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Inflation Dynamics in Nigeria: A Disaggregated Approach

Shehu Usman Adam[1], Sodiq Olaiwola Jimoh[2], Muktar Sabi Adamu[3], Yusuf Toyin Yusuf[4], Lukman Shehu Adam[5] & Abdul Muftah Shitu[6]
[1,2,3,4,5&6]Department of Economics and Development Studies, Kwara State University, Malete
Corresponding Email: sodiq.jimoh@kwasu.edu.ng

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Abstract

This study examines inflation dynamics in Nigeria using a disaggregated approach, focusing on key sectors such as food, energy, housing, water, health, and transport. Employing the Autoregressive Distributed Lag (ARDL) model, the study analyses the determinants of disaggregated inflation and the role of macroeconomic variables in shaping price movements. The findings reveal strong inflation inertia across sectors, with past inflation significantly influencing current price changes. In the food sector, the first lag of food price inflation exerts a dominant effect, while GDP growth negatively impacts food inflation in Nigeria. The energy, housing, and water sectors experience persistent inflationary pressures, but the effects diminish after four months, possibly due to government interventions. Similarly, the transport sector exhibits lagged inflationary effects, with money supply (GM2) and central bank independence (CBI_INDEX) playing crucial roles. The variance inflation factor (VIF) results suggest minimal multicollinearity, while heteroskedasticity tests indicate that inflation in the health and transport sectors is highly sensitive to economic shocks. These findings underscore the need for appropriate policies like enhancement of monetary policy transmission and stabilize food/oil markets while deregulating energy sectors and upgrading infrastructure. Prioritize healthcare supply chain improvements and transport fuel pricing reforms to address sectoral inflation.

Keywords: Disaggregated Approach, Dynamics, Inflation
JEL Classification Codes: C32, C31, E37

1. Introduction

One of the main issues being discussed globally daily is the fluctuations of prices of goods and services (Popkin, 2014). Firms' profit depends on price, real wages of workers depend on price, and the government needs to know the price because it determines the efficient allocation of resources in the system. Persistence increase in the general price level is what is referred to as inflation. The increment in the general price level is a significant concern for all economies. The role of price is one of the major reasons why the Central Banks of many countries choose price stability or reducing inflation as the most important among other objectives. In an attempt to achieve this objective, the developed countries target a 2-3 percent inflation rate because they have achieved a single-digit inflation rate over the years, which has strengthened the competitiveness of their local currencies globally. However, their major concern is disinflation, and the costs associated with it.

Contrary to this, most developing countries have witnessed a persistent increase in inflation immediately after the oil shocks of the 1970s (Adenekan, 1997). Most of these developing countries are still battling on how to reduce the inflation rate to a single digit. The emphasis given to price stability in the conduct of monetary policy is to promote economic development, growth and improve the competitiveness of local industries, among others (Stein, 2012). Hence, there is a need to understand the drivers of inflation.

Several researchers have examined the major determinants of inflation; prominent among them is Friedman (1971), who believes and argues that inflation is purely a monetary phenomenon and that inflation is mainly caused by a rapid increase in the growth rate of the money supply compared to output. Furthermore, some empirical studies also confirmed that the money supply plays significant role in the inflation rate in both developed and developing countries (Qayyum, 2006; Ratnasiri, 2009; Kabundi, 2012). Contrary to this, some studies also revealed that inflation is more influenced by technological/structural factors rather than monetary factors (Adenekan, 1997; Ayubu, 2013). However, the New Keynesian Philip Curve (NKPC) has been the main model that virtually all these studies used to explain inflation rate determinants.

Despite the extensive usage of the New Keynesian Philip curve in modeling inflation dynamics over the years, there are some controversies in the measurement, signs of the parameters, and

structure of the equation. Notable one among them is the use of the output gap as a proxy for marginal cost in the traditional Philip curve. In an attempt to address these shortcomings, Gali, Gertler, and Lopez-Salido (2001) used the share of labour to a gross domestic product as a proxy of marginal cost as against the ad hoc and conventional difference between output and its potential (output gap). Rudd and Whelan, (2007) and many other scholars opined that labours share to Gross Domestic Product (GDP) is not also a g proxy for average marginal cost. They conclude that the output gap explains inflation dynamics more than a share of labour to GDP. The backward and forward nature of inflation is another issue. It is now evident that inflation dynamics is also influenced by its inertia and expected values. The inclusion of previous values of inflation as a proxy of expected inflation has also generated the attention of scholars in recent times. Although, current inflation is assumed to be influenced by adaptive and rational expectation. Using the lag of inflation as a proxy of expected inflation will lead to the un-identifiability of the parameter associated with the expectations (Franses, 2018). All these played a major role in knowing the exact nature of countries' inflation dynamics and led to different shapes of Philip's curve from one country to another.

The shape of Philip's curve, the persistence of inflation, and the responsiveness of inflation to different shocks have been another main issue in inflation dynamics. Empirical studies have shown how inflation persistent rate by regressing inflation rate with it lags. The summation of the parameters of lags determines the level of persistence of inflation in that country or region. While summarizing the stylized facts of inflation dynamics, Mishkin (2007) identified what he noticed about inflation dynamics in recent times; that the inflation rate is less persistent, that the New Philip curve has flattened and that inflation does not respond to shocks in recent time. The degree of responsiveness of inflation to shocks varies from one country to another. The external shocks depend majorly on the degree of openness of a country to the rest of the world.

A few of the literature focuses on how aggregate inflation responds to shocks and how forecast can be made from aggregated inflation rate. Some studies go beyond these by using information from the disaggregated component of inflation to forecast. Although, theories are very clear that the forecast of sub-component outperforms the aggregated inflation forecast. However, there have been mixed

reactions in the empirical literature on this (Cevik &Teksoz (2013). Less emphasis has been placed on the prominent causes of the sub-component inflation rate and how each of the components reacts to shocks. Since different components of aggregate inflation have displayed different dynamics in Nigeria in recent times, there is a need for all economic agents to understand the key drivers of this occurrence in more detail. This study differs from previous studies by examining inflation dynamics using disaggregated data and how it is influenced by the degree of central bank independence.

Following the above introduction, the remainder of this paper is organized as follows. Section two reviews empirical literature, section three presents theoretical framework and methodology, section four discusses and interprets the data, while section five concludes the paper.

2. Empirical Literature

Several empirical studies have examined the determinants of inflation in various African countries using time series models. Adenekan (1997), using cointegration, ECM, and variance decomposition, analyzed inflation trends in Ghana, Nigeria, and Sierra Leone (1960–1995) and found that exchange rate and price fluctuations were significant contributors to inflation across the three countries. Similarly, Chipili (2022), through an ECM model, identified exchange rate volatility and imported inflation as long-run determinants of inflation in Zambia between 1994Q1 and 2019Q4, while domestic variables such as maize prices and energy costs influenced inflation in the short run. Both studies recommended improved exchange rate management and fiscal discipline to maintain price stability. In the same vein, Kavila (2015) found that expansionary monetary policy and exchange rate instability significantly explained Zimbabwe's hyperinflation (2006–2008) and subsequent dollarization period (2009–2012), suggesting the need for strict monetary controls and a stable exchange regime.

While the above studies emphasized external and monetary influences, others have identified structural and supply-side factors as key drivers of inflation. For instance, Harvey (2012) applied an SVAR model to Ghana's inflation and observed that structural shocks—such as those from supply and demand—had greater explanatory power than monetary influences. Ayubu (2013), using both SVAR and VECM approaches, similarly found that output fluctuations in

Tanzania (1993Q4–2011Q4) had more impact on inflation than changes in money supply. These findings point to the importance of addressing real-sector inefficiencies and production constraints as part of inflation control strategies.

In the Nigerian context, Akinbobola (2012) analyzed inflation from 1986 to 2008 using a VECM and reported that money supply and exchange rate had a negative effect on inflation, while output growth and foreign prices were positively associated with inflation. Correspondingly, the Central Bank of Nigeria (CBN, 2015) in its analysis of inflation (1982Q1–2012Q4), found that money supply growth remained a major determinant, though its effect weakened over time. Both studies called for better monetary policy coordination and diversification of the economy to reduce inflation volatility.

A number of studies extended their scope to include inflation's response to different types of shocks. Ali (2011), using a VAR model for Egypt (1980–2009), found that demand-pull, supply-side shocks, and inflation inertia were significant factors. Likewise, Paciello (2017), using Bayesian autoregressive models for the U.S. (1958–2007), revealed that inflation responds more rapidly to technological shocks than to monetary ones, indicating the importance of innovation in shaping inflation dynamics. Yu (2018) explored structural breaks in the money-inflation relationship in the UK using SQ and DQ tests, finding multiple shifts over time, and recommended models that accommodate regime changes. In a broader international context, Feldkircher and Siklos (2018) applied a GVAR model to inflation data from 2001 to 2016 and concluded that expected inflation and global oil prices were key predictors, both in the short and long run. Together, these studies suggest that inflation is influenced by a mixture of demand, supply, and global factors, and that adaptive models are necessary for accurate inflation forecasting.

Volatility in inflation has also been the subject of attention. Fasanya and Adekoya (2017), using a GARCH model, analyzed inflation volatility in Nigeria and found persistent and asymmetric responses to shocks. Supporting this, Nyoni and Nathaniel (2018) employed ARMA, ARIMA, and GARCH models for Nigeria (1960–2016) and projected an increase in inflation beyond 17% by 2021. Both studies recommended improved inflation targeting, forward-looking policies, and real-time inflation forecasting mechanisms to cushion against inflationary surprises.

Several other studies have emphasized the benefit of disaggregating inflation to better understand sector-specific dynamics. Kusuma (2013), using a FAVAR model for Indonesia (2002–2011), found that disaggregated inflation responded more flexibly to sectoral shocks. In a similar fashion, Adam, Kwimbere, Mbowe, and O'Connell (2016) focused on disaggregated inflation trends and emphasized the importance of analyzing component-level inflation to improve policy effectiveness. Likewise, Apaitan, Disyatat, and Manopimoke (2019) analyzed Thailand's inflation and found significant regional price variations, suggesting the need for decentralized inflation monitoring. Melolinna (2015) assessed inflation in the Eurozone, UK, and U.S., and concluded that demand shocks were the most significant drivers, reinforcing the importance of aggregate demand management in inflation control.

Further supporting the relevance of external shocks and global influences, Cevik and Teksoz (2013), in their study of Libya (1964–2010), used ECM to show that inflation inertia, money supply, exchange rates, and international sanctions all played significant roles. Finally, Silva (2024) examined inflation in Chile and the UK during the COVID-19 pandemic and demonstrated how production networks shape inflation's response to various shocks such as import prices, technological changes, and factor costs. These disaggregated studies collectively recommend sector-specific and regionally targeted policies to enhance the precision and effectiveness of inflation management strategies.

Despite the extensive research on inflation dynamics in Nigeria, a significant gap remains in the use of disaggregated data to analyse sector-specific inflation trends. Most existing studies rely on aggregate inflation measures like the Consumer Price Index (CPI) or GDP deflator, which provides a broad overview but fails to capture sectoral variations. Disaggregated data, which breaks down inflation into components such as food, housing, and transportation, offers a more detailed perspective on the relative contributions of different sectors to overall inflation. This approach can reveal key drivers of inflation, including supply-side shocks, demand pressures, imported inflation, and exchange rate fluctuations, which are often obscured in aggregate analyses.

Additionally, analysing inflation at a detailed level can enhance policy effectiveness by addressing the heterogeneous impact of inflation across different income groups and economic sectors.

Low-income households may be more vulnerable to rising food prices, while middle-income groups may be more affected by housing costs. Understanding these distributional effects is crucial for designing targeted interventions, social safety nets, and monetary policies. Moreover, examining price stickiness and wage rigidities across sectors can provide insights into how inflationary shocks propagate and how different industries respond to monetary policy changes. However, challenges related to data availability, quality, and consistency hinder progress in this area.

3. Methodology

3.1 Data and Sources

The study uses monthly time series data from 1995 to 2022, based on the 2009 base year for disaggregated CPI micro data. Variables include headline, core, and non-core inflation, grouped from CPI components. Additional data—such as GDP growth, exchange rate, crude oil prices, and consumer expectations—were sourced from the Central Bank of Nigeria and the World Bank. Central bank independence is included as a control variable. The output gap is estimated using the HP filter following (Cevik & Teksoz, 2013).

3.2 Specification of the Model

As a common practice, the level of inflation is often modeled as a function of the deviation of inflation inertia, output from its potential (output gap), and supply shocks, as suggested by the New-Keynesian Philip's curve and stated in equation (3.10). This study follow with modifications the models of Cevik and Teksoz (2013) and Kusuma (2013), by disaggregating the dynamics of the inflation rate in Nigeria. Thus flowing from equation 3.10 above, we transform the model by introducing the error term and the subscript for time series as;

$$\pi_t = \pi_{t-1} + \gamma(Y - Y^p) + \rho_t + \varepsilon_t \quad \text{---------- (1)}$$

The variable ε_t in equation (1), implies the error term. It is introduced to take care of other factors that determine inflation but cannot be capture by the present study. In line with the above, the hybrid model of the level of inflation can now be formulated as follows:

$$\pi_t = \beta_0 + \beta_1\pi_{t-1} + \beta_3\gamma(Y - Y^p) + \beta_4\rho_t + \varepsilon_t \quad \text{----------(2)}$$

Where π_t and π_{t-1}respectively implies the inflation rate and inflation expectations that proxies the lagged inflation (that is, agents

tend to formulate their expectations in a backward-looking manner), $(Y - Y^p)$ is the output gap (measured as the deviation of output from its potential level), and ρ is the supply shock term. Also, due to the important roles of money supply, crude oil and exchange rate in Nigeria economy and in line with previous empirical studies (see Kusuma, 2013 and Cevik and Teksoz, 2013), the lag of money supply, crude oil prices and exchange rate are also included in the model as stated below:

$$\pi_t = \beta_0 + \beta_1\pi_{t-1} + \beta_2\gamma(Y - Y^p) + \beta_3 M_{t-1} + \beta_4 Excrat_t + \beta_5 oilp_t + \beta_5 C_t + \varepsilon_t ----------(3)$$

Where $\pi_t$is the inflation rate, π_{t-1} is inflation inertia, $M_{t-1}$is lag money supply or money supply growth; excrat is the exchange rate and $oilp$ is the monthly world crude oil prices for Nigeria, C_t represents the control variables such as central bank independence (CBI), purchasing power parity(PPP), and $\beta_1 --- \beta_5$ are the parameters. Equation (3) is also transformed by replacingπ_t, π_{t-1}, and $Y - Y^p$ with Inflation (Inf), Consumer expectation survey (Ces), and output gap (gap) respectively.

$$Inf_{jt} = \beta_0 + \beta_1 Ces_t + \beta_2\gamma(gap) + \beta_3 M_{t-1} + \beta_4 Excrat_t + \beta_5 oilp_t + \beta_5 C_t + \varepsilon_t ----------(4)$$

Equation (4) therefore form the baseline estimation model to achieve the objective of the study. Inf_{jt}represents disaggregated inflation at food, energy, housing, water, health, and transport sectors at time t. Consumer expectation survey is proxied for lag inflation in this study is to account for adaptive expectations of consumers in Nigeria. This has not been used by any previous literature reviewed. Variables such as lagged inflation proxied by consumer expectation survey, money supply growth and world crude oil prices are expected to have positive relationship with inflation while the a priori expectations for output gap and exchange rate is expected to be negative. However, in a disaggregated approach, each of the components of inflation is regressed on the independent variables of equation 4.

4. Results and Discussion

Table 1: **Descriptive Statistics**

Var	M	Mdn	Max	Min	SD	Skew.	Kurt.	Jarque-Bera	*n*
Food	142.7	89.63	538.47	19.8	136.81	1.42	4.22	11.17	28
Energy	129.34	92.65	389.12	9.43	110.44	0.83	2.56	3.43	28
Health	126.63	95.45	354.37	32.93	84.51	1.16	3.48	6.5	28
Transport	127.65	91.68	400.03	18.55	104.24	1.06	3.21	5.28	28
CES	33.12	33.18	40.67	27.88	2.61	0.57	4.87	5.6	28
GDPG	0	-416.78	5897.69	-4233.1	3061.87	0.37	1.95	1.93	28
GMS	1.68	1.55	4.53	0.13	1.1	1.23	4.17	8.61	28
Exc. Rate	169.89	140.88	425.98	21.88	111.31	0.81	2.89	3.06	28
Oil Price	57.77	53.74	113.76	13.06	32.93	0.34	1.87	2.03	28
CBI Index	0.59	0.6	0.6	0.57	0.02	-0.6	1.56	4.09	28

Source: Authors Computation, 2025

Table 1 shows the result of the summary descriptive statistics of this study. The result shows that on the average the indicators of inflation such as food prices and energy prices recorded higher mean values of 142.703 and 129.338, when compared with other indicators like health (126.627) and transportation sector prices (127.645). This indicates that on the average, food and energy sector prices highly influence inflation dynamics in Nigeria and as such they are assumed to be volatile and very sensitive to various economic shocks. Also, the consumer expectation survey (CES) has the mean value of 58.115, which indicates that the consumer expectations on inflation dynamics are so high that it may affect the economic growth of Nigeria. GDP growth rate (GDPG) on the other hand, has the mean value of 0.0000 suggesting stagnated average economic growth rate in Nigeria. This is also evidence by the GDP growth's negative median value of -416.778. The central bank independence index (CBI_INDEX) recorded the average mean value of 0.591 suggesting that, on the average the central bank of Nigeria may not fully be independent of its activities, but relatively has a stable institutional framework for monetary policy, which could have an effect to inflationary pressures.

Examining the range from the results in Table 1 food and energy prices recorded the minimum and maximum values of (19.804 to 538.473) and (9.425 TO 389.124) respectively, suggesting a reflection of shocks or volatility. Also, oilprice and exchrat exhibit a significant variation, signifying that they both play significant role in inflation dynamics. However, GDPG with the maximum value of 5897.686 and minimum value score of 4233.108 indicates the presences of an outlier economic situation that may be witnessed by

events such as booms or recession in Nigeria. Large price fluctuations or variation measured by the standard deviation was found on food (136.806) and energy (110.436) as well as extreme high deviation in GDPG, while low variation was found with the cbi_index signifying that Nigeria's CB relative remains stable.

The normality test using the Jarque-Bera test indicates that almost all the variables are normally distributed. All variables except CBI_INDEX exhibits positive skewness indicating that their distributions have a long right tail and that price hikes are common in Nigeria. Similarly, the kurtosis values > 3 for food (4.223), health (3.481), GM2 (4.172), and CES (4.872) implies fat-tailed distributions, suggesting the presence of extreme outliers and could be due to extreme prices of goods and services, or money supply growth. The implication of this finding is that components like food and energy prices, alongside external factors like exchange rate and oil price shocks play significant role in driving inflation dynamics in Nigeria. While stable factors like the cbi_index could moderate inflation dynamics but may not mitigate the volatility observed in other variables of this study.

Table 2: **Unit Root Test Result**

Variable	Level Test	P-values	First Difference Test	P-values	Order
Food	8.02	1.00	-5.42	0.00	I(1)
Energy	1.83	1.00	-6.56	0.00	I(I)
Health	5.33	1.00	-23.16	0.00	I(1)
Transport	7.80	1.00	-3.83	0.00	I(1)
CES	-4.30	0.00	-	-	I(0)
GDP growth	1.30	0.89	-18.27	0.00	I(1)
Money supply	-22.84	0.00	-	-	I(0)
Exchange rate	-1.28	0.89	-3.73	0.02	I(1)
Oil price	-2.74	0.22	-18.81	0.00	I(1)
CBI index	-2.03	0.58	-18.21	0.00	I(1)

Source: Authors computation

Employing the Augmented Dickey-Fuller test statistics (ADF), the table 2 indicates the result of unit root test conducted in this study. It is used to determine the stationarity of the variables used. The result shows that variables such as, ENERGY, CES and Gm2 were stationary at level suggesting that the variables are integrated at level making them I(0) series. On the other hand, variables such as

food, health, transport, gdpg, exchrat, oilprice and cbi_index, are all integrated and stationary after the first difference suggesting that they are I(1) series. The implication of this is that the variables have shown some dynamics, meaning that they could have long run effect and as such, the use of OLS may not be the appropriate technique to be employed in this study but rather the use of other instrumental variable techniques. Based on this outcome, this study further examined other techniques like the cointegration test, long run bound testing, short-run ARDL test and so on.

Also, to observe the fluctuations and stationarity of the variables, a trend analysis using graphs was conducted and shown in the appendix 1 below. The results of the graphs as represented, indicate that variables like food, energy, health, transport, and so on fluctuates around their means for the period considered. The most volatile among them is the GDPP which fluctuates up to the peak implying that when the prices of goods are low, there will be high output per head thereby boosting the economy. However, CES and GM2 show rather a stable non-volatile movement, indicating that low expectations among consumers about the price change may lead to low inflation in the food, energy, health and transport sectors in Nigeria.

Table 3: Pairwise Correlation Analysis

Variable	1	2	3	4	5	6	7	8	9	10
Food	1.000									
Energy	0.980***	1.000								
Health	0.996***	0.992***	1.000							
Transport	0.993***	0.996***	0.999***	1.000						
CES	-0.210	-0.211	-0.202	-0.206	1.000					
GDP growth	-0.197	-0.101	-0.157	-0.142	0.284	1.000				
Money supply	-0.293	-0.327	-0.310	-0.307	0.030	-0.457*	1.000			
Exchange rate	0.958***	0.970***	0.966***	0.969***	-0.228	-0.289	-0.251	1.000		
Oil price	0.434*	0.502**	0.470**	0.487**	-0.066	0.266	-0.120	0.416*	1.000	
CBI index	0.596***	0.668***	0.628***	0.648***	-0.100	0.443*	-0.357	0.522**	0.651***	1.000

Source: Authors Computations

In assessing the collinearity among the variables used in this study, a correlation coefficient or covariance test was conducted as shown in the table 3 above. It shows the presence of both positive and negative relationship among the variables. Variables such as ENRGY, HEALTH, TRANSPORT, and EXCHRAT has positive, significant and high correlation, suggesting that an increase in the prices of these variables, will increase the level of inflation dynamics in Nigeria accruing from price shocks.

On the other hand, CES, GDPG, GM2 all shown negative relationship between them and other components of inflation, suggesting that high price shocks may reduce consumers' expectations towards the demand for goods and services. Similarly, price volatility caused by inflation dynamics could reduce the output level of Nigeria and as such it will reduce the economic growth rate of the country. Similarly, independence of central bank (CBI_INDEX) plays a significant role in stability of an economy, the result suggests that high price volatility may be caused by inadequate policy adopted by the monetary authority. This relationship therefore indicates the need to further test the level of the colinearities and their variations. Thus, to further test for long run relationship, the Autoregressive Distributive lag (ARDL) test was conducted as presented as analysed below.

Table 4: Bounds Test for Cointegration Result

Variable	F-Statistic	I(0) Bound (10%)	I(1) Bound (10%)	I(0) Bound (5%)	I(1) Bound (5%)	I(0) Bound (2.5%)	I(1) Bound (2.5%)	I(0) Bound (1%)	I(1) Bound (1%)
Food	1.63	2.53	3.59	2.87	4.00	3.19	4.38	3.60	4.90
Energy	2.07	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43
Health	1.89	2.53	3.59	2.87	4.00	3.19	4.38	3.60	4.90
Transport	0.23	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43

Source: Authors' Computation 2025

Table 4 shows the results of ARDL Bounds test for all the components of inflation. It id used to detect the existence of long-run relationship among the variables of the model. From the result, the F-statistics for food inflation has the value of 1.633875, while the critical bounds for each significance level shows 2.53, 2.87,3.19, 3.6 for I(0) and 3.59, 4, 4.38, and 4.9 for I(1) series. The decision rule here is that if the F-statistics is greater than the I(1) bound, there is evidence of a long-run relationship, and that there is no evidence of long-run relationship if the F-statistics is below the I(0) bound among the variables of the model. Thus, the outcome from food inflation could mean no evidence of long run relation and that inflation in Nigeria is driven more by short-term fluctuations rather than long-term equilibrating forces. These may include factors like external shocks (e.g., fluctuations in global oil prices, exchange rate instability, and food supply disruptions) as well as monetary and fiscal imbalances. Thus, the results of the food inflation suggest that structural weakness

of the Nigerian monetary system may not converge to long-term stability but rather fluctuates around a short term causality.

Similarly, the energy, housing and water sectors inflation shows that the F-statistic (2.07175) is lower than the I(0) bound at all significance levels, and as such the result fails to reject the null hypothesis. It therefore implies that there is no long-run relationship between the Energy_Housing_Water sector inflation and other explanatory variables, suggesting that inflation dynamics in the energy sector might be driven by short-term rather than long-term macroeconomic relationships. Also, the result of the ARDL Bound test for the inflation dynamics of the health sector in Nigeria indicates that the F-statistic (1.8904) is lower than the I(0) bound (2.53 at 10%), thus the null hypothesis of no long-run relationship is rejected. This suggest that the health inflation is influenced by short term dynamics meaning that there is no strong evidence of cointegration between Health sector inflation and other explanatory variables in Nigeria.

On the other hand, the transport sector inflation indicates that the F-statistic (0.2262) is far below the I(0) bound (2.12) at the different significance level, implying the we fail to reject the null hypothesis of no long-run relationship. This means that the transport sector inflation in Nigeria shows no strong evidence of cointegration with its explanatory variables and as such, the sector's inflation is assumed to be influenced by short term factors instead of long-term macro-policy changes. This could possibly be due to government policy or seasonal change in Nigeria.

Table 5: ARDL Result for Disaggregated Approach to Food Inflation

Variable	Coefficient	SE	T	p-value	VIF
ΔFood(-1)	0.521***	0.056	9.32	0.000	3.972
ΔFood(-4)	0.117*	0.056	2.09	0.037	3.636
CES	-0.024	0.019	-1.23	0.219	1.055
ΔGDP growth(-2)	-0.000†	0.000	-1.78	0.076	1.015
ΔGDP growth(-4)	-0.000*	0.000	-2.48	0.014	1.047
Money supply	-0.004	0.015	-0.28	0.781	1.137
Money supply(-1)	0.046**	0.015	3.09	0.002	1.117
ΔExchange rate	0.000	0.011	0.04	0.966	1.566
ΔOil price	0.007	0.012	0.59	0.559	1.176
ΔOil price(-1)	0.025*	0.012	2.04	0.042	1.174
ΔCBI index	-20.183	34.526	-0.58	0.559	1.126
ΔCBI index(-1)	104.559**	34.573	3.02	0.003	1.129
Constant	0.346	0.662	0.52	0.601	-
Trend	0.004***	0.001	3.84	0.000	2.239

Explanatory Notes: N = 28. CES = Consumer Expectations Survey; CBI = Central Bank Independence; t= t-test statistics; SE= Standard error; VIF = Variance Inflating Factor. Δ indicates first differences. Model fit: $R^2 = 0.761$, Adjusted $R^2 = 0.746$, $F(20, 310) = 51.99$, $p = 0.000$, DW = 2.026.†$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
Source: Authors' Computation, 2025

Employing the disaggregated approach to inflation dynamics, the result of table 5 above represents the ARDL model with (D(FOOD)) as the dependent variable, which is one of the critical components of inflation dynamics in Nigeria. The result shows that capturing the persistence of food price inflation over time, the first lag of food inflation has a positive and significant coefficient (0.521059, $p = 0.0000$), suggesting a strong inertia in food price inflation. That is food price changes in the previous month significantly influence current food price changes in Nigeria. It was also found that changes in food price inflation and GDP for the past four months (d(food(−4))d(food(-4)) significantly affects current inflation but with a weaker effect compared to d(food(−1))d(food(-1)). However, the GDPG showed negative and significant impact on food price inflation, reflecting some delayed adjustments in food supply or demand due to international activity. Other variables like GM2 oilprice were found to be significant while CES, CBII, and Exchange rate were not.

This suggests that an increased independence might reflect a stabilization method of monetary policy, but the effect could reflect short-term adjustment costs or policy changes that indirectly influence food prices more by supply-side factors (e.g., oil prices, structural inefficiencies) and monetary factors (e.g., money supply). The R-squared value of 0.761120 indicates that about 76% of the variation in food prices inflation is explained by the model, while the Durbin-watson shows no major presence of autocorrelation in the residuals.

Table 7: ARDL Result for Disaggregated Energy Inflation

Variable	Coeff.	SE	T	p-value	VIF
ENERGY_HOUSING_WATER(-1)	1.128***	0.056	20.23	0.000	4475.518
ENERGY_HOUSING_WATER(-4)	-0.298***	0.080	-3.73	0.000	8735.248
ENERGY_HOUSING_WATER(-4)	-0.298***	0.080	-3.73	0.000	8735.248
D(CES)	0.017	0.044	0.38	0.705	1.096
D(GDPG)	0.000	0.000	0.72	0.469	1.492
D(GDPG(-1))	-0.001**	0.000	-2.70	0.007	1.075
GM2	0.035†	0.020	1.75	0.081	1.118
GM2(-4)	0.056**	0.020	2.83	0.005	1.159
D(EXCHRAT)	0.012	0.015	0.84	0.399	1.543
D(OILPRICE)	0.002	0.016	0.15	0.878	1.134
D(OILPRICE(-1))	0.029†	0.016	1.84	0.067	1.128
D(CBI_INDEX)	6.686	45.720	0.15	0.884	1.133
D(CBI_INDEX(-1))	-48.511	45.064	-1.08	0.283	1.101
D(CBI_INDEX(-2))	102.797*	45.051	2.28	0.023	1.098
C	-0.037	0.268	-0.14	0.89	-
@TREND	0.001	0.003	0.20	0.843	2.585

Explanatory Notes. CES = Consumer Expectations Survey; CBI = Central Bank Independence t= t-test statistics; SE= Standard error; VIF = Variance Inflating Factor. Model fit: $R^2 = 1.000$, Adjusted $R^2 = 1.000$, $F(21, 308) = 69661.07$, $p = 0.000$, DW = 2.00. †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. VIF values < 10 indicate acceptable multicollinearity.
Source: Authors' Computation 2025

The result of the ARDL test shows the inflation dynamics in the energy, housing, and water sector of the Nigerian economy. The result indicates that the energy, housing, and water sectors' short-run impacts are explained by the first differences (D) of each of the variables. The monthly lagged effects of Energy_Housing_Water(-1): 1.1284 (p = 0.0000) and Energy_Housing_Water (-4) (-0.2985, p = 0.0002) implies that past inflation drives current inflation in the sector, which means that the sector is affected by a highly persistent inflation stream as experienced in the present state of Nigeria. However, inflationary pressures in the sector may be subside after four months possibly through government intervention. Changes in consumers' expectations on the other hand, shows no significant impact on the sector in the short run, suggesting that the dynamics in the sector is adaptive to the citizens of Nigeria. The GDP growth rate indicates a reduction in inflation only after the first lag D(GDPG(-1)) = -0.0006 (p = 0.0073), which implies that at the initial period an improved economic policy could boost the economy and thereby reduces

inflation. Similarly, money growth rate may lead to inflation in the energy sector only at lag four GM2(-4) = 0.0559 (p = 0.0049).

This is in line with the Irvin Fisher theory of money that says, "money supply is positively affected by the price level". It suggests that higher money supply will lead to higher prices of goods and services in the economy. on the aspect of exchange rate (EXCHRAT), oil prices (OILPRICE), and central bank independence (CBI_INDEX), there exist mixed results. D(EXCHRAT) = 0.0124 (p = 0.3989) for example was found not to have a significant impact in inflation dynamics of the energy sector in Nigeria. However, D(OILPRICE(-1)) = 0.0288 (p = 0.0674) has lagged effect suggesting that oil price change could only impact on the inflation of the energy sector only after a period of time. While D(CBI_INDEX(-2)) = 102.7972 (p = 0.0232) indicates that central bank of Nigeria's independence and credibility can impact on inflation of the sector only after a certain period of time. The result of the R^2 (0.9998) attest to these variation while the Durbin Watson opines that there is no autocorrelation in the relationship. The variance inflation factor (VIF) shows the presence of severe multicollinearity among lagged inflation variables (EHW(-1) to EHW(-5)) of the energy sector. This implies that past inflation persistently influences the current inflation in the Nigeria's energy sector. However, no significant multicollinearity among other macroeconomic variables (CES, GDPG, GM2, exchange rate, oil price, and CBI index) was found, suggesting that the variables can independently explain inflation dynamics without redundancy in Nigeria.

Table 8: ARDL Result for Disaggregated Health Inflation

Variable	Coefficient	SE	t	p-value	VIF
HEALTH(-1)	0.676***	0.056	12.16	0.000	1028.237
HEALTH(-2)	0.283***	0.067	4.22	0.000	1456.569
HEALTH(-5)	-0.134*	0.066	-2.03	0.044	1316.754
HEALTH(-6)	0.174**	0.057	3.07	0.002	949.295
CES	0.028	0.040	0.71	0.478	1.059
D(GDPG)	0.000	0.000	0.42	0.677	1.480
GM2	-0.002	0.030	-0.08	0.935	1.072
GM2(-1)	-0.040	0.031	-1.28	0.201	1.138
GM2(-2)	-0.067*	0.032	-2.11	0.036	1.164
GM2(-3)	-0.077*	0.032	-2.43	0.015	1.160
GM2(-4)	0.046	0.032	1.44	0.151	1.193
GM2(-5)	0.031	0.032	0.98	0.328	1.190
GM2(-6)	0.126***	0.032	3.99	0.000	1.198
GM2(-7)	0.076*	0.031	2.45	0.015	1.172

D(EXCHRAT)	0.001	0.023	0.06	0.952	1.533
D(OILPRICE)	0.005	0.024	0.21	0.836	1.042
D(CBI_INDEX)	-40.531	73.713	-0.55	0.583	1.191
C	-1.602	1.419	-1.13	0.260	-
@TREND	-0.011**	0.004	-2.67	0.008	7.980

Explanatory Notes: CES = Consumer Expectations Survey; CBI = Central Bank Independence. t= t-test statistics; SE= Standard error; Model fit: $R^2 = 0.999$, Adjusted $R^2 = 0.999$, $F(21, 307) = 17045.71$, $p = 0.000$, DW = 2.005. *p < 0.05, **p < 0.01, ***p < 0.001. VIF values shown are variance inflation factors.
Source: Authors' Computation 2025

According to Table 8, the health sector inflation in Nigeria has a highly persistent effect for all the lags. The result shows that past inflation in Nigeria affects the health sector performance, suggesting that if prices of goods and services increase, they tend be remain stagnant over an extended period. The macroeconomic effect of the health sector inflation indicates that GDP growth rate, and money supply growth (GM2) significant impact on the health sector inflation, indicating that economic growth and money supply growth could reduce the health sector inflation of Nigeria. However, explanatory variables like CES, EXCHRAT, OILPRICE and CBI_INDEX were found not to be significant and such do not directly impact health sector inflation in Nigeria possibly due to supply cost of the health sector equipment or price control.

The VIF result in table 8 which test the presence of multicolinearity (Centered VIF 949 - 1,478) has shown the presence of severe multicolinearity in the lagged inflation term of the health sector in Nigeria. This means that health sector inflation past errors influences the present inflation of the sector. However, variables such as CES, GDPG, GM2, Exchange Rate, Oil Price, CBI_Index shows no multicolinearity, meaning that errors in the health sector inflation does not have any influence on these variables in Nigeria.

Table 9: ARDL Result for Disaggregated Transport Inflation

Variable	Coefficient	SE	t	p-value	VIF
TRANSPORT(-1)	0.879***	0.055	15.97	0.000	3620.213
TRANSPORT(-2)	0.142*	0.056	2.54	0.012	6236.634
GM2	-0.038†	0.020	-1.90	0.058	1.070
D(CBI_INDEX)	96.274*	47.148	2.04	0.042	1.101
D(CBI_INDEX(-2))	-142.603**	45.056	-3.17	0.002	1.033
C	0.348	0.900	0.39	0.700	-
@TREND	-0.009**	0.003	-3.09	0.002	7.980

Explanatory Notes: CES = Consumer Expectations Survey; CBI = Central Bank Independence. t= t-test statistics; SE= Standard error; Model fit: $R^2 = 0.9997$, Adjusted $R^2 = 0.9997$, F(11, 320) = 108869.4, p 0.000, DW = 2.041. †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. VIF values shown are centered variance inflation factors.
Source: Authors' Computation 2025

In assessing the short-run fluctuations of the transport sector using the ARDL model, the result found a persistent lagged effect of the transport sector inflation with TRANSPORT(-1) = 0.8786 (p = 0.0000) and TRANSPORT(-2) = 0.1423 (p = 0.0117). This means that past transport inflation influences the current transport inflation, suggesting that increased prices of transport in Nigeria may remain high for an extended period of time. The macroeconomic effect of the transport sector inflation in the short-run indicates that GM2 and CBI_INDEX significantly influence the transport sector inflation. This is supported by the monetary policy rule that money supply is determine by the price level. Other explanatory variables of the model were found to have insignificant short-term relationship with transport inflation in Nigeria, meaning that the transport sector inflation tends to decrease, possibly due to improvements in infrastructure, better logistics, and increased competition in the transport sector.

The VIF result in Table 9 shows that presence of severe multicollinearity in the transport sector inflation, meaning that past inflation error in the Nigeria's transport sector influences the current errors. This implies that a change in the current price of the transport sector may be influenced by the past prices of the sector in Nigeria. However, no multicolinearity has been found between the inflation of the transport sector and other explanatory variables, meaning that variation in the sector does not significantly impact on the explanatory variables.

4.1 Discussion of Findings

While the table's results contradict Friedman's monetary hypothesis because the money supply's contemporaneous effect is negligible, they do show significant lagged inflation effects for food (ΔFood(-1), money supply (Money supply(-1)), and oil prices (ΔOil price(-1)), which are consistent with studies like Chipili (2022) : Feldkircher and Siklos (2018). Although the modest CES and exchange rate effects diverge from Adenekan (1997) and Akinbobola (2012), the negative impact of ΔGDP growth (-4) and the trend

variable's significance imply structural implications, corroborating Harvey (2012) and Ayubu (2013).

The empirical results show subtleties unique to Nigeria, although they generally concur with the literature on disaggregated inflation. The extreme persistence (ENERGY_HOUSING_WATER(-1) coefficient of 1.128) surpasses normal findings, indicating unique structural rigidities in Nigeria's energy sector, even if previous studies such as Chipili (2022) and Cevik and Teksoz (2013) identified energy costs as key inflation drivers. The findings confirm Harvey's (2012) structuralist perspective and defy Friedman's monetary hypothesis by demonstrating only lagged money supply impacts (GM2(-4)). However, the delayed GDP growth impact (D(GDPG(-1))) suggests weak demand-side transmission, which was not entirely expected. In contrast to Adenekan (1997) findings, the negligible contemporaneous exchange rate effect is probably a result of Nigeria's controlled energy pricing system, which mitigates instant pass-through.

The results show that health sector inflation (HEALTH(-1) and HEALTH(-2)) is persistent, which is consistent with research that emphasizes sector-specific inflation inertia, such as Cevik and Teksoz (2013). A subtlety not adequately conveyed in earlier research, the negative coefficients at longer lags (HEALTH(-5)) imply self-correcting mechanisms over time. Harvey (2012) theory of complex monetary transmission in developing economies is supported by the money supply (GM2), which defies Friedman's monetary hypothesis by exhibiting mixed lagged effects, which are positive at longer lags and negative at shorter ones (GM2(-6)). Adenekan (1997) conclusions are contradicted by the negligible effects of oil prices and exchange rates, which most likely reflect the particular dynamics of Nigeria's health sector.

Although the money supply (GM2) only marginally significantly differs from Friedman's monetary hypothesis, the results on transport inflation demonstrate considerable persistence which is consistent with Cevik and Teksoz (2013) findings on sectoral inflation inertia. Feldkircher and Siklos' (2018) theory of complex policy transmission is supported by the notable but opposing effects of central bank independence (CBI_INDEX) at various lags, which run counter to more straightforward monetary explanations. These trends, which produce delayed adjustments that are different from those in other sectors, are caused by traits of the transportation industry, such as controlled rates and the stickiness of fuel prices.

5. Conclusion and Recommendations

This study examines inflation dynamics in Nigeria using a disaggregated approach, focusing on key economic sectors such as food, energy, housing, water, health, and transport. The results indicate that inflation in these sectors exhibits significant persistence, with past inflation playing a crucial role in shaping current price movements. The findings show that structural issues, not monetary forces, are the main drivers of inflation in Nigeria. Due to storage constraints and bottlenecks in the agricultural supply chain, food prices exhibit considerable persistence, whereas the effects of oil prices manifest later because of import dependence and delayed exchange rate pass-through.

Weak transmission channels in the financial system are reflected in the delayed impact of monetary policy on inflation. The economy's structural rigidities are highlighted by the delayed response to GDP growth and the limited impact of consumer subsidies, which point to inadequate price controls. These results highlight how institutional inefficiencies and supply-side constraints influence inflation dynamics more so than traditional monetary or demand-side considerations.

The observed patterns stem from Nigeria's distinct economic architecture. The energy/housing inflation persistence reflects chronic underinvestment in infrastructure and price controls that create artificial shortages. The monetary policy lags suggest financial market imperfections that delay transmission, while the muted exchange rate response indicates import substitution in energy remains inadequate. The significant but delayed oil price effect (D(OILPRICE(-1))) reveals Nigeria's paradoxical position as both oil producer and fuel importer. These findings collectively highlight how institutional constraints and sector-specific bottlenecks distort conventional inflation pathways in developing economies.

The findings come from Nigeria's hybrid health system, which combines public and commercial delivery and has lags in price changes because of supply chain rigidities and administrative constraints. The health sector's dependence on imported medications with variable prices is reflected in the delayed monetary policy effects. Perhaps as a result of healthcare reforms, the negative trend coefficient indicates increasing efficiency over time. In line with Kusuma's (2013) emphasis on sector-specific analysis, these patterns

demonstrate how structural reasons rather than traditional macroeconomic variables drive Nigeria's health inflation.

The findings support Harvey's (2012) focus on sector-specific shocks by indicating that structural factors, rather than traditional monetary variables, are more responsible for Nigeria's transport inflation. Echoing Paciello's (2017) findings on technology-driven inflation adjustments, the negative trend coefficient suggests increasing efficiency over time, maybe as a result of ride-hailing services or infrastructure improvements. In contrast to Adenekan (1997), exchange rate effects are absent, which probably reflects buffers for fuel subsidies in transportation costs.

i. Policymakers should therefore give top priority to improving the transmission of monetary policy, stabilizing food supply chains, and reducing the volatility of oil prices while resolving structural inefficiencies to lessen the persistence of inflation.

ii. The following structural realities should also be addressed. First, in order to lessen price stickiness, progressive deregulation and infrastructural improvements should be given top priority in energy sector changes. Second, the reaction function of monetary policy should include larger transmission lags. Third, to lessen inflationary shocks from changes in energy prices, tailored social protection is required.

iii. Reforms in the health sector should take precedence over general financial measures in policy consequences through improvements in the pharmaceutical supply chain which may lessen the durability of inflation and through sector's delayed reaction to changes in liquidity.

iv. Reforms to the transportation sector, such as frameworks for gasoline pricing and competition laws, should take precedence over general monetary measures in policy consequences. While the substantial inertia calls for focused price stability methods, the CBI's mixed results indicate that central bank policies need to be calibrated sector-specifically.

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