workability and effectiveness of macroeconomic variables on inflation rates, and a part of such variables is money supply. A substantial body of experiential research conducted assesses the effects of money supply (LMYS), or the stock of money in circulation, on inflation rates, with the objective of validating various theoretical postulations advanced by early monetary theorists. The findings from these studies can generally be classified into three. The first group of studies provided empirical evidence of a positive relationship between the stock of money in circulation and the rate of inflation. The second group reported an inverse relationship between LMYS and inflation, while the third finds no statistically significant evidence of any relationship between LMYS and inflation rates. The absence of consensus among these empirical findings renders broad generalizations inconclusive. Studies that established a positive association between money supply and inflation include Asongu (2013), Mawajje and Lwanga (2016), Darrat (1985), Durevall and Sjo (2012), Simpasa et al. (2011), Nguyen et al. (2015), and Bashir et al. (2011), among others.

Olulu-Briggs and Ogbulu (2015) perceived broad money supply as a major factor that influences inflation volatility in West African countries in particular, and developing economies in general. In their exploration, they found out that in Nigeria during 2008 to 2013, about eight percent disequilibrium is corrected on a monthly basis by money supply on asset prices. Similarly, Babatunde and Shu'aibu (2011) emphasized the importance of controlling money supply growth as a means of curbing inflation, noting that general increases in prices adversely affect economic growth in developing economies. To them, controlling the stock of money in circulation is synonymous with controlling inflation.

However, the major challenge in managing money supply lies in the persistent drive of government/authorities to increase revenue. Both short-run and long-run relationships were identified between the stock of money in circulation and government revenue, indicating that increases in government revenue tend to expand the money supply in both the short and long run. Conversely, money supply was found to influence government revenue only in the short run. Consequently, the continuous increase in government revenue contributes to an increased stock of money in circulation, thereby fuelling inflationary pressures across various countries (Musa et al., 2014).

Asongu (2013) utilized the Vector Error Correction Model (VECM) to examine the effect of the stock of money in circulation on inflation and other liquid liabilities. His findings revealed that money supply positively and significantly affects inflation in the long run across ten African countries. Using the same methodology, Mawajje and Lwanga (2016) analyzed the factors influencing inflation fluctuations in Uganda and found that disequilibrium in money supply feeds into the inflationary process in the short run. Similarly, Simpasa et al. (2011) employed VECM, Autoregressive Conditional Heteroskedasticity (ARCH), and Autoregressive (AR) models to study East Africa. Their findings emphasized the significance of money supply in explaining inflation dynamics, and established that money supply positively affects inflation in both the short and long runs.

Durevall and Sjo (2012) studied inflation of Ethiopia and Kenya using VECM, and stressed that the direct effect of the stock of money in circulation on inflation is in the short run. Similarly, Nguyen *et al*., (2015), who deployed Global VAR, and short-run analysis, argued that inflation rates in the short-run are being driven by the stock of money in circulation in Sub-Saharan Africa (SSA). Okhiria and Saliu (2008), using the Vector Autoregressive (VAR) and Vector Error Correction Model (VECM), highlighted the significant influence of the stock of money in circulation on the inflation rate in Nigeria, finding a positive relationship in both the short and long run. Similarly, Akinboade et al. (2004), employing a log-linear dynamic model, confirmed that the stock of money in circulation directly affects inflation in both periods in South Africa. In the same vein, Bayo (2011), applied the Ordinary Least Squares (OLS) technique to a log-linear model to establish that in Nigeria, money supply is among the major determinants of inflation, and it exert a positive and significant effect on inflation rates. Kirimi (2014) deployed OLS to investigate the determinants of inflation in Kenya. The study also affirmed that the stock of money in circulation positively influences inflation rates. Likewise, Adu and Marbuah (2011), in their study on inflation in Ghana, employed the Autoregressive Distributed Lag (ARDL) model, Dynamic OLS (DOLS), and Fully Modified OLS (FMOLS), to uncover that money supply is a significant factor that directly influences inflation in both the short and long run. Moser (1995) used the VECM and DOLS approaches to also identify the

stock of money in circulation as the dominant factor influencing inflation in Nigeria across both periods.

Ojede (2015), using Generalized Method of Moment (GMM), affirmed that inflation rates in developing countries are driven by monetary growth. Furthermore, in his analysis, Nguyen (2014) utilized Pool Mean Group (PMG) to examine the dynamics of the rates of inflation in Asian countries, and found money supply to be positively influencing inflation rate only in the long run. Lim and Papi (1997) studied Turkish economy using DOLS and VECM, and maintained that, in the short-run, stock of money in circulation directly affect the rate of inflation. Lim and Sek (2015) deployed ARDL, and found that money supply, in the short-run, significantly influences the rate of inflation positively, for low inflation countries, and in the long-run, for high inflation countries.

However, some studies found money supply to be inversely affecting inflation rate. For instance, Olubusoye and Oyaromade (2008), using VECM, were surprised to find out that, in the short-run, lagged value of the stock of money in circulation was significantly and inversely affecting inflation in Nigeria. Sabade (2013) observed the presence of inverse impacts on inflation by the stock of money in circulation in India. Hossain and Islam (2013) utilized OLS to confirme that one year lagged value of money supply significantly and inversely affected inflation in Bangladesh. Nguyen (2014) on his study of inflation rates dynamics in Asian countries, using Pool Mean Group(PMG) and Generalized Method of Moment (GMM), found money supply to be inversely influencing the rate of inflation dynamics in the countries.

Nevertheless, a number of research reported insignificant influence of the stock of money in circulation on inflation. For instance, Adebiyi (2009), who utilized VAR, maintained that money innovation and other monetary instruments effected inflation in Nigeria and Ghana insignificantly. Odusanya and Atanda (2010) applied VECM to discover that even though the stock of money in circulation has a direct relationship with inflation it is insignificant in elucidating the inflation fluctuations in periods in Nigeria. Durevall and Sjo (2012) studied inflation of Kenya and Ethiopia using VECM. They stressed that the stock of money in circulation is insignificant in elucidating the inflation dynamics in the long run.

Lim and Papi (1997) studied Turkish economy using DOLS and VECM, and maintained that the stock of money in circulation is insignificant in elucidating inflation rates dynamics in the long run. Also, Lim and Sek (2015) deployed ARDL to find that the stock of money in circulation insignificantly influences inflation rates dynamics in the short-run of high inflation states, and the long-run of low inflation countries. Other studies that reported the insignificant influence of the stock of money in circulation on inflation in the short-run,

long-run or both include Ndidi (2013) and Bashir *et al*., (2011), Maku and Adelowokan (2013), and Iyaji *et al*. (2012).

Moreover, Kudar (2024) explored whether the influence of money supply (measured as broad money) on inflation behaves asymmetrically on annual data. The analysis coversed 38 countries that recorded an average inflation rate of five percent or higher between 1989 and2018, the study applied panel data techniques. Unlike previous studies that emphasize monetary shocks to explain asymmetric effects, this research employed changes in broad money across different intervals alongside control variables to test for asymmetry. The findings showed that asymmetric pooled and fixed-effect panel models provide a better explanation on the association between broad money and inflation than symmetric models. Results indicated that the impact of increases and decreases in money supply on inflation is not the same. Furthermore, expansions in broad money are associated with a sharper rise in inflation. These outcomes confirm the existence of an asymmetric relationship between broad money and inflation.

Whereas, Ilyas *et al*. (2022) examined the effects of shocks in inflation, money supply, and exchange rate on the economies of the West African Monetary Zone (WAMZ) from 1987 to 2019. The analysis applied the Kapetanios-Shin-Snell nonlinear co-integration test, the Kilian-Vigfusson asymmetric tests, and the Hatemi approach, all of which facilitated the estimation of an Asymmetric Structural Vector Autoregressive (ASVAR) model. The results showed that the impacts of shocks in inflation, money supply, and exchange rate are generally asymmetric across member countries, with the exception of Guinea and inflation in Liberia. Specifically, money supply is the main driver in Gambia and Nigeria, while in Ghana, Guinea, and Liberia, none of the variables significantly affect the economies. For Sierra Leone, both money supply and exchange rate play a major role. Additionally, most of the countries share common sources of shocks arising from monetary and exchange rate policies, except Gambia, where only monetary policy is relevant. Based on these findings, the study recommended that member states—particularly Ghana, Guinea, and Liberia—intensify efforts to adopt sound monetary and exchange rate policies to strengthen their economies. Moreover, since the majority of the countries face common shocks from these policies, the prospect of pursuing monetary integration appears feasible.

Furthermore, Ongan and Gocer (2025) investigated the symmetric and asymmetric impacts of U.S. monetary policy uncertainty (MPU) on money demand during the period, 2000(M1)–2025 (M5). The analysis employed the recently developed MPU index, and applied both linear and nonlinear autoregressive distributed lag (ARDL) models to the U.S. data. Results from the linear ARDL suggested no significant effect of MPU on money demand (M2). In contrast, the nonlinear ARDL revealed that MPU exerts a notable influence on M2. Specifically, increases in the MPU index reduce money demand, whereas

decreases in MPU raise money demand in the long run. This implies that higher uncertainty about monetary policy intensifies concerns regarding future interest rates, inflation, and growth prospects, prompting households and firms to act more cautiously in spending and investment. Conversely, reduced uncertainty encourages greater money holdings. The use of the MPU index, rather than broader measures such as the Economic Policy Uncertainty (EPU) index, offers a more targeted lens for examining monetary dynamics. Importantly, the findings provide forward-looking insights into how U.S. residents may adjust their demand for money in response to potential increases in MPU, especially in light of the Federal Reserve's evolving stance under the 2025 high-tariff economic agenda. This enhances the policy relevance of the study by highlighting possible behavioral reactions to future uncertainty.

On the other hand, Rashdan *et al*. (2025) examined both the symmetric and asymmetric effects of foreign currency reserves (FCR) and money supply (M2) on inflation in The Gambia, using monthly data from 2005 (M1) to 2019 (M12). The analysis applied the Nonlinear ARDL (NARDL) model to capture asymmetries, and the traditional ARDL model for symmetric relationships. Results from the NARDL indicates that a positive shock in foreign reserves exacerbates inflation, whereas a negative shock helps stabilize prices. Likewise, an expansion in money supply fuels inflationary pressures, while a contraction in M2 shows no significant impact. Findings from the ARDL suggested that FCR contributes positively to inflation in the long run, but exerts a negative influence in the short term. In contrast, money supply demonstrates a positive association with inflation in both the short and long run. Overall, the resulted highlight a policy dilemma in The Gambia: whether to build reserves as a safeguard against external shocks or to prioritize price stability.

Meanwhile, in his study, Medurapperuma (2023) maintained that GDP growth, money supply growth, and inflation are key drivers of macroeconomic stability and they play a critical role in shaping policy decisions. Sri Lanka is currently grappling with persistent inflationary pressures, which are often considered a monetary phenomenon. In line with the economic views of Karl Marx, Irving Fisher, and Milton Friedman, sustained increases in money supply have been identified as a primary source of inflation across many countries. Against this backdrop, this study investigated the interrelationship among GDP growth, money growth, and inflation in Sri Lanka. The analysis employed an econometric model supported by Fisher's and Friedman's theoretical frameworks, using secondary data spanning between 1990 and2021. Findings revealed that money supply expansion fuels inflation, which in turn exerts adverse effects on both short- and long-term economic growth. In the long run, rising money supply negatively affects GDP growth. The evidence suggests a strong and direct link between money supply and inflation, with important implications for growth outcomes. The study concluded that the Sri Lankan government

should adopt appropriate monetary policies to contain inflation while simultaneously promoting economic growth. The contribution of this research is twofold: first, it addresses the gap in the literature by providing one of the few econometric analyses of this relationship in the Sri Lankan context; second, it explores the asymmetric nature of shocks—both positive and negative—among money supply, inflation, and economic growth. This is an aspect largely overlooked in earlier studies.

Ghosh and Gorsi (2025) revisited the relationship between money supply and output in the United States and the United Kingdom, using quarterly data up to 2019. While modern central banks primarily target inflation and adjust monetary policy and liquidity to achieve price stability, the broader implications of these measures for other macroeconomic variables are often overlooked. Unlike much of the existing literature, which emphasizes linear relationships, this study investigates the asymmetric effects of money supply on output. The findings reveal that reductions in money supply exert a significantly stronger negative impact on output than equivalent increases. The analysis further highlighted a contemporary policy concern: although the large liquidity injections during the COVID-19 period provided short-term support, the subsequent withdrawal of this excess liquidity by several advanced economies may carry lasting adverse consequences for output.

2.1 The Major Gap Identified

There are number of studies in this regard but most of them concentrated on finding the linear and direct effect of money supply on inflation. In fact none of the reviewed study analyzed the non-linear effect of the stock of money in circulation on inflation. The studies on the asymmetric or non-linear effects are therefore lacking.

2.2 Theoretical Framework

The monetarist theory of inflation is the best in explaining the basis of this research and therefore, forms the theoretical framework of the study. It is the theory that guides the selection of the variables utilized by the study

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3. Methodology

3.1 Data

Table 1 summarizes the information of the data utilized by the research. Note that the data utilized by the research are sourced from world development indicators (WDI) of World Bank from 1970 to 2022. The 2022 was the most current data available during the sourcing and estimation. Hence, it is the availability of data that motivates the selection of the period.To unify the measurements of the data, the researchers transformed them into a logarithm, and interpreted as percentages.

Table 1: Variables names, their description and measurements

Variable	Description
Inflation Rate	"Inflation (Consumer Price, Annual %) is measured by the consumer price index that reflects the annual percentage change in the cost of the average consumer acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used."
Money Supply	Broad money (current LCU): the sum of currency outside banks; total stock of money in circulation.
Income (GDP)	GDP (current LCU): the sum of gross value added by all resident producers in Nigeria; the total value of commodities produces in Nigeria, annually.

Source: Created by the Authors; Note: Data and their descriptions are sourced from WDI.

3.2 Method of Estimation

The study utilizes Non-linear Autoregressive Distributed Lag (NARDL) Model, owing to thebenefits and merits it has over other models of estimations, such as VAR, VECM, OLS and other. NARDL can estimate asymmetric effect as against the other models; it can also accommodate mix stationary variables. Likewise, the estimations using NARDL is valid even if a small sample is used (Jalil *et al*., 2013).

3.3 The Model

Following Danlami *et al*., (2020)[a] and Pesaran *et al*., (1999; 2001), the NARDL model for this study is presented in the following Equations:

LINF = f(LMYS, LGDP)…….[1]

Where: LINF is Inflation Rate, LMYS is money supply and LGDP is Gross Domestic Products.

Transforming Equation 1 in an Econometric form it will become:

$$LINF_t = \beta_0 + \beta_1 LMYS_t + \beta_2 LGDP_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [\ 2\ ]$$

Where: β_0 is the constant (intercept) of the Equation, β_{is} are the coefficients of the variables, ε_t is the error term and subscript t reflects the data as time series. The other parts of the equation are as defined in the previous Equations.

Taking into cognizance, Pesaran *et al*., (1999, 2001), Equation [2] can be transformed into NARDL model as presented as follows:

$$\Delta LINF_t = \beta_0 + \sum_{k=1}^{p} \beta_1 \Delta LINF_{t-k} + \sum_{k=0}^{q} \beta_2^* \Delta LMYS_{t-k} + \sum_{k=0}^{q} \beta_3^* \Delta LGDP_{t-k} + \beta_4 LMYS_t + \beta_5 LGDP_t + \varepsilon_t .. [3]$$

Where: Δ is the difference operator, the superscript * segregates the effect of positive shocks from that of negative shock (if asymmetry exist) otherwise it falls back to linear effect with value of 1.
Equation 3 can be further separated into short run and long run Equations as follows:

Short Run Equation

$$\Delta LINF_t = \alpha_0 + \sum_{k=1}^{p} \alpha_1 \Delta LINF_{t-k} + \sum_{k=0}^{q} \alpha_2^* \Delta LMYS_{t-k} + \sum_{k=0}^{q} \alpha_3^* \Delta LGDP_{t-k} + \mathrm{v}_1 ECT_{t-1} + \varepsilon_t \ [4]$$

Where: v is the speed of adjustment towards long run Equilibrium, ECT is the error correction term, the remaining part are as defined in the previous Equations.

Long Run Equation

$$LINF_t = \alpha_0 + \sum_{k=1}^{p} \alpha_1 LINF_{t-k} + \sum_{k=0}^{q} \alpha_2^* LMYS_{t-k} + \sum_{k=0}^{q} \alpha_3^* LGDP_{t-k} + \varepsilon_t \quad [5]$$

Where: All the variables are as defined in the previous Equations.

4. Results Presentations and Discussions

This section presents and discusses the results. Starting with the characteristics of the variables, unit root test and the rest of the analysis, the features of the variables and correlation analysis are presented in Table 2 and Table 3, respectively.

Table 2: *Characteristics of the Study Variables*

	LINF	LMYS	LGDP
Mean	2.66	26.55	28.39
Median	2.57	26.64	29.04
Maximum	4.29	31.59	32.94
Minimum	1.24	20.70	22.92
Std. Dev.	0.66	3.43	3.24

Skewness	0.60	-0.07	-0.19
Kurtosis	3.18	1.68	1.65
Jarque-Bera	3.28	3.89	4.37
Probability	0.19	0.14	0.11
Sum	140.97	1407.26	1504.84
Sum Sq. Dev.	22.73	612.06	547.26
Observations	53	53	53

Source: Authors computation 2025.

Table 2 reveals that the mean (average) of all the variables are greater than their respective standard deviation. Hence, it can be said that the data of all the variables are clustered around their means (averages).

Table 3: *Correlation Analysis*

Variables	LINF	LMYS	LGDP
LINF	1.00		

LMYS	-0.07	1.00	
	(0.5975)	-----	
LGDP	-0.07	0.99	1.00
	(0.6190)	(0.0000)	-----

Source: Authors computation 2025.

The correlation analysis shows insignificant and inverse relationship between LINF and LMYS,which is theoretically in appropriate. This could be as a consequence of the asymmetry; hence, a conclusion cannot be reached based on the correlation analysis. Also, a insignificant correlation is established between GDP (income) and LINF, while a significant positive correlation is established between money supply and GDP.

4.1 Test of Stationary

The conducted unit root tests results revealed that the variables are mixed stationary as Inflation rate (LINF) is stationary at level, whereas Money Supply (LMYS) and Income (LGDP) are stationary at first difference, using both Augmented Dickey-Fuller (ADF) and

Phillips Peron (PP) unit root tests, as presented in Table 4.

Table 4; Unit-Root-Test

-	ADF	ADF	PP	PP
VRIBLE	**Level**	**1st Difference**	**Level**	**1st Difference**
LINF	**-4.14** (0.0019)**	**_**	**-3.90** (0.0039)**	**_**
LMYS	**-2.07 (0.5500)**	**-4.74** (0.0019)**	**-1.20 (0.8991)**	**-4.68** (0.0023)**
LGDP	**-0.54 (0.9786)**	**-6.55*** (0.0000)**	**-0.69 (0.9686)**	**-6.54*** (0.0000)**

Source: Authors' 2025; Notes: '' '**' '***' represents statistically significant at 1, 5 & 10 percent levels, respectively. Figures in parenthesis represent probability. ADF is Augmented Dickey Fuller and PP represents Philips Peron.*

4.2 General Modeling of NARDL

General modeling of the NARDL Model was estimated as presented in Table 5 below. Following NARDL (2, 0, 1, 0) Akaike Criterion, bounds test for co-integration, and the test of asymmetry were conducted

Table 5; ARDL (2. 0, 1, 0) General modeling Results

Variable	Coefficient	Std. Error	t-Statistic	probabilities
LINF(-1)	0.48**	0.14	3.49	0.0015
LINF(-2)	-0.32**	0.12	-2.64	0.0127
LMYS_POS	-0.41	0.73	-0.56	0.5778
LMYS_POS(-1)	3.29**	1.17	2.80	0.0086
LMYS_POS(-2)	-3.83**	0.97	-3.93	0.0004
LMYS_POS(-3)	1.91**	0.60	3.19	0.0033
LMYS_NEG	-25.09	25.00	-1.00	0.3234
LMYS_NEG(-1)	14.45	31.48	0.46	0.6494
LMYS_NEG(-2)	25.89	29.69	0.87	0.3898
LMYS_NEG(-3)	88.06**	41.19	2.14	0.0405
LMYS_NEG(-4)	-138.29**	36.73	-3.76	0.0007
LGDP	2.59**	0.67	3.87	0.0005
LGDP(-1)	-3.34**	0.79	-4.22	0.0002

LGDP(-2)	0.90	0.58	1.55	0.1313
LGDP(-3)	-0.71	0.55	-1.28	0.2115
LGDP(-4)	-0.51	0.41	-1.24	0.2229
C	25.49**	8.37	3.05	0.0047

Source: Authors' 2025, Notes: '' '**' '***' represents statistically significant at 1, 5 & 10 percent levels, respectively.*

4.3 Bounds Test for Co-integration

Based on the general modeling results, the bounds test revealed the existence of the variables' long run relationships, as the estimated F. statistic is about 10.77, which is higher than the critical values of I(0) and I(1) 4.29 and 5.61 respectively at one percent level of significance. See Table 6 below:

Table 6; Results of Bounds Test for Co-integration

Test Statistic	Value	K
F-statistic	10.77382	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Computed by the Authors' 2025

4.4 Test of Asymmetry

Non-linear impacts of the independent variables on the depended variables were tested, and it revealed that there is asymmetry on the effect of LMYS on inflation rate having F. statistic 3.72 and P Value of 0.0037.

Table 7; Test of Asymmetry

Test Statistic	Value	Df	Probability
F-statistic	3.724321	(8, 31)	0.0037
Chi-square	29.79457	8	0.0002

Source: Computed by the Authors' 2025

4.5 The Results of the Short-Run and the Long-Run

Table 8 presents both short- and long- run results of the estimated NARDL model. Note that the abbreviation *S.R* stands for Short Run while *L.R* for Long Run.

Table 8: SR and LR Results

Variables	Coefficients	STD Errors	t-Statistics	Prob
		S.R Regressors		
D(LINF(-1))	0.32**	0.12	2.64	0.0127
D(LMYS_POS)	-0.41	0.73	-0.56	0.5778
D(LMYS_POS(-1))	3.83**	0.97	3.93	0.0004
D(LMYS_POS(-2))	-1.91**	0.60	-3.19	0.0033
D(LMYS_NEG)	-25.09	25.00	-1.00	0.3234
D(LMYS_NEG(-1))	-25.89	29.69	-0.87	0.3898
D(LMYS_NEG(-2))	-88.06**	41.19	-2.14	0.0405
D(LMYS_NEG(-3))	138.29**	36.73	3.76	0.0007
D(LGDP)	2.59**	0.67	3.87	0.0005
D(LGDP(-1))	-0.90	0.58	-1.55	0.1313
D(LGDP(-2))	0.71	0.55	1.28	0.2115
D(LGDP(-3))	0.51	0.41	1.24	0.2229
CointEq(-1)	-0.84*	0.14	-6.00	0.0000
		L.R Regressors		
LMYS_POS	1.13**	0.44	2.57	0.0153
LMYS_NEG	-41.54***	23.12	-1.80	0.0822
LGDP	-1.26**	0.48	-2.65	0.0126
C	30.28**	10.74	2.82	0.0083

Source: Authors' 2025, Notes: '' '**' '***' represents statistically significant at 1, 5 & 10 percent levels, respectively.*

4.6 Discussions of Findings

Table 8 reveals that during the short-run (SR) period, inflation (LINF) exhibits persistence, as past inflation rates significantly influence current levels of LINF. Specifically, a one percent increase or decrease in the previous year's inflation rate leads to a corresponding increase or decrease in current inflation by 0.32 percent, a relationship that is statistically significant at the five percent level.

The variable of primary interest, Money Supply (LMYS), indicates that a positive shock (an increase in money supply) does not have an immediate significant effect on inflation. However, after one year, a one percent increase in LMYS leads to a 3.83 percent rise in LINF, while after two years, it results in a 1.91 percent reduction in LINF. Both effects are statistically significant. Overall, the short-run impact of positive LMYS shocks on inflation is inflationary in Nigeria. Conversely, the negative shocks of LMYS (reductions in money supply) show no immediate or one-year significant impact on inflation, but after two years, a one percent decrease in LMYS leads to an 88 percent reduction in LINF, significant at the five percent level.

Income (LGDP) is found to be inflationary, exerting a direct effect on LINF in the short run. A one percent increase in LGDP leads to an immediate 2.59 percent increase in LINF, although the effect becomes statistically insignificant in subsequent periods.

The adjustment towards long-run equilibrium occurs at a relatively fast pace, with a speed of adjustment estimated at 84 percent and significant at the one percent level. This implies that long-run equilibrium is achieved in less than two years, as approximately 84 percent of the disequilibrium is corrected each year.

Turning to the long-run (LR) results presented in Table 8, positive shocks in LMYS are distinctly inflationary. A one percent increase in LMYS, holding other factors constant, leads to a 1.13 percent rise in inflation, significant at the five percent level. Conversely, negative shocks in LMYS are deflationary; a one percent reduction in LMYS results in a 41.54 percent decline in inflation, significant at the ten percent level. These findings confirm the existence of asymmetry, as the effects of positive and negative LMYS shocks on inflation differ substantially and are statistically significant at the five and ten percent levels, respectively.

Meanwhile, LGDP is deflationary in the long run. A one percent change in LGDP results in a 1.26 percent change in LINF in the opposite direction, and this relationship is significant at the five percent level.

4.7 Post Estimation Diagnostic Checks

The checks were conducted to certify the fitness of the model. The results are as follows:

Autocorrelation Test

Serial Correlation LM test was conducted (based on Breusch Godfrey).The F-statistic is 0.06, and a probability of 0.9378 signifies that autocorrelation is absence in the estimated model.

Heteroskedasticity Test

Breusch Pagan-Godfrey test of heteroskedasticity was conducted. The F-statistic is 0.42, and the probability of 0.9661 all indicated that the variance of the errors are homskedastics, not heteroskadastics.

Normality Test

The result of Jarque-Bera statistics, with a value of 0.90 and probability 0.6392, indicated that the estimated model's error terms are normally distributed.

Specification Test

The specification test, the test of Ramsey reset has an F-statistic value of 1.90, and the probability value of 0.1672 impliedthat there is no specification error in the estimated model.

Table 9; Post Estimation Diagnostic Checks

Tests	F-statistics	Probability	Outcomes
Breusch-Pagan Test.	0.42	0.9661	No Heteroskedasticity
Breusch-Godfrey Test	0.06	0.9378	No Serial Correlation
Jarque-Bera	0.90	0.6392	Normally Distributed
Ransey Reset	1.90	0.1672	No Specification Error

Source: Authors' 2025

Dynamic Stability

Similarly, the estimated models are dynamically stable, based on the estimated CUSUM and CUSUM of Squares, as the model, estimated, falls amid the upper and lower ridge line of the tests as shown in Figure 1 and Figure 2.

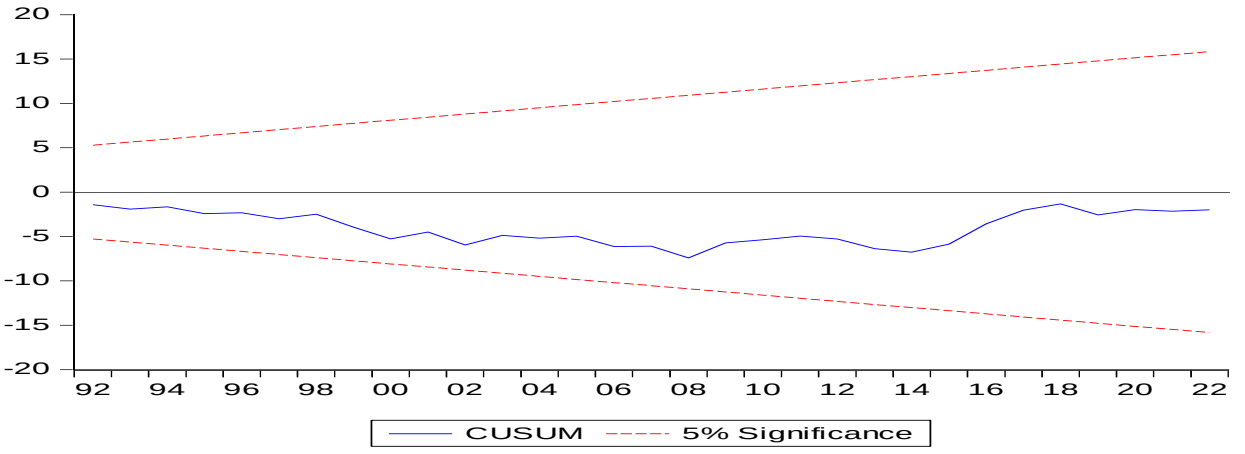

Figure 1; CUSUM of the Model

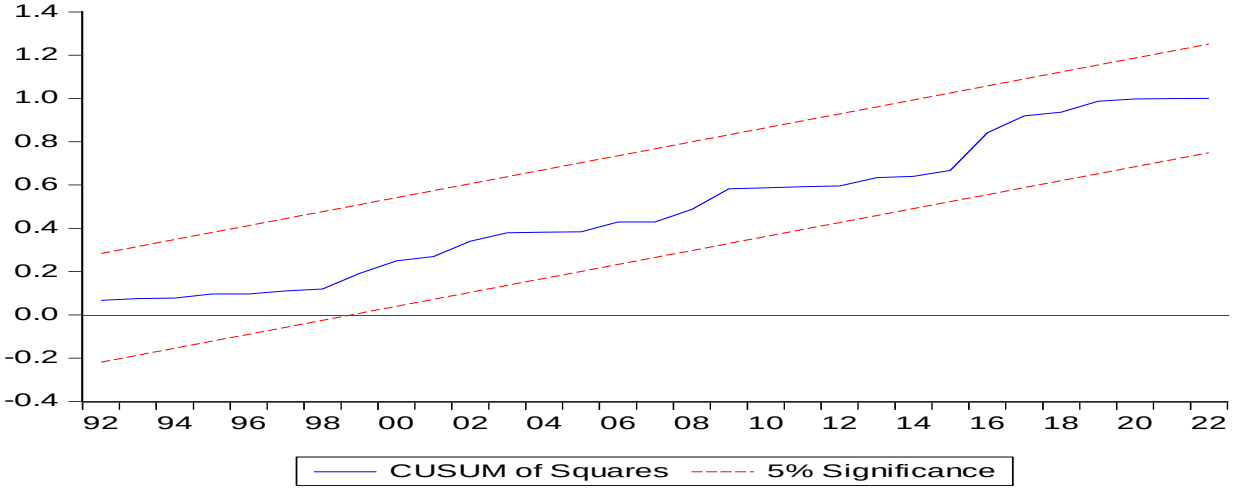

Figure 2; CUSUM SQ of the Model

5. Conclusion

The study was conducted to evaluate the asymmetric effect of the stock of money in circulation on inflation in Nigeria, employing the Nonlinear Autoregressive Distributed Lag (NARDL) model as its methodology for the period 1970–2022. Various pre- and post-estimation procedures were carried out. The pre-estimation tests included stationarity tests, which indicated that the variables were integrated of mixed orders, thereby justifying the use of the NARDL approach. Additionally, the bounds test and the test of asymmetry confirmed the existence of a long-run relationship and asymmetry between the variables. The post-estimation diagnostic checks further revealed that the estimated model was robust and free from specification errors. The findings showed that in both the short run and the long run, the effect of LMYS on inflation is asymmetric, as the impact of positive shocks differs from that of negative shocks. Specifically, positive shocks were found to be inflationary in both the short- and long-run periods, while negative shocks were

deflationary, with the latter exerting a stronger influence. This suggests that Nigeria's monetary policy, though fragile, remains effective; however, policymakers must exercise caution and be mindful of the divergent effects of LMYS on inflation resulting from asymmetry. Hence, in efforts to curb inflation through a reduction in money supply, excessive tightening could inadvertently lead to severe deflation.

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