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Monetary policy variables and return on equity: Empirical evidence of quoted insurance firms in Nigeria

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ABSTRACT: This study examined the effect of monetary policy variables and return equity of quoted insurance firms in Nigeria. Secondary data were obtained from the financial statement of 15 quoted insurance firms and the Central Bank of Nigeria Statistical Bulletin. The study modelled return on equity as the dependent variables while money supply, private sector credit, monetary policy rate, treasury bill rate and real interest rate as independent variables. Panel data methodology is employed while the fixed effects model was used as estimation technique at a 5% level of significance. Fixed effects, random effects and pooled estimates were tested while the Hausman test was used to determine the best fit. From the findings, the study conclude that money supply and real interest rate have negative but no significant effect on the return on equity. Monetary policy rate and private sector credit have a positive and significant effect while the Treasury Bill Rate have a positive but no significant effect on the return on equity of the insurance firms. It recommends that the management of the insurance companies should devise measures of managing the negative effect of monetary policy instruments on the performance of the insurance companies and the monetary authorities should harmonize the profitability objectives of the insurance companies with that of monetary policy to avert the negative effect on return on equity of the quoted insurance firms.

Keywords: Monetary policy, Nigeria quoted insurance firms, return on equity.

INTRODUCTION

The use of money as a stable and widely accepted medium of exchange reduces the costs of transactions as well as facilitates specialization in the production, trade and exchange of commodities. Financial assets with attractive returns, liquidity structure and risk characteristics encourage savings in financial form. Financial intermediaries by comparing alternative investment possibilities and selecting those investments with the highest return, contribute to raising the efficiency of resource use. In the same vein, investors and savers are enabled to exchange financial means in a way that suits their return, price, and maturity and risk expectations through access to different financial instruments. It is the efficient use of resources, savings, trade and risk taking that is considered the essential elements of a growing economy.

The Monetarists acknowledge that, in the short run, expansionary monetary policy tends to increase the level of real gross domestic product and employment by increasing aggregate demand. However, they argue that an increase in the quantity of money above the total output generates inflation in the economy. Additionally, the assumption of the monetarist theory led to the policy recommendation that the best contribution the government can make to achieve stable economic growth is to keep the money supply growing steadily at a rate equal to the growth of aggregate supply plus any target rate of inflation. Monetarists upheld the principle of trade-off between inflation and output but reformulated the Philips curve in terms of real wages and not nominal wages (Gonga and Sasaka, 2017).

The Nigerian financial market consists of a notable network of institutions ranging from banks, insurance companies, specialized banks, capital market, to finance

companies. The relevant laws empowered the financial institutions to undertake financial functions that enhance the realization of macroeconomic goals and maximize shareholder wealth. Insurance companies provide unique financial services for the growth and development of every economy. Such specialized services range from underwriting of risk and mobilization of long-term funds for capital investment, hence monetary policy variables can affect the performance of the industry negatively or positively. The relationship between monetary policy and performance of private investment and financial institutions is a perennial issue in developing economies judging from the hundreds of theoretical and empirical scholarly papers that have been written to capitalize on how monetary variables such as interest rate, monetary policy rates and liquidity reserves, money supply, affect private investment or financial institutions.

Insurance companies provide unique financial services for the growth and development of every economy. Such specialized financial services range from the underwriting of risks inherent in economic entities and the mobilization of a large amount of funds through premiums for long term investments. The risk absorption role of insurers promotes financial stability in the financial markets and provides a sense of peace to economic entities. The insurance companies' ability to cover risk in the economy hinges on their capacity to create profit or value for their shareholders.

Historically, insurance in Nigeria can be traced to the activities of European merchants on the West African coast. This was influenced by two factors; first, the expansion of cash crop production for exports, and the upward surge in economic activities in the 1890s; second, the British desire to protect its interest and properties in the protectorate of West Coast Africa (Ujunwa and Modebe, 2011).

According to Uche and Chikeleze (2001), increased trade commerce in Nigeria led to increased activities in shipping and banking and it soon became necessary for foreign firms to handle some of their risks locally. They further show that trading companies were therefore subsequently granted insurance agency licenses by foreign insurance companies. Prior to the introduction of insurance, there were some forms of traditional social and mutual schemes that existed in Nigeria, which evolve through the African communal channels like the extended family system, age grades, and clan unions in African cultures (Obasi, 2010, as cited in Ujunwa and Modebe, 2011). This form of traditional social insurance was by means of cash donations and organized collective labour of assisting one another and the entire community, especially those that suffer mishaps (Usman, 2009).

Monetary policy has long been acknowledged as an instrument used to influence investment and other macroeconomic indicators. However, it is generally accepted in theory and principle that the financial sector which includes the insurance industry is the transmission mechanism for the realization of government monetary and macroeconomic goals. The opinion that the non-bank financial institutions matter in the transmission of monetary policy can be traced to the Radcliffe committee meeting of the 1950s which suggested strongly that non-bank financial institutions such as insurance companies can influenced and be influenced by monetary policy and thereby be brought under the control of monetary authorities. This led to the redefinition of the money supply as Ms = C+ DD + SD + TD + NBFI (Onoh, 2002). The effect of monetary policy variables such as interest rate, money supply, monetary policy rate and Treasury bill rates on the qualitative measures of insurance performance is limited in Nigeria; therefore the objective of the study is to examine the effect of monetary policy variables on the return on equity of quoted insurance firms in Nigeria.

LITERATURE REVIEW

Conceptual review

Concept of monetary policy

Monetary policy is defined by the Central Bank of Nigeria (CBN) as combination of measures designed to regulate value supply and cost of money in an economy, in consonance with the level of economic activities. Odufalu (1994) defined monetary policy as the combination of measures taken by monetary authorities (the CBN and the ministry of finance) to influence directly or indirectly both the supply of money and credit to the economy and the structure of interest rate for economic growth, price stability and balance of payment equilibrium. He added that the CBN is empowered by decree 25 of the1991 Act, to formulate and implement monetary policy in Nigeria, in consultation with the ministry of finance subject to the approval of the President. Onyibo (1993) summed it up when he said that monetary policy is therefore applied to influence the availability and cost of credit in order to control the money supply policy. He generally describes the action taking by the Central Bank as using tools/instruments at its disposal to influence monetary conditions, in particular, the quantity and supply of money to achieve macro-economic goals.

Concept of Insurance in Nigeria

Insurance is generally defined as the pooling of funds from the insured (policy holders) in order to pay for relatively uncommon but severely devastating losses which can occur to the insured. Insurance as a contract is between two parties where one party called the insurer undertakes to pay the other party called the insured a fixed amount of money on the occurrence of a certain event. Obasi (2010) as cited in Ujunwa and Modebe (2011) defines it as a contract between the person who buys insurance and an

insurance company who sold the policy. He opined that "by entering into the contract, the insurance company agrees to pay the policy holder or his family members a predetermined sum of money in case of any unfortunate event for a predetermined fixed sum payable which is in normal term called insurance premiums.

Apart from the risk management functions, insurance policy such as life and whole life is an aspect that provide savings plans and in direct completion with the investment in other financial institutions such as the deposit money banks, savings associations, mutual funds and real estates and other real and financial investments (Ezirim and Muoghalu, 2002). Insurance plays financial intermediation function, a major source of long-term capital and facilitate the growth of the capital market (Catalan *et al.,* 2000; Akotey *et al*. 2013; Ezirim, 2005). Hence, monetary and macroeconomic shocks can affect positively or negatively insurance investment. Nigerian government over the years has embarked on monetary and macroeconomic reforms to enhance real and portfolio investment in the financial sector. For instance, the deregulation of interest rate and the financial sector in the last quarter of 1986, the reforms in the foreign exchange market to attract foreign real and portfolio investment, the establishment of National Insurance Commission (NAICOM) in 1997.

The enactment of the Insurance Act 2003 which increase the capital base of the categorized insurance businesses to N15m for life insurance, N200m for general insurance and N350m for reinsurance and the recapitalization policy in 2005 which further increase the capital base to N2 billion life insurance, N3 billion non-life and N10 billion reinsurance which the reduced number of insurance companies from 104 to 49, reinsurance from 4 to 2 (Fatula, 2007) with the objective of consolidating in the sector maximize investment returns and to attract foreign capital infusion (Ayeleso, 2010). However, the extents to which these reforms have affected investment in the insurance industry remain a matter of research interest as investment in the industry continues to decline. Record revealed that only 10% of Nigerian have insurance policy of any type (Mordi, 1990, Wilson and Summers, 2002).

Concept of Insurance in the financial market

Insurance companies especially the life insurers are exposed to the interest rate environment because they sell long-term products whose present value depends on interest rates. On a fundamental level, the products satisfy two objectives for customers. The first objective is that insurance customers want protection from adverse financial consequences resulting from either loss of life (by buying life insurance policies) or exhaustion of financial resources over time (by buying annuity policies). The second objective is to allow customers to save (generally in a tax-advantaged way) for the future. Because customers are expected to receive cash from their policies years after they have been issued, life insurers face the challenge of investing the customers' payments in such a way that the funds are available to satisfy policyholders in the distant future. This feature generally leads life insurers to invest in a collection of long-term assets, mostly bonds (Berends *et al*., 2013).

Theoretical foundation

Managerial theory of firms

Managerial theory of firm was developed by Bumole in the year 1967 in his book called business behaviour, value and growth and as well used by Sangosanya (2011). This theory is based on the complex nature of the modern manufacturing sector. The theory states that the reason why managers are hired is for revenue maximization and not for profit maximization. This theory believes that for the economy to grow faster through industrialization, the country needs to increase its public expenditure so as to facilitate the developmental processes of their economies. The theory emphasizes that a firm's decisions whether to grow or not depends on the level of fiscal policy because the firm grows through government expenditure on industrialization. This is the theories of which this research is based.

Performance has been viewed from various perspectives depending on the objectives and expectations of the users of the information generated. However, it is a relationship between input and output with an objective to be achieved. Richard *et al*. (2009) present that an organization's performance can be viewed from three major areas of outcomes; financial performance (usually measured by profit, return on assets, and return on investment. Product market performance (sales and market share); and shareholders' return (total shareholder return and economic value added). Nworji *et al*. (2011) elucidated that corporate performance is an important concept that relates to the way and manner in which financial resources available to an organization are judiciously used to achieve the overall corporate objectives of an organization. It keeps the organization in business and creates a greater prospect for future opportunities

Monetarists theory

The development of the monetarist theory is credited to Friedman (1963). It is based on the fact that changes in money supply are the most significant determinants of the rate of economic growth and the behavior of the business cycle. Essentially, the monetarist theory often referred to as monetarism has remained a fundamental macroeconomic theory that focuses on the importance of the money supply as a key economic determinant variable. The proponents of the theory are of the view that money

supply is a primary determinant of price levels and inflation. Thus, changes in the money supply also affect employment and production levels temporarily, while the effect on inflation is more long-lasting and significant. According to the theory, monetary policy is a much more effective tool than the fiscal policy for stimulating the economy or slowing down the rate of inflation. The monetarists argue that inflation occurs if money supply rises faster than the growth of national income. This provides an insight into the role of money in the economy, especially its effect on the general price level.

It is believed that the central bank of a country can either expand or contract the money supply through the manipulation of interest rates. Increase in interest rate reduces the amount of money lent to businesses and consumers, thus reducing economic growth, employment and exacerbates the poverty incidence. Conversely, reducing interest rates will increase the amount borrowed by consumers and businesses, thus boosting spending and stimulate economic growth. The monetarist theory equation is generally expressed as:

$$MV = PQ \quad (1)$$

Where: M = money supply, V = velocity of money, P = price of goods and services, and Q = quantity of goods and services

Based on the assumption that V is constant, changes in money supply (M) affects either price of goods and services (P), quantity of goods and services (Q) or both components in the equation of exchange. According to Friedman (1963), effective monetary policy is helpful in stabilizing the economy.

Keynesian monetary theory

This theory is credited to Keynes (1936) in his publication of the General Theory of Employment, Interest and Money. The basic assumption of this theory is that short-run changes in real output and employment is influenced by changes in aggregate demand. Thus, the government through the central bank can stimulate aggregate demand to generate employment through changes in monetary policy. The theory argues that as long as there is no liquidity trap, expansionary or contractionary monetary policies have effects on interest rate and economic activities. That is, expansionary monetary policy leads to decrease in the real interest rate which in turn reduces the cost of capital and causes investment spending to increase. This ultimately leads to increases in aggregate demand, output and as well as the demand for labour in the production process (Mishkin, 1996).

Conversely, contractionary monetary policy results in increases in the real interest rate and decreases in investment spending, and consequently low levels of output and employment opportunities. The central bank through its indirect policy measures can reduce the level of interest rate to increase investment and in turn create employment opportunities. Generally, the Keynesian monetary theory explains the effect of variation in money supply on the level of economic activity through its effect on the rate of interest which determines investment in the economy. For the Keynesians, expansionary monetary policy that reduces interest rate tends to produce real effects on output and employment. Blanchard and Gali (2007) assert that the new Keynesian model provides the baseline for monetary policy analysis in the presence of nominal rigidities. It is important to note that central banks adopt the new Keynesian model as the bedrock of medium-scale models. Based on the new Keynesian assumptions, employment can be influenced through the mechanism of aggregate demand. Moreover, it advocated for countries to focus on expansionary monetary policy as a medium of influencing aggregate demand, and in turn employment.

Consequently, the Keynesians belief on monetary policy is that, for money to have impact on the economy, three things must happen:

1. A change in money supply must lead to a change in the interest rate.
2. The change in interest rate must lead to a change in the level of investment.
3. The change in the level of investment must have significant effect on national income.

The Keynesians felt that various links are weak basing their position on the following arguments:

The liquidity trap: The explanation here is that money supply is exogenously determined by the monetary authorities and remains the same until altered by them. Therefore, supply of money is perfectly inelastic until it is altered by the authorities. Based on this, they believe that there will arise a time when the economy will be so liquid that additional money supply will be trapped in the already liquid economy and the additional money supply hoarded as speculative balance, thus preventing it from having any effect on the rate of interest. This is graphically shown in Figure 1.

Interest rate and Investment: In the event that the economy is not yet in the liquidity trap region and a change in money supply could influence the rate of interest at the time and the effect on national income will depend on the elasticity of demand for investment. An increase in the money supply caused the interest rate to fall from r_1 to r_2. Direct controls were used to force interest rates down to r_3 when the economy was in the liquidity trap region. All that in turn caused investment to rise from I_1 to I_2 and from I_2 to I_3 given the relatively elastic investment demand curve (Figure 2). Assuming that the investment demand curve is

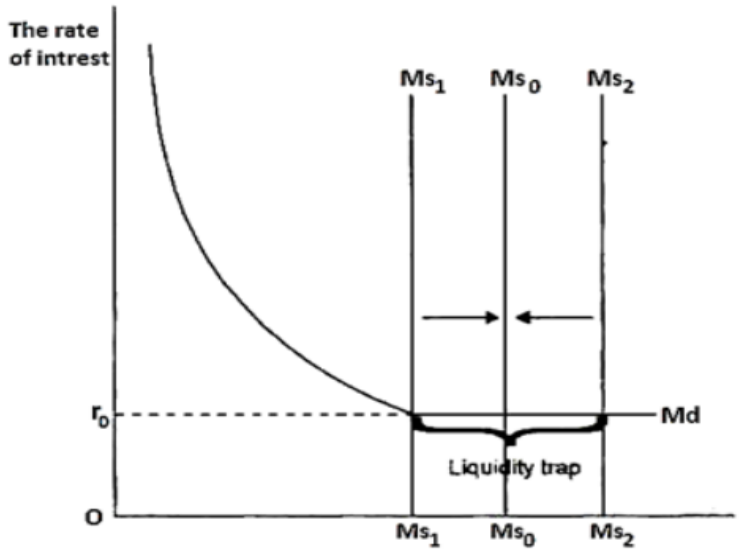

Figure 1. Graph of the liquidity trap.

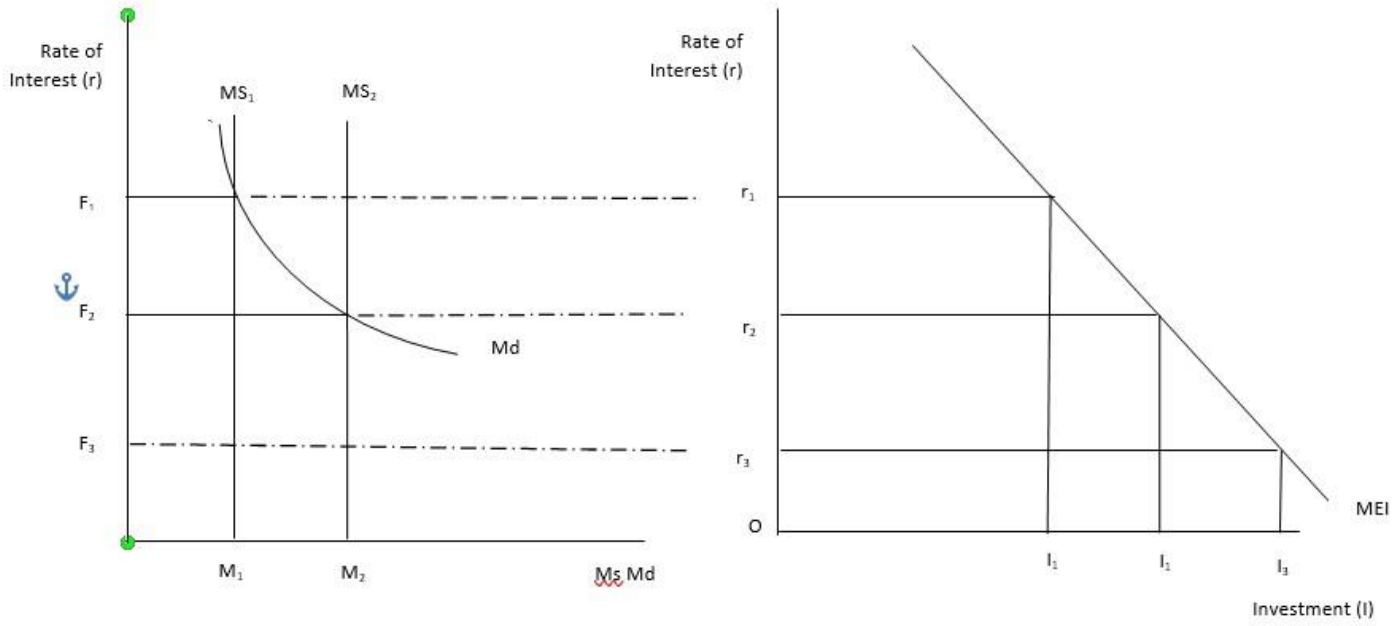

Figure 2. Interest rate and Investment graphs – *Marginal Efficiency of Investment (MEI).*

relatively inelastic as the graph in Figure 3, the ultimate effect of the change in money supply on investment, notwithstanding the reduced rate of interest, may be very small.

Investment and National Income: This constitutes the third condition discussed by the Keynesians, the link between investment and national income. The final impact of interest rate on national income where interest rate succeeds in changing the level of investment or there is autonomous investment from the government is hinged on the national income multiplier (Figure 4).

Keynesians however remain skeptical about the effectiveness of the monetary policy. They point out that an expansionary monetary policy that increases the reserves of the banking system does not need to lead to a multiple expansion of the money supply because banks can opt to not lend their excess reserves. They tend to lay more emphasis on fiscal policy, which they see as having a more direct impact on real GDP.

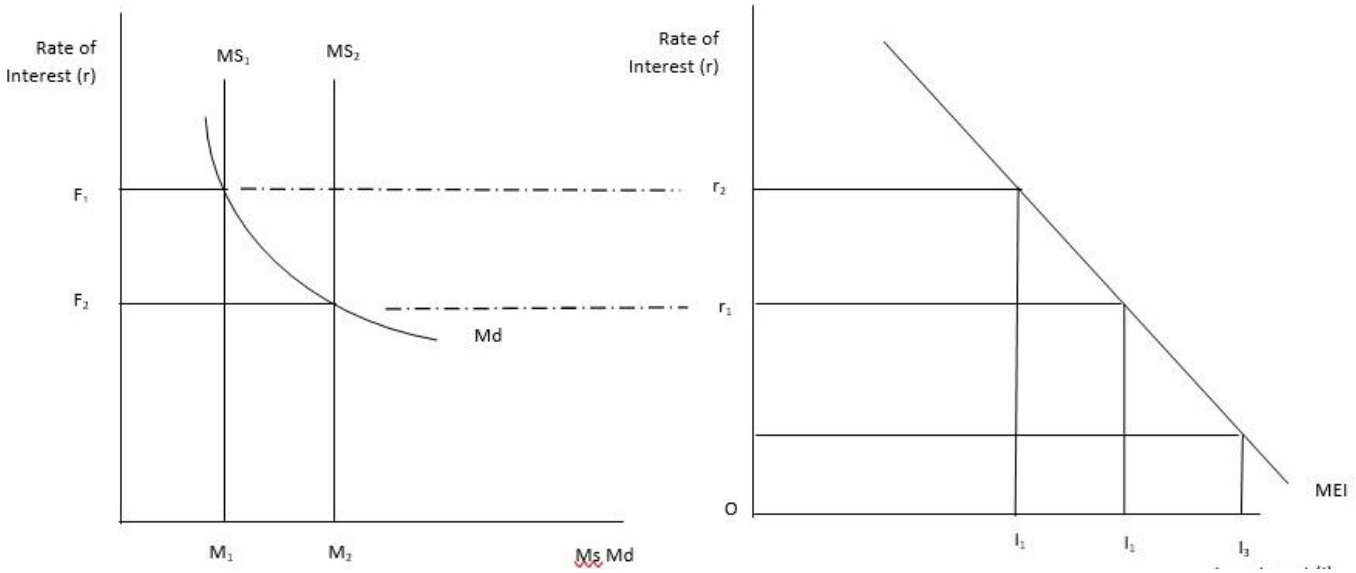

Figure 3. Interest rate and investment graph – Reduced interest rate is unable to increase the level of investment.

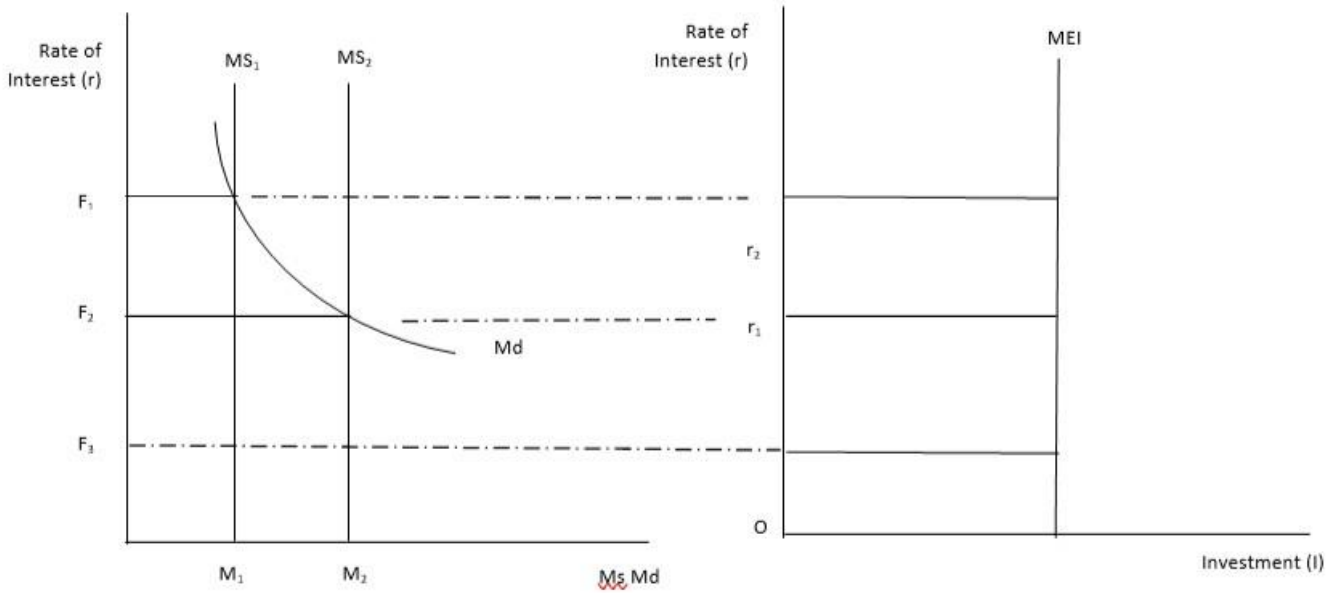

Figure 4. Interest rate and Investment graphs – perfectly inelastic case.

Empirical review

Yimka *et al*. (2020) examined the influence of monetary policy on the financial performance of deposit money banks in Nigeria. The study engaged the use of time series data for 35 years, from the period 1984 to 2018; all deposit money banks as captured by the Central Bank of Nigeria Statistical Bulletin (2015) were considered. The effect of liquidity ratio, lending rate, loan to deposit ratio and cash reserve ratio were examined on the financial performance of deposit money banks measured by their net worth and total credits. The data were analyzed using descriptive and inferential statistics. Based on the result of the stationarity test, the ordinary least square method and the Autoregressive Distributed Lag method were employed. A short run model of net worth and long run model for both the log of net worth and the log of total credits were estimated. The results revealed that the mean net worth and total credits were 5455.27 and 79608.63 respectively. In the long run, monetary policy variables including liquidity ratio, lending rate, loans to deposit ratio and cash reserve ratio had no significant effect on the log of net worth.

However, in the short run, variations in the liquidity ratio, loans to deposit ratio and cash reserve ratio for previous years had a significant effect on the log of net worth in the current year. When financial performance is measured as total credits, the liquidity ratio and loans to deposit ratio had a positive significant effect in the long run. The cash reserve ratio had a negative significant effect in the long run. The log of lending rate was insignificant in both the long and short run.

Olokoyo (2012) investigated the effect of monetary policy on the Nigerian Deposit Money Bank (DMB) System. The Nigerian banking system is currently undergoing a series of reforms in order to enhance its competitiveness and efficiency. The Ordinary Least Square (OLS) method is used to examine the effect of monetary policy on the Nigerian Deposit Money Bank System, using such variables as total loans and advances (TLA) as the dependent variable and liquidity ratio (LR), cash reserve ratio (CRR), monetary policy rate (MPR), and average exchange rate (AER) as independent variables. The result of the findings shows that the monetary policy rate reveals the most significant effect on commercial banks loans and advances during the period under study.

Iheanachor (2015) ascertained the monetary policy instruments of the Central Bank of Nigeria (CBN) during and after the bank consolidation exercise (2000 – 2016) and determine the effects of these policies on the financial performance of deposit money banks (DMBs) in Nigeria. An Autoregressive Lag Model (ADL) analysis of secondary data obtained from the CBN Statistical Bulletin, 2016 shows that the monetary policies of the CBN had a significant effect on the performance of DMBs in the short run but an insignificant effect in the long run.

Udeh (2015) examined the impact of monetary policy instruments on the profitability of commercial banks in Nigeria using the Zenith Bank Plc experience. The paper used a descriptive research design. It utilized time series data collected from published financial statements of Zenith Bank Plc as well as the Central Bank of Nigeria Bulletin from 2005 to 2012. Four research questions and four hypotheses were raised for the study. Pearson Product moment correlation technique was used to analyze the data collected while t-test statistic was employed in testing the hypotheses. The study discovered that the cash reserve ratio, liquidity ratio and interest rate did not have a significant impact on the profit before tax of Zenith Bank Plc. However, the minimum rediscount rate was found to have a significant effect on the profit before tax of the bank.

Ndubuaku *et al*. (2017) examined the impact of monetary policy regimes on the performance of commercial banks in Nigeria. The paper used Descriptive and Ex-post Facto Research Design. It utilized time series data collected from the Central Bank of Nigeria Bulletin. The study was divided into SAP Period (1986-1999) and Post SAP Period (2000 - 2013). Eight research questions and eight hypotheses were raised for the study. Regression and Pearson Product Moment Correlation technique were used to analyze the data collected while t-test statistic was employed in testing the hypotheses. Monetary Policy Rate was the independent variable while Total Assets Value, Deposit Mobilization, Loans and Advances and Credit to the Private Sector were the dependent variable in different regression equations. The study discovered that Monetary Policy Rate during the SAP Period did not have a significant impact on the Total Assets Value, Deposit Mobilization, Loans and Advances and Credit to the Private Sector while Monetary Policy Rate during the Post SAP Period had a significant impact on the Total Assets Value, Deposit Mobilization, Loans and Advances and Credit to the Private Sector respectively.

Okpara (2009) investigated the effect of monetary policy on the returns on risk assets; evidence of tier one banks in Nigeria. Eco Transnational Bank and First Bank of Nigeria were used. The study ranges from 1986-2014, a period of 30 years. The Vector Auto-regressive (VAR) model was used to integrate the multi-variate time series. The variables used were; inflation rate, real interest rate, Treasury bill rate, loan to deposit rate for Eco Bank and First Bank, and the returns on asset for Eco Bank and First Bank. The Treasury bill rate was the only variable that was statistically significant. The regression showed that the dependent variables were responsible for half of the variations in the returns on assets. The estimated parameters were not significant in the regression model, thus, one can say monetary policy has a partial effect on the returns on assets of tier one banks in Nigeria.

Osakwe *et al*. (2019) examined the effect of monetary policy on the performance of the manufacturing sector in Nigeria. The explanatory variables are monetary policy rate, Treasury bills rate, cash reserve requirement and money supply; while the dependent variable is the manufacturing (MANU) sector output. The study adopted an ex-post facto research design and used secondary data obtained from the CBN Statistical Bulletin. The study covered a period of 32 years (1986 to 2017). The data were subjected to the Augmented Dicker Fuller stationarity test to determine the best suitable econometric tool for analyses. The Autoregressive Distributive Lag (ARDL) was used for the model estimation. The results indicate that: monetary policy tools have a significant effect on the manufacturing sector output in Nigeria in the short run only.

Njeri (2016) studied the effects of interest rate changes on the financial performance of insurance firms in Kenya. The study adopted a descriptive survey design. The targeted population were the 43 insurance firms in Kenya. The study targeted the top 5 managers of these insurance firms with a sample size of 115 respondents. Data were obtained majorly from secondary sources using a data sheet and were analyzed using descriptive and inferential statistics. Findings indicate a significant relationship between interest rates and the stock returns of insurance firms in Kenya. The study recommends the need for government regulation of interest rates to safeguard

borrowers from exploitation by insurance firms.

Okaro and Nwakoby (2016) conducted a study to investigate conflicting issues of interest between liquidity and profitability of banks in the Nigerian banking system. The purpose of the study was to ascertain the influence of liquidity management on the profitability performance of deposit money banks (DMBs) in Nigeria. Relevant data were gathered from CBN and NDIC annual publications for 16 years covering 2000-2015, in order to address the objectives, research questions and stated hypotheses. The data were analyzed using multiple regression analysis by employing E-view 8.0 statistical package. The OLS result depicted there is a negative and significant relationship between liquidity ratio and Deposit Money Banks' profitability. Again, the study revealed that there is a positive and significant relationship between cash to deposit ratio and profitability of the Deposit Money Banks.

Macfubara *et al*. (2018) investigate the existing relationship between monetary policy instruments and the performance indicators of insurance companies in Nigeria from 1990 – 2017. Secondary data were obtained from the Stock Exchange fact book and the Central Bank of Nigeria (CBN) Statistical Bulletin. Multiple linear regressions were formulated to examine the effect of the independent variables on the dependent variable. Return on equity was modelled as a function of the Treasury bill rate, monetary policy rate, interest rate, growth of money supply and exchange rate. R2, T-Statistics, β Coefficient, F-Statistics and Durbin Watson were used to examine the extent to which the independent variables affect the dependent variables while augmented dickey fuller unit root test, granger causality test, cointegration test and error correction models were used to ascertain the dynamic relationship between monetary policy variables and return on equity of the insurance firms. Findings revealed that all the explanatory variables have a positive effect on return on equity except treasury bill rate. The unit root test found that the variables are stationary at the first difference, the cointegration test found the presence of long run relationship while the granger causality test found a uni-directional causality. The study concludes that monetary policy has a moderate effect on the return on equity of the insurance firms and recommends that management of insurance companies should devise measures of managing the negative effects of the monetary policy instruments to enhance the performance of the insurance companies.

Ehiogu and Nnamoch (2018) study investigated the effect of interest rates on the profit of insurance companies in Nigeria's insurance industry. An Ex-post facto research design was used in the study. The data were subjected to a Unit root test. Afterwards Ordinary Least Square Regression analysis technique was used to test the hypothesis. The analysis of the study was at a 5% level of significance. It was found that interest rates had a positive and insignificant individual effect on the total profit of the Nigerian insurance industry. The following respective implication of the finding shows that Interest rates can reduce the returns of its investment. The study based on the aforementioned finding concluded that the insurance business profit margin is not significantly but positively influenced by interest rate. The researcher recommends that insurers have to build and hold reserves over a long time horizon, which makes investment returns an important part of overall earnings.

METHODOLOGY

The quasi-experimental research design was used to study whether this relationship exists between monetary policy and the return on equity of quoted insurance firms in the Nigeria Stock Exchange. Supply, private sector credit, monetary policy rate, Treasury bill rate and real interest rate as independent variables. Panel data methodology is employed while the fixed effects model is used as an estimation technique a at 5% level of significance. The population of interest is all the quoted insurance firms quoted on the Nigeria Stock Exchange for the period of ten years from 2012 to 2021. However, a sample size of 15 quoted insurance firms was selected using a random sampling technique base on the availability of data within the time scope of the study.

Model Specification

The regression models are presented as follows;

Pooled regression model specification

$$ROE = \beta_0 + \beta_1 MS_{it} + \beta_2 PSC_{it} + \beta_3 MPR_{it} + \beta_4 TBR_{it} + \beta_5 RIR_{it} + \mu_{it} \quad (2)$$

Fixed effect model specification

$$ROE = \alpha_0 + \alpha_1 MS + \alpha_2 PSC + \alpha_3 MPR + \alpha_4 TBR + \alpha_5 RIR + \sum_i^9 = 1\alpha_i idum \quad (3)$$

Random effect model specification

$$ROE = \alpha_0 + \alpha_1 MS + \alpha_2 PSC + \alpha_3 MPR + \alpha_4 TBR + \alpha_5 RIR + \mu i + \varepsilon 1_{it} \quad (4)$$

Where: ROE= Return on equity of the quoted insurance firms; MS= Money supply proxy by percentage of broad money supply to gross domestic product; PSC = Private sector credit to gross domestic product; MPR=Monetary policy rate; TBR = Treasury bill rate; RIR = Real interest rate; $\varepsilon 1$= Stochastic or disturbance/error term; t = Time dimension of the variables; and α0 = Constant or intercept.

Prior expectation of the result

The a-priori expectation of the variables is that an increase in the explanatory variables leads to an increase in the

dependent variables' corporate value, therefore it can be mathematically stated as follows:- $a_1, a_2, a_3\ a_4 > 0$.

Technique for data analysis

In order to determine the best choice of analysis technique, the study run three types of regression; Ordinary Least Square (OLS), Fixed Effect and Random Effect regression. All these methods have various assumptions and conditions that must be fulfilled in order to achieve efficient estimates. However, the best technique was decided by the Hausman Specification test (either fixed effect or random effect regression) and Lagrangian Multiplier Test (either random effect or OLS). The random effect has the advantage of accounting for the panel effect in the data as opposed to OLS, which pools the data and treats it as if it were obtained from a single entity.

In order to achieve reliability of the result, robustness tests like Multicolinearity test, Hausman test, Lagrangian multiplier test for random effect and Heteroscedasticity test will be conducted (Gujarati, 2003).

T-test: The t-test was used to test the hypothesis that a particular coefficient is significantly different from zero or whether the estimated coefficient value occurred by chance in equation (2). The tests were performed at both 95% and 99% levels of confidence.

F-test The F-statistic: This test is important to test the hypothesis that the whole relationship provided by the equation (2) is significantly different from zero, i.e. whether the independent variables' characteristics scores explain the variation in growth indicators for each of the individual firms. The test will be performed at both 95% and 99% levels of confidence.

R^2 - Change The R-squared (R^2) value ranging from '0' to '1' or the 'corrected R-squared' (R^2) which is adjusted for degrees of freedom indicates the explanatory power (goodness of fit) of the model.

RESULTS AND DISCUSSION

The results of the power for the entire test procedure based on the underlying time series model is stationary as all the procedures produced a reasonably high power over all the sample sizes and order considered except for order 2 where ADF (Augmented Dickey Fuller) produced extremely low power. The power of the tests is extremely high over all the sample sizes and orders considered. From the coefficient of the sample size, most of the firms have a linear relationship and are also integrated in the order of 1(1). Descriptive statistics were used to vividly describe the distribution and behaviour of all the variables.

Table 2 presents the descriptive summary of the independent variables and return on equity of the quoted insurance firms. The descriptive statistics were presented on the overall data (combined) to observe for general patterns among the sampled variables. As indicated, the first line of descriptive analysis was conducted on all the firms combined. Results, as shown in Table 2 show mean statistics, indicate that on average the sampled insurance firms return on 4.4. The minimum and the maximum coefficient return on equity respond to variation positively at maximum and at minimum. The Jarque-Bera and the probability value show that the variables are normally distributed.

Hausman Test: First a choice between fixed and random effects regression has to be made. This is determined by the probability of the Chi-sq. statistics from the Hausman test. The Hausman test shows a probability of the Chi-Sq. as 0.0000 which is less than 0.05; therefore, the study adopts the fixed effect model (Table 3).

F-Test: The F-calculated value is 6.180068 from the pooled regression results while the p-value of F-statistic is 0.000327 at a 5% level of significance, considering the p-value, the chosen level of significance $\alpha = 0.05$ [5%] is less than the p-value of F-statistic. It is concluded that the regression model is statistically significant. This means that the joint influence of the explanatory variables on the dependent variable is statistically significant (Table 3).

Coefficient of Multiple Determinations (R^2): The computed coefficient of multiple determinations of 0.555168 from the fixed effect shows that 54.2 percent of the total variations in the return on equity are accounted for, by the explanatory variables while the remainder is attributed to variables that are influenced by other factors not included in the regression model (Table 3).

Durbin Watson statistics (DW): The computed DW is 2.163965 from the fixed results; show that at a 5% level of significance with two explanatory variables and 150 observations. The value of the computed DW is greater than the lower limit. Therefore, there is no evidence of positive first order serial correlation (Table 3).

Regression Coefficient and T-Statistics: The results indicate that money supply and real interest rate have a negative effect on the return on equity of the 15 quoted insurance firms. The coefficient of the variables of money supply reduced the return on equity by 2.5 percent while the real interest rate reduced the return on equity by 0.01 percent. The negative effect of the variables contradicts this study's a-priori expectations and the theories of investment. It also contradicts macroeconomic reforms aimed to strengthen corporate organizations. The negative effect of the variables contradicts the findings of Yimka *et al.* (2020) that the mean of net worth and total credits are 5455.27 and 79608.63 respectively and that in the long run, monetary policy variables including liquidity ratio,

Table 1. Intermediate Phillips-Perron test results.

Cross section	Prob.	Bandwidth	Obs
Prestige Assurance	0.0068	1.0	4
Royal Exchange Plc	0.0045	0.0	4
Standard Alliance Insurance Plc	0.0016	3.0	4
Sovereign Trust Insurance Plc	0.0018	0.0	4
Alliance Insurance	0.0215	3.0	4
Wapic Insurance Plc	0.0436	0.0	4
Universal Insurance Company Plcny Plc	0.0113	2.0	4
Consolidated Hallmark Insurance	0.0012	0.0	4
Equity Assurance	0.0018	1.0	4
Lasaco Assurance	0.0175	0.0	4
Linkage Assurance	0.0027	0.0	4
Great Nigerian Insurance Plc	0.0091	3.0	4
Guinea Insurance Plc	0.0064	0.0	4
Niger Insurance Co.	0.0205	0.0	4
N.E.M Insurance CO (NIG) PLC.	0.0233	0.0	4

Source: Extract from E-view 9.0.

Table 2. Descriptive statistics.

Parameters	ROE	TBR	RIR	PSC	MS	MPR
Mean	4.429600	4.232667	64.92867	4.538000	1.128000	4.232667
Median	4.120000	4.270000	66.50000	4.400000	1.080000	4.270000
Maximum	48.80000	6.340000	80.40000	5.270000	1.570000	6.340000
Minimum	1.250000	1.140000	42.90000	4.060000	0.640000	1.140000
Std. Dev.	5.306621	0.996729	10.37288	0.449071	0.309144	0.996729
Skewness	7.937089	-0.366427	-0.479081	0.550616	-0.175162	-0.366427
Kurtosis	66.95020	3.657236	2.314727	1.842836	2.154747	3.657236
Jarque-Bera	13567.56	3.028232	4.336479	7.974189	2.616189	3.028232
Probability	0.000000	0.220003	0.114379	0.018554	0.270335	0.220003
Sum	332.2200	317.4500	4869.650	340.3500	84.60000	317.4500
Sum Sq. Dev.	2083.856	73.51667	7962.153	14.92320	7.072200	73.51667
Observations	150	150	150	150	150	150

Source: Computed from E-view 9.0.

lending rate, loans to deposit ratio and cash reserve ratio had no significant effect on the log of net worth. However, in the short run, variations in the liquidity ratio, loans to deposit ratio and cash reserve ratio for previous years had a significant effect on the log of net worth in the current year. It also contradicts Olokoyo (2012) who found that monetary policy has significant effect on commercial banks loans and advances during the period under study and also the findings of Ihenachor (2017) that monetary policies of the CBN had a significant effect on the performance of DMBs in the short-run but an insignificant effect in the long-run.

However, the study found that monetary policy rate, private sector credit and Treasury bill rate added 1.3, 3.5 and 0.32 percent on the return on equity of the quoted insurance firms within the periods of the study. The positive effect of the variables confirms our a-priori expectations and validates the reforms in the financial market such as the deregulations of the financial market in the last quarter of 1986. Empirically, the findings of the study confirm the findings of Udeh (2015) that cash reserve ratio, liquidity ratio and interest rate did not have a significant impact on the profit before tax of Zenith Bank Plc but the minimum rediscount rate was found to have a significant effect on the profit before tax of the bank. It also validates the findings of Ndubuaku *et al*. (2017) who found that monetary policy rate during the post SAP period had significant impact on the total assets value, deposit mobilization, loans and advances and credit to the private sector respectively. Okpara (2009) revealed that the dependent variables were responsible for half of the variations in the returns on assets and the findings of

Table 3. Multiple regression results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Pooled Regression Results				
MS	-2.423718	2.147400	-1.128676	0.2629
MPR	1.350675	0.604194	2.235498	0.0286
PSC	3.456003	1.475169	2.342785	0.0220
TBR	-1.581608	0.339307	-4.661287	0.0000
RIR	-0.010795	0.058291	-0.185182	0.8536
C	-13.53587	7.656266	-1.767947	0.0814
R-squared	0.118211	Mean dependent var		4.429600
Adjusted R-squared	0.067823	S.D. dependent var		5.306621
S.E. of regression	5.123506	Akaike info criterion		6.169895
Sum squared resid	1837.522	Schwarz criterion		6.324395
Log likelihood	-226.3711	Hannan-Quinn criter.		6.231585
F-statistic	2.346018	Durbin-Watson stat		2.066471
Prob(F-statistic)	0.062879			
Fixed Regression Results				
MS	-2.475465	2.183408	-1.133762	0.2617
MPR	1.366002	0.759230	1.799195	0.0374
PSC	3.476698	1.503469	2.312451	0.0245
TBR	0.323875	0.449761	0.720106	0.4754
RIR	-0.019888	0.063437	-0.313503	0.7551
C	-13.04588	8.032947	-1.624047	0.1100
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.674999	Mean dependent var		4.429600
Adjusted R-squared	0.541962	S.D. dependent var		5.306621
S.E. of regression	5.194088	Akaike info criterion		6.347449
Sum squared resid	1510.799	Schwarz criterion		6.934546
Log likelihood	-219.0294	Hannan-Quinn criter.		6.581871
F-statistic	6.180068	Durbin-Watson stat		2.163965
Prob(F-statistic)	0.000327			
Random Regression Results				
MS	-2.423718	2.176983	-1.113338	0.2694
MPR	1.350675	0.612518	2.205120	0.0307
PSC	3.456003	1.495491	2.310949	0.0238
TBR	-0.028451	0.014504	-1.961619	0.0515
RIR	-0.010795	0.059094	-0.182666	0.8556
C	-13.53587	7.761741	-1.743922	0.0856
	Effects Specification			
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			5.194088	1.0000
	Weighted Statistics			
R-squared	0.118211	Mean dependent var		4.429600
Adjusted R-squared	0.067823	S.D. dependent var		5.306621
S.E. of regression	5.123506	Sum squared resid		1837.522
F-statistic	2.346018	Durbin-Watson stat		2.066471
Prob(F-statistic)	0.062879			
	Unweighted Statistics			
R-squared	0.118211	Mean dependent var		4.429600
Sum squared resid	1837.522	Durbin-Watson stat		2.066471
Correlated Random Effects - Hausman Test				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		45.674063	4	0.0000

Source: Computed from E-view 9.0.

Osakwe *et al*. (2019) that monetary policy tools have significant effect on the manufacturing sector output in Nigeria in the short run only.

Conclusion

This study examined the effect of monetary policy variables on the return on equity of quoted insurance firms in Nigeria using time series and panel data sourced from the Central Bank of Nigeria Statistical Bulletin and financial statements of the quoted insurance firms. From the findings, the study concludes that money supply and real interest rates have negative but no significant effect on the return on equity. Monetary policy rate and private sector credit have a positive and significant effect while Treasury bill rate has a positive but no significant effect on the return on equity of the insurance firms.

Recommendations

In line with the above findings, the study, therefore, recommends that:

1. The management of the insurance companies should devise measures of managing the negative effect of monetary policy instruments on the performance of the insurance companies and the monetary authorities should harmonize the profitability objectives of the insurance companies with that of monetary policy to avert the negative effect.
2. Interest rate policies should be revisited or fully deregulated to allow market forces of demand and supply to avert the negative effect on the performance of the insurance firms and there should be expansionary monetary policy that enhances the investment of the insurance companies for better performance.
3. The operating environment of the insurance companies should be overhauled to enhance effective management of the monetary environment vis-a-vis measures to effectively manage the monetary policy shocks that occur in the process of administering monetary policy.
4. Monetary policy tools effect should be handled by the management through risk management policies for the firms to keep the firms afloat and still relevant to the Nigerian financial industry.

CONFLICT OF INTEREST

The author declares no conflicts of interest.

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