EMPIRICAL ANALYSIS OF THE CAUSES AND EFFECTS OF INFLATION IN NIGERIA

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Abstract

This research work examined the causes and effects of inflation in Nigeria between 1969 and 2009 and what could be done to ameliorate the negative effects on the economy. The time series variables properties on some selected variables were examined using Augmented Dickey Fuller (ADF) Unit root test and co-integration analysis. The result revealed that the explanatory variables (money supply, growth rates, gross domestic product growth rates and expenditure revenue ratio) are not spurious but exchange rate of dollar to naira was non-stationary. The study also revealed that the gross domestic product growth rate is counter inflationary as against inflationary factors.

Keywords: Inflation, Growth Rate, Economic Variables, Inflation Effects, Unit Root, Exchange Rates, Money Supply

1.0   Introduction

Inflation is a problem in all facets of life and in all economic entities. The government of any nation is concerned with the responsibility of ensuring that her plans and programme are not frustrated by unpredictable and galloping prices. Every firm desires a stable macro-economic environment that is devoid of unrepentant price change that can bring about reliable forecast and planning. An individual also strives that he is not worse off by unexpected price increase. All these bring home the need to explore the study of inflation so as to form a timeless and dependable model of its tendency (Taiwo, 2011).

Inflation is a household word, but few give attention to the dimension of causes and impact of its effects. It is undoubtedly one of the most highly treated subjects in economic researches and literature. Its effects and causes are many, vary and well treated in literature. See Okpara and Nwaoha (2010), Fullerton and Ikhide (1998), Odusunya and Atanda (2010), Egwaikhide et al (1994), Jhingan (2004), Batini (2004), Owoye (2007),Asogu (1999) among others.

This study investigated the major causes, effects of inflation and the model that best explains the uniqueness of Nigerian inflationary tendency and develops a tool for forecasting its behavioiur.

Besides, we also examined the nature of relationship that exists between inflation and some other economic variables such as government spending, money supply, expectations, exchange rate, gross domestic products, exchange rate of dollar to naira and expenditure to income ratio among others.

This work is significant and elaborate because it covered a period of 40 years (1969-2009), a period that has not been covered in the nearest past. It also examined inflation in terms of growth rate and not in absolute value. The significance of the study could also be traced to the exclusion of the inflationary data before 1970. This is premised on the fact that past research on the subject has dealt extensively in this period, and in most cases included the 'war dummy' to show the impact the Nigerian civil war had on inflation.

1.1   Determinants and Effects of Inflation in Nigeria

The causes of Nigerian inflation for some time period could be traced to several studies such as Tegene (1989), Baro (1995), Moser (1995), Bruno and Easterly (1998), Erbaykal and Okuyan (2008), Awogbemi and Ajao (2011) among others.

Changes in money supply, credit to government by banking system, government deficit expenditure, industrial production and food price indices are underlined factors that contribute to inflationary tendencies in Nigeria. Increase in government expenditure financed by monetization of oil revenue and credit from banking system could also be responsible for the expansion of money supply which in turn (with lagged effect) contributes to inflationary tendencies.

Growth in the money supply is another determinant of inflation.

When money supply growth increases substantially, inflation also increases and when there is a decline in monetary growth rate, there is a strong relationship between increase in money supply and inflation.

Rising cost of goods are often taken to be counter-productive and negative to an economy. The most significant effect of inflation is its impact on the revenues of the government. When it is higher than previously planned and thought, the revenues of the government will increase. Inflation is also responsible for inefficiencies and

non-performance of an economy. It makes budgeting and future planning difficult for economic agents and imposes a drag on productivity, particularly when firms are forced to shift resources away from products and services thereby discouraging investment and retarding growth (Orubu,2009).

1.2 Inflation Targeting and Its Variants

The Central Bank in any country is empowered to perform duties that will ensure soundness of the financial and monetary system. In order to achieve the monetary stability, it is always confronted with the challenge of choosing the right strategy to apply in order to meet the envisaged end. Among the most popular strategies are exchange rate targeting, monetary targeting, Nominal GDP targeting and inflation targeting.

Exchange rate targeting involves the manipulation of exchange rate and the price of foreign currencies especially the dollar as a premise for influencing the macro-economic variables while Monetary targeting is the process of controlling the availability, cost and usefulness of money, credit and related monetary vulnerable to achieve a predictable macro-economic situation. The Central Bank of Nigeria has been adopting monetary targeting as a strategy for managing macro economic situation of the country and this strategic approach has suffered criticism that range from poor performance, not acceptable as requirement for monetary and economic integration.

Inflation targeting has been canvassed as an audacious and judicious option in the strategic choice for macroeconomic management by any responsive monetary authority. There are many definitions of inflation targeting. Some of these include the following:

Inflation targeting is the process of offering a framework of constrained discretion in which the constraint is the inflation target and the discretion is the scope and flexibility of taking account of economic and other considerations. This is in alignment with Bernanke & Mishkin (1997), Bernanke et al, (1999), Kuttner & Posen (2000).

Another author submitted that inflation targeting is that form which disregards entirely the real effect of monetary policy both in the short and medium term and focuses exclusively on controlling inflation within the shortest possible time horizon. This is aptly captured by Svensson (2001).

Inflation targeting has also been viewed as the strategy in which the Central Bank adopts a numerical target for inflation and commit to achieving it. Mordi (2009) identified that the overall objective of the Central Bank is to put inflation within a permissible range and if inflation is within this range, then the Central Bank is free.

Mishkin (2002) and Truman (2003) identified the features of inflationary targeting as follows:
- Institutional commitment to price stability as the primary goal of monetary policy;
- Numerical target aimed at making the goal operational;
- Time horizon within which to meet the target;
- Evaluation as an on-going exercise to determine if the target has been met or not;
- An elaborate system in which both the monetary aggregates and the exchange rate are used in setting monetary policy;
- Increase transparency and communication to the public about plans, objectives and advancement on monetary policy.

The strategy of inflationary targets has gained wide spread support among economists because it is widely accepted that there is no trade off between output and inflation and the evidence of the 1970s that showed that higher inflation does not bring faster growth and may even reduce it (Mervyn, 2008). This has helped the monetary authorities to justify their policies primarily on price stability.

1.3 Relationship between Inflation, Money Supply, Exchange Rate and Gross Domestic Products

There are many studies that focused on the relationship that exist between inflation and other economic variables such as money supply, Gross Domestic Product (GDP) and Exchange rate. Since this relationship is controversial and lack consensus, it is important to discuss recent findings that highlight some revealing trends in the variables as they relate to inflationary phenomenon.

On inflation and money supply, there are vast and varied literatures. Traditionally the monetarist held sway in their proposition that increase in money supply.

Taking from the old classical equation, an increase in the quantity of money will generate a proportionate increase in general price level. By this, the monetarist posts a direct causality between money supply and inflation. This school of thought insists that increase in money supply may arise from deficit government expenditure or expansionary debt financing which may combine to increase general price level.

In Nigeria, a number of studies have been undertaken on the subject of money supply and prices. A particular case is Ajayi (1978) who investigated the relationship between money, prices and interest rates in Nigeria. He concluded that money is one of the significant causes of rising price level. His finding reflected the traditional approach where the relationship between money and prices is assumed to be direct and one way.

Another contributing work is that of Okpanachi (2004) which examined the relationship between government defiant, price level and capital formation in Nigeria. The findings of the study were enumerated as follows:

1. Budgetary deficit increases supply
2. That the price level could be explained in terms of other measures of deficit financing such as domestic credit creation and internal credit marginalization;
3. That there exists a positive and significant relationship between variation in price level and in domestic credit creation;
4. That the deficit financing influences capital formation.

On exchange rates, GDP and balance of payment deficit, the monetarists settled with the premise that deficit balance of payment tends to lead to disequilibrium in domestic money market and that excess money supply that often comes from expansionary expenditure on foreign goods and assets can cause exchange rate depreciation under a floating exchange rate system. However in a fixed exchange rates system such expansion is financed by government by drawing on external reserves in order to meet the deficit.

There are however some studies that negated the effect of exchange rate or imported inflation on domestic price level. Chibber & Safik (1991) for example, argued that there is no relationship between exchange rate and inflation. Basing his argument on empirical studies of selected African countries, he concluded that devaluation could exert upward pressure on the general price level only in the short run. He argued that the extent to which devaluation of local currency engenders inflation is largely a function of the impact of such policy measures on revenues and expenditure, (budget) of government, together with the monetary policy that is simultaneously pursued

Sowa and kwakye (1991) also concluded using Ghana data, from their studies that exchange rate as a variable could not have a significant direct relationship with price movement. However, Elbadawi (1990) study of Uganda inflationary data between 1988 and 1989 revealed that monetary expansion and deprecation of exchange rate were responsible for Uganda's inflation. It is therefore a case of lack of consensus on the subject of impact of the various variables on inflation.

2.0 Materials and Method
2.1 Description of Data

Data on Nigerian inflation as influenced by economic variables (money supply, real gross domestic product, budget deficit and exchange rate were used. The data covering the period 1969-2009 were collected from Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS)

2.2 Research Method

Descriptive and analytical approaches are employed in this study. The model used specifies inflation rate as a function of money supply (MS), Exchange Rate (XR), Government Expenditure Revenue Ratio (ERR) and Gross Domestic Product Growth Rate (GDPR) before being log linearized as

$\text{Log InF}_t = \alpha + \beta_1 \log \text{MS} + \beta_2 \log \text{EXRDN} + \beta_3 \log \text{ERR} + \beta_4 \log \text{GDPR} + \mu_t$ ....(1)

where Inf_t is the inflation growth rate at year t,

α is the constant term,

β_i are the various drifts of the explanatory variables and

μ_t is the white noise.

The concern is to confirm the degrees of causation between various independent variables by subjecting the model to linear multiple regression analysis.

Augmented Dickey Fuller (ADF) test was also conducted on the series of data collected to confirm if a variable has a unit root.

Given the equation:

$\Delta Y_t = \beta_{1} + \beta_2 t + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-1} + \mu_t$ ....(2)

Where ΔY_t is the change in Y at period t,

β_1 is the constant component,

$\beta_2 t$ is the deterministic trend,

δ is the root to be determined,

Y_{t-1} is the lagged value of Y and $\sum \alpha_i$

Y_{t-1} is the augmented portion that take care of the correlation between Y_t and Y_{t-1} and µt is the error term.

The hypothesis for each of the variables is tested as H_o: $\delta = 0$ versus H_1: $\delta < 0$

3.0 Empirical Analysis and Results

Time series on economic indicators on Nigerian economy were analyzed using Shazam Econometric software. All the relevant variables were used in building the regression equation with the coefficients of the variables, constant term, correlation coefficients and Durbin Watson statistic shown in the table below:

Table 1: **Regression Table**

Variable	Coefficient	Standard Coefficient	T-Ratio	Standard Error	Elasticity Mean
Constant	0.91447	0	3.326	0.275	0.8208
GDPR	-0.21762	-0.3393	-1.602	0.1358	-0.511
EXRDN	0.11982	-0.1109	-0.4507	0.5899	0.032
ERR	-0.26587	0.2809	1.02	0.1174	0.0879
MS	0.25901	0.0235	0.1313	0.1973	0.0313
	R – Square =>	0.2257			
	Durbin => Watson(d)	0.7954			

From table 1, Inflation Growth Rate (INF) becomes

$$INF = 0.91447 – 0.21762\ GDPR – 0.26587\ ERR + 0.11982 EXRDN + 0.25905 MS + \mu_t$$

The results of the Augmented Dickey Fuller test conducted to examine the unit root behavior of the variables considered are shown in the table below

Table 2: **Augmented Dickey Fuller Test**

Variable	Lag No	t-test	Critical Value at 10% sig. level	Critical Value at 5% sig.lev	AIC
INF	2	-3.5774	-3.13	-3.41	-2.24
GDPR	6	0.92734	-3.13	-3.41	-0.852
EXRDN	0	-4.8404	-3.13	-3.41	-4.09
ERR	0	-2.1412	-3.13	-3.41	-4.137
MS	2	-3.9187	-3.13	-3.41	-1.796

The results of co-integration test on inflation and each of the independent variables contain the report of Philip test shown below:

Table 3: **Phillip Co-integration Test**

Variables	Regressand	R^2	Durbin Watson(d)	t-test	Critical Value at 10% Sg.level
INF & GDPR	INF	7.62 E-02	0.9187	-3.7843	-3.5
INF & EXRDN	INF	6.99 E-02	0.859	-3.5946	-3.5
INF & ERR	INF	0.1122		-3.6223	-3.5
INF MS	INF	1.82 E-03		-3.6043	-3.5

3.1   Interpretation of Results

From table 1, the regression coefficients showed that the ratio of government expenditure to income (EXRDN) and Money Supply Growth Rate (MS) have the greatest impact on inflation than all other variables

The t-statistic of inflation growth rate in table 2 is greater than critical values -2.13 and -3.4 at 10% and 5% levels of significance respectively.

This led to the rejection of the null hypothesis indicating that the inflation growth rate is stationary. This applies to other economic variables under consideration excluding the Exchange Rate of Dollar to Naira (EXRDN) which in absolute value (t-value) is less than the critical values at 10% and 5% respectively. This implies that the null hypothesis is not rejected and as such, EXRDN is non-stationary

The Durbin Watson Statistic (d) for inflation is greater than R^2 of the correlation coefficient in table 3; meaning that the possibility of spurious regression is being avoided.

3.2   Policy Implication of the Results

The results of the series of test carried out showed that inflation growth in Nigeria can be adequately explained by variables under consideration.

The negative coefficient of Gross Domestic Product is a signal to the fact that expenditure backed by real productive activity may be counter-inflationary. The non-stationary behavior of Exchange Rate of Dollar to

Naira over the years is an indication that it reflects most often time trend reaction rather than being caused by external factors.

The result of the study also indicates that there is no co-integration between inflation and all the independent variables which indicates that the variables can be used for forecasting of inflation growth rate. This study also revealed that there is a positive relationship between inflation and exchange rate of dollar to naira and money supply growth rate while negative relationship exists between inflation and gross domestic product growth rate and ratio of government expenditure to income. This implies that while increase in money supply can lead to inflation, a monetary expansion that is truly based on productivity of the economy may not be inflationary especially when such expansion is predicated on actual increase in government revenue.

4.0 Conclusion and Recommendations

It is very obvious that Nigerian government uses monetary and fiscal policies measures as tools for combating inflation and meeting various macro-economic objectives. Evaluation of these policies showed that they do not work due to negligence of the correlation that exists between government expenditure, money supply and inflation.

Expenditure management and budget discipline should be taken seriously by Nigerian government. This can be achieved by ensuring that all expenditures made match with revenue.

Nigerian government should also act productively in balancing its fiscal and monetary policy as well as institutional intervention with expectation on inflation. This will prevent unexpected and unplanned reaction of prices which may have a counter-productive impact on the economy.

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