

Effectiveness of Monetary Policy in Reducing Inflation in Nigeria (1970-2013)

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Abstract

The research study examined the “Effectiveness of Monetary Policy in reducing inflation in Nigeria”, for the period 1970 - 2012, employing the co integration and Error Correction Technique of econometric analysis. The data were sourced from the Central Bank of Nigeria statistical bulletin of various years. The test of both the Unit root and co-integration revealed that there is a long relationship between the variables while the Granger Causality test revealed an un-directional relation between Monetary Policy and inflation. However, the VECM test revealed that inflation, Gross Domestic Product (GDP) and exchange rate are negatively related and positively related to broad money supply (M_2) and domestic credit. The study is of the recommendation that Central Bank of Nigeria should balance its control instruments to achieve macroeconomic stabilization and development, money supply should be controlled to ensure high employment, interest rates should be liberalized to control price and output movement, the society needs to be sanitized of corruption and in all. Monetary policy measures should be designed in a way that enhances the attainment of the macro-economic objectives while checking inflationary trend.

Keywords: Effectiveness, Monetary Policy, Inflation, Nigeria

Introduction

The socio-economic problems of the Nigerian economy are traceable to inflationary spiral. The persistent and unacceptably high rises in the general price level in an economy resulting from general loss of purchasing power of the currency generates inflation. Inflationary pressures assumed a dimension of serious concern in Nigeria following the introduction of the structural adjustment programme (SAP) in 1986 and it is presently a major policy concern for the monetary authorities in the economy. Three approaches are used to measure inflation that is, the deflator or gross national product (GNP), the consumer price index (CPI) and the Wholesale Price Index (WPI). The dynamic changes in these two latter approaches are regarded as direct measures of inflation. In Nigeria, inflation rates are measured with CPI which is easily and currently available on monthly, quarterly and annual basis even though it is the least efficient of the three.

Since 1960s, inflation has been accelerating in the Nigerian economy. The inflation rates as measured by the changes in CPI averaged 4.0 percent between 1960 and 1970 that is with the annual rates contained in the single digit except in 1967, during the Nigeria civil war when it was estimated to be 10.0 percent. Its pressures were curtailed during the civil war (1967 to 1970) because of the curtailment of income due to compulsory savings for the purpose of financing the war and other restrictive economic, fiscal and political measures. The reconstruction measures and repayment of war bonds after 1970 resulted in the injection of massive private and public nominal expenditures in to the country. This again pushed the inflation rates upward. This period also witnessed sharp increase in government revenue in foreign exchange from oil exports. Thus the 1970s witnessed double-digit inflation rates which averaged 15.6 percent. The rapid growth in government expenditures financed largely by the monetization of the petroleum foreign exchange revenue exacerbated expansionary pressures on money supply whose average annual growth rate for the 1970s was 32.5 percent compared with 7.5 percent in the 1960s.

Credit to the domestic economy from the banking system following the same pattern as the rates of inflation and growth of money supply, accelerated from an average of 50.7 percent in the 1960s to 72.9 percent in the 1970s and declined to 25.2 percent in the 1980s. These developments appeared to have led credence to the monetarists' theory of inflation which is a monetary phenomenon. This so called “accelerating” inflation rates of

the 1960s and 1970s was only a tip of the iceberg when compared with the escalating and unabated trend inflationary pressures has assumed in the 1980s and the intractable rates of the early 1990s following the deregulation of the Nigerian Economy and unrestricted use of deficit financing as a tool to economic management (Idemili, 1994). The wage increase of 15 percent in 1993 Abubakar's increase in 1998 and Obasanjo's minimum wage coupled with ominous adjustment of prices of petroleum products to reflect current opportunity costs may add another dimension to inflationary pressures in Nigeria. In addition, the deregulation of downstream oil sector announced in October, 1st, 2003 by Obasanjo has Worsen the general price level in Nigerian. Finally, the current plan to increase the minimum wage to ₦18, 000 per Nigeria worker in this 2011 and subsequent plan to remove oil subsidy will no doubt increase the rate of inflation. The oil glut from 1981, that resulted into balance of payments deficits also led to foreign exchange crises that necessitated various measures of import restrictions. These restrictions reduced raw materials for domestic production and spare parts for machinery operation. The resulted shortage of goods and services for local consumption spurred the inflation rate to rise from 20% in 1981 to 39% in 1984 (Itua, 2000). With the adoption of the Structural Adjustment Programme (SAP) in 1986, there was a temporal reduction in fiscal deficit as government removed subsidies and reduced her involvement in the economy. But as the effects of structural adjustment programme (SAP) polices gathered momentum, there was a fall in growth rate of Gross Domestic Product (GDP) in 1990 from 8.3% to 7.2% in 1984 with inflation rising from 2.5 (1990) to 57.0% (1994). Again, the devaluation of the naira by the Central Bank of Nigeria (CBN) through the second tier foreign exchange market (SFEM) led to a fall in agricultural outputs as machines and raw materials (mostly imported) were out of reach. The devaluation reduced the aggregate real income and aggregate demand and at the same time raised the naira prices of goods whose production depended heavily on imported goods. Thus, unsold inventories accumulated in the face of consumer revolt. In this circumstance, the national income (NI) fell and the price rose (Osagie, 1989).

In 1995, inflation rate rose to 72.8% due to the increased lending rate, the policy of guided deregulation and the lagged impact of fiscal indiscipline. In addition to her contemporary fiscal and monetary policies, the Nigerian government had implemented various other policies aimed at curbing inflation in the country. One of the such policies was the price policy (price control) in 1971 meant to control the soaring prices of essential goods but abolished in 1989 for its ineffectiveness resulting from the severe shortages witnessed during the oil glut in Nigeria (Udu, 1989). The Economic Recovery Emergency Fund of 1986 where one percent (1%) of workers' salaries was deducted monthly to build the funds was meant to curb inflationary trends in Nigeria. They gradually and greatly reduced the purchasing power of the working class. But the policy measures failed as the prices of goods and the profits of corporate bodies were not controlled. Therefore as prices rose, the labour unions agitated for higher wages resulting in further higher prices. (Agba, 1984). More so, various agricultural programmes like Operation Feed the Nation and the Green revolution were implemented to boost output to reduce prices of food items but yielded minimal results.

Notwithstanding the various efforts of Nigerian government to curb their inflationary trends, inflation continued to cause setback in the growth rate in the standard of living of most Nigerians who are fixed income earners or unemployed (Agha 1984) inflation has had adverse effects on balance of payments in Nigerian economy hence the fall in the growth rate of the Gross Domestic Product (GDP) from 26.8% (1981) to 5.4% (2000) and 3.5% (2002) according to Fatukasi (2011). Given constant set of prices today, a situation of relatively much money chasing the same bundle of goods and services tomorrow with constant real wage income simply implies adjustment in consumption patterns. The same bundles of goods and services consumed today cannot therefore be consumed tomorrow. Hence, a decrease in consumption capacity and standard of living is imminent. The same can be said of producers. Too much money chasing the same bundles of inputs tomorrow ignites an adjustment process. The overall influence of this on the firm depends on its nature and the price elasticity of demand for her output. Given a firm that has an elastic demand for her output an attempt to neutralize the effect of inflation by a commitment increase in the prices of output often leads to greater loss in producer surplus, profitability and operations of the firm would therefore be greatly impaired. Inflation causes uncertainty about future prices and makes it difficult for money to perform the functions of medium of exchange and store of value. It affects adversely output, employment and income distribution (Fakiyesi, 1993, CBN 1996). Indeed, inflation is the leading cause of economic retardation and social and political unrest in less developed countries like Nigeria (Emina, 2006). Further, the effects of inflation includes continuous erosion of the purchasing power of money, inequitable distribution of income among earners, loss of social welfare due to price increases and reduction of savings and investments (Okluna, 2008). Inflation causes excessive relative price variability and misallocation of resources. It reduced real income of labour where nominal wages are without escalator clauses. Inflation can be observed as an aggregate that has a continuous chain reaction with both symbol and real macroeconomic aggregates price increase in one sector of an economy can easily be transmitted to other sectors. And most often, the responsiveness of most sectors may not be entirely proportionate. Given these interrelationship therefore an accurate evaluation of effects of government policy measures on diverse sectors and aggregates viz-a-viz inflationary trend cannot be accurately ascertained. Over the last few decades, high

inflation has caused yield on investment to decline while government policy objectives is adversely affected as the real size of its budget shrinks with rising inflation which hampered economic growth. The bulk of the studies have concentrated on Gross Domestic Product, exchange rate and money supply as causes of inflation.

Objective of the Study

The main objective of this study is to determine to what extent monetary policy has been effective in reducing inflation in Nigeria. However, the specific objectives of the study are:

- (1) To analyze and explain the causes and dynamics of inflation in Nigeria since 1970.
- (2) To examine the effect of monetary policy on inflation in Nigeria between 1970-2012.

Research Questions

From the objective of the study, one can deduce the following research questions:

- (1) What are the causes and dynamics of inflation in Nigeria?
- (2) What are the effects of monetary policy on inflation in Nigeria?
- (3) How effective are monetary policy in reducing inflation in Nigeria?

Hypothesis of the Study

Following from the objectives, we make the following hypothesis

H₀: Monetary policy in Nigeria has no significant impact in reducing inflation in Nigeria,

H₁: Monetary policy has a significant impact in reducing inflation in Nigeria

Theoretical Framework

The theoretical underpinning of this work is centred on the quantity theory of money as advanced by Friedman. According to Friedman, (1976) the earliest theory regarding the determination of price level and changes in price level is the quantity theory of money. This theory in its simplest form postulates a direct proportional relationship between money supply and price level. According to the theory, if money supply were doubled, prices would increase proportionately.

However, apart from money supply, other monetary policy variables that affect inflation are exchange rate and real Gross Domestic Product (Osakwe 1983, Adeyokumu 1982 and Sanyo (2000). In the model specified by Sanyo (2000), money supply, exchange rate and real Gross Domestic Product were the variables that impacted on inflation.

Model Specification

The model adopted in this study is a general specification type drawing from the literature on inflation in Nigeria. Hence, the model is based on the assumption that changes in price level depend on growth in real income, money supply, and exchange rate. Other factors include growth in domestic credit and government expenditure. Thus:

$$PF=f(RY, MS, EXR, DC, GEX) \text{ -----1}$$

Where,

- PF= inflation rate,
- RY=real income growth,
- MS=aggregate money supply growth rate
- EXR=nominal exchange rate (US \$/N)
- DC=domestic credit growth rate,
- GEX=growth in government expenditure

The linearised version of equation 1 in natural log form is given as:

$$\ln PF = a_0 + a_1 \ln RY + a_2 \ln MS + a_3 \ln EXR + a_4 \ln DC + a_5 \ln GEX + U_i \text{ -----2}$$

The error-correction specification incorporating the long run equilibrium relationship and short-run dynamics for the model is given as:

$$\ln PF = d_0 + d_1 \ln RY + d_2 \ln MS + d_3 \ln EXR + d_4 \ln DC + d_5 \ln GEX + d_6 \ln PF_{-1} + d_7 U_{-1} + e_i \text{ ---3}$$

Method of Analysis

Data collected for the study will be analyzed using the econometric analytical method. It is important to note that conventional regression analysis with time series data is conducted under the implicit assumption that the variables present in the regression are stationary over time. It has been pointed out in several studies that most economic time series data are not stationary over time, particularly in their levels, while their differences (first or second) are usual stationary (Pyndyck and Rubinfeld 1995). This is justifiable since the studies in empirical macroeconomics almost always involve trend variables and as such the variables employed in this study which includes GDP, money supply, exchange rate, domestic credit, inflation are always non stationary and trending (Greene, 2004). Thus, Ordinary regression analysis is only meaningful when applied to stationary data. However, the ordinary least square is advantageous because of its BLU property, i.e. the best, linear, unbiased estimator. If the two different series are non-stationary individually, but are co integrated among the variables, we can, however, apply a Vector Error correction Mechanism (VECM) which will enable us to link the long run and short run relationships involved. Another justification for adopting the co integration technique with its implied (VECM) is that it has certain advantages over the traditional partial adjustment

model that is, it is central to econometric modeling of integrated variable data consistency will be achieved given that the variables (GDP, money supply, exchange rate, interest rate, inflation used in the study are integrated of the same order, information is greatly enhanced since both the short-run changes in the variables used in the research and the long-run relationship will be included in the VECM specification and the log in VECM is not as restrictive as the traditional model (Oluranti, 1996).

Data Presentation and Analysis

Presentations of Unit Root Test

As a preliminary step in the error correction modeling process, unit root test was conducted on the data. This determined their empirical characteristics. The rationale for this is to guard against generating spurious results. The technique used here is the Augmented Dickey- Fuller Test (ADF). The result is presented below in table 1

From the result in the table 1, except for the rate of inflation, all the other variables failed the stationary test. In other words the variables that failed the test are trended and hence have unit root. This conclusion is informed by the values of the ADF statistic against their critical values at 95% level. However the test statistics of the first than their critical values. Thus, the variables are said to be of order (1) as differencing once eliminated the unit root and ensured stationary.

Co integration Test

As follow up to the unit root test, co integration test is used to determine the existence of long run relationship between the dependent and independent variables. The test technique used here is the Johansen method. The method test the null hypothesis of no co integrating relationship. That is $r=0$ versus $r \geq 0$. The test is presented below.

The test's results in the table 2 below suggest the existence of more than one co integrating relationship. The conclusion is based on the statistics of the maximal eigenvalue and the trace of stochastic matrix against their critical values at 95%.

Granger Causality Test

The next is to present the estimated Vector Error Correction Model (VECM), but in line with the objectives of this study, we first of all, present the Granger Causality Wald Test result for inflation and other monetary policy indicators. The test is presented in the table below

The interpretations of the Granger Causality results presented in table 4.4 are based on the chi Square statistics and probability value. In statistics, for a variable to be significant, its Chi Square value must be in excess of 2 in absolute value or the probability value must be less than 0.05, when we use 5% level of significant. Based on the decision rule stated above, the result shows that inflation rate has unidirectional Granger causality relationship with interest rate, no causal relation with broad money supply, exchange rate and GDP respectively. No Granger causal relation between gross domestic product and broad money supply. The only serious Granger causal relations were shown between interest rate and gross domestic product and broad money supply. Also all the variable put together, each of these variables Granger causes others. With these results we can conclude that inflation rate only has a unidirectional Granger causal relation with interest rate and the dynamism is presented in the graph see appendix.

Analysis of the Vector Error Correction Model Estimation

Under this analysis (VECM) we are not interpreting the coefficients of the variables, (this is because in VAR and VECM the interest truly is not on the coefficients of the variables) rather, we are interested on the impulse response and the variance decomposition of the variables, though the result of the estimation of VECM is presented in table 4.5 below;

Again, our interest here is how inflation has responded to the impulse of the monetary policy variables (broad money supply, exchange rate and interest rate and gross domestic product) selected for this study.

The result in the table show that apart from the response of inflation rate to its impulse, other monetary instrument show no impulse to inflation at the current period, all the response of inflation rate were seen in lag 1 period. The following impulse – response graph showed more clearer pictures of the relationship of inflation rate and other monetary policy instruments. It shows that inflation is negatively related with gross domestic product and exchange rate, and positively related with broad money supply and domestic credit.

In the variance decomposition result is carried out. The result shows higher decomposition rate in all the variables except between log of gross domestic product,

The graph shows the variance decomposition of monetary policy instrument in Nigeria. It is build on the concept of confident interval, the results shows transitory shock relationships among the variables unlike the permanent shocks shown in the first reported graphs. Those with smaller shaded portion (e.g. exchange rate and domestic credit) presents cases of permanent shocks, while the larger shaded portions (e.g., logm2 and DC) presents transitory shock relationships.

Interpretation of Result

In the first test carried out, all the variables were tested and found to be stationary at their first differences. This can be seen from the values obtained. From the test statistics which were greater than that of the critical values

at 5% significant level. In the second test carried in the granger causality test carried out it was found that inflation has a unidirectional causality with the Domestic credit and also, all the variables put together granger cause one another.

Finally, in the VECM test, where the impulse responses and variance decomposition of the variables were determined, it was revealed that while inflation was positively related to the domestic credit and money supply it was negatively related to real Gross Domestic Product and Exchange rate. This is in line with Sanyo (2000) findings.

Discussion of Findings

Money supply, lag of exchange rate and government expenditure as admitted are positively associated with inflation in Nigeria. The most profound impact is recorded by contemporaneous exchange rate variable. The inflation rate rises as contemporaneous government expenditure rises. These results are consistent with economic theory, which posits the existence of a positive relationship between money supply, exchange rate and government expenditure on one hand and the rate of inflation on the other hand.

The exchange rate in Nigeria has been depreciating over the years and it has exerted a positive impact on the rate of inflation in the economy. The reason is apparent given the import dependence of productive units; especially in the industrial sector. A depreciating exchange rate in this instance has implications for cost of production and cost of finished goods in the market. The findings suggest that it takes some time for its effect to manifest in the rate of inflation.

Government expenditure is found to be positively associated with price inflation in Nigeria. Again this conforms to the position of economic theory. This is in line with findings from various empirical results. Domestic credit in Nigeria did not meet the behavioral expectation because of the structural and administrative problems involved in domestic credit policies in Nigeria.

Conclusion

This study assessed the effectiveness of monetary policy as reducing inflation tools in Nigeria. This analysis is done using Vector Error Correction Model (VECM) estimate. This assessment became crucial in view of the role of monetary authority in Nigeria, which is anchored on the use of monetary policy that is usually targeted towards the achievement of full-employment equilibrium, rapid economic growth, price stability, and external balance.

This study also shown the effort of monetary policy at influencing the finance of government fiscal deficit through the determination of the inflation-tax rate did not affect both the rate of inflation and the real exchange rate, thereby causing volatility in their rates. And finally the study revealed that inflation affects volatility of its own rate as well as the rate of real exchange.

Policy Recommendation

Based on the findings of this study, the researcher recommends the following: That the monetary policy in Nigeria should be set in such a way that the objective meant to be achieved is well defined.

- i) The cost of inflation-focused monetary regimes should be checked, more than anything else. The cost of inflation-focused monetary regimes is to divert the attention of the some of the most highly trained and skilled economists and policy makers in Nigeria away from the tasks that previous generations of central bank took for granted as being their main job: to help this country develop, to create jobs, and to foster socially productive economic growth.
- ii) It is always crucial for central banks to balance their control instruments with the crucial task of macroeconomic stabilization. Otherwise both stabilization and development will be lost.
- iii) We have shown that in the short run, control of money supply may cause the attractor of actual unemployment because reducing inflation rate in any economy is also reducing employment due to the tradeoff between inflation and employment. If these conditions are not met, control of money supply and inflationary monetary policies may, under certain conditions, be unable to adjust the economy to the stable inflation equilibrium in the short run, but we have argued that these adjustment capacities may be asymmetric, and sometimes these monetary policies may be even be counterproductive.
- iv) Interest rate in Nigeria should be totally liberalized if it is expected to be a strong monetary policy instrument of price level and output movement. The forces of demand and supply should be allowed to determine its rate in Nigeria.
- (vi) To control inflation, there should be control of money supply by way of reducing government fiscal budgeting and society need to be sanitized ensuring fiscal discipline.
- (vii) Also, government should stimulate the productive capacity of the economy especially the agricultural sector to increase food production so that prices will come down and consequently reduce inflation.

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Table1

Table4. 1: Unit Root Test Statistics

Variables	ADF*	Variables	ADF**
InPF	-4.0438	DInPF	-5.9150
InRY	-2.0718	DInRY	-3.7842
InMS	-3.1632	DInMS	-5.0701
InEXR	-2.2550	DInEXR	-3.7633
InDC	-2.3041	DInDC	-4.6663
InGEX	-1.8166	DInGEX	-3.7443

Source: Author's Computation

*95% critical value=-3.5671

**95% critical value=-3.5731

Table 2

Table4. 2: Co integration Test Statistics

Null	Alternative	Test Stat.(Max)	95% Critical	Test Stat(Trace)	95% Critical
$r \leq 0$	$r=1$	47.8971	43.6100	172.6574	115.8500
$r \leq 1$	$r=2$	41.2230	37.8600	124.7603	87.1700
$r \leq 2$	$r=3$	29.0549	31.7900	83.5400	63.0000
$r \leq 3$	$r=4$	22.8246	25.4200	54.4851	42.3400
$r \leq 4$	$r=5$	16.7373	19.2200	31.6605	25.7700
$r \leq 5$	$r=6$	14.9232	12.3900	14.9232	12.3900

Source: Author's Computation

Table 3
Table 4.3: Granger Causality Wald Test result

Equation	Excluded	chi2	Df	Prob > chi2
LogPF	LogRY	1.2235	1	0.269
“	LogM2	1.5924	1	0.207
“	LogEXR	0.03222	1	0.858
“	LogDC	2.7798	1	0.095
“	ALL	9.8349	4	0.043
LogRY	LogPF	1.715	1	0.190
“	LogM2	0.3232	1	0.570
“	LogEXR	0.52307	1	0.470
“	LogDC	2.6222	1	0.105
“	ALL	6.3129	4	0.177
LogM2	LogPF	4.0e-05	1	0.995
“	LogRY	1.7207	1	0.190
“	LogEXR	0.02914	1	0.864
“	LogDC	0.54506	1	0.460
“	ALL	2.3009	4	0.681
EXR	LogPF	0.77481	1	0.379
“	LogRY	0.78322	1	0.379
“	LogM2	0.0963	1	0.756
“	LogEXR	0.70043	1	0.403
“	ALL	6.6369	4	0.156
DC	LogPF	0.96605	1	0.326
“	LogRY	4.6261	1	0.031
“	LogM2	6.0134	1	0.014
“	LogEXR	0.11468	1	0.735
“	ALL	10.047	4	0.040

Source: The Author's computation

Table 4

Table 4.4: Vector error-correction model (VECM)						
Sample: 1961 - 2009		No. of obs = 49				
Log likelihood = -200.6244		AIC = 8.760178				
Det(Sigma_ml) = .0024772		HQIC = 8.96525				
		SBIC = 9.300698				
Equation	Parms	RMSE	R-sq	chi2	P>chi2	
D_logpf	2	.511296	0.4343	36.07695	0.0000	
D_logry	2	.081194	0.5242	51.78702	0.0000	
D_logm2	2	.061547	0.7079	113.9018	0.0000	
D_exr	2	11.223	0.0833	4.270816	0.1182	
D_dc	2	2.63713	0.0313	1.518417	0.4680	
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
D_logpf _ce1 L1. _cons	- .9028078 - .7903561	.1503376 .1518048	-6.01 -5.21	0.000 0.000	-1.197464 -1.087888	- .6081515 - .4928241
D_logry _ce1 L1. _cons	.025712 .1052912	.0238737 .0241067	1.08 4.37	0.281 0.000	-.0210796 .058043	.0725037 .1525395
D_logm2 _ce1 L1. _cons	-.0042686 .0900359	.0180969 .0182735	-0.24 4.93	0.814 0.000	-.0397379 .0542205	.0312006 .1258513
D_exr _ce1 L1. _cons	-2.786044 .5580599	3.299928 3.332133	-0.84 0.17	0.399 0.867	-9.253784 -5.9728	3.681696 7.08892
D_dc _ce1 L1. _cons	.872453 .9615611	.7754001 .7829674	1.13 1.23	0.261 0.219	-.6473033 -.5730268	2.392209 2.496149

Table 5

Table 4.5: Impulse – Response Functions

Step	(1) irf	(2) irf	(3) irf	(4) Irf	(5) irf
0	1	0	0	0	0
1	-0.097192	-0.171137	0.404853	-0.003968	0.017287

- (1) Irf name =order 1,Impulse=Log Inf and response=log Inf.
- (2) Irf name =order1,Impulse=Log Gdp ,and response=Log Inf
- (3) Irf name=order1,impulse=Logm2,and response=Log Inf
- (4) Irf name=order1,impulse=Exr and response=Log Inf
- (5) Irf name=order1,Impulse=DC,and response=Log Inf.

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