The Upshot of Money Supply and Inflation in Nigeria

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Abstract

This study empirically investigates the upshot of money supply on inflation in Nigeria using annual time series data spanning from 1970 to 2016. Co-integration and Autoregressive Dynamic Error Correction Model (ADLECM) approach was utilized. 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 ECM 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. 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, minimize importation by encouraging local production of products and services. The CBN 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 CBN 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.

Keywords: *ECM, Granger causality, CBN, Nigeria, Infrastructure*

JEL Classification: E51, E58, C22, C51

1. Introduction

In the last few years, the caption that covers 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 i.e. the volatile nature of the Naira (Nigeria's currency) to dollar exchange rate, high interest rate, inadequacies in the forex market, low or negative gross domestic product (GDP) growth rate, corruption, political turbulence, insecurity to mention a few in Nigeria and few other African countries which include: Tanzania, Kenya, Ethiopia etc. Surprisingly, politicians across the world especially in developing countries which Nigeria is inclusive, look at inflation 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 in the last decade when its value moved from single digits to double digits in the third quarter of 2008 at a rate of 11.5 according to (IMF 2011 World Economic Outlook). However, it became more prominent in the last two years when its value increased from 9.0% in the fourth quarters of 2015 to 18.3% in the first quarters of 2017 accounting for about 100 percent rise in price levels of commodities and facilities (FSDH, 2016). Meanwhile, it has put economic agents vis-à-vis private sector, households, and government at a disadvantage in that income declines in real terms due to rising prices; get worsen especially if such inflation is sustained by high level of uncertainty and after making the cost of living to be on the high side according to (Greenridge et.al, 2009).

On the other hand, money supply can be seen as notes and coins circulating outside the central bank. Such that, an increase in money supply is described as direct monetary transmission mechanism which connotes that when money supply rises, it makes people in an economy to spend more of such money over money demand thereby making demand to exceed supply according to Ragan (2014). Therefore, to reiterate the commonly used economic slogan that economists are interested in ascertaining how a particular term is related to other ones. Which in turn gives rise to a sixty-four million dollar (meaning, the big and essential) question which goes thus: 'is money supply the cause of high inflation in Nigeria?'

Nevertheless, efforts to study whether or not money supply is the cause of high inflation would be futile without first addressing a question posed by the Federal Reserve Bank of San Francisco (FRB, 2002) 'what are the factors that contribute to a rise in inflation in a nation?' Otherwise asked as 'What are the determinant of inflation?' According to Bryan (2003), this is a great question because inflation rates and speculation are often mentioned in the media, pointing to their significance in stimulating or marring the economy with implications on individual's per capita income. In Nigeria, this is made possible by the national media which sensitizes the public on the values of this economic indicator as published by National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) respective on a monthly and quarterly basis. More so, an understanding of the sources of inflation will serve as a prerequisite to determine how effective economic policy that can be utilized to combat such inflationary pressure.

Meanwhile, before the above, it will not be out of place to first reckon with the most widely embraced theory of inflation known as the Quantity Theory of Money. This theory was first popularized by one of the foremost monetary economists called Milton Friedman, which stipulate that inflation is monetary therefore effort to trim it down should be ascribed to monetary policy. In particularly, when such inflation is at its first stage. Owing that, the growth of money is generally believed to have a profound influence on economic activities of any nation in the long run. The reason stems from the fact that a rise in money supply makes money more available in the hands of consumers and producers and thus generates consumption and investment as supported by the study of Bello and Saulawa (2013).

About the determinant of inflation, evidence from literatures accounted for the key determinant of inflation around the globe. For instance, Pinto (1990), argued that a rise in inflation can be attributed to the devaluation of currency possibly due to the unification of both the official and parallel exchange rate which in turn eliminate revenue from export earnings. To corroborate the above study, studies of Egwakhide (1994) and Imimole and

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Enoma (2011), emphasized that the devaluation of the currency could prompt up the general price level through an increase in the cost of production in the short run. Fakiyesi (1996) and Ajisafe (1996) analyzed the main determinant of inflation in Nigeria with a view to suggest the relevant policy that could be utilized to curb it. Consistently, their results found that money aggregate stands to be a fundamental factor that spurs inflation growth in Nigeria.

In the same vein, the study of Fullerton and Ikhide (1993) examined inflation dynamics in Nigeria. Their results suggested that, the acclaimed devaluation of naira in the late 1980s and 1990s, despite the rising prices of products, was responsible for further activates inflation in the country. Hence, emphasized that monetary factor is the sole component that can induce inflation without requiring for any reparation. More recently, Bawa et al., (2016), examined the dynamics of the inflationary process in Nigeria. Surprisingly, the results indicated that inflation in Nigeria exhibited a strong degree of inertia. Hence, stressing that past and average rainfall appears to be the main determinant of the inflationary process in Nigeria over the study period. In a similar but surprising study, Odusanya and Atanda (2010) analyzed the dynamics and simultaneous interrelationship between inflation and its determinants. Results showed that only GDP growth and inflation inertia are significant in explaining inflationary process in Nigeria. In developing countries like Mali, Mame (2007) investigated how consumer price inflation can be identified. The results revealed that money and external sector equilibrium were found to be the principal determinant of inflation in Mali. Similarly, in Egypt, Metwally and Al-Sowaidi (2004) employed a simultaneous equation to explain the nature and causes of inflation from 1986 to 2002. The results indicated that both demand pull and cost push factors are the core determinant of inflation in Egypt.

Therefore, after a brief examination of the determinants of inflation, it was discovered that variation in money aggregates, fiscal deficit, external sector equilibrium, oil prices, and currency devaluation among others is responsible for the inflationary process in Nigeria and other developing countries alike. Accordingly, monetary factors were found to be more prominent among the factors that trigger inflation thereby validating the submission of the monetarists' theorem. Worrisomely, in Nigeria despite, all attempts to increase government expenditure in order to stimulate aggregate demand have been unable to yield the required results. Instead, inflation keeps rising especially within the last decade. May be because key monetary variables like interest rate and overnight lending rates to mention a few have been on the high side in the name of 'cooling off' the economy by the central bank of Nigeria through their policy drive. It is in this context that this current study is interested in re-examining the above raised question. 'Is money supply a cause of high inflation in Nigeria? ' The essence of this is to determine the actual and immediate cause of the inflationary process in Nigeria. Furthermore, to confirm if inflation is connected with money supply or not and proffer the needed solution to enable the country to tread on a pathway of growth.

Meanwhile, the current economic restructuring that emanates from the economic condition Nigeria is facing calls for a study like this nature. Also, Nigeria just like other upward looking developing countries is going through a substantial process of liberalization with its major macroeconomic fundamentals in a muddled manner. Couple with the problem of political instability via terrorism, high inflation rates, high interest, and high exchange rate to mention few which in turn is currently causing financial meltdown and decline in the growth of real GDP at large. Recently, Nigerian economy has recorded an enviable stepping up in growth as real GDP grew by 6.27, 7.57, and 7.38 percent, in

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2009, 2010 and 2011, respectively. In the same vein, growth in real per capita income was 2.78 percent, 3.76 and 4.78 percent 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 GDP of Nigeria shrank by 0.36, 1.5, 0.8 and 0.5 percent in a year on year basis. Where the latter followed an upwardly revised 1.7 percent 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 NBS (2017) even though, economic growth highlighted above is not the core of this current study. Yet, it has an adverse effect on inflation rate in the country.

Furthermore, the reason for this current research is borne-out of the intent to contribute to the existing body of knowledge by re-examining empirically whether or not money supply is the cause of high inflation in Nigeria. Also, it plans 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 effect of money supply on inflation as well as building policies that will guarantee that stability and sustainable development is achieved in the country. The rest of the inquiry is structured in four sections; the next section discusses the literature reviews. Section three showcases the research methodology; section four presents the empirical analysis and discussion of results. While section five, provides conclusion and recommends policy implication.

2.   Literature review

There is a growing disparity between developed and developing countries regarding the role money supply plays in an inflationary process around the globe especially in developing economies which Nigeria is inclusive, despite the pivotal task it performs in stabilizing the economy and guarantee a good standard of living among others. Consequently, this has resulted into numerous studies in the empirical literature on the impact of money supply on inflation both in developed and developing economies with mixed feelings.

Basically, as regarding quantity theory of money, which equation states that MV = PT only holds when full-employment has been achieved by a country be it developed or developing as the case may be. From the identity, M stands for currency and others forms of money in circulation (i.e. M1, M2, M3), V refers to velocity of money, which is the number of times money changes hands, P is the prevailing price level and T represent the total volume of goods and services produced in an economy. As matter of fact, the left hand side of the stated equation symbolizes money supply while the right-hand side stands for demand for money, because money demand arises from transactions. In the short run, it is believed that both 'V' and 'T' are unchanged. Therefore, P is said to vary positively with M. In such a way that higher money supply leads to greater price level and vice versa. Consequently, a variation in money supply can result into a change in prices. Meaning that if a country is facing high rates of inflation, reducing the level of money supply would reduce inflation in a modest way and vice versa in case of disinflation and deflation. Although, critics have opposed the validity of this theory in the short run, while, some are of the opinion that it holds in the long run. For instance in developing countries like India,

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Turkey and Nigeria in the African region does not believe that the upheld assumption of the theory regarding the constant state of V and T holds.

Particularly in Nigeria, there is this believe that there are other dynamic prevalence in the country and political factors that triggers prices rather than just money supply. Moreover, it is believed that the theory works in one direction and not on the other. In the sense that, large volume of money supply may elevate prices but on the other hand, a reduction in money supply may not necessarily reduce prices as currently prevalence in Nigeria and India respective as buttressed by Shubhada-Sabade (2014). Hence, re-emphasizing the opinions of critics of the theory, ranging from Karl Marx, Keynes and monetarists counter position; all of which has agreed with the theory but with distinct and divergence opinion with respect to the driver of prices. For example, Marx points that, the driver of prices is production, Keynes emphasized on income and demand and Friedman dwells on the quantity of money.

On the other hand, according to the fiscal theory of price level, empirical evidence shows that government fiscal policy alters the price level, such that for prices to be stable, the government on its part ensure sustainable finances in the right direction; they must run a balanced budget, the business fluctuations must be without any record of deficit as opined by Leeper (1991) and Woodford (1994) among others. The question is that, in Nigeria has the country been able to meet up with all these requirements? The answer is 'No'. It is at this instance that the current study seeks to re-examination the question 'is money supply actually a cause of higher inflation' with particular reference to Nigeria. In Nigeria, there are several country–specific literatures regarding the relationship between money supply and inflation. For simplicity, these studies would be categorized into the following: those that believe that money supply causes inflation; money supply does not cause inflation and others.

With regards to those that are of the opinion that money supply cause inflation; for instance, Osakwe (1983) on the relationship between money supply and money wages. The study found that increase in money supply and money wages (with lag-in-effect) was the principal factors influencing price movements. Furthermore, they uphold that inflation is a part of the most important economic variables that can distort economic activities of any country. In consonance to the above, the study of Uduakobong (2014) empirically investigated the long-run causal relationship between money supply and inflation in Nigeria within the period 1970 to 2011. The study reveals that there exists a long-run linear relationship between money supply and inflation in Nigeria. Bakare (2011) undertook an investigation of the determinants of money supply growth and its implication on inflation in Nigeria. 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. Also, Olorunfemi and Adeleke (2013) explored on money supply and inflation in Nigeria. The results unfolds that money supply and exchange rate are key in stimulating inflation in the country.

On the studies that do not believe that money supply causes inflation in Nigeria. Ogunmuyiwa (2004), while conducting an enquiry into the factors that cause of inflation in Nigeria using time series data, noted that money supply is inconsequential in explaining inflation movements in Nigeria, although, marked that the Central Bank's monetary tools are more reactive to inflation and could be used to control it. Contrary to Ogunmuyiwa (2004), Chuku (2009), argued that monetary policy innovations carried out on the quantity-based nominal anchor money supply showed modest effects on output and prices with a very fast speed of adjustment. While, innovations on the price-based ostensible anchor

(MRR and REER) have neutral and fleeting effects on output and infers that the administration of the quantity of money advocated money supply in the economy is the most powerful instrument for financial policy usage. In contrast, these studies like Onitiri and Awosika (1982), suggested that neither monetary nor structural phenomenon alone explained Nigeria's inflation. One striking conclusion from this study was that a combination of both factors precipitates the inflation process.

Another line of argument is the position that money supply has positive impact on inflation rate in Nigeria.

Waingade (2011) examined the connection between money supply and inflation over a long-run period. The result of their outcomes demonstrates that there exists a positive connection between growth in the money 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. Sequel to the above, Oyejide (1972) examined the causes of inflation in Nigeria, with specific emphasis on the structuralist point of view. The author particularly, addresses the effect of deficit financing to stimulate inflation process in Nigeria and found that there is an exceptionally solid positive connection amongst inflation and the different measures of deficit financing that was utilized in the vicinity of 1957 and 1970. Moreover, their outcomes exhibited that there is a long-run linear connection between the rate of inflation and its determinants. In addition, Gary (1994) used an error correction model to determine the factors that affect inflation in Nigeria. The result pinpoints that, money expansion, spurred up by fiscal policies explains to a large degree the inflationary process in Nigeria. Little wonder, did the study of study of Busari (2007) on the determinant of inflation in Nigeria confirm that inflation is positively related to money supply and marginally to the fiscal deficit.

Odusola and Akinlo (2001) employed unrestricted VAR technique and impulse response to examine a study on output, inflation and exchange rate in Nigeria. Evidence from VAR results indicated a negative influence of inflation on the output. However, output and parallel exchange rate were found to be the major determinants of inflation dynamics in Nigeria. This was also supported by the study of Iyabode (1999) who utilized a two stage least square model to estimate inflationary trend in Nigeria during the period 1971 – 1995. The results confirmed the importance of parallel market exchange rate dynamics in determining inflation. In the same vein, Maku et al, (2013), inspected the dynamic of inflation in Nigeria utilizing 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.

From other developing economies, studies like that of Cevik and Teksoz (2013) employed co-integration and error correction models to investigate inflation dynamics in Libya. The study found inflation inertia to be key determinant of consumer price inflation in Libya. The result also indicated that government spending, money supply growth, global inflation, exchange rate pass-through and imposition and subsequent removal of international sanctions played central roles in the Libyan inflationary process. Also, Kabundi (2012) investigated with the use of the quantity theory of money to identify the main factors underlying inflation in Uganda. The study showed that both external and

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domestic factors affects inflation in Uganda, amongst which are money growth, world food prices, domestic supply and demand effects in the agricultural sector, energy prices and inflation inertia. Furthermore, Bozkurt (2014) analyzes money – inflation and growth relationship in Turkey by utilizing 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 showed that money supply and velocity of money are the principal determinants of inflation in the long-run in Turkey. 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; while on the other hand, causality runs from money supply to inflation in Turkey.

In the same vein, Al-Fawwaz and Al-Sawai'e (2012) analyzed the short run relationship between money supply, 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, study like that of Tyrkalo and Adamyk (1990) investigated the relations between both the money supply and inflation and between money supply and GDP. Their outcomes recognize a long-run connection between money growth and inflation. Likewise, Tang and Lean (2007) analyzed 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. 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) investigated the causal relationship between money and inflation in Yugoslavia and Argentina respectively 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 (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. More so, Mbonge et al., (2014) and Sabade (2014), posed a question 'is money supply the cause of inflation?' using an alternative postulate to understand inflation to test the validity of quantity theory of money in India. Their results pinpoints that the inflation dynamics playing out in developing economies are different and requires necessary re-visit. It is on this note that this current study seeks to re-investigate the upshot of money supply on inflation in Nigeria. In addition, the study intends to capture both the short and long run dynamic relationship in the model and equally find out if causality exist between them and if does, then, know the direction of causality.

3. Research methodology. Sources of Data and Model Specification

For the purpose of this study is to re-investigate the upshot of money supply on inflation in Nigeria. We employed data from Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank Development indicators. The data used for this study spans from 1970 – 2016. Based on previous studies 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; Mbonge et al., (2014) and Sabade (2014) etc. 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:

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

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) below.

$$In\mathrm{CPI}_t = \beta_0 + ln\beta_1(MS)_t + ln\beta_2(MPR)_t + ln\beta_3(RGDP)_t + ln\beta_4(RER)_t + ln\beta_5(DOP)_t + \varepsilon_t ......(3)$$

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, heteroskedasticity, achieve a better fit which in turn ensures actualizing elasticity's rather than slope hence making the variables to appear more symmetric according to Gujarati and 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 Mbonge et al., (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 Cointegration 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 a Dynamic Error Correction mechanism (ADLECM) 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 ADLECM model of this study is presented as follows:

$$\mu_t = Incpi_t - \beta_0 - \beta_1 Inms_t - \beta_2 Inmpr_t - \beta_3 Inrgdp_t - \beta_4 Inrer_t - \beta_5 Indop_t + \beta_6 t \quad .... (4)$$

$$\Delta In\mathrm{cpi}_t = \alpha_0 + \alpha_1 \Delta In\mathrm{ms}_t + \alpha_2 \Delta In\mathrm{rer}_t + \alpha_3 \Delta In\mathrm{rgdp}_t + \alpha_4 \Delta Indo\mathrm{p}_t + \alpha_5 \Delta In\mathrm{mpr}_t + \alpha_6 \Delta \mu_{t-1} + \varepsilon_t \ldots (5)$$

Where; εt is the white noise disturbance and $\mu t - i$ 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 $\alpha 6$ 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. Consequently, the need 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:

$$Incpi_t = \sum_{i=1}^{p} \alpha 1_i In\mathrm{ms}_{t-i} + \sum_{i=1}^{p} \beta_{1i} In\mathrm{cpi}_{t-i} + \sum_{i=1}^{P} \varphi_{1i} In\mathrm{dop}_{t-i} + \sum_{i=1}^{P} \Omega_{1i} In\mathrm{rgdp}_{t-i} + \sum_{i=1}^{P} \sigma_{1i} In\mathrm{rer}_{t-i} + \sum_{i=1}^{P} \psi_{1i} In\mathrm{mpr}_{t-i} + \mu_{1t} ....(6)$$

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$$Inms_t = \sum_{i=1}^{p} \alpha 1_1 \, Inms_{t-i} + \sum_{i=1}^{p} \beta_{1i} \, Incpi_{t-i} + \sum_{i=1}^{P} \Omega_{1i} \, Inrgdp_{t-i} + \sum_{i=1}^{P} \sigma_{1i} Inrer_{t-i} + \sum_{i=1}^{P} \phi_{1i} Indop_{t-i} + \sum_{i=1}^{P} \psi_{1i} Inmpr_{t-i} + \mu_{1t} \ldots (7)$$

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

Variable Measurements

Data used in this paper are annual figures which spans from 1975 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 (2016). 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 criticized 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 (Nigeria's currency) 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.

4. Results and Discussion

In an attempt to examine whether money supply impacts on inflation in Nigeria, this section begins by conducting some preliminary analysis (descriptive statistics, unit root test and co-integration test) on the variables employed in the study. The result is presented in Table's 1, 2 and 3 below.

Preliminary Analysis

Table 1.

Descriptive Statistics of Variables in the study model

	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	0.513162
Skewness	-0.118016	0.403930	-0.013838	-0.121182	-0.184820	-0.424360
Kurtosis	1.488367	2.176371	1.353424	1.351085	1.794918	2.055003
Jarque-Bera	4.583958	2.606548	5.310957	5.439588	3.111512	3.159470
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, LDOP =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 utilized in the model are normally distributed. More so, that the variables are first differenced and computed by the ratio relative to prior observation.

Unit Root Test

Table 2.

Result of Unit Root Test

Var.	AT LEVEL				AT FIRST DIFFERENCED			
	ADF-t stat	**PP-t stat**	**CV at 5%**	**Decision**	**ADF-t stat**	**PP-t stat**	**CV at 5%**	**Dec.**
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)

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 based on the p-Value and t-statistics that the null hypothesis of a unit root was not rejected. Meaning 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 (ADF and PP) test as presented in Table 2 above. Since, the variables are stationary at first differencing; we proceed to test the existence of long run relationship among the variables. The result of the Johansen co-integration test is presented in Table 3 below.

Johansen Co-integration Test

Cointegration 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 below.

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Table 3.

Result of Johansen Co-integration Test

Trace Test				Maximum Eigen Value Test			
Null	Alternative	Statistics	95% Critical Values	Null	Alternative	Statistics	95% Critical Values
r = 0	r ≥ 1	205.744	95.7537	r = 0	r = 1	78.0476	40.0776
r ≤ 1	r ≥ 2	127.697	69.8189	r ≤ 1	r = 2	58.9120	33.8769
Trace Test				Maximum Eigen Value Test			
Null	Alternative	Statistics	95% Critical Values	Null	Alternative	Statistics	95% Critical Values
r ≤ 2	r ≥ 3	68.7846	47.8561	r ≤ 2	r = 3	33.7870	27.5843
r ≤ 3	r ≥ 4	34.9976	29.7971	r ≤ 3	r = 4	18.2019	21.1316
r ≤ 4	r ≥ 5	16.7958	15.4947	r ≤ 4	r = 5	12.5170	14.2646
r ≤ 5	r ≥ 6	4.27878	3.84147	r ≤ 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 ≤ 1, r ≤ 2, r ≤ 3, r ≤ 4 and r ≤ 5 were rejected by the trace statistics method. Although, the null hypothesis r ≤ 3 and r ≤ 4 were accepted by the maximum Eigen values statistics due to the fact that, their statistical value was less than their critical values. The implication is that, there is a long run relationship among the variables with 3 cointegrating equations at 5% level of significance in the model.

Empirical Analysis

Table 4.

Ordinary Least Square Results

Variables	Coefficient	Std Error	t-stat	Prob.
LMPR	0.130411	0.091388	1.427006	0.1611
LMS	-0.022516	0.036837	-0.611228	0.5444
LPOF	0.245136	0.043510	5.634014	0.0000
LRER	0.074117	0.067590	1.096576	0.2792
LRGDP	0.565444	0.054304	10.41247	0.0000
C	-6.680139	0.365495	-18.27695	0.0000
R^2 = 0.995, Adj. R^2 = 0.994				
F-statistic=1628.813,prob>F=0.0000, Root MSE= 0.189874				

The result of the long run estimate in Table 4 clearly proves that money supply has a negative but insignificant relationship with price inflation in Nigeria although; this result was consistent with the study of Tang and Lean (2007).

Table 5.

Residual Stationarity test results

Variable	ADF Test	PP Test	Order of Integration
Residual	-3.90888	-3.07362	*I*(0)

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Error Correction Model

Co-integration and non-spurious regression are the fundamental requirements of ECM. Consequently, the results of co-integration test (Table 3) and regression residual test (Table 5, above) provide enough evidence of long run relationship among the variables under consideration as there are three cointegrating vectors and Stationarity of residual at level, therefore, the basis to estimate ECM. The result is presented in Table 6 below.

Table 6.

Results of the ADLECM

Variable	Coefficient	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)

The ECM results show that there is mixed impact of the exogenous variables on inflation between the captured period. Meaning that, some of the exogenous variables indicated a positive influence on inflation, while others had a negative influence on it in the short run. Evidence from the F-statistics indicates that the explanatory variables are jointly significant. 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. 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 in the current value of inflation. This in turn, contradicted the popular monetary postulation which buttress that, the general price levels of goods and services is directly proportional to the amount of money supply leads an increase in the price level vis-à-vis inflation (Moses et al. (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

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stability of inflation. Consequently, 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. More particularly, the coefficient of the ecm_{t-1}(-0.2065) in Table 6 pinpoints the adjustment mechanism of the equilibrium with the break of the model at 0.27 units. The implication from the aforementioned is that there is 21% of errors are corrected yearly from the previous periods in to the short run dynamic process. Despite, the appropriateness of the model, it was further verified by carrying out various diagnostic tests on the residual of the ECM model. They include: Normality test, Serial correlation LM test and Heteroskedasticity test respectively. Evidence from their results showed that the residuals of model passed the three tests based on their probability values (see appendix).

4.7. The Granger Causality Test

Table 7.

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 result of the causality test as shown in Table 7 reveal that the null hypothesis of no causality was not rejected at 5% level of significance. Meaning that, there is no causality between money supply and inflation, which outcome is consistent with the study of Koyuncu (2014). Hence, money supply does not granger cause inflation and vice-versa in Nigeria.

5. Conclusion and Policy implication recommendation

This study investigates the upshot of money supply on inflation in Nigeria. After exploring on all the needful theoretically and empirically literatures, the study concludes that money supply does not impact on inflation both in the short and long run in Nigeria. This is evidence from the results obtained from both the long and short run analysis. However, the outcome of this study tends to support the work of Akinbobola (2012) who posited that inflation seems to find no explanation on money supply in Nigeria.

As a result, the government of Nigeria should put in place other measure that triggers up inflation in Nigeria which includes: high exchange rate, interest rate and high domestic fuel price respectively in other to achieve low inflation rate. The study also revealed that monetary policy rate has an impact on money expansion that is accompanied

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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 and vice-versa. 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.

    The above result was also supported by the result of our Granger causality test, that there is no causality between money supply and inflation during the periods under study. Meaning that, money supply is not a major cause of inflation; rather it is caused by some structural factors in the country. Therefore, the study recommends that the federal government through the monetary authorities should regulate the monetary policy rate downwardly to encourage foreign and private investment in the country which in turn boosts 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, subsidize fuel price because they turn out to be among the factors that triggers high inflation in Nigeria possibly because of the ripple effect they exhibit on economic activities at large vis-a-vis transportation, prices of food, necessity items to mention few.

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