IS INFLATION A PURELY MONETARY PHENOMENON? EMPIRICAL INVESTIGATION FROM NIGERIA. (1970 –2009)

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Abstract:

This paper examines weather inflation is purely a monetary phenomenon in Nigeria using annual data from 1970-2009, the econometric approaches adopted in the paper is the Ordinary least square (OLS). This study comes out with empirical evidence that will help in understanding the causes of inflation in Nigeria. The study concludes that inflation is not a purely monetary phenomenon in Nigeria as the coefficient of broad money supply is less than unity. However, the variable is highly significant in explaining inflation in Nigeria. The result indicates that the regressors in the model are highly significant in causing inflation in Nigeria as shown by the F-statistic.

Keywords: Inflation, Monetary Phenomenon

1. Introduction

Inflation remains one of the major economic variables that can distort economic activities in both develop and less develop countries. Although it has been argue that moderately rising prices (single digit inflation) initially activates the level of economic activities (Adeoye 2002), continuous inflation however, is "evil" to any economy.At the micro-level, it arbitrarily redistributes income, wipes out savings, erodes real income (fixed income earners), leads to price distortions,and it brings about misallocation of society/economic resources at the aggregate level (Adeoye 2002). Thus, understanding the factors driving inflation is very vital for the formulation and implementation of appropriate macroeconomic policies. The monetarist led by Milton Friedman believes that inflation is always and everywhere a monetary phenomenon. This monetary view is based on the quantity theory of money by

Irving Fisher (1948) depicts that changes in money supply growth are followed by equal and proportionate changes in the inflation rate. Thus, the monetarists posit that contractionary monetary policy will be an effective anti-inflationary instrument. Studies on the impact of inflation on economic growth and the direction of causality between money supply growth and inflation are repleted in the literature (Oyejide 1972). However, very few studies have tried to examine whether inflation is purely a monetary phenomenon in Nigeria (Bakare 2011). However, the study is different from other study as it examine whether inflation is purely a monetary phenomenon in Nigeria using recent data. In attaining the above objective, this study would provide answers to the following research questions; is the growth of money supply statistically significant in causing inflation in Nigeria?,does money supply have a direct and proportionate relationship with inflation in Nigeria.

The paper is sub-divided into five sections, following this introduction, is section two which focus on empirical literature review, and stylized facts on growth of money supply and inflation in Nigeria. Section three presents the theoretical framework and methodology of the study; the presentation and analysis of result is done in section four while the policy recommendation and conclusion is presented in section five.

2. Empirical Literature Review

Inflation is one of the most important economic variables that can distort economic activities of any country. As a result, there exist a large number of empirical studies on the determinant of inflation. Khan and Schimmelpfennig (2006) studied factors that explain and help forecast inflation in Pakistan. A simple inflation model was specified that included standard monetary variables (money supply, credit to the private sector), an activity variable, the interest and the exchange rates, as well as the wheat support price as a supply-side factor. The study performed comprehensive analysis of data and estimated the Vector Error Correction model. Impulse response function of CPI inflation, private sector credit growth and wheat support price was estimated. Malik (2006) studied the effects of monetary policy actions on inflation using Near-VAR approach. His results showed that effect of monetary policy transmits into inflation with a lag of half year and then take another year to reach the peak. This study suggested the identification of variables that are most important in explaining inflation in Pakistan by considering monetary policy actions, supply side factors and foreign inflation.

Cheng and Tan (2002) employed the Johansen's co-integration test and VECM approach to examine the long run equilibrium relationship and the causality direction

between inflation and its determinants (i.e. money supply, output, interest rate, exchange rate and trade balance) in Malaysia. They found that the variables are co-integrated, but there is no evidence of direct causal effect runs from money supply to inflation in Malaysia. In the same vain, Tang and Lean (2007) found that the effect of money supply (M1) on inflation in Malaysia is negative and statistically significant at 1 per cent level. This finding did not support the monetarists' view that inflation is a result of excessive rate of expansion of money supply.

In Nigeria, Oyejide's 1972 study constitutes a pioneering attempt at providing an explanation of the causes of inflation in Nigeria, most especially from the structuralist perspective. Specifically, he examined the impact of deficit financing in propagating inflation processes in Nigeria and concluded that there was a very strong direct relationship between inflation and the various measures of deficit financing that were in use between 1957 and 1970. In a commissioned study for the Productivity, Prices and Incomes Board of Nigeria, Ajayi and Awosika (1980) found that inflation in Nigeria is explained more by external factors, most especially the fortunes of the international oil market and to a limited extent by internal influences.

Adeyeye and Fakiyesi (1980) estimated and tested the hypothesis that the main factor responsible for instability of prices and inflationary tendencies in Nigeria was government expenditure. Working with annual time series data spanning 1960–1977, they tested the hypothesis that the rate of inflation in Nigeria is linearly related to the rate of growth of money stock, government expenditure, especially deficit, and growth of government revenue, especially monetization of foreign exchange from oil export. The result established some significant positive relationships between inflation rate and growth in bank credit, growth of money supply and growth in government expenditure, while the relationship with growth of government revenue was uncertain.

Using quarterly data, Osakwe (1983) attempted to verify the amount of government expenditure that affected money supply in the ten-year period 1970–1980. Significant statistical evidence obtained from the analysis showed strong relationships between increases in net current expenditure and growth in money supply, on the one hand, and growth in money supply and inflation, on the other hand. Further increases in money wage rate and money supply (with a lag in effect) were identified as the two most important factors that influenced the movement of prices during the period.

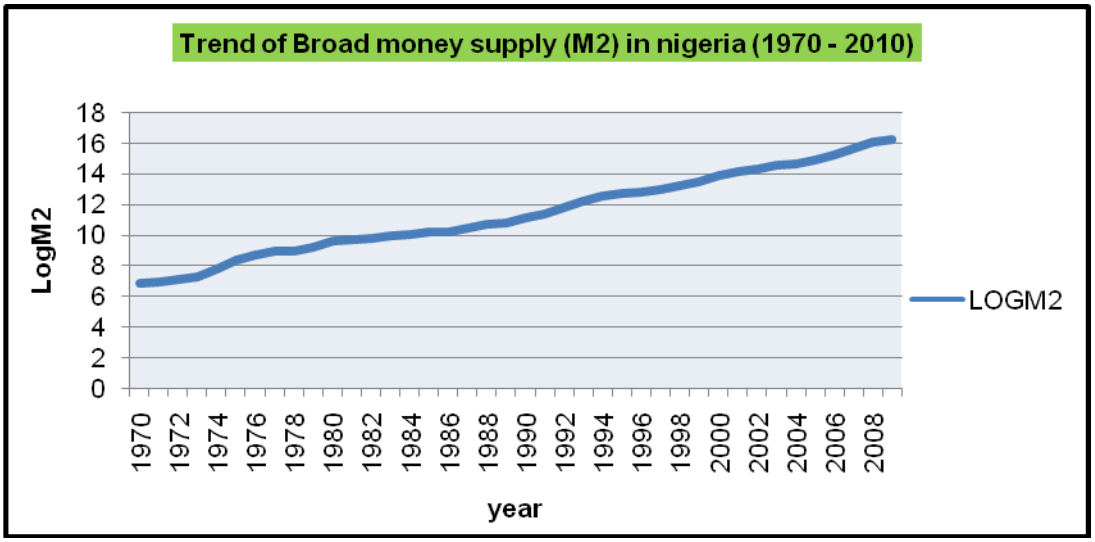
Fashoyin (1984) in a study with respect to the impact of structural phenomenon on inflation in Nigeria identified ten structural variables (agricultural bottlenecks, industrial production, imports, exports, food import and production, trade union militancy, indirect taxation on companies, wage bill, government expenditure – deficit financing and money supply) responsible for inflation in Nigeria. Regressing the rate of inflation on the ten variables using the Ordinary Least Square (OLS) approach, the results indicated that money supply; wages, imports, exports, food import and indirect taxation had significant positive relationships with inflation. However, other variables provided inconclusive results due to unavailability of data for computation.

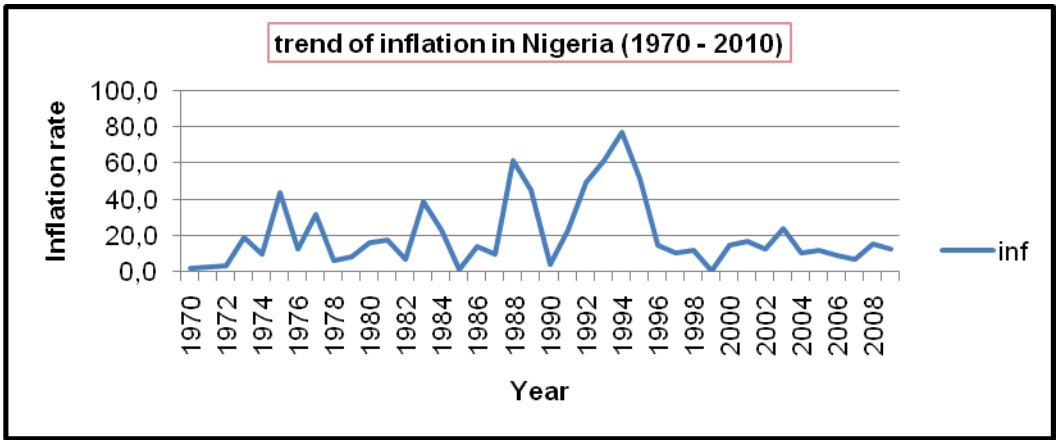
Nwaobi (2002) used data from 1960 through 1995 and the Johansen co-integration framework found that money demand, real GDP, inflation and interest rate are co integrated in Nigeria. He also found stable money demand in the period under study. Fatukasi (2004) investigated the determinants of inflation in Nigeria between 1981 and 2003. The study made use of non-linear multiple regression models. He posited that the causes of inflation in Nigeria are multi-dimensional and dynamic, requiring full knowledge at any point in time to be able to proffer solutions to the inflationary trends in the country.

Omokeet. al., (2010), tested the causal long-term relationship between budget deficit, money growth and inflation in Nigeria. Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) test were carried out to test the stationarity of the variables used. The result of the study pointed to a close long-term relationship between inflation and money supply. Olusanya (2009) analyzed the main sources of fluctuations in inflation in Nigeria. Using the framework of error correction mechanism (ECM) it was found that the lagged CPI, expected inflation, petroleum prices and real exchange rate significantly propagate the dynamics of inflationary process in Nigeria.

Bakare (2011) conducted a study on the determinants of money supply growth and its implications on inflation in Nigeria. The study employed quasi-experimental research design approach. The results showed that credit expansion to the private sector determines money supply growth and inflation in Nigeria. He therefore concluded that changes in money supply are concomitant to inflation in Nigeria.

3. Stylized Fact on inflation rate and growth of Money supply in Nigeria





4. Theoretical Framework and methodology

The theory guiding this study is the famous quantity theory of money propounded by fisher (1911). The theory in its simplest form depicts that changes in the stock of money supply will be translated into equi-proportionate change in the general price level (inflation rate). This is based on the assumption that at full employment, the level of transaction (national output) and velocity is constant, or at least change slowly. Thus, inflation will be directlyproportional with the quantity of money stock. The starting point of the quantity theory of money is the popular identity:

$MV = PY$ ..... (1)

Where M = money supply, V = velocity of money in circulation, Y = real national output, and P = aggregate price level. From equation 1, we can derive another equation

$$P = \frac{MV}{Y} \text{ or } V = \frac{PY}{M} \quad \text{..... (2)}$$

From our discussion above, the proportional relationship between the money stock and general price level (inflation) can be shown in the elasticity of the price level with respect to the money supply is:

$$E_{pm} = \frac{\delta P}{\delta M}.\frac{M}{P} \quad \text{..... (3)}$$

Differentiating equation 1 totally yields

$$M\delta V + V\delta M = P\delta Y + Y\delta P \quad \text{..... (4)}$$

But δY and δV is constant at full employment. i.e. change in Y and V is zero at full employment. Thus equation 4 yields;

$$V\delta M = Y\delta P \quad \text{..... (5)}$$

$$\frac{\delta P}{\delta M} = \frac{V}{Y} \quad \text{..... (6)}$$

Substituting equation 6 into equation 3 yields

$$E_{PM} = \frac{V}{Y}.\frac{M}{P} \quad \text{..... (7)}$$

From equation 2, $V = PY/M$. Substituting this into equation 7, we have

$$E_{pm}\frac{1}{Y}.\frac{PY}{M}.\frac{M}{P} = 1 \quad \text{..... (8)}$$

Equation 8 above depicts that there is a direct proportional relationship between the general price level (inflation) and the growth rate of money supply, when velocity and output are constant. i.e., in a regression of inflation on money supply growth, the coefficient of money is estimated to be unity (1). The proportionality relationship imply that a permanent

increase in money growth leads to an equal increase in the rate of inflation (general price level)

Model specification

The model for this study is based on the theoretical framework above as adopted in the study carried out byGrauwe (2005), and Tang (2008). Thus the model for this study is specified as follows:

$$P_t = F(MS_t, Y_t) \quad \text{..... (9)}$$

Where P = General Price level at time t measured by the rate of inflation, MS = Growth of money supply at time t and Y = National output growth at time t proxy with real gross domestic product.Converting equation 9 into elasticity and specifying it in a regression form yields;

$$LOGP_t = \alpha_1 + \alpha_2 LOGM2_t + \alpha_3 LOGY_t + \mu_t \quad \text{..... (10)}$$

Whereu_t is white noise error term and is normally distributed. LOG indicates the natural logarithm of the respective variables. The quantity theory money says that there is a direct and proportional relationship between inflation and the growth of money supply. However, the relationship between the inflation and output growth is inverse since the economy is assume to be operating at full employment, increase output at full employment will bring about a fall in price.On the basis of these propositions we expect for β1 to be equal to unity, and a negative sign for β2. i.e., we expectβ_1 =1and β2<0.

Data Source

The study used yearly time-series data. Specifically, the data of interest are real gross domestic product, inflation rate and broad money supply (M2). These data are sourced from the Central Bank of Nigeria (CBN) statistical Bulletin (2010).

Estımatıon Technıque

The technique of estimation is the ordinary least square (OLS). The technique is considered due to its simplicity of it computation procedure in conjunction with optimal properties of its estimates.

Presentation and discussion of result

Table 1; presentation of result

Cpi = -7.152 + 0.916 – 0.116

(-11.507) (18.202) (-1.292)

R^2 = 0.97 F-stat = 667.915 D.W = 0.240

Note; value in parenthesis represent T statistics.

4.3 Dıscussıon Of Result

The coefficient of the multiple determination R^2: An evaluation of the ordinary least square (OLS) estimate show that 97 percent systematic variation of the level of inflation in Nigeria can be explained by the regressors. (MS2 and RGDP) This shows a good fit as about 3 percent systematic variation of inflation in Nigeria is left unaccounted for by the model which we attribute to the error term.

The F-statistic: the F- statistic is carried to test the overall significance of the estimated regression model. Thus, we compared the calculated F with the critical F value at 5 percent level (0.05) at k -1, i.e. (3-1 = 2) and N – K = 40 – 3 = 37 degree of freedom for the model. Where K = the number of parameter estimated and N = the number of the observed years. If F>F (0.05), we reject the null and accept the alternative hypothesis and if otherwise we accept the null hypothesis and reject the alternative hypothesis. From the statistical table, F 0.05 at (2, 37) degree of freedom is 2.84 while estimated F is 667.9. Obviously, it can be seen that F>F0.05 (i.e., 667.9 > 2.84). This shows that variation in inflation in Nigeria could be attributed to changes in the independent variables. This is also seen from the value of the probability of 0.0000.

Specifically, a percentage increase in previous growth of money supply increase the level of inflation by 0.916 percentages. The implication of this is that inflation is not purely a monetary phenomenon as the coefficient of growth of money supply is less than unity. The variable is statistically significant in explaining current level of inflation at the 5 percent level. This because the T- statistic value of 18.202 is greater than the T-tabulated value of 1.78. Also, the result indicates that during the period under study, a percentage increases in growth of gross domestic product decrease the level of inflation in the country. This

conforms to the quantity theory of money by the monetarists. However, the variable is not statistically significant in explaining the level of inflation in the country.

5. Conclusıon And Polıcy Recommendatıon

In this study the ordinary least square technique is use to examine whether inflation is purely a monetary phenomenon in Nigeria during the period 1970 to 2009. Following the quantity theory of money by fisher (1997) and the model byGrauwe (2005) and Tang (2008), we specify a model which expresses inflation as a function of growth of money supply and gross domestic product. The variables in the model have the expected sign as depicts by the quantity theory of money. However, the result showed that inflation is not purely a monetary phenomenon in Nigeria as the coefficient of growth of money supply is less than unity. Also the variables are jointly significant in explaining the dependent variable as showed by the $R^2$and F-statistic. Based on the result, we recommend that inflation in Nigeria should not be solely in the hands of the monetary authority.

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Appendix

obs	CPI	M2	RGDP
1970	0.200000	978.2000	4219.000
1971	0.200000	1041.800	4715.500
1972	0.300000	1214.900	4892.800
1973	0.300000	1522.500	5310.000
1974	0.300000	2352.300	15919.70
1975	0.400000	4241.200	27172.00
1976	0.500000	5905.100	29146.50
1977	0.600000	7898.800	31520.30
1978	0.700000	7985.400	29212.40
1979	0.700000	10224.60	29948.00
1980	0.800000	15100.00	31546.80
1981	1.000000	16161.70	205222.1
1982	1.100000	18093.60	199685.3
1983	1.300000	20879.10	185598.1
1984	1.800000	23370.00	183563.0
1985	1.900000	26277.60	201036.3
1986	2.000000	27389.80	205971.4
1987	2.200000	33667.40	204806.5
1988	3.500000	45446.90	219875.6
1989	5.300000	47055.00	236729.6
1990	5.700000	68662.50	267550.0

1991	6.400000	87499.80	265379.1
1992	9.200000	129085.5	271365.5
1993	14.50000	198479.2	274833.3
1994	22.80000	266944.9	275450.6
1995	39.40000	318763.5	281407.4
1996	50.90000	370333.5	293745.4
1997	56.30000	429731.3	302022.5
1998	60.70000	525637.8	310890.1
1999	64.80000	699733.7	312183.5
2000	69.20000	1036080.	329178.7
2001	82.30000	1315869.	356994.3
2002	92.90000	1599495.	433203.5
2003	106.0000	1985192.	477533.0
2004	121.9000	2263588.	527576.0
2005	143.6000	2814846.	561931.4
2006	155.5000	4027902.	595821.6
2007	163.8000	5809826.	634251.1
2008	182.8000	9166835.	672202.6
2009	205.4000	10767378	716949.7

Source; CBN Statistical bulletin (2009)

Dependent Variable: LOGCPI

Method: Least Squares

Date: 08/03/12 Time: 10:29

Sample: 1970 2009

Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.151536	0.621491	-11.50706	0.0000
LOGM2	0.916465	0.050349	18.20242	0.0000
LOGRGDP	-0.116362	0.090059	-1.292066	0.2043

R-squared	0.973048	Mean dependent var	1.898037
Adjusted R-squared	0.971592	S.D. dependent var	2.352027
S.E. of regression	0.396430	Akaike info criterion	1.059403
Sum squared resid	5.814795	Schwarz criterion	1.186069
Log likelihood	-18.18806	F-statistic	667.9149
Durbin-Watson stat	0.239731	Prob(F-statistic)	0.000000