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Monetary Policy and Price Stability in Nigeria: 1981-2015

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Abstract
The study investigated the impact of monetary policy on price stability in Nigeria. Annual data covering 1981 – 2015 were utilized. Unit root test was conducted using Augmented Dickey-Fuller test method and the result showed that the variables were stationary though at different levels. Co-integration test was also conducted using Johanssen co-integration technique and the result revealed that the variables in the model are co-integrated implying that the variables have a long run relationship. The model was estimated using ordinary least square method and the result revealed that money supply and liquidity ratio have a significant impact with price stability. The result revealed that 96.27 percent of the total variation in the model is caused by changes in the explanatory variables. Based on these findings, the study recommends that the central bank should adopt appropriate monetary policy by reducing money supply, increasing the liquidity ratio as these will lead to reduction in consumer's price index.
Keywords. Monetary policy; Price stability, Money supply

1.1 Introduction:

Monetary policy is the process by which the government, central banks or the monetary authority of a country controls the supply of money, availability of money and cost of money to attain a set of objectives oriented towards the growth and stability of the economy (Dimoji, Atorudibo and Onwuneme 2013). It is also concerned with the measures taken to regulate the supply of money, the cost and availability of credit in the economy (Ahuja 2011). Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy in consonance with the level of economic activities. It can be described as the art of controlling the direction and movement of monetary and credit facilities in pursuance of stable price and economic growth in the economy (CBN 1992). The principal objectives of monetary policy include: price stability, economic growth and balance of payments equilibrium (Jhingan, 2000). However, for most economies, the objectives of monetary policy include: price stability, maintenance of balance of payments equilibrium, promotion of employment and output, and sustainable development (Folawewo and Osunubi 2006). These objectives are necessary for the attainment of internal and external balance and the promotion of long-run economic growth (Imoughele, 2014).

1.2 Statement of problem:

In Nigeria, different types of monetary policy have been adopted and applied. Sometimes, tight monetary policy has been adopted and at other times loose monetary policy has been adopted mainly to stabilize prices. Unfortunately, irrespective of these different forms of monetary policies adopted and implemented, high rates of price instability have been experienced in Nigeria. Given the importance of price stability in an economy like keeping the value of money stable, eliminating cyclical fluctuations, reducing inequalities of income and wealth, encouraging economic growth and promoting economic welfare, the study therefore investigated the impact of monetary policy on price stability in Nigeria.

1.3 Objectives of the study:

The broad objective of the study was to investigate the impact of monetary policy on price stability in Nigeria. The specific objectives of the study were:

(i) To investigate the effect of money supply on price stability in Nigeria
(ii) To examine the effect of cash reserve ratio on price stability in Nigeria
(iii) To investigate the effect of liquidity ratio on price stability in Nigeria

1.4 Hypothesis of the Study:

In order to guide the study, the following null hypotheses were formulated:

H_{O1}: Money supply does not have any significant effect on price stability in Nigeria.
H_{O2}: Cash reserve ratio does not have any significant effect on price stability in Nigeria.
H_{O3}: Liquidity ratio does not have any significant effect on price stability in Nigeria

2.0 LITERUATURE REVIEW

2.1 Theoretical Framework

2.1.1 Classical view of monetary policy

In the classical system, the main function of money is to act as a medium of exchange. It is to determine the general level of prices at which goods and services will be exchanged. The relationship between money and price level is explained in terms of the quantity theory of money. The classical quantity theory of money states that the price level is a function of the supply of money. Algebraically,

MV =PT where M, V, P and T are the supply of money, velocity of money, price level and the volume of transactions. From the equation, the total money supply (MV) equals total value of outputs (PT) in the economy. Assuming V (the velocity of money) and T (the total output) to be constant, a change in the supply of money (M) causes a proportional change in the price level. Thus money is neutral. It is simply a 'veil' whose main function is to determine the general price level at which goods and services will be exchanged (Jhingan, 2010)

2.1.2 Keynesian view of Monetary Policy

Keynesian theory did not buy the idea that the relationship between money and price is direct and proportional. They share the view that it is indirect through the rate of interest. They also rejected the proposition that the velocity of circulation of money is constant. Keynesians believe that expansionary monetary policy increases the supply of loanable funds available through banking system, causing interest rates to fall. With the lower interest rates, aggregate expenditures on investment and interest-sensitive consumption goods usually increase, causing real gross domestic product to rise. Hence monetary policy affects real gross domestic product indirectly (Nwoko, Ihemeje and Anumadu 2016).

2.1.3 The Monetarist Theory

The monetarist essentially adopted Fisher's equation of exchange to illustrate their theory as a theory of demand for money and not a theory of output, price and money income by making a functional relationship between the quantities of real balances demanded a limited number of variables. Monetarist like Friedman emphasized money supply as the key factor affecting the wellbeing of the economy. Thus in order to promote steady growth rate, the money supply should grow at a fixed rate, instead of being regulated by the monetary authorities. Friedman equally argued that since money supply is substitutive not just for bonds but also for many goods and services, changes in money supply will therefore have both direct and indirect effect on spending and investment respectively such that demand for money will depend upon the relative rates of return available or different competing assets in which wealth can be (Udude, 2014).

2.2 Conceptual literature

Monetary policy is a deliberate effort by the monetary authorities (the central bank) to control the money supply and credit conditions for the purpose of achieving certain broad economic objectives (Anyanwu 1993). It is also seen as the process by which the government, central bank or monetary authority of a country control the supply of money, availability of money and cost of money to attain a set of objectives oriented towards the growth and stability of the economy (Dimoji, Atorudibo and Onwuneme, 2015). According to Ahuja (2013), monetary policy is concerned with the measures taken to regulate the supply of money, the cost and availability of credit in the economy. Jahan (2014) sees monetary policy as the process by which the government, central bank or regulatory power of an economy manages (i) the provision of cash (ii) accessibility of cash and (iii) cost of cash to acquire a set of goals focused towards the development and balance of the economic system. Monetary policy is equally seen as the credit control measures adopted by the central bank of a country (Jhingan, 2000)

The principal objectives of monetary policy are full employment, price stability, economic growth and balance of payments (Jhingan, 2000). In agreement with this, Okafor and Obasi (2011) further stressed that the goals and objectives of monetary policy are full employment, price stability, economic growth and development, and equitable distribution of income. According to Anyanwu (1993), objectives of monetary policy refer to the macro-economic goals which can change from time to time depending on the economic fortunes of a particular country. Generally, such objectives include maintenance of relative stability in domestic prices, attainment of a high rate of, or full employment, achievement of as high rapid and sustainable economic growth, maintenance of balance of payments equilibrium and exchange rate stability.

In other to achieve these objectives, central bank of Nigeria uses various instruments and these include: open market operation, required reserve ratio (RRR), bank rate, liquidity ratio, selected credit control and moral suasion (Udude, 2014; Okafor and Obasi 2011)

Monetary policy is of two main types: expansionary monetary policy and contractionary monetary policy. Expansionary monetary policy is traditionally used to try to combat unemployment in a recession by lowering interest rates, increasing the supply of money in the economy more rapidly than usual in other to stimulate economic activity. In the case of depression, the central bank buys bonds in the open market, lowers the reserve requirements of commercial banks, reduce the discount rate as well as encouraging public borrowing through selective credit measures. All these will lead to a decrease in the cost and availability of credit in the money

market and an improvement in the economy (Dimoji, Atorudibo and Onwuneme, 2013). A contractionary monetary policy is designed to curtail aggregate demand. It is used to overcome an inflationary gap. The economy experiences inflationary pressure due to rising consumers' demand for goods and services and there is also boom in business investment. The central bank starts contractionary monetary policy in other to lower aggregate consumption and investment by increasing the cost and availability of bank credit. It might do so by selling government securities in the open market, by raising reserve requirements of member banks by raising the discount rate and controlling consumer and business credit through selective measure. By such measures, the central bank increases the cost and availability of credit in the money market and thereby controls inflationary pressures (Jhinghan, 2000).

Price stability is the general level of prices in the economy. It is a situation where prices in an economy change slowly, or do not change at all. It also connotes avoiding a prolonged inflation or deflation. Price stability helps in achieving high level of economic activity and employment. It means that prices on average are stable over time. Price stability is one of major objectives of monetary policy.Price stability has a number of positive impacts on economic activity which include promotion of high standard of living, reduction in uncertainty about general price development, reduction in inflation premium risk, prevention of unnecessary hedging activities, prevention of arbitrary distribution of wealth and income. It also contributes to financial stability (Ajayi, 2012).

2.3 Empirical literature

Okwu, Obiakor, Falaiye and Owolabi (2011) examined the effects of monetary policy innovation on stabilization of commodity prices in Nigeria. The methodology adopted was empirical econometric analysis approach. Variables used for analysis were consumer price index (CPI), broad money aggregates (BMA) and monetary policy rate. The tool of analysis used in the work was a multiple regression model specified on perceived functional link between the indicators on Central Bank of Nigeria's monetary policy innovations and commodity prices indicator (CPI). The result showed that positive relationship existed between the respective indicators of monetary innovations and indicator of commodity prices. Also monetary policy rate had more immediate effect than broad money on consumer price index, and that commodity prices responded more to monetary policy rate than to broad money aggregates. The result also indicated that although both broad money and monetary policy rates exerted positive effect on commodity prices, only broad money exerted significant effect at 0.05 level of significance but the overall effect of both on commodity prices were statistically significant.

Hameed, Khaid and Sabit(2012) presented a review of how the decisions of monetary authorities influence the macro variables like GDP, money supply, interest rates and inflation. The method of least square OLS explains the relationship between the variables under study. Tight monetary policy with balanced adjustments in independent variables shows a positive relationship with dependent variable

Abiodun and Tokunbo (2006) examined the efficacy of monetary policy in controlling inflation rate and exchange rate instability. The analysis performed is based on a rational expectation framework that incorporates the fiscal role of exchange rate. Using quarterly data spanning over 1980:1 to 2000:4 and applying time series test on the data used. The paper shows that the effort of monetary policy at influencing the finance of government fiscal deficit through the determination of the inflation tax rate affects both the rate of inflation and the real exchange rate thereby causing volatility in their rates. The paper reveals that inflation affects volatility of its own rate, as well as the rate of real exchange. The policy import of the paper is that monetary policy should be set in such a way that the objective it is to achieve is well defined.

Amassoma, Nwosa and Olaiya (2011) appraised monetary policy development in Nigeria and also examined the effect of monetary policy on macroeconomic variables in Nigeria for the period 1986 to 2009. The study adopted a simplified ordinary least square technique and also conducted the unit root and co-integration tests. The findings of the study showed that monetary policy has witnessed the implementation of various policy initiatives and has therefore experienced sustained improvement over the years. The result also shows that monetary policy had a significant effect on exchange rate and money supply while monetary policy was observed to have an insignificant influence on instability. The implication of this finding is that monetary policy has had a significant influence in maintain price stability within the Nigerian economy. The study concluded that for monetary policy to achieve its other macroeconomic objective such as growth, there is need to reduce excessive expenditure of the government and align fiscal policy along with monetary policy measure.

Okwo, Eze, and Nwoha (2012) examined the effect of monetary policy outcomes on macroeconomic stability in Nigeria. Data was gathered for a time frame of 1985 to 2010. A simplified ordinary least square technique stated in multiple forms was applied to the data after ensuring data stationarity. At 5% significant level, none of the variables are statistically significant. The insignificant statistics between monetary policy, gross domestic product, credit to the private sector, net credit to the government and inflation in Nigeria, suggest that monetary policy as a policy option may have been inactive in influencing price stability. These considerations suggest that sound fiscal policies will be an important component of policy mix to price stability to be sustained and credible.

Godson (2013) looks at the effects of monetary policy on inflation in Ghana. Annual data from 1985 – 2009 were used to estimate the model. The study limited itself to these variables, interest rate, exchange rate and money supply on inflation. The result showed a long run positive relationship between money supply and inflation. The study recommends that monetary policy alone should not be used but fiscal and other non-monetary measures must be employed

3.0 Methodology

Multiple regression analysis was used in the study. Time series data spanning from 1981 to 2015 was sourced from the Central Bank of Nigeria statistical bulletin. The data was analysed using E-views.

3.1 Model specification

The equation specified for estimation is as follows:

CPI = f (MS, CRR, LR) …… (1)

Equation (1) above can be transformed into an econometric model as follows:

$$\mathbf{LOG(CPI) = b_0 + b_1LOG(MS) + b_2LOG(CRR) + b_3LOG(LR) + U}$$

Where CPI = Consumers' price index

MS= money supply

CRR = Cash reserve ratio

LR = liquidity ratio

U = stochastic variable or error term

b_0 = constant term

b_1, b_2, and b_3= parameters to be estimated

3.2 Apriori Expectation

$b_1 > 0$, $b_2 < 0$, $b_3 < 0$,

Since the data for the analysis is time series, the Augmented-Dickey Fuller (ADF) unit root test was employed to ensure data stationarity and avoid the problem of spurious regression. The Johansen test for co-integration was also employed to investigate whether there is existence of long run relationship among the variables in the model.

Table 1: Unit root test result

Variables	ADF test statistic	5% critical value	Order of integration
CPI	-5.848054	-2.9527	1(1)
MS	-3.872620	-3.5562	1(1)
CRR	-4.363565	-2.9558	1(1)
LR	-3.032957	-2.9527	1(0)

Source: Author's computation

The unit test result presented on table 1 showed that CPI, MS and CRR are all stationary at their first difference. This is because their various ADF test statistic are greater than their various 5% critical values in absolute terms. The result also showed that LR is stationary at level because its ADF test statistic is greater than its 5% critical value in absolute terms.

Table 2: Johanssen co-integration test result

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.620950	57.83309	47.85613	0.0044
At most 1	0.442944	25.82021	29.79707	0.1342
At most 2	0.178812	6.512262	15.49471	0.6349
At most 3	0.000338	0.011143	3.841466	0.9157

Trace test indicates 1 co-integrating eqn at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-value

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.620950	32.01288	27.58434	0.0126
At most 1	0.442944	19.30795	21.13162	0.0883
At most 2	0.178812	6.501119	14.26460	0.5498
At most 3	0.000338	0.011143	3.841466	0.9157

Max-eigen value test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The trace test indicates that there is 1 co-integrating equation both at 0.05 level and 0.01. This is evidenced by the probability value of 0.0044 associated with trace statistic value of 57.83309. The max-eigen value test also indicates that there is 1 co-integrating equation 0.05 level. This is also evidenced by the probability value of 0.0126 with max-Eigen statistic value of 32.01288. Thus these results showed that the variables are co-integrated. That is, CPI has a long run relationship with money supply (MS), cash reserve ratio (CRR) and liquidity ratio (LR).

Table 3: Regression result

Dependent Variable: LOG(CPI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.508545	1.114708	-3.147501	0.0036
LOG(MS)	0.695327	0.027028	25.72643	0.0000
LOG(CRR)	-0.101160	0.098943	-1.022405	0.3145
LOG(LR)	-0.648919	0.316219	-2.052121	0.0487

R-squared	0.962714	Mean dependent var	3.031045
Adjusted R-squared	0.959106	S.D. dependent var	1.631788
S.E. of regression	0.329985	Akaike info criterion	0.727671
Sum squared resid	3.375591	Schwarz criterion	0.905425
Log likelihood	-8.734240	F-statistic	266.8053
Durbin-Watson stat	0.581495	Prob(F-statistic)	0.000000

The result as presented in Table 3 gave the R-Square value as 0.962714 which implies that, about 96.27% of the total variation in consumers' price index (CPI) in Nigeria within the period under study, was explained by changes in money supply, cash reserve ratio, and liquidity ratio. The F-statistic of 266.8053 with the corresponding probability value of 0.0000 measured the adequacy of the regression model and the overall influence of Money supply, cash reserve ratio and liquidity ratio on consumer price index. Since P = 0.000 < 0.05 (level of significance), the model was a good fit and the explanatory variables (MS, CRR and LR) jointly exerted a statistically significant effect on the dependent variable (CPI). The presence of autocorrelation (Durbin –Watson = 0.581495) shows omission of other explanatory variables that accounted variation in consumer price index but were captured by our stochastic variable (U). The coefficient of the constant term stood at -3.508545 which implies that if all the explanatory variables (MS, CRR, and LR) is zero, the dependent variable (CPI) will fall by 3.508545 percent. The coefficient of money supply (MS) was 0.695327 which is in agreement with the a priori expectation of positive MS shows that on the average, a one percent increase in money supply (MS) leads

to 69.53 percent increase in consumers' price index (CPI). The t-value of money supply (MS) is 25.72643 with the probability value of 0.000 < 0.05 (level of significance) shows that money supply (MS) has a significant effect on consumer price index in Nigeria within the period under study. The coefficient of cash reserve ratio (CRR) was -0.101160 which is in agreement with the a priori expectation of negative cash reserve ratio (CRR) shows that on the average, a one percent increase in cash reserve ratio leads to 0.10116 percent decrease in consumers' price index (CPI). The t-value of CRR is -1.022405 with the probability value of 0.3145 > 0.05 (level of significance) shows that (CRR) has an insignificant effect on consumers' price index in Nigeria within the period under study. The coefficient of liquidity ratio (LR) was -0.648919 which is in agreement with the a priori expectation of negative liquidity ratio (LR) shows that on the average, a one percent increase in liquidity ratio (LR) leads to 0.648010 percent decrease in consumers' price index (CPI). The t-value of liquidity ratio (LR) is -2.052121 with the probability value of 0.0485 < 0.05 (level of significance) shows that liquidity ratio (LR) has a significant effect on consumer price index in Nigeria within the period under study.

4.1 Summary:

The effect of monetary policy on price stability in Nigeria for the period 1981 – 2015 has been examined in this study. The result of data analysis showed that money supply has a positive and significant effect on consumer's price index in Nigeria. The result also showed that cash reserve ratio has a negative and insignificant effect on consumers' price index in Nigeria while liquidity ratio has a negative and significant effect on consumers' price index in Nigeria. The joint effect of the explanatory variables on the dependent variable was statistically significant implying that these variables were considered important variables in explaining changes in consumers' price index in Nigeria within the period of study. The modeled and operationalized framework of analysis exhibited a very high explanatory power, thereby providing supporting evidence that the explanatory variables included in the model were relevant in explaining changes in consumers' price index in Nigeria within the period of study.

4.2 Conclusion:

The study therefore concludes that monetary policy affects consumers' price index in Nigeria.

4.3 Recommendation:

Based on these findings, the study recommends that the central bank should adopt appropriate monetary policy by reducing money supply, increasing the liquidity ratio as these will lead to reduction in consumer's price index.

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