



Ditimi Amassoma

Department of Economics
Faculty of Social Sciences
Federal University Oye-Ekiti, Nigeria
ditimi.amassoma@fuoye.edu.ng

Keji Sunday

Department of Economics
Faculty of Social Sciences
Federal University Oye-Ekiti, Nigeria
sunday.keji@fuoye.edu.ng

Emma-Ebere Onyedikachi

Department of Economics
Faculty of Social Sciences
Federal University Oye-Ekiti, Nigeria
obiajulu.emma-ebere@fuoye.edu.ng

The influence of money supply on inflation in Nigeria

DOI: 10.22367/jem.2018.31.01

Accepted by Editor Ewa Ziemia | Received: August 25, 2017 | Revised: October 10, 2017; October 26, 2017; November 7, 2017; November 24, 2017 | Accepted: November 28, 2017.

Abstract

Aim/purpose – The aim of this study is to empirically investigate the influence of money supply on inflation in Nigeria. The study was borne out of the curiosity to re-examine the immediate cause of the alarming rate of inflation in Nigeria which is adversely affecting the general welfare of Nigerian populace.

Design/methodology/approach – The study employed co-integration test and error correction approach on annual time series data spanning from 1970 to 2016 to ascertain both the long run and short run dynamics relationship among the variables under consideration.

Findings – The results showed that money supply does not considerably influence inflation both in the long and short run possibly because the country is in recession. The error correction model has the correct sign of negative and it is significant meaning that about 21% of the errors are corrected yearly. The Granger causality outcome demonstrates that, there is no causality between money supply and inflation in Nigeria within the study period and vice-versa.

Research implications/limitations – The implication of this is often that there are different economic conditions which are key determinant of inflation in Nigeria. The study recommends that the government should diversify the economy, minimise importation by encouraging local production of products and services. The Central Bank of

Nigeria should guarantee an exchange rate policy that is essentially determined by the state of the economy and not by speculators being a net importation economy. Also, the Central Bank of Nigeria should look inwards into the current interest rate and see how it can be regulated in such a way that will encourage private and foreign investors to be able to invest in the country. This in turn, successively increases income, infrastructure development and economic growth at large.

Originality/value/contribution – This paper has been able to confirm that money supply is not a key factor that trigger up inflation in Nigeria.

Keywords: error correction model, Granger causality, Central Bank of Nigeria.

JEL Classification: E51, E58, C22, C51.

1. Introduction

In the last few years, the caption that has covered the headline of newspapers, economic forums, one-to-one interviews, panel interviews, government agenda and so on has meandered around high inflation rate, high exchange rate, high interest rate, scarcity in the forex market, low or negative gross domestic product gross domestic product growth rate, corruption, civil wars, insurgency to mention a few in Nigeria and few other African countries which include Tanzania, Kenya, Ethiopia, etc. But the major concern of this study is that of high inflation rate which common to Nigeria and the likes; more so because, it is one of the key macroeconomic aims of the government. The reason for this is because it has a direct implication on the standard of living of the people in any country, especially in Nigeria. Surprisingly, politicians across the world look at this issue as if they are horrific visitation in the form of food shortages, self-inflicted hardship, poverty, foreign invasion or a plague, over which they have no control.

In Nigeria, the syndrome of inflation has been so alarming from the outset of the earlier and current administrations despite the various promises by politician both in the pre-democracy and democracy era to fight against it in Nigeria. Unfortunately, none of them have ever been managed to stabilise or even reduce this despicable syndrome. Particularly, in this current governance, inflation rate has wide-ranged from 9.2% and 18.3% at the end of the first and fourth quarters of 2016 and decline to 16.1% at the end of the second quarter in 2017 which stands to represent instability of prices in the economy. Correspondingly, the rise in the inflation rate has accounted for about 100% rise in price levels of commodities and facilities (First Securities Discount House [FSDH], 2016). Remarkably, this problem of high inflation has attracted much theoretical and empirical effort. Yet, the sixty-four million naira (Nigeria's currency) question of what are the factors that stimulate high inflation in Nigeria have not been properly

addressed (i.e. a very difficult question to answer). For instance, economic theory suggests that inflation is caused by growth in money supply in an economy.

All the more especially, the need to curb high inflation is inevitable to most researchers, policy makers and serious-minded government and as such has different opinion about the proper measures used in stabilising this syndrome. For instance, the school of thought that advocate for monetary policy measure believes that government should cut the money supply via credit refrain and stable budget deficit. As a matter of fact, the above suggestion is workable, however, with little defect, which is the tendency to truncate economic stability in the market mechanism as a result of the unprompted variation in inflation.

Be that as it may, the simple and practical solution is to curb the government expenditure which causes a deficit in the process of economic development. This is because when money supply treks up, it has the tendencies to depreciate the value of monetary units speedily therefore, leading to increase in the cost of living of everyone in the economy, de-motivate businesses, and therefore discourages investment due to high cost of doing business. The latter point of view account for the reason most investors (foreign and national) are moving their businesses away from Nigeria to other countries which in turn reduce economic growth as opined by Mbongo, Mutasa, & Msigwa (2014).

Conversely, the economic growth of Nigeria has not been too mesmerising, especially after the global financial crisis in 2007/2008. Though, the economy experienced a highly regarded growth in the post-independence era. In this period, i.e. from 1960-1970, real gross domestic product accounted for 3.1% annual growths. Similarly, real gross domestic product grew by 6.2% annually between 1970 and 1978. Regrettably, a negative growth surfaced in the early 1980's, but declined with the inception of SAP with real gross domestic product registering annual growth of 4% in the period 1988-1997. Overall, annual growth averaged was less than 3% for almost three decades after the discovery and exploitation of oil according to (National Petroleum Council [NPC], 2004).

More recently, the Nigerian economy has recorded an enviable stepping up in growth as real gross domestic product grew by 6.27%, 7.57%, and 7.38%, in 2009, 2010 and 2011, respectively. In the same vein, growth in real per capita income was 2.78%, 3.76% and 4.78% in 2008, 2009 and 2010 which averaged 3.77% for 2008, 2009 and 2010, respectively. Just at the end of the first, second, third quarters of 2016 and first quarter of 2017, the gross domestic product of Nigeria shrank by 0.36%, 1.5%, 0.8% and 0.5% in a year on year basis. Where the latter followed an upwardly revised 1.7% decrease in the earlier period. Therefore, it is the smallest fall in five quarters of contraction, as oil sector continued to decline although at a slower pace to mention a few as opined by (Na-

tional Bureau of Statistics, 2017, pp. 62-85) even though, economic growth highlighted above is not the core of this current study. However, the focus of this paper is to empirically investigate the extent to which money supply affects inflation in Nigeria.

Undoubtedly, there are many factors that are responsible for high inflation in Nigeria, these among others include: volatile nature of the naira to dollar exchange rate, lack of keen policy coordination, elongated deficit budget, over dependence on oil export and unfavourable balance of payments problem where import prices are on the high side and in turn leads to high domestic prices and rise in the price of goods and services especially when such country is import dependent like that of Nigeria.

Over and above, it is indubitable that the current high inflation rate is more of a structural perspective, than from a monetarism point of view. This is majorly because the country has refused to diversify its economy by investing into other sectors like manufacturing, mining sector, lack of proper legal frameworks in Forex management, and lack of focus in the agricultural sector. As a matter of fact, the most widely embraced school of thought on inflation is the Quantity theory of Money popularised by Irvin Fishers (1911) which stipulates that it is monetary therefore; its reduction should be ascribed to monetary policy, particularly at its first stages. This is because the growth of money is generally believed to have a great influence on economic activities of any nation. This is because a rise in money supply makes more money available in the hands of consumers and producers and thus generates consumption and investment.

Moreover, as money supply continues to rise, prices of goods and services begin to increase, especially if the growth of output reaches full capacity as demonstrated by (Bello & Saulawa, 2013). In addition, this increase in money stock would lead to wages and salaries minimum adjustment and budget deficit financing by the government through the Central Bank Nigeria as observed by Bhattarai (2011). In contrast to the above, if output is inelastic, it may be as a result of constraint in foreign exchange, technological backwardness or low productivity when there is a tendency that it will expose inflationary pressures.

To the best of the authors' knowledge, the reason for high inflation in Nigeria is more attributed to the latter view-point than the former. Except if such growth of money is adequately controlled through the Central Bank of Nigeria ensuring that it is consistent with the rate of economic growth in the country as buttressed by (Kwon, McFarlane, & Robinson, 2006). Furthermore, it is clear that there are mixed feeling and conflicting findings amongst earlier studies by authors and policy makers about the relationship between money supply and inflation. As a matter of fact, it was the study of Mbongo, Mutasa, & Msigwa

(2014) that have actually focused on the effect of money supply on inflation in Tanzania.

Outcomes from previous studies revealed that there is a mixed feeling on the subject matter under study. Therefore, the aim of this current study is to re-examine the effect of money supply on inflation in Nigeria. As a matter of fact, the reason for this current research is borne-out of the intent to contribute to the existing body of knowledge by re-appraising empirically the effect of money supply on inflation in Nigeria. Also, it intends to improve our knowledge about diverse explanation in the literature that has outlined money supply and inflation both in pragmatic and hypothetically as it relates to Nigeria. From the practical perspective, it is obvious that the contribution and findings of this study would be supportive to the government and policy makers in terms of helping them to understand the influence of money supply on inflation as well as building policies that will make ensure stability and sustainable development in the country.

The rest of the paper is structured around four sections; the next section discusses the literature reviews. Section three showcases methodology and data sources; section four presents the empirical analysis and interpretations. While section five provides conclusion, discussion and policy implication for recommendations.

2. Theoretical framework

The theoretical foundations employed by this study include the monetarism theory of inflation, Keynesian demand full theory and the structuralist theory.

2.1. Monetary theory of inflation

The theoretical underpinning of this current study will take its root from the monetarist theory. This is with reference to the purchasing power parity via the money supply and demand framework which shows how the monetary policy shocks fallout to inflation. Such that if the money stock rises without a corresponding increase in output, the extra money supply will simply bid up prices based on the quantity theory of money. As the price level rises, the exchange rate depreciates based on the purchasing power parity theory as put by Chamberlin & Yueh (2006). Based on the demand for money, the rise in money supply causes a fall in the domestic interest rate. The fall in the domestic interest rate results in an increase outflow of short-term finance from the country and a cut inflow, as depositors strives to take advantage of the relatively higher interest

rate abroad. The supply of the domestic currency on the foreign exchange market rises and the demand falls. However, the theoretical framework concentrates on the components and the impacts of monetary policy options in Nigeria economy. In contrast, inflation in Africa has been combated from more of a political economy perspective than from a macroeconomics approach rather than applying the traditional methods which Nigeria is inclusive according to (Laryea & Sumaila, 2001).

2.2. The Keynesian view

The Keynesian school of thought is known as demand side economist. Keynes economic theory proposes that changes in money supply will not directly affect the price and that visible inflation is the result of pressure in the economy expressing them in price and that those forces have no direct relationship with money supply. Notwithstanding, they emphasised that the factors that results to inflation can majorly be ascribed to fiscal divergence in the economy in form of cost-push factors and demand – pull inflation according to (O’Sullivan, 2002, p. 341; Sheffrin, 2003). Hence, concluding that the increases in government and private spending, natural disasters, increased prices, wage spiral is the causes of high inflation in developing countries including Nigeria.

2.3. Structuralist theory

This theory was first propounded by Prof. Gardner Ackley and he is of the view that inflation occurs as a result of the unbalanced economic system that is inherent in a country. Furthermore, the supporters of structural theories believed that inflation arises due to structural maladjustments in the country or as a result of some of the institutional features of the business environment. Consequently, they proffer both the use of monetary and fiscal measures for sorting out this economic problem.

3. Empirical evidence of the upshot between money supply and inflation

The influence of money supply on inflation has become an important focus in the global economy including Nigeria. Various studies have experimentally researched on the connection between money supply and inflation in many nations of the world. This is as a result of many conflicting and contrasting results

obtained by some of these studies. Accordingly, the classical theory of inflation explains how the aggregate price level gets determined through the interaction between money supply and money demand. The assumption that a given change in the rate of money growth induces an equal change in the inflation rate, prompting Friedman (1968) to claim that inflation is always and everywhere a monetary phenomenon, which this study proposes to dwell upon.

Numerous empirical studies on money supply and inflation relationship have been conducted in the literatures, although with varied results. For example, Bozkurt (2014) analyses money, inflation and growth relationship in Turkey by utilising co-integration test. The study used quarterly data of money supply (M2), GDP, velocity of money and deflator spanning between 1999Q1 to 2012Q4. The results show that money supply and velocity of money are the principal determinants of inflation in the long-run in Turkey. The results further buttressed that a 1% decreases in income directly reduces inflation by 1%. Similarly in Turkey, Koyuncu (2014) used the time-series approach for investigate the impact of the budget deficit and money supply on inflation for the period of 1987-2013. His study discovers that there is no causality from inflation to money supply. On the other hand, causality runs from money supply to inflation in Turkey.

In the same vein, Al-Fawwaz & Al-Sawai'e (2012) analysed the short run relationship between money, price level, and the gross domestic product (GDP) for the Jordanian economy. The results show that price level negatively correlates with the output level. Much earlier, for example study of Tyrkalo & Adamyk (1990) investigated the relations between both the money supply and inflation and between money supply and GDP. Their outcomes recognise a long-run connection between money growth and inflation. Likewise, Tang & Lean (2007) analysed the relation between money supply (MI) and inflation in Malaysia. Their regression outcome depicts that the impact of money supply (MI) on inflation in Malaysia is negative and statistically significant at 1% level. The implication from their study did not support the monetarist's view which pinpoints that inflation is purely a monetary phenomenon.

The studies of Lahiri (1991) and Chaudhary & Ahmed (1995) investigated the causal relationship between money and inflation in Yugoslavia and Argentina, despite the different in time lag. Their empirical results showed bi-directional relationship between money stock and inflation in Argentina and Yugoslavia. In contrast to the above, the study of Makinen & Woodward (1989) revealed from their empirical studies on hyper-inflation in Taiwan that there exists uni-directional causality between money supply and inflation with the causality running from inflation to money growth in the nation's economy.

In Nigeria, studies have focused on inflation dynamics and its determinants on short and long run, triggering factors of inflation, the influence it exerts on foreign direct investment, fiscal deficits, and economic growth. Recently, studies have dwelled on the impact of money growth on inflation Dynamics, monetary policy to mention a few.

Nevertheless, opinions based on the aforementioned studies have had noticeably altered signalling ability or efficiency of the monetary aggregates as monetary policy anchors according to Central Bank of Nigeria (2015, pp. 34-54). For instance, an earlier study by Ogunmuyiwa (2004), while conducting an enquiry into the factors that causes inflation in Nigeria, noted that although M2 is insignificant in explaining inflation movements in Nigeria, the Central Bank's monetary tools are more responsive to inflation and could be used to control it. In addition, Osakwe (1983) found that an increase in money supply and money wages (with lag-in-effect) was the principal factors influencing price movements. Inflation is a part of the most important economic variables that can distort economic activities of any country. The study concluded that policy linkage between inflation and monetary policy instruments in Nigeria and Ghana is not strong and predictable in the short run, thus suggested that both countries are not yet developed for inflation targeting.

In accordance with above, Waingade (2011) examined the connection between money supply and price level over a long-run period. The result of their study demonstrates that there exists a positive connection between growth in the cash supply and price level. The relationship between the two has, however, not been corresponding. The growth in money supply has more often than not surpassed the growth in inflation rate. The gap between the two is attributable to the growth in real national income. The above is followed up by the study of (Uduakobong, 2014) who empirically investigated the long-run causal relationship between money supply and inflation in Nigeria within the period 1970 to 2011. The author used a multivariate co-integration regression technique. The study revealed that there exist a long-run linear relationship between money supply and inflation in Nigeria, despite the fact that an investigation into causality revealed no causality between money supply and inflation in Nigeria. Though, real broad money supply at lag 1 exhibited a negative and significant influence on the inflation rate in Nigeria. Moreover, their outcomes exhibited that there is a long-run linear connection between the rate of inflation and its determinants.

Also, Maku, & Adelowokan (2013) inspected the dynamic of inflation in Nigeria utilising an autoregressive technique. The results demonstrate that there is a critical adjustment process of the dynamic of inflation rate while actual output growth rate and fiscal shortage are noteworthy determinants of the inflation

rate in Nigeria. They concurred that the objective of the monetary authorities' had prompted a relentless increment in prices which constituted a major macroeconomic challenge. Bakare (2011) undertook an investigation of the determinants of money supply growth and its implication on inflation in Nigeria. The investigation utilised a semi-exploratory research design approach. The results demonstrated that there is an unequivocal connection between money supply growth and inflation in Nigeria. Thus, presuming that deviation in money supply is accompanying to inflation in Nigeria.

In rundown, as indicated by the above empirical evidences, it demonstrates that numerous among the investigations inferred that money is the most vital variable that influences inflation over the long run and that inflation is to a great extent a monetary phenomenon while few among them believe that money is in a roundabout way corresponding to the price levels. Moreover, a superficial take a gander at the above reviewed empirical confirmations uncovered that there are clashing and uncertain findings among the prior investigations both in developing and developed economies which can fall into the accompanying.

It is in view of the above, that this current study seeks to re-examine empirically the dynamic influence of money supply on inflation on the ground of the monetarist theory of inflation which sees inflation strictly as a monetary phenomenon according to Milton Friedman (1968). This study intends to also know the direction of causality between money supply and inflation in Nigeria. This will be among the few studies that will fill the study gap in the literature within the Nigerian context.

4. Methodology and data

4.1. Sources of data and model specification

For the purpose of re-investigating if money supply is the cause of inflation in Nigeria or not. We employed data from Central Bank of Nigeria statistical bulletin (2010, pp. 23-45; 2016, pp. 34-54) and World Bank Development indicators. The data used for this study spans from 1970-2016. Based on previous studies like in the literature, about various arguments on the determinants of inflation, we specify that Inflation proxy by consumer price index (CPI) is a function of money supply (MS), output (GDP), real exchange rate (RER), domestic oil price (DOP), and monetary policy rate (MPR), government expenditure (GE) according to authors like (Mbongo, Mutasa, & Msigwa, 2014). Our model is as specified in equation (1):

$$CPI_t = f(MS, MPR, EXR, RGDP, DOP)_t \quad (1)$$

Equation (1) is written in an econometric form as seen in equation (2) below:

$$CPI_t = \beta_0 + \beta_1(MS)_t + \beta_2(MPR)_t + \beta_3(RGDP)_t + \beta_4(RER)_t + \beta_5(DOP)_t + \varepsilon_t, \quad (2)$$

Furthermore, in order to produce the most appropriate coefficient for the CPI with respect to the independent variables, we transform the model in equation (2) on a log-log econometric form as seen in equation (3).

$$\ln CPI_t = \beta_0 + \ln \beta_1 (MS)_t + \ln \beta_2 (MPR)_t + \ln \beta_3 (RGDP)_t + \ln \beta_4 (RER)_t + \ln \beta_5 (DOP)_t + \varepsilon_t, \quad (3)$$

where: ‘ \ln ’ represents natural log.

More so, the reason for log-log transformation among others is that, it will be helpful in following ways; to reduce the problem of multicollinearity, heteroscedasticity, achieve a better fit which in turn ensures actualising elasticity’s rather than slope hence making the variables to appear more symmetric according to (Gujarati & Porter, 2009). Since, we are interested in examining the impact of money supply and inflation and their long run interaction as well. We rely on an Autoregressive Dynamic Lag Error Correction Model (ADLECM). This approach has been used by (Mbongo, Mutasa, & Msigwa, 2014) to test the relationship between money supply and inflation in Tanzania. After testing for the existence of long run linear relationship between the variable, with the null hypothesis of no co-integration among the variables in equation (3) specified thus: $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ against the alternative hypothesis $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$. Accordingly, if the results show the existence of co-integration, then we can proceed to estimate the error correction model according to (Sorensen, 2005). Therefore, the need for disequilibrium in the short run necessitate the use of the Error Correction mechanism (ECM) in this study, so that one can treat the error term from eqn (3) as the equilibrium error which can then be used to tie the short run behaviour of the dependent variable to its long run value. Thus, the ECM model of this study is presented as follows:

$$\mu_t = \ln CPI_t - \beta_0 - \beta_1 \ln MS_t - \beta_2 \ln MPR_t - \beta_3 \ln RGDP_t - \beta_4 \ln RER_t - \beta_5 \ln DOP_t + \beta_6 t \quad (4)$$

$$\begin{aligned} \Delta \ln CPI_t = & \alpha_0 + \alpha_1 \Delta \ln MS_t + \alpha_2 \Delta \ln RER_t + \alpha_3 \Delta \ln RGDP_t + \alpha_4 \Delta \ln DOP_t + \\ & + \alpha_5 \Delta \ln MPR_t + \alpha_6 \Delta \mu_{t-1} + \varepsilon_t, \end{aligned} \quad (5)$$

where: ε_t is the white noise disturbance and μ_{t-1} is the lagged value of the error term in the previous model when the error term is non-zero, meaning that the model is in disequilibrium.

More so, the value of α_6 shows how fast the equilibrium converges. Furthermore, this study intends to use the Granger causality test to ascertain the direction of causality between money supply and inflation in Nigeria. The reason

for this is owing to the postulation of the Quantity theory of money which critics presumes a causal relation between money supply and inflation to be one-sided. Hence, the need to establish the exact direction of causality between these variables. This in turn, would prompt policy makers to point out the avenues of influence and outcomes after implementation of the policy. The granger causality for this study is expressed as follows:

$$\begin{aligned} Incpi_t = & \sum_{i=1}^p \alpha_{1i} Inms_{t-i} + \sum_{i=1}^p \beta_{1i} Incpi_{t-i} + \sum_{i=1}^p \phi_{1i} Indop_{t-i} + \\ & + \sum_{i=1}^p \Omega_{1i} Inrgdp_{t-i} + \sum_{i=1}^p \sigma_{1i} Inrer_{t-i} + \sum_{i=1}^p \psi_{1i} Inmpr_{t-i} + \mu_{1t} \end{aligned} \quad (6)$$

$$\begin{aligned} Inms_t = & \sum_{i=1}^p \alpha_{1i} Inms_{t-i} + \sum_{i=1}^p \beta_{1i} Incpi_{t-i} + \sum_{i=1}^p \Omega_{1i} Inrgdp_{t-i} + \\ & + \sum_{i=1}^p \sigma_{1i} Inrer_{t-i} + \sum_{i=1}^p \kappa_{1i} Indop_{t-i} + \sum_{i=1}^p \psi_{1i} Inmpr_{t-i} + \mu_{1t}, \end{aligned} \quad (7)$$

where; 'In' denotes natural logarithm, p is the maximum lag length, μ_{1t} , stochastic error terms (normally distributed with zero mean and constant variance).

4.2. Variable measurements

Data used in this paper are annual figures which spans from 1970 to 2016 and include consumer price index (headline consumer price index), money supply (narrow money), real exchange rate, domestic oil price, output proxy by real GDP, and monetary policy rate respectively are sourced from National Bureau of Statistics and Central Bank of Nigeria statistics bulletin (NBS, 2016, pp. 23-45). All of which were measured in naira except the rates. CPI was used to proxy inflation due to the fact that quantity theory of money though, accepted but criticised on the ground that there are different drivers of prices in an economy. Gross domestic product was used to proxy for output, while, the volatile nature of the naira to dollar exchange rate serves as the real exchange rate, monetary policy rate was used to proxy money market rate. Lastly, the money supply data is proxy by narrow money and is in billions of naira.

5. Empirical analysis and discussion of result

5.1. Preliminary analysis of variables

In an attempt to re-examine the influence of money supply on inflation in Nigeria, this section begins by first carrying out some preliminary analysis which include descriptive statistics, unit root test and co-integration test after which the empirical analysis for the study would be explored.

5.1.1. Descriptive statistics

Table 1. Descriptive statistics of variables in the study model

Specification	LCPI	LMS	LDOP	LRER	LRGDP	LMPR
Mean	1.667085	12.49025	1.111717	2.423160	13.93486	2.277053
Median	1.834180	12.19844	1.178655	3.085852	14.04588	2.484907
Maximum	5.364105	19.31790	4.976734	5.717028	18.43547	3.258097
Minimum	-2.302585	6.885714	-2.471004	-0.604404	8.347353	1.252763
Std. Dev.	2.532786	3.675899	2.620173	2.346094	3.167716	.513162
Skewness	-0.118016	0.403930	-0.013838	-0.121182	-0.184820	-0.424360
Kurtosis	1.488367	2.176371	1.353424	1.351085	.794918	2.055003
Jarque-Bera	4.583958	2.606548	5.310957	5.439588	3.111512	.159470
Probability	0.101066	0.271641	0.070265	0.065888	0.211030	0.206030
Sum	78.35302	587.0415	52.25069	113.8885	654.9385	107.0215
Sum Sq. Dev.	295.0901	621.5628	315.8040	253.1912	461.5835	12.11344
Observations	47	47	47	47	47	47

Source: Authors computation from E-views 7.

Descriptive statistics demonstrate the unique features of the data used. For instance, in Table 1, the average mean and median value of LRGDP (13.93486), i.e. real gross domestic product is the highest among others (i.e. LCPI = 1.667085, LMS = 12.49025, LPOF = 1.111717, LRER = 2.423160, LMPR = 2.277053), respectively. Table 1, also confirms that 19.31790 is the maximum and -0.604404 the minimum. It is clear that LMS is highly volatile with the highest standard deviation. The values of skewness and kurtosis were also computed for 47 observations. Results exhibit that all variables are negatively skewed except the value of LMS which is positive, thereby implying that they are left long tail. Evidence from the Jarque-Bera (JB) test indicates that all variables utilised in the model are normally distributed. More so, that the variables are first differenced and computed by the ratio relative to prior observation.

5.1.2. Unit root test

To perform the unit root test, the researchers employed both Augmented Dickey Fuller and Philip Perron test. To achieve this, a null hypothesis that the variables have a unit root was set. Expectedly, after performing the test, it was discovered that based on the p-Value and t-statistics that the null hypothesis of a unit root should be accepted. This implies that all the variables of interest are not stationary at level, but after taking the first difference of these variables, they now became stationary using both the ADF and PP test as presented in Table 2. Hence, the first difference can be used for the purpose of economic analysis.

Table 2. Result of unit root test

Variable	AT LEVEL				AT FIRST DIFFERENCED			
	ADF-t stat	PP-t stat	CV at 5%	Decision	ADF-t stat	PP-t stat	CV at 5%	Decision
LMS	0.470090	0.605112	-2.926622	NS	-7.260224	-7.26191	-.2928142	S
LDOP	0.166940	0.166940	-2.926622	NS	-5.663817	-5.620572	-.2928142	S
LMPR	-2.296816	-2.083082	-2.960411	NS	-7.059619	-8.850366	-.2929734	S
LRER	-1.723612	-1.840679	-2.926622	NS	-3.250133	-3.250133	-.2918853	S
LCPI	-0.830764	-0.596874	-2.926622	NS	-3.523589	-3.403172	-.2928142	S
LRGDP	-1.287820	-2.990516	-2.926622	NS	-6.292812	-6.740605	-.2928142	S

Source: Authors computation from E-views 7.

5.1.3. Johansen co-integration test

Co-integration is a crucial test for the existence of long relationship among variables. As a matter of fact, this procedure relies heavily on the relationship between the rank of a matrix and its characteristic roots as buttressed by (Johansen, 1991). The result of the co-integration test is presented in Table 3.

Table 3. Result of Johansen co-integration test

Trace Test				Maximum Eigen Value Test			
Null	Alter native	Statistics	95% Critical Values	Null	Alter native	Statistics	95% Critical Values
$r = 0$	$r \geq 1$	205.744	95.7537	$r = 0$	$r = 1$	78.0476	40.0776
$r \leq 1$	$r \geq 2$	127.697	69.8189	$r \leq 1$	$r = 2$	58.9120	33.8769
$r \leq 2$	$r \geq 3$	68.7846	7.8561	$r \leq 2$	$r = 3$	33.7870	27.5843
$r \leq 3$	$r \geq 4$	34.9976	29.7971	$r \leq 3$	$r = 4$	18.2019	21.1316
$r \leq 4$	$r \geq 5$	16.7958	15.4947	$r \leq 4$	$r = 5$	12.5170	14.2646
$r \leq 5$	$r \geq 6$	4.27878	3.84147	$r \leq 5$	$r = 6$	4.27878	3.84147

Source: Authors computation from E-views 7.

From the above table, it was observed that the null hypothesis of no co-integration for $r = 0$, $r \leq 1$, $r \leq 2$, $r \leq 3$, $r \leq 4$, and $r \leq 5$ were rejected by the trace statistics method. Although, the null hypothesis $r \leq 3$ and $r \leq 4$ were accepted by

the maximum Eigen values statistics due to the fact that, their statistical value was less than their critical value. The implication is that there is a long run relationship among the variables with 3 co-integrating equations at 5% level of significance in the model.

5.2. Empirical analysis

5.2.1. Ordinary least square results

Evidence from the regression results in Table 4, shows the performance of the regression fit with probability of F-test (0.000). The overall performance of the model is relatively high with the adjusted R-squared (0.994), implying that 99.4% of the inflation in Nigeria is explained by the explanatory variables utilised in this study. However, since the study is interested in examining the short run dynamic influence of money supply on inflation, the study proceeds to the error correction model. Therefore, the result of the parsimonious error correction results is presented in Table 4.

5.2.2. Error correction model

The error correction model results show that there is mixed impact of the exogenous variables on inflation between the captured periods in the short run. Evidence from the F-statistics indicates that the explanatory variables are jointly significant. Hence, amplifying that output, money supply, price of fuel and exchange rate are significant in explaining the inflationary spiral in Nigeria in the short run. On the converse, money supply is not significant at least in the short run. R^2 value of 0.64 indicates that 64% of the variations in the response variables are accounted for by the changes in the explanatory variables. The value of DW statistics which is approximately (2.0) shows the absence of serial autocorrelation.

Table 4. Error correction model result

Variable	Co-efficient	Std Error	t-Statistic	Prob.
C	0.041139	0.024522	1.677675	0.1021
ECT (-1)	-0.206566	0.074042	-2.789842	0.0084
DLRGDP	0.179743	0.051017	3.523205	0.0012
DLDOP	0.114849	0.032010	3.587967	0.0010
DLCPI(-1)	0.427565	0.104490	4.091918	0.0002
DLRER(-2)	0.103789	0.047783	2.172087	0.0365
DLMPR(-1)	-0.134612	0.062627	-2.149434	0.0384
DLMS(-1)	-0.017618	0.033000	-0.533861	0.5967
R ² = 0.64, Adj. R ² = 0.58 F-Stat = 9.286, Prob. < F (0.0001), DW = 1.68				

Source: Authors computation from E-views 7.

For example, the coefficient of the past values of MPR (-0.135) and MS (-0.018) has a negative influence on the current value of inflation in Nigeria. Although, the former was found to be statistically significant while the latter statistically insignificant to the current value of inflation. This in turn, contradicts the popular monetary postulation which buttress that, the general price levels of goods and services is directly proportional to the amount of money supply which later leads an increase in the price level vis-à-vis inflation as buttressed by Moses, Tule, Obioma, Okpananchi Odeniran, & Olaoye (2015). Similarly, the current value of real GDP and the domestic oil price (DOP) were found to impact the current inflation figure in the economy. In addition, it was discovered that the first lagged value of inflation and second lagged value of the real exchange rate was found to exert influence on the current value of inflation in Nigeria positively.

Over and above, the adjustment coefficient error term was found to be non-zero and negative as expected and statistically significant at the 5% level shows the dynamic stability of inflation. Therefore, it can be inferred that in the short run, the model diverges from the equilibrium. In such a way that, any variation in the inflation via CPI can be regulated by adjusting the money supply, the real exchange rate, monetary policy rate, output and price of fuel respectively towards convergence in the equilibrium. This further suggests that the relation between inflation and the explanatory variables is significant for the long run plan as analysed above. More particularly, the co-efficient of the ECM_{t-1} in Table 5, i.e. -0.2065 , pinpoints the adjustment mechanism of the equilibrium with the break of the model at 0.27 units. The implication from the aforementioned is that 21% of the errors are corrected yearly from the previous periods in to the short run dynamic process.

5.2.3. The Granger causality test

The direction of causality between money supply and inflation has been noted by authors like Gujarati & Porter (2009) and Olorunfemi & Adeleke (2013). As a matter of fact, Granger causality test is applied to investigate the causal influence between money supply and inflation in Nigeria. This is because the direction of influence is significant to identify the possible source of causality which in turn can be helpful in policy implementation.

Table 5. The result of Granger causality test

Direction of causality	F-value	Observation	Probability	Decision
CPI → MS	0.1594	43	0.9574	Do not reject the null
MS → CPI	0.9170	43	0.4653	Do not reject the null
RER → CPI	2.6932	43	0.0473	Reject the null
CPI → RER	2.9820	43	0.0326	Reject the null
RGDP → DOP	6.3466	43	0.0006	Reject the null
DOP → RGDP	3.4751	43	0.0175	Reject the null

Source: Authors computation from E-views 7.

The direction of causality between money supply and inflation has been noted by authors like Gujarati & Porter (2009) and Olorunfemi & Adeleke (2013). As a matter of fact, Granger causality test is applied to investigate the causal influence between money supply and inflation in Nigeria. This is because the direction of influence is significant to identify the possible source of causality which in turn can be helpful in policy implementation.

However, from the result of the causality test in Table 5 above, it was discovered that we do not reject the null hypothesis of no causality at 5% level of significance. Meaning that, there is no causality between money supply and inflation, although the outcome of this study is consistent with the study of Koyuncu (2014) and Okwo, Eze, & Nwoha (2012) among others. Hence, purporting that money supply does not Granger cause inflation and vice-versa in Nigeria.

6. Conclusions and policy implication recommendation

6.1. Conclusions

This study investigates the influence of money supply on inflation in Nigeria. After exploring on all the needful, theoretically and empirically, the study concludes that money supply does not impact on inflation both in the short and long run in Nigeria. Despite the fact that, money supply exerted a negative but insignificant relationship with inflation in Nigeria both in the long and short run. This supports the work of Akinbobola (2012), thereby purporting that inflation has no explanation in money supply in Nigeria. As a result, the government of Nigeria should put in place other measures that trigger inflation which include high exchange rate, high interest rate and high domestic fuel price in order to achieve low inflation rate.

The study also revealed that monetary policy rate has an impact on monetary expansion which is accompanied with a reduced interest rate. This in turn

will make it possible for banks to provide credit to private sectors at a low lending rate thereby, fostering the economy. In this wise, the government can use inflation as a watch dog on the efficacy of monetary policy since, it is generally known as a monetary phenomenon. As against theoretical expectation, the study revealed that money supply is not a major cause of high inflation rate in Nigeria during the period under study, rather it emanates from a structuralist perspective.

6.2. Recommendation and policy implication

Consequently, the study recommends that the federal government through the monetary authorities should regulate monetary policy rate downwardly to encourage foreign and private investment in the country. This is because it will in turn boost productivity and economic growth at large. In addition, the government should reduce her outrageous expenditures and control the incessant budget deficit that has been recorded in Nigeria while the central bank should desist from creating cheap currency so as to curb excess supply of money in the economy. In addition, the government should diversify the economy; enact easy export policy, subsidise fuel price since they turn out to be one the factors that triggers high inflation in Nigeria possibly because of the ripple effect they exhibit on economic activities in form of high transportation, high prices of food, necessity items to mention a few. Therefore, the study suggests more focus on other factors that trigger inflation in the country other than money supply so as to reduce its menace on the economic well-being.

References

- Akinbobola, T. O. (2012). The dynamics of money supply, exchange rate and inflation in Nigeria. *Journal of Applied Finance and Banking*, 2(4), 117-141.
- Al-Fawwaz, T. M., & Al-Sawai'e, K. M. (2012). Output, money, and prices: The case of Jordan. *Journal of International Business Research*, 5(12), 223-229.
- Bakare, A. S. (2011). An empirical study of the determinants of money supply growth and its effects on inflation rate in Nigeria. *Journal of Research in International Business and Management*, 1(5), 124-129.
- Bello, M. Z., & Saulawa, M. A. (2013). Relationship between inflation, money supply, interest rate and income growth in Nigeria 1980-2010: An empirical investigation. *Journal of Economics and Sustainable Development*, 4(8), 23-39.
- Bhattarai, K. (2011). Impact of exchange rate and money supply on growth, inflation and interest rates in the UK. *International Journal of Monetary Economics and Finance*, 4, 355-371.

- Bozkurt, C. (2014). Money, inflation and growth relationship: The Turkish case. *International Journal of Economics and Financial Issues*, 4(2), 309-329.
- Central Bank of Nigeria (2010). *Statistical bulletin*, 4(5), Abuja: Author.
- Central Bank of Nigeria (2016). *Statistical bulletin*, 11(5), Abuja: Author.
- Chamberlin, G., & Yueh, L. (2006). *Macroeconomics*. UK: Thompson Learning.
- Chaudhary, M. A., & Ahmed N. (1995). Money supply, deficit and inflation in Pakistan, *The Pakistan Development Review*, 34(4), 945-995.
- Chowdhury, A. R., Dao, M. Q., & Wahid, A. N. M. (1995). Monetary policy, output and inflation in Bangladesh: A dynamic analysis, *Applied Economics Letters*, 2, 51-55.
- First Securities Discount House. (2016). *Inflation rate to accelerate*. Economic Intelligence Group, Access Bank. Retrieved from <https://www.fsdhsecurities.com/Top/Reports.aspxirst/news/NIGERIA%20ECONOMY/Inflation-Rate-to-Accelerate-to-17.2Percent-in-July-2016---Access-Bank-/32046>
- Fisher, I. (1911). *The purchasing power of money*. New York: MacMillan.
- Friedman, M. (1968). *The quantity theory of money*. London: Harvard Publisher.
- Gujarati, D. N., & Porter, D. (2009). *Basic Econometrics* (3rd ed.). United State: The McGraw-Hill.
- Johansen, S. (1991). Estimation and hypothesis testing of co-integration vectors in Gaussian. *Econometrica*, 59, 1551-1580.
- Koyuncu, F. T. (2014). Causality network between budget deficit, money supply and inflation: An application to Turkey. *International Journal of Business and Social Science*, 5(10), 54-65.
- Kwon, G., McFarlane, L., & Robinson, W. (2006). *Public debt, money supply, and inflation: A cross-country study and its application to Jamaica*. Washington, DC: International Monetary Fund.
- Lahiri, A.K. (1991). Money and inflation in Yugoslavia. *IMF Staff Papers*, 38(4), 751-788.
- Laryea, S. A., & Sumaila, U. R. (2001). *Determinants of inflation in Tanzania* (Working Papers WP/2001/12). Bergen, Norway: CMI.
- Makinen, G. E., & Woodward, R. (1989). The Taiwanese hyperinflation and stabilization of 1945-1952. *Journal of Money, Credit and Banking*, 21(1), 90-121.
- Maku, A. O., & Adelowokan, O. A. (2013). Dynamics of inflation in Nigeria: An autoregressive approach. *European Journal of Humanities and Social Sciences*, 22(1), 1175-1184.
- Mbongo, J. E., Mutasa, F., & Msigwa, R. E. (2014). The effects of money supply on inflation in Tanzania. *Economics*, 3(2), 19-26.
- Moses, K., Tule, E. C., Obioma, U. M., Okpananchi U. M., Odeniran S. O., & Olaoye O. J. (2015). *Monetary growth and inflation dynamics in Nigeria* (Working Paper Series CBN/WPS/01/2015/02). Abuja: Central Bank of Nigeria.
- National Bureau of Statistics (2016). *Statistical bulletin*, 4(5), Abuja: Author.
- National Bureau of Statistics. (2017). *Statistical bulletin*, 8(3). Abuja: Author.

- National Petroleum Council. (2004). Facing the Truth about energy: A comprehensive view to 2030 of global oil and natural gas, 15 June, Washington, DC: Author.
- Ogunmuyiwa, M. S., & Francis, E. A. (2010). Money supply – economic growth nexus in Nigeria. *Journal of Social Sciences*, 22(3), 199-204.
- Olorunfemi, P., & Adeleke, P. (2013). Money supply and inflation in Nigeria: Implications for national development. *Modern Economy*, 4(3), 161-170.
- Okwo, I. M., Eze, F., & Nwoha, C. (2012). Evaluation of monetary policy outcomes and its effects on price stability in Nigeria. *Research Journal of Finance and Accounting*, 3(11), 37-47. Retrieved from <http://www.iiste.org/Journals/index.php/RJFA/article/viewFile/3811/386h>
- Osakwe, J. O. (1983). Government expenditures, money supply and prices (1970-1980). *Journal of CBN Economic and Financial Review*, 21(2), 102-121.
- O'Sullivan, A. (2002). *Modern theories of inflation*, Boston: Addison Wesley – Longman.
- Sheffrin, S. M. (2003). *Economics: Principles in action* (2nd ed.). In association with The Wall Street Journal classroom edition, Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Sorensen, E. H. (1982). Rational expectations and the impact of money upon stock prices. *Journal of Financial and Quantitative Analysis*, 17(5), 649-662.
- Tang, C. F., & Lean, H. H. (2007). Is the Phillips curve stable for Malaysia? New empirical evidence. *Malaysian Journal of Economic Studies*, 44(2), 95-105.
- Tyrkalo, R., & Adamyk, B. (1999). Monetary policy transmission and its meaning to the effectiveness of NBU activity. *Herald of NBU*, 7(6), 11-22.
- Uduakobong, S. I. (2014). An empirical investigation of the relationship between money supply and inflation in Nigeria: An econometric analysis. *Journal of Economics and Sustainable Development*, 5(12), 149-155.
- Waingade, R. A. (2011). Money supply and inflation: An historical analysis. *The IUP Journal of Monetary Economics*, IX(1), 22-45.