

INFLATION DYNAMICS IN NIGERIA

ABSTRACT

Inflation remains a central issue to policy makers and analysts. High inflation induces uncertainty, adversely affects financial sector development and it is the goal of monetary authorities to achieve price stability in consonance with the general consensus that price stability aids growth of the economy. Despite the goal of single-digit inflation rate by monetary authority (CBN), the Nigerian economy is still practically characterized by high cost of living, increased variability of relative prices of goods and services; therefore the reliability of the monetary aggregates as the main signal for the conduct of monetary policy for control of inflation has become increasingly questionable. Against this backdrop, this research examined the determinants of dynamics of inflation in Nigeria over a period of 36 years (1982-2016); using New Keynesian Philips Curve theoretical framework, Ordinary Least Square estimation techniques (OLS), ARDL bounds testing approach to cointegration and Vector Autoregressive (VAR) econometric techniques to ascertain if inflation is only a monetary phenomenon in Nigeria having inflation as dependent variable and exchange rate (Ex), interest rate (Ir), Unemployment (U), Real Gross Domestic Product (RGDP) as independent variable. The result of the estimation shows that inflation is not only a monetary phenomenon by the statistical significance of EX and RGDP at short and long-run, U and IR at long-run. Therefore, it was thus recommended that exchange rate and inflation targeting monetary policy framework that will revalue the naira should be implemented to reduce inflation while expansionary fiscal policy that will increase RGDP is also recommended for reduction of inflation.

Keywords: Inflation, Exchange rate, Unemployment and Real Gross Domestic Product.

SECTION ONE

1.0 INTRODUCTION

Inflation remains a central issue to policy makers and analysts. Its importance is premised on the distortions that high inflation rate can exert on domestic macroeconomic conditions with the potential to derail the economy from the path of sustainable economic growth and development. For a developing economy like Nigeria, which is characterized by significant structural imbalances and uncertainties, an insight into the dynamics of inflation is very pertinent and specifying the major determining factors to the changes in the level of prices over time cannot be overemphasized.

Anyanwu (1993) opined that Nigeria started to experience high inflationary trend as a result of government policies to stimulate a fast rate of economic growth or labor productivity and development. In spite of this, continued depreciation of the Naira has continued to aggravate the inflationary situation in the country. The sole dependency of import whose cost has risen as a result of devaluation of Nigerian domestic currency has encouraged local scarcity and high price of goods and services thereby negating the country's policy to achieve economic stability specifically price stability.

The objective of economic stabilization inclusively price control led the researcher to the specification of the statement of problem for this study in order to properly guide the researcher to producing a consistent and unbiased result that will be of importance to policy makers and other relevant agencies in Nigerian economy. Therefore the study examined the dynamics of inflation in Nigeria with a view of establishing determinant factors that can cause inflation dynamics or changes which will help in price stabilization.

1.2 STATEMENT OF PROBLEM

The inflationary forces that led to the collapse of the Bretton Woods system in the 1960s and 1970s greatly refocused the monetary policy from its primary function of providing finance for government, stabilizing the financial system to the stabilization of price and currency. Therefore the Central Bank of Nigeria (CBN) 2007 Act requires the bank to achieve monetary and price stability objective in consonance with the general consensus that price stability (low and stable inflation) aids growth of the economy. Prior to this mandate, the Central Bank of Nigeria in 2014 campaigned for a single-digit inflation rate between six percent (6%) and nine percent (9%). But despite the reflection of single-digit goal achieved in 2014 (9.3 percent) inflation rate via monetary policy, inflation still remains a major threat to the Nigerian economy thereby causing high cost of living, increased variability of relative prices of goods and services.

Friedman (1963) argued that "inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output".

Extensive research to address inflationary problem in Nigeria by investigating its main determinants were conducted with varying results, depending on the methodology applied and objectives set to achieve, among others. Mordi, C. N. O., E. A. Essien, A. O. Adenuga, P. N. Omanukwue, M. C. Ononugbo, A. A. Oguntade, M. O. Abeng, O. M., & Ajao (2007), in their study on the dynamics of inflation used autoregressive integrated moving average (ARIMA), popularly known as the Box- Jenkins methodology considering consumer price index as a measure of inflation. Gujarati and Dawn (2009) stated that the concept of autoregressive integrated moving average is a theoretic model because they are not derived from any economic theory. Thus, this study added to the body of empirical literature by varying on the

methodology adopted by Mordi et al.(2007), thereby used the New Keynesian Philips Curve framework, Autoregressive Distributed Lag (ARDL) and Vector Autoregressive (VAR) methodology to determine inflation dynamics model for inflation control in Nigeria covering a scope of 1982 to 2018.

1.3 Objectives of the Study

The broad objective of this study is to examine inflation in Nigeria with the view of ascertaining its determinants, while the specific objectives of this study are:

1. To examine the relationship of inflation dynamics and its determinant in Nigeria.
2. To examine if inflation is only a monetary process in Nigeria.

1.4 Significance of the Study

This study has been considered significant in the following ways.

1. The findings of this research will help Federal Government of Nigeria and its agencies to formulate policy for control of inflation.
2. This study will be relevant for researchers who intend to have an empirical base for other research works needed to be embarked upon in Nigeria and the world in general.

SECTION TWO

2.0 LITERATURE REVIEW

In this section, viewpoint of eminent scholars and researchers was reviewed and the analytical literature framework organized under the following sub-headings:

2.1 Theoretical Literature Review

The theoretical review of this study focused on the determinants of dynamics of inflation in a given economy in both short-run and long-run analysis with economic theories that will effectively put into consideration the economic criteria of a good research.

2.1.1. Conceptual Framework

Inflation has been defined as a situation of persistent rise in the rate of change of the general price level. The mechanisms or processes of inflation are quite diverse. The process of inflation has therefore been explained differently to reflect the various sources of price change.

Dynamics in economics means changes in economic system over time. Therefore inflation dynamics are interpreted as resulting from an anchoring of inflation determining factor or expectations as a result of better monetary policy. Monetary policy is the process by which monetary authority of a country controls supply of money often targeting inflation or interest rate to ensure price stability, while fiscal policy is the use of government revenue collection and expenditure to influence the economy (CBN 2014).

2.1.2 Review of Basic Theories

In recent times, there have been three dominant schools of thought on the causes of inflation; the neo-classical or monetarist, neo-Keynesian and structuralist.

(a) The Quantity Theory of Money

The monetarist, following from the Quantity Theory of Money (QTM), have propounded that the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct and proportionate change in the price level. The QTM is traceable to Irving Fisher's famous equation of exchange:

$$MV = PQ \quad (1)$$

where M stands for the stock of money; V for the velocity of circulation of money; Q is the volume of transactions which take place within the given period; while P stands for the general price level in the economy. Transforming the equation by substituting Y (total amount of goods and services exchanged for money) for Q, the equation of exchange becomes:

$$MV = PY \quad (2)$$

The introduction of Y provides the linkage between the monetary and the real side of the economy. In this framework, however, P, V and Y are endogenously determined within the system. The variable M is the policy variable, which is exogenously determined by the monetary authorities. Nevertheless, the model's general weakness is found in its inadequacy to explain general price movement. The truism of direct proportion between change in the quantity of money and change in the price level cannot be accepted in today's world (as there are other factors involved such as infrastructural and structural factors).

(b) The Phillips Curve

Two major goals of interest to economic policy makers are low inflation and low unemployment, but quite often, these goals conflict. The adoption of monetary and/or fiscal policy moves the economy along the short-run aggregate supply curve to a point of higher output and a higher price level. As higher output is recorded, this is followed by lower unemployment, as firms need more workers when they produce more and vice-versa. This trade-off between inflation and unemployment is described as the Phillips

curve. This was an empirical discovery by Phillips (1958), which showed an inverse relationship between wage and unemployment rates, using United Kingdom data plotted over the period 1862-1957. The discovery is strengthened by the fact that movement in the money wages could be explained by the level and changes of unemployment.

A major criticism of the Phillips curve is that it does not take into account the interactions in the underlying or structural behavior of consumers and firms in the economy, but rather captures empirical regularities between unemployment and inflation rates based purely on correlations in historical data.

2.1.3 Review of Other Related Theoretical Issues

Other related theories reviewed to further explain the determinants of inflation are state as follows:

(a) Keynesian Theory

The Keynesians opposed the monetarists' view of a direct and proportional relationship between the quantity of money and prices. According to this school, the relationship between changes in the quantity of money and prices is non-proportional and is indirect, through the rate of interest. The strength of the Keynesian theory is its integration of monetary theory and value theory on the one hand and the theory of output and employment through the rate of interest on the other hand. Thus, when the quantity of money increase, the rate of interest falls, leading to an increase in the volume of investment and aggregate demand, thereby raising output and employment. In other words, the Keynesians see a link between the real and monetary sectors of the economy an economic phenomenon that describes equilibrium in the goods and money market (IS-LM). Several weaknesses of the Keynesian postulation have been documented. For instance, Keynesians assume prices as fixed, so that the effect of money appears in terms of quantity of goods traded rather than their average prices. Keynesians also assume that monetary changes are largely absorbed by changes in the demand for money. They fail to appreciate the true nature of money and assume that money could be exchanged for bonds only. However, it is known that money can be exchanged for many different types of assets like, securities, physical assets, human wealth, etc.

(b) New Keynesian Philips Curve

The economists no longer use the Phillips curve in its original form because it was shown to be too simplistic. This can be seen in a cursory analysis of US inflation and unemployment data from 1953–92. There is no single curve that will fit the data (Gali 1999). Modified forms of the Phillips Curve that take inflationary expectations into account remain influential. The theory goes under several names, with some variation in its details, but all modern versions distinguish between short-run and long-run effects on unemployment. This is because in the short run, there is generally an inverse relationship between inflation and the unemployment rate; as illustrated in the downward sloping short-run Phillips curve. In the long run, that relationship breaks down and the economy eventually returns to the natural rate of

unemployment regardless of the inflation rate. The "short-run Phillips curve" is also called the "expectations-augmented Phillips curve", since it shifts up when inflationary expectations rises, The New Keynesians Philips Curve recognizes the fact that most economic decisions are made under conditions of uncertainty. However, given their preoccupation with the dynamics of growth and long-run considerations, it is logical to expect that they cannot successfully, abstract from the reality of uncertainties surrounding dynamic analysis.

(c) Monetary policy framework and implementation in Nigeria

Since inception, CBN has used two monetary policy frameworks for the implementation of monetary policy namely: exchange rate targeting and monetary targeting. Exchange rate targeting framework was used between 1959 and 1973 while monetary targeting has been in use from 1974 to date. The shift to monetary targeting was largely informed by the collapse of the Breton Woods system of fixed exchange rates in 1974 and change in strategy to demand management as a means of containing inflationary pressures and balance of payments imbalances.

2.2 Empirical Literature Review.

A review of the empirical literature on inflation in industrialized emerging market and developing economies is the focus of the researcher which will help to reveal the dominant theoretical underpinning for assessing the dynamics of inflation and the methodology for forecasting its future trajectory.

Asogu (1991) focused on the econometric investigation of the nature and causes of inflation in Nigeria. The study found that increase in real GDP or supply situation, especially food, and low cost of production of consumables tended to ameliorate inflation. He added that increase in government expenditures – deficits financing, tend to increase the money supply and worsen the depreciation of the exchange rate, which in turns intensify the inflationary pressure. The author noted that the monetary model does not adequately explain the inflation process in Nigeria.

Khan and Schimmelpfennig (2006) examined the relative importance of monetary factors and structuralist supply-side factors for inflation in Pakistan. Their study showed that monetary factors were the main drivers of inflation, while “wheat support price” affects inflation in the short-run. Using monthly data from 1998 to June 2005, a monetary perspective was considered by specifying a stylized inflation model that include monetary variables such as money supply, credit to private sector, the exchange rate, as well the “wheat support price” as a supply-side factor. A vector- error correction model (VECM) was estimated in growth rates as well as in log levels. The choice of sample periods reflected a trade-off

between having sufficient observations and avoiding structural breaks that would complicate the empirical analysis. The findings indicated that monetary factors played a dominant role in recent inflation, affecting inflation with a lag of about one year and increases in the wheat support price influence inflation in the short-run. The conclusion of the study was that wheat support price mattered for inflation over the medium term only if accommodated by monetary policy. The study confirmed that a long-run relationship existed between the CPI and private sector credit.

Odusanya and Atanda (2010) critically analyzed the dynamic and simultaneous interrelationship between inflation and its determinants in Nigeria between 1970 and 2007. The time series variables properties were examined using the Augmented Dickey Fuller (ADF) unit root test and the result reveals that inflation rate, growth rate of real output and money supply, and real share of Fiscal deficit are stationary at levels, while other incorporated variables in the empirical analysis- real share of Import, Exchange rate and Interest rate-are stationary at first difference. The long-run and short-run mechanism of interaction between inflation and its determinants were examined using the Augmented Engle-Granger (AEG) cointegration test and Error Correction Mechanism (ECM) model respectively.

Moses and Tule (2015) examined the key relationship between money supply, inflation and underpinning the conduct of monetary policy in Nigeria. The motivation for the study is derived from the perceived weakening relationship between money supply and inflation in recent times. The methodology was a Vector Auto regressive (VAR) model. Three variants of OLS - ordinary least square, fully modify OLS, and dynamic OLS – techniques were used in estimating the data. Results from these estimates showed that the coefficients of money supply were positive and significant at 1, 5, and 10 per cent, respectively in the inflation equation for the full sample period, suggesting that money supply bears a long run positive relationship with inflation. Based on the coefficient stability results obtained from the Chow test, the entire sample was divided into two sub samples with the first one covering the period 1982q1 to 1996q4 while the second sub sample covered the period 1996q1 to 2012q4. The equation was re-estimated for the two sub-samples. The coefficient of money supply was significant in the first sub sample but insignificant in the second sub sample, buttressing the point made earlier in their trend analysis that the relationship between inflation and money supply might have weakened in recent years. Overall, the study confirms the existence of some relationship between growth in monetary aggregates and inflation, but this relationship has weakened in recent years. The diminishing strength of the relationship between money and prices could be explained in part by recent developments in the Nigerian Financial System including new products and assets classes which may affect demand for money.

2.3 Justification of the Study

Quite a number of theoretical and empirical literatures have been reviewed but it was observed that issues in relation to inflation dynamics or determinant remains unsettled in the literature so that any new attempt to address them is likely to be an added knowledge to old arguments. This is true of inflation in Nigeria. The literature abounds on the causes, consequences and remedies of inflation in Nigeria. Despite this, the problem has continued to be here. Yet to undertake another study in this area requires justification. Inflation itself is a highly dynamic process, which means that the process of inflation within the last 10 years may not be the same as it was perhaps 25-30 years ago. This study departs from previous studies via change in methodology by employing Perron (2006) to determine the break points/dates as well as further investigate the properties of the time series data employed. The structural breaks test becomes necessary, especially following the introduction of Structural Adjustment Program (SAP) in 1986 and the Wholesale Dutch Auction System (WDAS) in 2006 and the occurrence of the 2007/2009 global financial crisis. The consideration of effect of expected rate of inflation in inflation policy control is still a contribution to knowledge by using Autoregressive Distributed Lag and New Keynesian Philip Curve framework in other to identify if inflation is only a monetary process in Nigeria.

SECTION THREE

3.0 RESEARCH METHODOLOGY

This chapter deals with the methods and procedures adopted in the conduct and advancement of the study. They include theoretical framework, model specification, estimation technique and procedure.

3.1 Theoretical Framework

The New Keynesian Philips Curve (NKPC) methodology has been widely used in the empirical literature to depict relationship between inflation, inflation expectations and the real marginal cost of production. It indicates that the rate of inflation will increase when real marginal costs increase and there are expectations for higher prices by economic agents in the future. Calvo (1983) described the basic NKPC in the standard form as:

$$\pi_t = \beta E_t \pi_{t+1} + K(y_t - y_t^*) \quad (3.5)$$

Where y_t represent actual output, y_t^* is the potential output.

3.2 Model Specification

In line with the work of Cevik and Teksoz (2013), we used the past values of inflation and monetary aggregates as a proxy for inflation expectations, as agents tend to formulate inflation expectations in a

backward-looking manner. The hybrid model of consumer price inflation can now be formulated as follows:

$$\pi_t = \alpha\pi_{t-1} + \beta m_{t-1} \chi(y_t - y_t^*) + \varphi ex + \xi u + \mu \quad (3.7)$$

Where ex is the official exchange rate as a control variable that also represents monetary policy and u is unemployment rate. For the necessity of uniformed scale of measurement and consistent interpretation of results, all variables were transformed to the natural logarithms. The log transformation of all the variables allows us to interpret the coefficients as elasticities.

3.2.1. Economic apriori Expectation

This refers to the supposed relationship between the dependent and independent variables of the model as determined by the postulations of economic theory. The result or parameter estimates of the models will be interpreted on the basis of the supposed signs of the parameters as established by economic theory. Put differently, the parameter estimates of the model will be checked to find out whether they conform to the postulations of economic theory or not.

Table 1: Summary of the Apriori Expectation

Regressand	Relationship	Regressors
INF	+	EX
INF	+ OR -	IR
INF	+ OR-	RGDP
INF	-	U

SECTION FOUR

4.0 DATA ANALYSIS, PRESENTATION AND DISCUSSION OF FINDINGS

4.1. Data Presentation

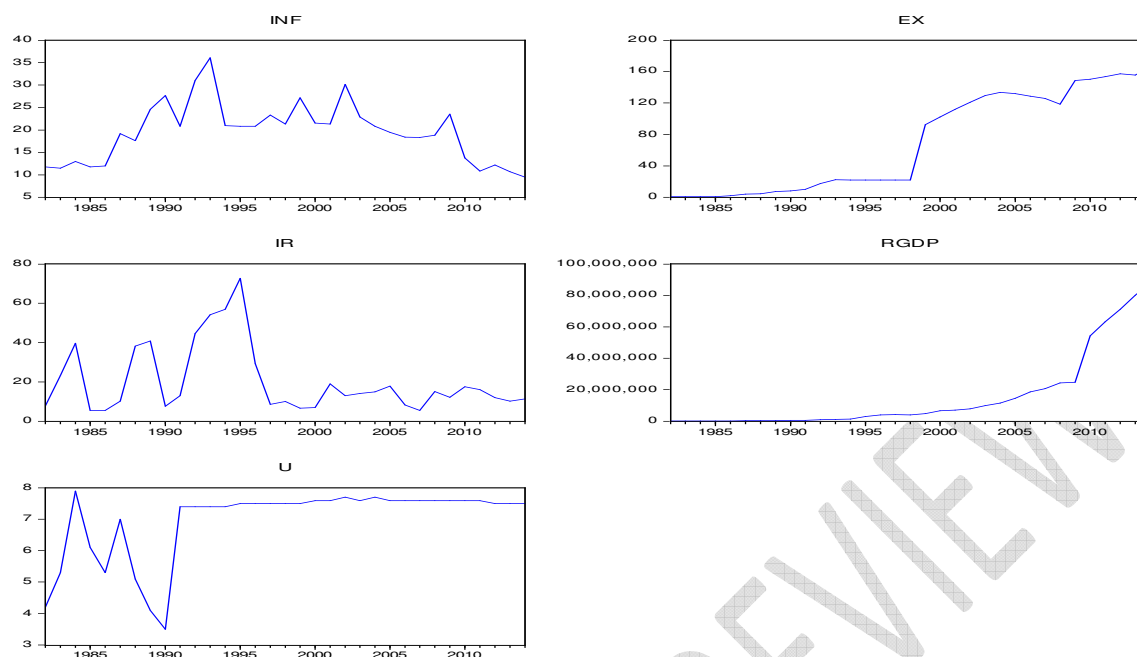


Figure 1: Graphical Presentation of Data

Source: Researcher Plot 2018

Table 2: Results of Estimation of Error Correction and Long-run Models

Dependent Variable is LOG(INF)			
Cointegrating Form (ECM)			
Variable	Coefficient	t-Statistic	Prob
DLOG(EX)	9.264394**	4.112976	0.0005
DLOG(IR)	0.275085	0.271768	0.7883
DLOG(RGDP)	-8.472253**	-2.890778	0.0085
DLOG(U)	-0.390648	-0.093407	0.9264
ECT(-1)	-0.627809	-6.326469	0.0000
Long-run Coefficients			
LOG(EX)	0.508208*	5.372803	0.0000
LOG(IR)	0.196002	1.885555	0.0726
LOG(RGDP)	-0.416302**	-4.918156	0.0001
LOG(U)	0.019837	0.052277	0.9588
C	6.919547	6.239489	0.0000

$R^2 = 0.79$, $Adj. R^2 = 0.71$, F. Statistic = 9.36, and DW = 1.8

Note: *, ** and *** represent 1%, 5% and 10% level of significance respectively.

Source: Researcher Computation, 2018

SECTION FIVE:

5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

High inflation induces uncertainty, adversely affects financial sector development and the vulnerable poor segment of the population; and consequently, poses serious threats to macroeconomic stability resulting to high social costs. This study examines the dynamics of inflationary process in Nigeria using the ARDL bounds testing approach to cointegration and further complemented by the examination of impulse responses and variance decomposition from a VAR model. The empirical model relates inflationary process to exchange rate, interest rate, real GDP and unemployment rate. The result reveals that the variables are co-integrated since the F-statistics is greater than the lower bound critical value at 10%. Hence the null hypothesis of no co-integration is rejected and long-run co-integration relationship is established among the variables in this study period. Further analysis reveals not all the variables were significant as shown by the p-values in influencing inflationary process in Nigeria but with the exception of exchange rate and real GDP that were found to be significant in influencing inflationary process in Nigeria. In addition, the coefficient of error correction is significant at 1 percent with correct negative sign. The coefficient of ECM is (-0.62) which shows high speed of adjustment from short run fluctuations to long run equilibrium (62% discrepancy is corrected each year) approximately 62 percent of disequilibrium from the previous year's shock convergence back to the long run equilibrium in the current year.

The study also found strong evidence of the importance of exchange rate, interest rate, unemployment and real GDP in the inflation process in Nigeria, lending evidence to the dominance of the monetarist proposition on inflation dynamics. But the statistical significant nature of exchange rate (EX), unemployment and real gross domestic product (RGDP), shows a trace of monetary and fiscal process. By implication, both monetary and fiscal policy can contribute to inflation dynamics in Nigeria. This implies that inflation in Nigeria is not only a monetary phenomenon.

5.1 Policy Recommendations

Based on the findings from this research, it is necessary to provide a set of policy recommendations that would be applicable to the Nigerian economy. The research therefore suggests the following policy options based on our empirical findings:

- ❖ The study recommends monetary policy framework that is on exchange rate and inflation targeting. A lower exchange rate targeting policy will help to revalue the Naira whose devaluation has raised domestic prices of import without significant impact on export. Low exchange rate will reduce inflation. This recommendation conforms to the remark made by analyst at Vetiva Capital Management following the announcement of flexible exchange rate by CBN on May 24th 2016. Vetiva Capital Management expect inflation to spike in the near term (Emeka Anaeto 2016, Forex: CBN throws Naira into open market, nullifies N197/\$ exchange rate section, paragraph 3).
- ❖ Expansionary fiscal policy that will shift the labor supply curve downward (increase in labor supply) which invariably translate to downward shift in aggregate supply curve and downward pressure on price level.
- ❖ The Federal Government of Nigeria should embark on job creation policy that will reduce unemployment regarding that unemployment in Nigeria has a direct positive relationship to inflation. This means that reduction in unemployment will bring about decrease in inflation.
- ❖ Policies that will set the interest rate to single digit which will encourage investment and increase in RGDP level should be institutionalized such that the excesses produced could be exported if well monitored and which may thus lead to a reduction in inflation.

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LIST OF ABBREVIATIONS

ARDL: Autoregressive Distributed Lag

CRR: Cash Reserve Requirement

CNB: Central Bank of Nigeria

CPI: Consumer Price Index

ECM: Error Correction Mechanism

ECT: Error Correction Term

EX: Exchange Rate

INF: Inflation

IR: Interest rate

LR: Liquidity Ratio

NBS: National Bureau of Statistics

OLS: Ordinary Least Square

QTM: Quantity Theory of Money

RGDP: Real Gross Domestic Product

U: Unemployment

VAR: Vector Auto regression