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Effect of Monetary Policy on the Performance of the Nigerian Capital Market (1986 – 2016): Stylized Facts from ARDL Approach

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Authors' contributions

This research work was carried out in collaboration between all authors. Author FNE conceptualized the study, wrote the first draft of the manuscript and critically reviewed it thereafter. Author OL sourced and managed relevant literature. Author ACA sourced the data, performed the analysis and interpreted the result of the analysis. All authors read and approved the final manuscript.

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ABSTRACT

In this study, the empirical effect of monetary policy tools on performance of the Nigerian capital market was re-examined. The real effect of monetary policy tools on capital market performance is still not clear both from theoretical and empirical background, especially in emerging economies like Nigeria. Explicitly, this study evaluated the effect of monetary policy rate (the rate at the Central Bank of Nigeria extend credit facility to other financial institutions operating in the country), cash reserve ratio, liquidity ratio and loan to deposit ratio on the performance of the Nigerian capital market. Nigerian Stock Exchange and Central Bank of Nigeria annual reports of various edition supplied the relevant data for analysis. The Autoregressive Distributive Lag (ARDL) was the technique applied in estimating the model and for co-integration assessment, while granger causality analysis aided in ascertaining the effect of monetary policy tools on capital market performance. The result of the analysis illustrated that monetary policy tools and capital market

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performance in Nigeria are not co-integrated. The study also found that Nigerian capital market performance is not significantly affected by monetary policy announcement by the Central Bank of Nigeria rather, it is monetary policy rate that is significantly influenced by performance of the capital market. Based on the application of a superior methodology by way of ARDL in data analysis, the Central Bank of Nigeria should be cautious and properly consider the prevailing macroeconomic condition in monetary policy decision, especially with regard to liquidity ratio because of its potential in fuelling or deterring inflation which affects prices of stocks in the capital market.

Keywords: Capital market performance; monetary policy.

1. INTRODUCTION

In view of the rapidly increasing role of the capital market in financial intermediation, volatility in stock prices can have significant implications on the performance of the financial sector as well as the entire economy [1]. With this scenario, the monetary authorities tries to adjust monetary policy tools to suit the macroeconomic goal of the government and if possible, jettison any fundamental that may distort financial system stability, reliability and economy in general. Since there exist functional relationship between monetary policy and market index, so it is necessary for the Central Bank to determine the effect of monetary variables such as money supply, interest rate and inflation rate on the performance of capital market, and besides, a stock market is not always blessed with upbeat condition [2]. Despite the fact that the influence of monetary policy on capital market sustainability is of immense significance to the Central Bank, individual and corporate investors need to be aware of uncertainties that would be attached to the value of shares propel by variation in monetary policy tools of the Central Bank.

Understanding the influence of changes in monetary policy would sharpen investors' intent in measuring the intrinsic value of common stocks. The evaluation of the intrinsic value of a common stock with regards to prevailing market price envisages the over-pricing and under-pricing linked with securities traded on capital markets. While earnestly acknowledging fundamentalist point of view, [3] asserts that making profits from stock trading depends on an investor's ability to accurately calculate stock's intrinsic value which is done by examining the environment of the firm; related economic, financial and other qualitative and quantitative factors. Subsequent to the argument that mechanism of the capital market is influenced by variation in monetary policy, then the efficient market hypothesis postulation would hold as the

capital market tends to assimilate and integrate all information regarding monetary policy as a tool of stabilization by the monetary authorities to realize a desired or target macroeconomic goal.

The importance of monetary policy in macroeconomic management directs the intention and considerable interest of researchers and policy makers to find out the impact of monetary policy on stock market performance in developing and developed countries [4]. In the wake of the recent global financial crisis, evidence shows that asset price bubbles and their collapse typically precede financial crises signalling a strong consensus about the importance of achieving a low and stable inflation rate as the main goal of monetary policy in the last two [5].

1.1 Study's Motivation

The nature of relationship between monetary policy and capital market performance is still not clear both from theoretical and empirical background, especially in emerging economies like Nigeria. The empirical findings of [6,7] assert the presence of a negative relationship between monetary policy instruments and capital market performance in India and Nepal respectively. [8, 9] envisage the manifestation of significant positive association linking monetary policy and capital market performance singly in Bangladesh and Nepal. The nexus between monetary policy and capital market become more confusing as a study by [10] empirical prove that monetary policy is very effective in determining capital market performance in China but only when the market is in a bear condition.

In Nigeria, [11] reports that monetary policy rate has no significant effect on capital market performance as surrogated by all share index but on the contrary, [12] depicts the opposite: monetary policy affects the performance of the Nigeria capital market. The latest monetary policy disaggregated and most recent study

based on internet search by [13] unveil that monetary policy rate has insignificant positive effect on capital market performance while liquidity ratio was observed to insignificantly affect performance of the Nigerian capital market. Although the study improved on existing studies of [11] and [12] which integrated monetary policy rate as core index of monetary policy by incorporating monetary policy rate and liquidity ratio as monetary policy variables, the inclusion of lending rate and deposit rate of deposits money banks to measure monetary policy of the Central Bank of Nigeria is a source of criticism. The work of [14] was criticised on inclusion of inter-bank rate, open buy back and inflation as monetary policy surrogates, while [15] was disparaged by modelling only monetary policy rate. This study takes a new dimension by incorporating the four basic monetary paraphernalia of the Central Bank of Nigeria: monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio and using up-to-date in an attempt to ascertain the effect of monetary policy on performance of Nigeria's capital market. Furthermore, this study adopted a methodology through ARDL which is considered superior to Ordinary Least Square (OLS) because it takes into consideration the different order of integration of financial variables.

This study is separated as follows: the background and motivation for the study was succinctly depicted in section one. Section two encompasses the review of related literature. The method and data were entailed in section three. The results were discussed in section four, while section five concluded the study.

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual Elucidation

The quantum of money supply in circulation in an economy in no small measure influences the consumption pattern of the citizens. The management of liquidity level in the economy is of great importance to the monetary authority in an attempt to deter or prevent macroeconomic economic consequences of either higher or lower money supply. Money growth also affects interest rates and prices and this in turn will influence stock prices, for consideration, assuming that money demand remains constant, increase in money supply raises interest rates thereby increasing the opportunity cost of holding cash as well as stocks, and lured by higher interest earnings, people are likely to convert all their cash and stock holdings to interest-bearing

deposits and securities with obvious implications for the stock prices [16]. As noted by [17], the consequent effect of monetary policy fluctuations on interest rate influences the discount rate used to value the cash flows from equities (i.e. dividends). Restrictive monetary policy, for example, lowers stock prices by raising the expected equity premium due to an increase in risk which may be caused by an increase in interest expense or a weakening of the balance sheet or a fall in the expected level of consumption [18]. A successful implementation of monetary policy requires a fairly accurate consideration of how fast the impact of such policy changes could be delivered to other parts of the economy and how large the impact is [19].

The capital market is the indicator of the economy's financial stability and strength and the growing importance of capital markets around the world has reinforced the belief that finance is one of the key elements for growth in a country [20]. [21] note that capital markets have a multidimensional role to play in connection with monetary policy decision making as stock market performance is greatly affected by innovations in monetary policy through several channels on one hand, while, on the other hand, stock prices reflect economic developments to a great extent and thus can be considered by monetary policy authorities in the conduct of policy decisions. The capital market is important in determining the speed with which policy changes are transmitted into the entire economy [22] thus prone to internal shocks from variation or adjustments in monetary policy fundamentals of the Central Bank.

2.2 The Alleged Nexus between Monetary Policy and Capital Market Performance

The relationship between monetary policy and the capital market performance has been a subject of interest among economists and policymakers over a long period of time [8]. No doubt, a linkage exist between capital market development and growth of the economy, and stock prices are generally believed to be determined by some fundamental macroeconomic variables such as interest rate, inflation, money supply and exchange rate [11]. Upward review of the monetary policy rate will automatically/directly shift prime lending rate upward thus investors has no other option than to revalue their stocks. In other words, the value of their wealth, given by the sum of the discounted future cash flows (and/or dividends),

is affected by an easing or tightening of monetary policy through either the discount rate or expected earnings or both [23]. Indirectly, monetary policy exerts influence on capital market performance through its influence on the determinants of dividends and the stock returns premium by influencing the degree of uncertainty faced by agents [24]. Observers of the great recession have argued that when facing a liquidity trap, expansionary monetary policy will, instead of fostering steady growth, tend to fuel financial markets [25]. Contractionary monetary policy is associated with lower stock prices given that higher discount rate for the expected stream of cash flow and/or lower future economic activity, while an expansionary monetary policy is commonly viewed as good news as these periods are usually associated with low interest rate, increased economic activity and higher earnings for the firms in the economy [14].

Depreciation in a country's currency increases the competitiveness of firms that are in the export business as such, the price of their stocks will follow an upward trend and the expectation is that foreign investors are attracted to the local stock market; devaluation increases exports for local firms, while an appreciation reduces both export competitiveness and performance of stock prices [22]. Bernanke and Gertler [26] as cited in asserts that inflation targeting Central Banks automatically accommodate productivity gains that lift stock prices, while offsetting purely speculative increases or decreases in stock values whose primary effects are through aggregate demand. The empirical study of [27] proved that monetary policy of changing monetary aggregates has fewer impacts in bear markets than bull markets, but changes in monetary policy rate can be more influential in bear markets; increases in monetary aggregates or reductions in the monetary policy rate have positive contemporary effects on stocks only during the periods in which they are used as the monetary policy target by the Central Bank.

2.3 Theoretical Consideration

Finance literature has documented theories in respect to the alleged connection between monetary policy and capital market performance as well as linking the psychological trust to investing in capital market. This study dwelt on the parapets of rational expectation theory, Markowitz modern portfolio theory, efficient market hypothesis and capital assets pricing model.

Markowitz modern portfolio theory asserts that investors that are risk averse can clearly select investments or structure a portfolio in such a way as to maximize earnings based on the prevailing market risk. The theory argues that an investment with high risk yields high return relative to investments with lower risks. The portfolio theory enables managers to classify, estimate and control the sources of investment risk and return [28]. The most important aspect of Markowitz' model was his description of the impact on portfolio diversification by the number of securities within a portfolio and their covariance relationships (Megginson, 1996 as quoted in [29]). The process of selecting a portfolio may be divided into two stages. The first stage starts with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio [30].

The efficient market hypothesis is of the assumption that the current prices of assets quoted in the capital market fully signify all the available information about the firm's value, and making profit in excess of what is obtainable in the market is completely out of place. The present of many investment analysts and advisers, different information on firms' values, availability of many investors, stock prices immediately adjust to latest/new information. Based on the background of the globalisation and mobilisation of the world this hypothesis becomes increasingly important as the information flow is getting steadily faster with the new technologies which make it possible to have access to information all over the world [31]. A capital market is said to be efficient when prices of stock incorporate and adjust to availability of information: both past and new information. In an efficient capital market, the net present value of all transaction is zero. The efficient market hypothesis has being documented to subsist in three forms: weak, semi-strong and strong. Weak form efficient hypothesis prevails when current prices of stock fully reflect past information on prices. The semi-strong hypothesis describes a situation where all publicly available information is depicted in current prices of securities, while the strong efficient market hypothesis unveils a condition where all available information (past, private and public) are surrogated in present prices. Ibenta [28] viewed capital market efficiency from the roles the capital markets are expected to perform in the economy which is

classified into allocation, operational and pricing efficiency. The allocative efficiency centres on efficient allocation of scarce resources to deficit segment of the economy; operational efficiency when the cost of transaction on the capital market is at its barest minimum and pricing efficiency when prices are determined by the interplay of demand and supply.

The rational expectation theory is of the notion that investors select assets for investments in the capital market on the bases of their rational outlook, experiences in the past and availability of private and public information. The theory argues that the future state of the economy in the rational thinking of the people is what influences current expectation in the economy. On the premise of the rational expectation theory, firms' satisfactorily rely on past prices to predict likely prices in future which sharpens their future operational pattern. On the argument that individuals are rational in thinking and rely on past information to make future prediction, changes in monetary policy of the Central Bank could be viewed to have some disequilibrium in the capital market and the economy as a whole. The all share index of the Nigerian Capital Market on 15th June, 2016 raised to about five month high to worth N294 billion based on the Central Bank of Nigeria announcement on the 24th May, 2016 to adopt a flexible exchange rate policy aimed at reducing pressure on the local currency. The monetary policy committee of the Central Bank of Nigeria on 24th May, 2016 held a meeting and retained the monetary policy rate at 12% and cash reserve ratio at 22.5% in anticipation of the plan introduction of the flexible exchange rate system.

The Capital Asset Pricing Model (CAPM) is utilized to ascertain the required rate of return on an asset so as to make investment decision including or excluding an asset in portfolio that is well diversified. Invariably, the capital asset pricing model determines the correlation between expected return and risk therein. Financial analysts see the capital asset pricing model as the theoretical guide to the pricing of risky stocks or securities. The attraction of the capital asset pricing model is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk but unfortunately, the empirical record of the model is poor—poor enough to invalidate the way it is used in applications [32]. Following the assumption of the capital asset pricing model, the appropriate price of securities are ascertained and investors are at liberty to

evaluate securities that is either over-priced or under-valued/priced.

2.4 Empirical Studies

In reviewing related studies as regard the nexus between monetary policy and capital market performance, we looked at some past and pioneering works with respect to methodology. Thereafter, recent empirical findings in the subject matter were acknowledged [33]. Showed that interest rate of the federal fund is extremely informative about future movements of real macroeconomic variables. Interest rate and money growth which affects stock prices have been proved empirically to be moving in opposite directions after a monetary policy shock (see [34]. Thorbecke [35] addressed how stock return data respond to monetary policy shocks. Monetary policy was measured by innovations in the federal funds rate and non-borrowed reserves, by narrative indicators, and by an event study of Federal Reserve policy changes. Findings indicated that expansionary policy increases ex-post stock returns. Further result from estimating a multi-factor model revealed that exposure to monetary policy increases an asset's ex-ante return. Rigobon and Sack [36] measured the reaction of monetary policy to the stock market and found that monetary policy reacts significantly to stock market movement.

Chiades and Gambacorta [37] tested the cross-sectional differences in the effectiveness of the bank lending channel of monetary policy in Italy. Using data from 1986 to 1998, result showed that after a monetary tightening the decrease in deposits subject to reserve requirements is sharper for those banks that have less incentive to shield the effect of a monetary squeeze: small banks characterized by a higher ratio of deposits to loans and well-capitalized banks that have a greater capacity to raise other forms of external funds. Jensen et al. [38] extended Fama and French's (1989) analysis by suggesting that the monetary environment influences investors' required returns. Their findings indicated that Fama and French's results vary dramatically across monetary environments; that is, the behaviour of the business-conditions proxies and their influence on expected security returns is significantly affected by the monetary sector. Taylor [39] showed that the use of monetary policy rules in emerging market economies has many of the same benefits that have been found in research and in practice in developed economies.

Nwakoby and Alajekwu [13] determined the effect of monetary policies on stock market performance in Nigeria from 1986 to 2013. An ex post facto research design was adopted using data from the Central Bank of Nigeria Statistical Bulletin, 2013 edition. The method of data analyses used were Johansen co-integration, OLS and granger causality tests. All Share Index was used as the indicator of stock market performance (ASI), while the explanatory variables include Monetary Policy Rate (MPR), Treasury bill rate (TBR), Lending interest rate (INT), Liquidity ratio (LR) and deposit rate (DR). The co-integration result indicated that there is long run relationship between monetary policy and stock market performance in Nigeria. The OLS regression result showed that monetary policy significantly explains 53% of changes stock market performances in Nigeria. However, Monetary Policy Rate (MPR) has insignificant positive effect on All Share Index (ASI), while Lending Rate (INT) has significant positive effect on All Share Index (ASI). Furthermore, Treasury Bill Rate (TBR) and Liquidity Ratio (LR) have insignificant negative effect on All Share Index (ASI) in Nigeria; and Deposit Rate (DR) has a significant negative effect on All Share Index (ASI) in Nigeria.

Laopodis [23] analysed the dynamic linkages among the federal budget deficit, monetary policy and the stock market for the period 1960 to 2004. The empirical results generally suggested that deficits matter for the stock market and imply a violation of the Ricardian Equivalence Proposition. Further analyses using taxes and government spending showed a higher sensitivity of the stock market to taxes relative to spending. When replacing market returns with before- and after-tax corporate profits and excess market returns, they observed several economically significant results. For instance, unexpected increases in the monetary policy rate lower expected stock returns leading to lower corporate profits and, thus, ultimately lower corporate tax revenues. Finally, the explicit modelling of inflation along with the deficit, monetary policy rate and stock prices indicated a negative response of the stock market to innovations in inflation a result taken to suggest that the stock market pays attention to inflation information before pricing assets.

Bjørnland and Leitemo [24] addressed the interdependence between US monetary policy

and the S&P 500 using structural VAR methodology. They found great interdependence between interest rate setting and stock prices. Stock prices immediately fall by one-and-a-half percent due to a monetary policy shock that raises the federal funds rate by ten basis points. A stock price shock increasing stock prices by one percent leads to an increase in the interest rate of seven basis points.

Handoyo et al. [40] appraised the effect of fiscal and monetary policy on Indonesian Stock price as well as main sectors stock price such as agricultural, mining, manufacture, and financial sector indexes. The study employed the Monte Carlo algorithm to Near-SVAR models. They found that there is a positive stock price response to monetary policy shock both aggregated and sectoral stock price. In term of interaction between fiscal policy shock and stock market, they found that all sectors respond negative relationship. The study also provided the evidence that not only both policies are able to influence the stock price individually, but also the interaction between monetary and fiscal policy is important in explaining stock market performance.

Afroze [1] identified the influence of Monetary Policy on the performance of Dhaka Stock Exchange. The researcher used selected indicators for measuring money supply – a key tool for implementing Monetary Policy and selected indicators for measuring the performance of Dhaka Stock Exchange (DSE) Limited available for 5 years (2006 – 2010). The empirical findings of the study showed statistically significant correlation amongst the indicators for measuring money supply and the indicators for measuring performance of Dhaka Stock Exchange Limited, in addition to the statistically significant influence of monetary policy on the performance indicators of DSE.

Muktadir-Al-Mukit and Shafiullah [2] investigated the impact of monetary policy variables on the performance of recent post crashed stock market of Bangladesh using monthly data from 2011. As a dependent variable, Dhaka Stock Exchange (DSE) General Index (DGEN) was used as a proxy for stock market performance and three independent variables namely money supply, repo rate and inflation rate were proxies for monetary policy tools. The study used econometric techniques of measuring the functional relationship between monetary variables and market index using the concept of

Unit root test and co-integration technique. Causal relationships was investigated using Granger causality test. The coefficients of all the explanatory variables were found statistically significant. By employing co-integration technique it was observed that in the volatile stock market of Bangladesh, a one percent increase in inflation, in money supply and in repo rate contributes 2.61 and 12.98 percent decrease and 6.08 percent increase in the market index respectively. Finally, Granger causality analysis suggested the existence of unidirectional causality from inflation to DGEN index and money supply to DGEN index.

Nemaorani [3] studied the impact of monetary policy as conducted by Bank of Botswana on the stock prices, particularly those of listed on the Botswana Stock Exchange (BSE). The study regressed nominal and real stock returns using Botswana data for the period January 2001 to September 2011. The empirical results suggested that shifts in monetary policy indeed leads to a change in stock returns, however inconsistent with most studies on the subject matter. The coefficient of the real 91 day Bank of Botswana monetary policy rate was significant and positive which suggested a positive relationship between monetary policy and stock prices in Botswana.

Qayyum and Anwar [41] explored the linkages between the monetary policy and the stock market in Pakistan. The estimation technique employed include Engle Granger two step procedure and the bivariate EGARCH method. The results indicated that any change in the monetary policy stance have a significant impact on the volatility of the stock market.

Albaity [42] unearthed the volatilities of monetary variables, interest rates, and inflation rate on two Islamic stock market indices. Using time series analysis such as GARCH, the results revealed that in the variance univariate models of the conventional indices that M1, M3, inflation rate, and real growth in GDP are significant in influencing KLCI volatility, while M2, M3, inflation rate and interest rate affected DJINA volatility. On the other hand, in the Islamic indices, KLSI and DJIMI variance is influenced by M2, M3, and inflation rate. In addition, in the multivariate model, DJIMI is influenced by the interest rate and the inflation rate in the mean and variance equations. In contrast, KLSI is influenced commonly in the mean and variance equations by M3, and the inflation rate.

Iglesias and Haughton [43] looked into the interaction between monetary policy and stock prices in Barbados, Jamaica and Trinidad and Tobago (T&T), both individually and jointly as the Caribbean countries using structural VARs. Annual and monthly frequencies were used for Barbados, while due to data availability constraints, only annual data was employed for Jamaica and T&T. First, they results showed that in Barbados with monthly (and annual) data, a monetary policy shock that increases the Treasury bill rate by 100 basis points causes stock prices to increase by 0.038 (and fall by 0.06) %; while a stock price shock that increases stock prices by 1% results in an increase in the Treasury bill rate of 30 (and 190) basis points respectively. For Jamaica, a monetary policy shock causes stock prices to fall by 0.3%; while a stock price shock that increases stock prices by 1% results in an increase in the Treasury bill rate of 400 basis points. Likewise for T&T; a shock to monetary policy causes stock prices to fall by 0.1% and a shock leading to a 1% increase in real stock prices causes the Treasury bill to increase by 330 basis points. When they analysed the three Caribbean countries jointly; a positive 1% stock price shock causes the Treasury bill rate to increase by 700 basis points and a positive monetary policy shock cause stock price to fall by 0.027%.

Wang and Mayes [44] investigated the impact of domestic monetary policy rate announcements on the stock markets of New Zealand, Australia, the United Kingdom and the euro area, using event-study methods to identify stock price reactions to the unanticipated/surprise component of announcements. As Australia and New Zealand did not reach the zero bound they investigated whether there is an impact from the global financial crisis on stock market reactions that can be distinguished from the asymmetric reactions to surprises that characterise the business cycle. They found that the euro area and the UK both show a financial crisis effect but behaviour in New Zealand and Australia does not change. They conducted robustness checks and explored confounding factors, especially the impact of guidance from central banks that prepares markets for policy rate changes.

Sourial [45] attempted to identify the impact of monetary policy on the Egyptian stock market returns, and whether the stock market could be an alternate channel for transmitting monetary policy rather than the traditional money and credit channels. The empirical investigation was

conducted using Bayesian VAR models consisting of four endogenous variables with four lags and a constant. Monthly data used in the estimation were the actively traded stocks HFI returns to represent market performance and inflation rate, as well as growth in both M1 and M2, and growth of credit to the private sector to represent the monetary stance. Empirical investigation showed, currently, the effectiveness of the credit channel in transmitting the monetary policy as well as the balance sheet channel. Nevertheless, the results provided evidence that in the future the stock market could be an effective channel in transmitting the monetary policy rather than the traditional credit channel.

3. METHODS AND MATERIALS

The ordinary relationship between monetary policy and performance of capital in Nigeria was estimated via Autoregressive Distribute Lag (ARDL) technique. Before evaluating the effect of monetary policy on Nigeria capital market, the long run co-integration relationship was assessed with Autoregressive Distribute Lag (ARDL) co-integration. The choice of ARDL is based on its power to take into consideration the different order of integration of financial time series data. The Granger Causality test was applied to determine the effect of each monetary policy tool on capital market performance. The relevant data from 1986 to 2016 were supplied by Nigerian Stock Exchange and Central Bank of Nigeria annual reports. Capital market performance was measured using the all share index, while Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), Liquidity Ratio (LR) and Loan to Deposit Ratio (LDR) indicated monetary policy instruments.

3.1 Specifying the Empirical Model

A modified model of [13] was adopted based on the construction of a linear regression model. Subsequently, Nigerian capital market performance – monetary policy is estimated as thus:

$$Y_t = \beta_0 + \sum_{i=1}^p \beta_i X_{i-1} + \delta_t \quad (1)$$

Where: Y_t entails the all share index which is gauge for performance of capital market in Nigeria; β_0 depicts the intercept, β_i showcases the coefficients of the monetary policy variables, X_i unveils monetary policy instruments: mpr = monetary policy rate, crr = cash reserve ratio, lr

= liquidity ratio and ldr = loan to deposit ratio; whereas δ_t shows the error term and thus:

$$\begin{aligned} \text{Log}ASI_t &= a_0 + a_1 \text{Log}MPR_t + a_2 \text{Log}CRR_t + a_3 \text{Log}LR_t \\ &+ a_4 \text{Log}LDR_t + \delta_t \end{aligned} \quad (2)$$

4. RESULTS AND DISCUSSION

4.1 Descriptive Attributes of the Data

Table 1 presents the descriptive attributes of the data from 1986 to 2016. The mean values of the ASI, MPR, CRR, LR and LDR are 15629.42, 13.61, 7.63, 45.17 and 65.40, while 10963.10, 13.50, 7.50, 44.30 and 66.90 reflect the median respectively. The maximum values of the variables are 57990.22 for ASI, 26.00 for MPR, 24.00 for CRR, 64.10 for LR and 85.70 for LDR. In the same vein, the minimum statistics are 163.80 for ASI, 6.00 for MPR, 1.00 for CRR, 29.10 for LR and 38.00 for LDR. The standard deviation was observed to be 14924.78 for ASI, 3.92 for MPR, 5.75 for CRR, 8.97 for LR and 12.39 for LDR. All the variables were positively skewed towards normality as evidenced by the positive values of the skewness statistic except for LDR. The Kurtosis value shows that all the variables are leptokurtic in nature except for LR and LDR as evidenced by the less than 3 values of the Kurtosis statistic. The Jarque-Bera suggests that MPR and CRR were normally distributed as the p-values are significant at 5% level of significance.

4.2 Unit Root Test

The stationarity of the data were determined by Augmented Dickey-Fuller (ADF) Test and Phillips Perron (PP). The stationarity check test was estimated at first difference and in two sets: intercept and trend intercept. Table 2 and 3 evidence the results of the ADF and PP tests.

4.3 Residual and Stability Test

The residual (serial correlation and heteroskedasticity) and stability (Ramsey specification) was processed. Table 4 and 5 give the residual diagnosis of the model, while Table 6 took care of the model stability diagnostic. From Table 4, the serial correlation LM test presents no autocorrelation in the model (p-value > 0.05). In Table 5, the model has no heteroskedasticity problem (p-value > 0.05), whereas Table 6 discloses that the model is well specified (p-value > 0.05).

Table 1. Descriptive attributes of the data

	ASI	MPR	CRR	LR	LDR
Mean	15629.42	13.60871	7.633871	45.16548	65.39613
Median	10963.10	13.50000	7.500000	44.30000	66.90000
Maximum	57990.22	26.00000	24.00000	64.10000	85.70000
Minimum	163.8000	6.000000	1.000000	29.10000	38.00000
Std. Dev.	14924.78	3.916879	5.754381	8.967720	12.38360
Skewness	0.839628	0.766244	1.209010	0.250645	-0.582239
Kurtosis	3.143551	4.886243	4.322991	2.721096	2.646180
Jarque-Bera	3.668991	7.629142	9.812954	0.425060	1.913213
Probability	0.159694	0.022047	0.007399	0.808536	0.384194
Sum	484512.0	421.8700	236.6500	1400.130	2027.280
Sum Sq. Dev.	6.68E+09	460.2583	993.3869	2412.600	4600.605
Observations	31	31	31	31	31

Source: Computer analysis using E-views 9.0

Table 2. Result of ADF test

Variables	Intercept	Trend and intercept	Remark
ASI	-5.300172 (0.00)*	-5.193517 (0.00)*	Stationary
MPR	-4.199524 (0.00)*	-4.240651 (001)*	Stationary
CRR	-2.276481 (0.03)**	-2.266706 (0.03)**	Stationary
LR	-6.105213 (0.00)*	-5.984285 (0.00)*	Stationary
LDR	-4.567333 (0.00)*	-4.523443 (0.00)*	Stationary

Source: Data output via E-views 9.0

Note: The p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively

Table 3. Result of PP test

Variables	Intercept	Trend and intercept	Remark
ASI	-6.381376 (0.00)*	-6.241616 (0.00)*	Stationary
MPR	-7.011884 (0.00)*	-6.882593 (0.00)*	Stationary
CRR	-4.711611 (0.00)*	-4.769737 (0.00)*	Stationary
LR	-10.35370 (0.00)*	-10.56588 (0.00)*	Stationary
LDR	-5.065653 (0.00)*	-5.027367 (0.00)*	Stationary

Source: Data output via E-views 9.0

Note: The p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively

4.4 VAR Lag Selection Criteria

Prior to co-integration analysis, the lag length was determined using the traditional Akaike information criterion (AIC) and Schwarz information criterion (SC) test statistics. The lag length for the model is one (see Table 7).

Table 4. Serial correlation LM test

Obs*R-squared	F-statistic	Prob.
10.54178	1.717611	0.1686

Source: Data output via E-views 9.0

Table 5. Heteroskedasticity test

Obs*R-squared	F-statistic	Prob.
4.174480	1.011504	0.4196

Source: Data output via E-views 9.0

Table 6. Ramsey reset specification

F-statistic	Likelihood ratio	DF	Probability
3.317006	3.862188	(1, 25)	0.0806

Source: Data output via E-views 9.0

4.5 ARDL Co-Integration

The ARDL co-integration takes into account the mixed order of integration of variables and eliminates possible bias alleged by non-integration at same order. The ARDL result as shown in Table 8 is clear evidence that monetary policy tools are not co-integrated with capital market performance in Nigeria. This assertion is on the argument that the F-statistics for the model is less than upper bound critical value (3.936557<4.01) at 5% level of significance.

4.6 Regression Results

The short run relationship between monetary policy and performance of the Nigerian capital market was estimated using ARDL regression technique. The regression outputs were evaluated using the coefficient of the individual variable, Adjusted R-squared, F-statistic and Durbin Watson statistic.

4.6.1 Monetary policy tools and capital market performance

From Table 9, monetary policy rate and loan to deposit ratio have significant negative relationship with performance of the capital market. Cash reserve ratio has negative insignificant relationship with capital market performance, while liquidity ratio is positively and insignificantly related with capital market performance in Nigeria. When monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio are held constant, performance of the Nigerian capital market would improve by 43832.01 points. A unit increase in monetary policy rate results in 879.23 depreciation in performance of the capital market. A unit increase in cash reserve ratio leads to 753.73 points decline in capital market performance. A

unit rise in liquidity ratio would improve capital market performance by 71.66 points. A percentage increase in loan to deposit ratio results in 410.79 depreciation in performance of the capital market. The Adjusted R-squared reveals that 80.81% variation in capital market performance was as a result of joint fluctuation in monetary policy tools of monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio. The significance value (5% significance level) of the F-statistic suggests that monetary policy tools significantly explained that changes in Nigerian capital market performance. The Durbin Watson statistic of 2.16 entails no autocorrelation in the model. Furthermore, the serial correlation LM test in Table 4 provided evidence of no autocorrelation in the model.

4.7 Granger Causality Estimation

The granger analysis was employed to ascertain the effect of monetary policy tools on capital market performance in Nigeria. The result as detailed in Table 10 infers evidence no unidirectional or bidirectional relationship between monetary policy tools: monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio of the Central Bank of Nigeria and capital market performance in Nigeria. Put differently, capital market performance in Nigeria is not significantly affected by Central Bank of Nigeria announcements on monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio. Surprisingly, it was crystal clear that it is the performance of the capital market that tends to influence changes in monetary policy rate. This is seen by the unidirectional causal relationship between all share index and monetary policy rate (p-value < 0.05) and causality runs from the direction of all share index to monetary policy rate at 5% level of significance.

Table 7. Lag length criteria for ASI, MPR, CRR, LR and LDR

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-612.8508	NA	4.29e+13*	45.56077*	46.75024*	45.92440*
2	-593.7535	24.55365	7.57e+13	45.98239	48.36133	46.70966
3	-569.4105	22.60425	1.26e+14	46.02932	49.59772	47.12022

Source: Data output via E-views 9.0

* Indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: HannanQuinn information criterion

Table 8. Bound test for ASI, MPR, CRR, LR and LDR

T-Test	5% Critical value bound		Remark
	Lower bound	Upper bound	
F-Statistic	2.86	4.01	Null Hypothesis Accepted
3.936557			

Source: Data output via E-views 9.0

Table 9. OLS regression: ASI, MPR, CRR, LR and LDR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI(-1)	0.707118	0.114461	6.177801	0.0000
MPR	-879.2313	424.7182	-2.070152	0.0500
CRR	-753.7310	539.7476	-1.396451	0.1779
CRR(-1)	-453.5115	724.6834	-0.625806	0.5385
CRR(-2)	2216.515	725.4449	3.055387	0.0062
LR	71.66203	200.0783	0.358170	0.7240
LR(-1)	-177.2200	190.3246	-0.931146	0.3629
LDR	-410.7854	143.9000	-2.854658	0.0098
C	43832.01	17590.87	2.491748	0.0216
R-squared	0.862941	Mean dependent var		16695.08
Adjusted R-squared	0.808117	S.D. dependent var		14846.84
S.E. of regression	6503.578	Akaike info criterion		20.64722
Sum squared resid	8.46E+08	Schwarz criterion		21.07155
Log likelihood	-290.3847	Hannan-Quinn criter.		20.78011
F-statistic	15.74029	Durbin-Watson stat		2.161168
Prob (F-statistic)	0.000000			

Source: Data output via E-views 9.0

Table 10. Granger causality estimation

Null hypothesis:	Obs	F-statistic	Prob.	Remarks
MPR does not Granger Cause ASI	29	0.02245	0.8820	No Causality
ASI does not Granger Cause MPR		6.11192	0.0200	Causality
CRR does not Granger Cause ASI	29	0.73154	0.3999	No Causality
ASI does not Granger Cause CRR		0.48722	0.4911	No Causality
LR does not Granger Cause ASI	29	1.69889	0.2034	No Causality
ASI does not Granger Cause LR		0.59385	0.4476	No Causality
LDR does not Granger Cause ASI	29	2.03667	0.1650	No Causality
ASI does not Granger Cause LDR		1.82868	0.1875	No Causality

Source: Data output via E-views 9.0

4.8 Test of Hypotheses

in all share index of the Nigerian capital market.

4.8.1 Decision rule

The null hypothesis is rejected if the p-value of F-statistic in OLS regression is less than 0.05. On the contrary, the null hypothesis is accepted if the p-value of F-statistic in OLS regression is greater than 0.05.

4.8.2 Hypotheses restatement

1. H_0 : Monetary policy tools does not significantly explained the variation

4.9 Discussion of Findings

4.9.1 Relationship between monetary policy and capital market performance

The significant negative relationship between monetary policy rate and capital market performance as evidence in Table 9 signals the relevant of monetary policy rate adjustment on production and consumption in the economy. This points toward the direction that monetary

Table 11. Test of hypothesis

Model	P-value	F-statistic	Decision
ASI → MPR, CRR, LD and LDR	0.001874	5.751472	Reject H ₀

Source: Regression Output from Table 9

policy rate of the Central Bank of Nigeria is high to attract considerable investment in the capital market. Economists are of the opinion that the current monetary policy rate of 14% is high as it adversely increases prime lending rate which is above 23%. The high interest rate in the country makes investment in the capital market unattractive, hence frequent volatility in securities prices owing to variation in cost of capital. This finding attests to previous empirical results of [8, [9,10] and [46] on the negative correlation between monetary policy rate and performance of capital markets in Bangladesh, Iran, China and Poland. However, this is in sharp contrast to [13] who found a positive insignificant relationship existing between monetary policy rate and capital market performance in Nigeria. The cash reserve ratio having a positive relationship with capital market performance in Nigeria refutes the research findings of [6] for India, [46] for Polish Stock Exchange and [13] for Nigeria capital market. Nevertheless, it tallies with [10] for China Stock Exchange. With the high monetary policy rate of the Central Bank of Nigeria, the efficiency of the capital market will be seriously affected as the cost involved in trading in the market would high. The high cost of trading on the market is an indication of how inefficient the Nigeria capital market is as evidence by its low contribution to the level of capital mobilization and investment attributed to its low market capitalization over the years when compared with other capital markets operating in other countries of the world such as China, South Africa and United Kingdom among others. This study would not affirm to the presence of a long run relationship between monetary policy tools and capital market performance in Nigeria as previously reported by [13].

4.9.2 Granger causality analysis

The Granger analysis in Table 10 reveals that monetary policy tools of the Central Bank of Nigeria through monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio has no significant effect on the performance of Nigerian capital market. Rather, it appears that it is the performance of the capital market that

tends to determine the direction of monetary policy rate as a tool of monetary policy. This would be due to frequent instability in macroeconomic fundamentals and the prevailing high cost of production incurred by firms. Again, the inability of the monetary policy tools to predict or influence capital market performance would be that the financial system is still in its developing stage. Monetary policy rate following the direction of all share index as depicted in Table 10 suggests that the Central Bank of Nigeria perhaps considers the performance of the capital market in implementation of monetary policy. This could be that the Central Bank of Nigeria is trying to fulfil its mandate of ensuring financial stability by ensuring development of the capital market in a bid to create expansion in mobilization of resources through the capital market.

5. SUMMARY AND RECOMMENDATION

This particular study shows the effect of monetary policy on Nigeria capital market performance from 1986 to 2016 by specifically by determining the effect of monetary policy rate, cash reserve ratio, liquidity ratio and loan to deposit ratio over all share index. The findings of the regression analysis are summarized here with:

1. Monetary policy rate has no significant effect on capital market performance in Nigeria, despite having a significant negative relationship with the all share index.
2. Cash reserve ratio was found to be not significantly affected by the performance of the Nigeria capital market even when it relates with all share index, negatively but insignificantly.
3. Liquidity ratio has no significant effect on capital market performance in Nigeria although all share indexes correlates with liquidity ratio, positively and insignificantly.
4. Loan to deposit ratio those do not significantly affect the performance of capital market in Nigeria with the regard to the unvarying negative association of all share index.

Following the findings of the study, the Central Bank of Nigeria took a step to be cautious and properly consider the prevailing macroeconomic condition in fixing the liquidity ratio, as because of its potential in fuelling or determining the inflation which affects prices of stocks of the capital market. Expansionary monetary policy should guarantee adequate liquidity in the economy and therefore be pursued vigorously by the Central Bank of Nigeria. Adequate level of liquidity offers firms' in the capital market with better access to financial resources which will later increase their revenue and get translated to prices of securities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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