EFFECT OF NIGERIA EXPANSIONARY MONETARY POLICY ON INVESTMENT GROWTH

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Abstract- This study makes a modest contribution to the debates by empirically analyzing the relationship between Nigeria expansionary monetary policy (money supply) and investment growth (gross fixed capital formation), using time series data from 1970 to 2012, obtained from the Central Bank of Nigeria statistical bulletin and the West African Institute for Financial and Economic Management data base. It employs the Engle-Granger two step modeling (EGM) procedure to co-integration based on unrestricted Error Correction Model and Pair wise Granger Causality tests. From the analysis, my findings indicate that money supply and gross fixed capital formation are cointegrated in this study. The error correction term of -0.76 is negatively signed and also significant at all conventional level indicating that when the variables wonder away from equilibrium following an exogenous shock, 76 percent of the disequilibrium is corrected after one year. Based on the result of granger causality, the paper concludes that causality exist between the two variables used in this study. Therefore, the policy implication of these findings is that any reduction in money supply (contraption) would have a negative repercussion on investment growth in Nigeria.

Keywords- Money Supply, Gross Fixed Capital Formation, ECM, Causal Relationship, Growth

I. INTRODUCTION

In Keynes's General Theory (1936), investment played a key role in that it was presented as the most important factor governing the level of spending in an economy, despite the fact that it typically was only one-fifth to one-sixth of total spending. This paradox can be understood by the help of the multiplier developed in the 1930's. The multiplier is the amount by which a change in investment would be multiplied in achieving its final effect on incomes or expenditures (Hamilton, 1994). In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth and this wealth will lead to an increase in the standard of living of individuals. It includes real investment in physical capital. Increase in physical capital demand high volumes of a product; products are generally labor intensive, leading to an increase in the demand for workers and thus allowing for the availability of more jobs. By acquiring jobs, individuals are able to obtain an income and, consequently, an increased standard of living. Additionally, increasing demands for labor will force wages to go up, which in turn will also increase the standard of living.

The idea of having more machines, equipment's, robots, or roads in an economy will increase the amount of goods or services that can be produced. But having capital doesn't mean we will grow, we need to make more capital in order to see a change in growth rates. By increasing the amount of capital produced in an economy each year, will see growth rates increase. The biggest difference between China and Nigeria right now is that China is investing most of its profits into new factories and technologies, while Nigeria is spending its profits on consumer goods.

In other to increase investment in the country, the Nigerian government has embarked on various policies to address this issue. Some of the policies involved the use of monetary and fiscal policy. However, Anderson and Jodon (1968) postulated that monetary policy has grater and faster impact on economic activity thus suggesting that greater reliance be place on monetary measures than fiscal measure in the conduct of stabilization policy. Uniamikogbo and Enoma (2001) asserted that monetary variable is more effective and dependable than fiscal variable in affecting changes in economic activities such as the production sector.

Monetary policy is one of the macroeconomic instruments with which monetary authority in a country employed in the management of their economy to attain desired objectives. It entails those actions initiated by the Central Bank which aim at influencing the cost and availability of credits (Horvitz 196, Nwankwo, 1991 and Wrightsman 1976). In influencing credit in Nigeria, the government through the Central Bank use expansionary and contractionary monetary policy. This paper is interested in the later because of its role in making credit available in an economy.

Expansionary monetary policy refers to any policy initiative by a country's central bank to raise (or expand) its money supply. This can be accomplished with open market purchases of government bonds, with a decrease in the reserve requirement, or with an announced decrease in the discount rate. In most growing economies the money supply is expanded regularly to keep up with the expansion of gross domestic product (GDP). In this dynamic context, expansionary monetary policy can mean an increase in the rate of growth of the money supply, rather than a mere increase in money (Suranovic, 2010).

Previous studies have dealt separately with money supply and investment growth and also the effect of money supply on economic growth but not linking this important instrument that government use in expanding credit and increase in physical capital. Studies on money supply and economic growth found positive relationship between them. They include: Sims (1972); Friedman and Meiselman (1963); Cagan (1956); Greenwood and Jovanovic, (1990) others include King and Levine (1993); Wachtel and Rousseau (1995) and Neusser and Kinglert (1996). Others include Mansor (2005), Ogunmuyiwa and Ekon (2010) and Owoye and Onafowora (2007).

Unlike this studies that focused on money supply effects on the entire economy, this study takes a dynamic approach to the effect of money supply on the expenditure side of the economy of Nigeria from 1970-2012. This is achieved by specifying a bivariate framework utilizing Engle-Granger two step modeling (EGM) procedure where the dependent variable (Gross Fixed Capital Formation) is determined by an endogenous variable (Money Supply). The study will also employ Granger Causality to analyze the relationship between money supply and investment growth i.e. if money supply granger causes investment growth or investment growth granger cause money supply.

Based on this understanding, it is clear that there exists a gap in literature with regard to understanding the dynamics of expansionary monetary policy effects on investment growth in Nigeria suggesting the need for this research. For this purpose, the paper is divided into four sections. The first section is the introduction, the second section is the Literature Review and theoretical framework, the third section is the methodology and the fourth section concludes the work.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

According to Imoughele and Ismaila (2014), the attainment of macroeconomic objectives, namely full employment, price stability, high and sustainable economic growth and external balance, from immemorial, has been a policy precedence of every economy, whether developed or developing. Adefeso and Bolaji (2010) revealed that the realization of these goals undoubtedly is not automatic but requires policy guidance. This policy guidance represents the objective of economic policy.

Monetary policy is one of the instruments used in achieving macroeconomic objectives and it can be easily fashioned based on the duo of money supply and credit availability in the economy. As noted by Masha et al (2004), in ensuring monetary stability, the Central Bank through the deposit money banks implement policies that guarantee the orderly amount and development of the economy through appropriate changes in the level of money supply. The reserves of the banks are influenced by the Central Bank through its various instruments of monetary policy. These instruments include the cash reserve requirement, liquidity ratio, open market operations and primary operations to influence the movement of reserves. All these activities affect the banks in their credit operations and thus influence the cost and availability of loanable funds. Thus, the financial market provides a useful channel for the implementation of monetary policy.

The financial market is an organized institution that is created for the sale and purchases of funds. It consists of the money and capital markets. Money market is that which deals in short-term securities. On the other hand, capital markets are that part which specializes in the mobilization of long-term funds for the purpose of rapid economic growth and development (Ajie, 2006). A capital market comprises of a primary and secondary markets. A primary market is a market for new issues of securities. But the secondary market consists of exchanges and over-the-counter market where securities are bought and sold for their issuance in the primary market.

According to Rama (1993) quoted in Boopen and Khadaroo (2008), the two critical factors impacting private sector investment in industrialized countries are changes in aggregate demand giving rise to the income accelerator and secondly the effect of relative prices of capital and labour and therefore profitability. However in developing countries they allege private sector investment is determined broadly by growth of GDP, (consequently money supply), the level of foreign direct investment (FDI), real exchange rates, public investment, government fiscal deficits, real interest rates and uncertainty. These instrumental factors are complemented by the levels of residual income that private citizens accrue and the liquidity obtaining in the economy. More often than not investment is determined by Government economic priorities established in the short term by the government budget (monetary and fiscal policy) and executed in the long term through a development plan.

Discussing the impact of monetary policy on private sector investment Kahn (2010), as reported by Olweny, and Chiluwe (2012), observes that monetary policy objectives are concerned with the management of multiple monetary targets among them price stability, promotion of growth, achieving full employment, smoothing the business cycle, preventing financial crises, stabilizing long-term interest rates and the real exchange rate. That these objectives are all not consistent with each other is obvious, as the preference of monetary policy objectives is anchored upon the weights assigned by monetary authorities or country priorities. Experience shows that emphasis is usually placed on maintaining price stability or ensuring low inflation rates.

The effectiveness of monetary policy on the real economy is still an issue under intense debate

particularly related to the efficacy of the transmission mechanism. Traditionally monetary policy is seen as influencing private sector investment via three routes; namely the interest rate channel, the demand for money and the credit channel. In less developed countries Kahn (2010) avers that underdeveloped financial systems and weak interest rate responsiveness inhibit the use of the interest rate and demand for money channels due to limited applicability, while he argues that monetary policy is effective on the asset side of financial intermediary balance sheet (the credit channel view) where it tends to have greater impact. Bernanke and Gertler (1995) classify three channels of monetary policy as the balance sheet channel, the bank-lending channel and the credit channel. The balance sheet channel focuses on monetary policy effects on the liability side of the borrowers' balance sheets and income statements, including variables such as borrowers' net worth, cash flow and liquid assets whilst the bank lending channel centers on the possible effect of monetary policy actions on the supply of loans by depository institutions.

Through the control of monetary policy targets such as the price of money (interest rate - both short term and long term), the quantity of money and reserve money amongst others; monetary authorities directly and indirectly control the demand for money, money supply, or the availability of money (overall liquidity), and hence affect output and private sector investment. This view is supported by Kahn (2010) who imputes that monetary policy objectives can affect the real sector through the injection and absorption of liquidity, or by affecting the level of reserve money, or through the money multiplier, which is used to manipulate the overall stock of money. For instance the Bank of England on its website explains that aside from the bank rate another tool that may be used to achieve the same ends is to inject money directly into the economy in a process known as quantitative easing.

From the perspective of the firm, monetary policy effects on private sector can be observed through the balance sheet, the cost of capital, its effect on investment decisions and the internal rate of return aver Gaiotti and Genera (2001). Thus monetary policy that facilitates credit to private sector investment encourages the growth of private investment whilst tight monetary policy that restricts credit to businesses discourages private sector growth.

2.1 Money Supply (M2) in Nigeria

Monetary policy contraction or expansion typically affects money supply through the monetary transmission mechanism where money supply (M2) composed of cash and quasi cash, call, savings & time deposits as well as certificates of deposits is manipulated by Central Banks. Through the use of several toolkits inclusive of central bank lending, open market operations, quantitative easing, cash reserve ratio and liquidity ratio requirements.

Money supply in an economy results to the following:

1. Expansionary monetary policy causes an increase in bond prices and a reduction in interest rates.
2. Lower interest rates lead to higher levels of capital investment.
3. The lower interest rates make domestic bonds less attractive, so the demand for domestic bonds falls and the demand for foreign bonds rises.
4. The demand for domestic currency falls and the demand for foreign currency rises, causing a decrease in the exchange rate. (The value of the domestic currency is now lower relative to foreign currencies)
5. A lower exchange rate causes exports to increase, imports to decrease and the balance of trade to increase.

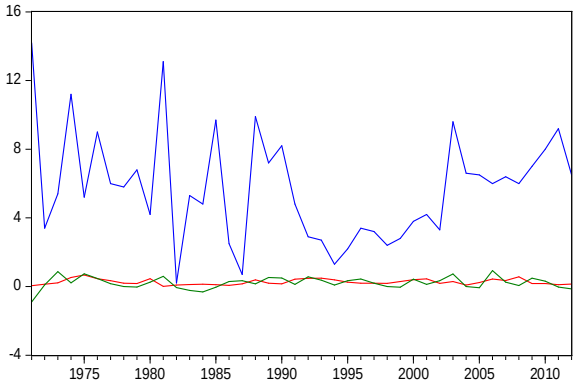
While attempting to identify the appropriate definition of money in Nigeria, Ojo (1978) in Ogunmuyiwa and Ekon (2010) adopted Chetty's theoretical approach with the use of 1961-79 data and found that the wider definition of money is more appropriate when measuring national income in the Nigerian economy. Continuing Asogu (1998) examined the influence of money supply and government expenditure on Gross Domestic Product. He adopted the St Louis model on annual and quarterly time series data from 1960 -1995. He finds money supply and export as being significant. This finding according to Asogu corroborates the earlier work of Ajayi (1974) Nwaobi (1999) while examining the interaction between money and output in Nigeria between the periods 1960- 1995. The model assumed the irrelevance of anticipated monetary policy for short run deviations of domestic output from its natural level. The result indicated that unanticipated growth in money supply would have positive effect on output. A clear examination of the above shows that there is no general agreement on the determinant of economic growth in the Nigerian economy.

However, the influence of money supply on investment growth can only be taken with mixed reactions. Between 1970 and 2012, the growth rate of money supply had a negative growth in 1971 (92%), and the growth rate was highest in 2006 (92%), and lowest in 2008 (6%). The growth rate of gross fixed capital formation which is a proxy for investment was lowest in 1981 (0.1%) and highest in 1975 (68%). For money supply, the year it was lowest (1970-1971) coincided with the year Nigeria just came out from a civil war while the highest (2006) was a year to a general election the was adjudged the most corrupt by the person that emerged the President in February, 2007 general election although investment increased by 44% that same year. The highest donors in the ruling party campaign are always the big investors that have access to credit whenever they want. In 1970, the country's economy grew by 25% and the growth rate decreased to 14% in 1971 when money

supply reduced by -90% while investment increased by 0.4% see figure 1.

The percentage increase in money supply from 1970-2012 was greater than the percentage increase in investment. The elasticity is 0.66 which is less than 1 making it inelastic.

Figure 1: Growth Rate of Nigeria's Real GDP, M2 and GFCF (1970-2012)



Source: CBN Statistical Bulletin Vol 23, 2012 and WAIFEM, 2014

III. METHODOLOGY

3.1 Scope of study

This study was designed to cover a period of 43 years (1970- 2012). A time series data was used for this study. Data used in this study were obtained from the Central Bank of Nigeria Statistical Bulletin and West African Institute of Finance and Economic Management.

3.2 Description of Time Series Variables Used

1. Money Supply (M2): A measure of money supply that includes cash and checking deposits (M1) as well as near money. "Near money" in M2 includes savings deposits, money market mutual funds and other time deposits, which are less liquid and not as suitable as exchange mediums but can be quickly converted into cash or checking deposits. It is expected that, an increase in money supply will lead to increase in physical capital.
2. Gross Fixed Capital Formation: It refers to net additions of capital stock such as equipment, buildings and other intermediate goods. A nation uses capital stock in combination with labour to provide services and produce goods; an increase in this capital stock is known as capital formation. Generally, the higher the capital formation of an economy, the faster an economy can grow its aggregate income. Increasing an economy's capital stock also increases its capacity for production, which means an economy can produce more. Producing more goods and services can lead to an increase in national income levels.
3.

3.3 Model Specification

Engle-Granger two step modeling (EGM) procedure (Engle and Granger, 1987) has been widely used to test for long-run relationship. If X_t and Y_t are individually I(1) processes and there exist a linear combination of this variables that is I(0) process, then X_t and Y_t are cointegrated. In other words, a long run equilibrium relationship exists among these variables. Based on the Granger Representation Theorem (GRT), if two variables are cointegrated, there exists an Error Correction Model (ECM) which relates these variables in the short-run while maintaining the consistency of the OLS estimated long-run parameter obtained in the cointegrating regression. In this instance, ECM indicates the periodic change in the time series variables and how it eventually returns to its long run equilibrium value. Since the ECM equation contains only stationary variables which preclude spurious regression, granger causality test can be applied. This is because cointegration analysis shows that there is causality amongst variables but it does not reveal the direction of such causality.

The long-run cointegrating regression is given as follows

$$LGFCF_t = \phi LM2_t + u_t \qquad (1)$$

Where LGFCF represents the natural log of gross fixed capital formation and LM2 represents the natural log of money supply. $LGFCF_t$ and $LM2_t$ are both nonstationary variables and integrated of order one (i.e. $LGFCF_t \sim I(1)$ and $LM2_t \sim I(1)$). The necessary condition for cointegration is that the estimated residual from equation (1) be stationary (i.e $U_t \sim I(0)$). If the above conditions are met, ECM is estimated from this model.

$$\Delta LGFCF_t = \delta_1 \Delta LM2_t + \delta_2 \theta_{t-1} + \varepsilon_t \qquad (2)$$

Where Δ is the first difference operator, ε_t is the error term and θ is the estimated residual from equation (1) (i.e $LGFCF_t - \phi LM2_t$). GRT requires that the coefficient δ_2 in the short-run equation (2) be negative and statistically significant to confirm the cointegration of the variables. Note that the estimation of the ECM precludes the question of spurious regression since the variables are stationary and equally incorporates both the static long-run and dynamic short-run components.

Granger causality analysis is used to test the hypothesis of prediction of future values of a particular variable(s) while incorporating the past lags of other variables in the model. In other words, a time series variable X_t is said to granger cause another time series variables Y_t if the former contains useful information to predict future values of the later. In this framework, if the F-test of the included lagged variables is statistically significantly different from zero, it implies that there is causality which can either be unidirectional or bidirectional in a bivariate case.

The granger causality test is estimated from the following equations

$$\Delta LGFCF = \sum_{i=1}^{n} \alpha_i \Delta LM2_{t-i} + \sum_{i=1}^{n} \beta_j \Delta LGFCF_{t-j} + u_t \qquad (3)$$

$$\Delta LM2_t = \sum_{i=1}^{n} \lambda_i \Delta LM2_{t-i} + \sum_{i=1}^{n} \gamma_j \Delta LGFCF_{t-j} + u_{2t} \quad \ldots\ldots(4)$$

Where α, β, λ and γ are the respective coefficient of the variables, t represents time while i and j are their lags, u_{1t} and u_{2t} are uncorrelated white noise error term. The null hypothesis is $\alpha = 0$ for all i_s and $\gamma = 0$ for all j_s while the alternative hypothesis is given as $a_i \neq 0$ and $\gamma_j \neq 0$.

3.4 Results

We begin by exploring the time series properties of the variables. Augmented Dickey-Fuller (1979) test and (PP) Phillips and Perron (1988) test for unit root is deployed to test the stationarity of the variables. The ADF tests the null hypothesis of nonstationarity while the confirmatory PP test for stationarity of the null hypothesis. Table 1 reports the result of the ADF and PP test for both the levels and first-difference of the variable.

Table 1. ADF and KPSS Unit Root Test for AGDP and TGA

Variable	ADF test		PP	
	level	First Difference	level	First Difference
LGFCF	0.302669	-10.85896	0.306971	-10.28948
LM2	-0.078292	-4.499237	-0.111798	-4.499237
5% Critical Value	-2.933	-2.935	-2.933	-2.935

Note the ADF 5% critical value for constant and trend is 3.568379

Table 1 reveals that both variables are nonstationary at level but are stationary at their first-difference. In short, both variables are integrated of order one (i.e. they are I (1) processes) which sets the stage for cointegration test. Below is the estimated result of the cointegrating equation (1).

$$LGFCF_t = 1.86 + 0.79\ LM2_t$$
$$(0.26)\ (0.02)$$

Note that the standard error is given in parenthesis below the estimated coefficient. The coefficient of M2 is statistically significant different from zero. From this estimation, we retrieved the residual and performed ADF test and confirm that it is integrated of order zero. (i.e $U_t \sim I(0)$) (Result is not reported to save space) and used it to estimate the ECM of equation (2). The result is given below

$$\Delta LGFCF_t = \underset{(0.17)}{-0.11} + \underset{(0.00)}{1.07}\ \Delta LM2_t - \underset{(0.00)}{0.76}\ \theta_{t-1}$$

$$R^2 = 0.67 \qquad d = 1.5$$

The estimated coefficient of the ECM term which is also the speed of adjustment to equilibrium is negative and statistically significant as required by the granger representation theorem. This is enough evidence that GFCF and M2 are cointegrated in this study. The speed of adjustment to equilibrium is 76% within a year when the variables wander away from their equilibrium values.

Table 2. Pair wise Granger causality test

Direction of causality	F-stat	pvalue	Decision	Lag length
M2 → GFCF	5.60	0.00*	Do not reject	2
M2 ← GFCF	0.96	0.39	Reject	2
M2 → GFCF	3.28	0.03*	Do not reject	3
M2 ← GFCF	0.86	0.46	Reject	3
M2 → GFCF	2.51	0.06*	Do not reject	4

The arrow shows the direction of causality.

Since causality test is affected by number of lags included, the study tested using 2, 3 and 4 lag lengths. The results in Table 2 shows that at all conventional level of significance and at two lag lengths, a unidirectional causality running from money supply to investment growth with no reverse causality (no feedback) from investment growth to money supply. At 5% level of significance and 3 lag lengths, there was unidirectional causality running from money supply to investment growth with no reverse causality from investment growth to money supply. Similarly, at 10% level of significance and 4 lag lengths, a unidirectional causality running from money supply to investment growth with no reverse causality from investment growth to money supply was found. The hypothesis that the lag values of M2 and GFCF are statistically significantly different from zero is not rejected for the second, third and fourth lag length as the p-values of the F-test indicate. Based on the result of granger causality, we conclude that causality exist between the two variables used in this study which is in line with economic theory.

CONCLUSION

In this study, we set out to empirically investigate the empirical relationship between expansionary monetary policy (money supply), and investment growth (gross fixed capital formation), using annual time series data from 1970 to 2012. Some econometric tools are employed to explore the relationship between these variables. The study examines stochastic characteristics of each time series by testing their stationarity using Augmented Dickey Fuller (ADF) test. Then, the relationship between expansionary monetary policy (money supply), and investment growth (gross fixed capital formation) is examined using Engle-Granger two step modeling (EGM) procedure and Pairwise Granger causality tests. The results from the Test indicate that there exists a relationship between expansionary monetary policy (money supply), and investment growth (gross fixed capital formation) in the short and long-run. In addition, the causality results reveal that at all conventional level of significance and at two lag lengths, a unidirectional causality running from money supply to investment growth with no reverse causality (no feedback) from investment growth to

money supply. At 5% level of significance and 3 lag lengths, there was unidirectional causality running from money supply to investment growth with no reverse causality from investment growth to money supply. Similarly, at 10% level of significance and 4 lag lengths, a unidirectional causality running from money supply to investment growth with no reverse causality from investment growth to money supply was found. According to empirical findings of this study, one may tentatively suggest that the growth of investment in Nigeria is directly dependent on and determined by money supply as indicated in the short and long run period. Similarly, causality results reveal that Contractionary Monetary Policy would have a negative repercussion on gross fixed capital formation (investment growth) in Nigeria.

The study recommends that Monetary authority should create and implement monetary policies that favour efficient provision of more investment climate by facilitating the emergency of market based interest rate and exchange rate regimes that attract both domestic and foreign investment in the long run. The Central Bank should make more stringent punishment for non-compliance to the monetary policies by financial institutions most especially in the provision of credit facility for investment in the country.

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