

Interaction Between Monetary Policies and Stock Market Development in Nigeria: An Econometrics Analysis

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doi: <https://doi.org/10.37745/ejbir.2013/vol13n11938>

Published January 01, 2025

Citation: Udeorah S., Oladosu I.O. and Odiche W. (2025) Interaction Between Monetary Policies and Stock Market Development in Nigeria: An Econometrics Analysis, *European Journal of Business and Innovation Research*, Vol.13, No.1, pp.,19-38

Abstract: *This study explored the interplay between monetary policies and stock market development in Nigeria, focusing on key monetary policy variables such as interest rate, money supply, exchange rate, and liquidity ratio. Stock market development was measured through market capitalization. Anchored in Monetarism theory and the Efficient Market Hypothesis, the research utilized annual time series data spanning from 1990 to 2023, sourced from the Central Bank of Nigeria (CBN) statistical bulletin and Nigeria Exchange Group (NGX). Analytical methods included descriptive statistics, the Augmented Dickey-Fuller (ADF) unit root test, and the Autoregressive Distributed Lag (ARDL) approach. Results revealed that interest rates negatively and significantly impact stock market capitalization, while broad money supply and exchange rates exhibit positive and significant effects. Conversely, liquidity ratio was found to have a negative but non-significant impact on market capitalization. The study concluded that monetary policy serves as a critical stabilization tool influencing stock market development in Nigeria. It recommended that the Central Bank of Nigeria adopt a balanced approach in setting the Monetary Policy Rate (MPR) to effectively manage market expectations.*

Keywords: monetary policy, stock market, market capitalisation, interest rate, money supply, exchange rate, liquidity ratio.

INTRODUCTION

Mobilization of resources for national development has been the central focus of development: economists. Over the years, the vital role of savings and investment in the stock market to enhance economic growth has been given considerable attention in the literature. As a result, studies on stock market have grown considerably in developed and developing countries over the last two decades. As economies develop, more funds are needed to meet the rapid expansion. Thus, stock market serves as a veritable tool in mobilizing and allocating savings among competing uses which are critical to the growth and efficiency of the economy (Ogunleye & Adeyemi, 2015). Stock markets are one of the relevant constituents of the financial system, which help firms or companies to raise capital by issuing their shares and also create an enabling environment which allows for trading of the shares. Owing to this, it is obvious that the stock market plays a very critical role in economic growth and development of any nation. Therefore, the development of stock market is regarded as key and important vehicle in accelerating the growth of an economy (Araoye, Ajayi & Aruwaji, 2018). The stock market plays a major role as an economic institution which enhances the efficiency in capital formation and allocation. It enables both corporations and the government to raise long-term capital which enables them to finance new projects and expand other operations. Thus, the efficient functioning of the market paves way for the primary market by making investors more willing to purchase new securities in anticipation of selling such in the secondary market (Odo, Anoke, Onyeisi & Chukwu, 2017). The securities that are traded in the stock market have the nature that is so much influenced by monetary policy announcements, both globally and nationally. These monetary policy surprises have made stock markets so unpredictable and stock prices so unstable that both the developed and the emerging markets are found in the same saga. There are varying monetary policy tools used by the Central Banks of nations to manipulate the economy through the determination of credit accessibility and the amount of money that should be in circulation within a specified period (Omodero, Adetula & Adeyemo, 2021).

With this scenario, the monetary authorities try 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, stock market performance and economy in general. Since there exists functional relationship between monetary policy and market index, it becomes necessary for the Central Bank to determine the effect of monetary variables such as money supply, credit and interest rate on the development of stock market (Muktadir-Al-Mukit & Shafiullah, 2012). Nwoko, Ihemeje and Anumadu (2016) defined monetary policy as the actions taken by monetary authority, such as the apex bank of a nation, to regulate the value of money, supply and cost of money in the economy with the aim of achieving predetermine macroeconomic objectives. Monetary policy is also defined by the Central Bank of Nigeria (CBN) as mixture of processes intended to regulate value supply and interest rate as fees for money in a financial transaction, in agreement with the status of economic accomplishments (Nwoko, Ihemeje & Anumadu, 2016). However, the importance of monetary policy in macroeconomic management directs the intention and considerable interest of researchers and policy makers to find out its impact of on stock market

development in developing and developed countries. In different economies of the world, monetary policy effect on stock market vary according to peculiarity and prevailing economic conditions as well as efficiency of the market in response to policies (such as monetary policy) and inflationary trend. As a result of the above, the transmission mechanism may differ. It is believed that the operations of the monetary policy channels may vary systematically across countries due to differences in the extent of financial intermediations, i.e. the size, concentration and health of the banking system, the development of the stock market and structural economic conditions and as a result, the effect of the monetary policy tools on stock prices may vary equally. Nigerian stock market being an emerging market exhibits its own behaviour due to the changes in monetary policy which has effect on its performance (Clem & Alajekwu, 2016). In furtherance, Omodero, Adetula and Adeyemo (2021) established that the interest rate changes, as one of the monetary policy channels, affect the stock market through dwindling of stock investment. When the interest rate is high, investors tend to reduce their investment commitment due to the high cost of finance. The stocks, at this point, become less attractive and result in the low stock market output. However, a low-interest rate helps to boost the stock market. Also, the money supply determines the level of money available for investors to spend. When the money in circulation is not at equilibrium, investors find it challenging to invest the little that is meant for household usage. The point is that monetary powers are encouraged to ensure that the money supply matches the level of economic activities in an economy and this in turn affect stock market development (Omodero, Adetula & Adeyemo, 2021).

Statement of the Problem

One of the major objectives of monetary policy in Nigeria is price stability. However, despite the various monetary policies/measures adopted by the Central Bank of Nigeria (CBN) over the years, inflation still remains high and remains a major threat to every sector of the Nigeria economy especially the financial sector. However, whether the problem of inflation in Nigeria is due to mismanagement of monetary policy tools or structural deficiencies still remain a controversial matter. Also, in spite of many and frequently changing monetary and other macro-economic policies, the Nigerian stock market has been faced with a lot of challenges. For instance, in the Nigerian stock market, there has been a decline in the value of shares resulting from the global financial and economic crisis. This has equally reduced the propensity to invest in the market. The poor functioning of the stock market also deters foreign investors because the markets are illiquid and trading is expensive, thereby adversely affecting the economic growth and development of the country. Moreover, low market capitalization, delay in delivery of share certificate, double taxation, problem of macro-economic instability, poor public awareness about the workings of the stock market, underdevelopment of the stock market coupled with a high incidence of unethical practices have restricted the role of the stock market in promoting economic growth and development in Nigeria.

It is interesting to note that some studies (such as Tubotamuno & Oladosu, 2024; Anyanwu & Ohurogu, 2024; Nugraha & Sari, 2023; Shirya, Njoka & Abdul, 2023; Eghosa & Amenze, 2022;

Omodero, Adetula & Adeyemo, 2021; Alugbuo & Chika, 2020; Osakwe & Chukwunulu, 2019, Anaele & Umeora, 2019; Chukwuemeka, 2018) had empirically determined how monetary policy affect stock market and capital market in Nigeria. However, most of these studies provided mixed evidences and showed lack of consensus in their findings. Furthermore, most of the studies covered short periods while the most up to date among these studies covered time period that ended at 2021 as none of them covered up to 2023. All these indicate the presence of research gaps and the need to further undertakes a study in this area to bridge these gaps. It is against this backdrop that this study was set out to empirically determine the effect of monetary policy on stock market development in Nigeria, covering a period from 1990 - 2023 which is long enough for accurate data analysis and more updated as it captured the most recent events.

The aim of this study is to examine the effect of monetary policy on stock market development in Nigeria, specifically focusing on determining the effect of interest rate, evaluating the impact of broad money supply, examining the influence of liquidity ratio, and ascertaining the role of exchange rate on market capitalization of the stock market in Nigeria

LITERATURE REVIEW

Conceptual Literature

Concept of Monetary Policy

Monetary policy is the deliberate use of monetary instruments (direct and indirect) at the disposal of monetary authorities such as central bank in order to achieve macroeconomic stability. Monetary Policy is essentially the tool for executing the mandate of monetary and price stability. Monetary policy is essentially a program of action undertaken by the monetary authorities generally the central bank, to control and regulate the supply of money with the public and the flow of credit with a view to achieving predetermined macroeconomic goals (Ajayi & Atanda, 2012). Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy. It can be described as the art of controlling the direction and movement of credit facilities in pursuance of stable price and economic growth in an economy (Chowdhury, Hoffman & Schabert, 2013). Nwoko, Ihemeje and Anumadu (2016) defined monetary policy as the blend of procedures taken by monetary authorities (e.g. 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.

Types of Monetary Policy

According to Afolabi, Adeyemi, Salawudeen, and Fagbemi (2018), monetary policy primarily consists of two types: expansionary and contractionary. Expansionary monetary policy aims to

boost economic activity by increasing the money supply or reducing the cost of borrowing, thereby addressing issues like depression, recession, and deflation. This is achieved through actions such as purchasing securities in the open market, lowering interest and discount rates, reducing reserve requirements, and easing credit controls, ultimately leading to higher aggregate demand, investment, savings, employment, output, and economic growth, albeit with a potential rise in inflation. Conversely, contractionary monetary policy serves to decrease the money supply or increase borrowing costs to curb inflation and slow down economic activity, resulting in lower investment, employment, output, and economic growth. The monetary authorities may shift between these policies as economic objectives change, reflecting the dynamic nature of Nigeria's monetary policy landscape.

Objectives of Monetary Policy

According to Onoh (2017), monetary policy, as adopted in Nigeria, have four broad objectives. These include: Monetary policy in Nigeria, as outlined by Onoh (2017), aims to achieve four primary objectives: maintaining full employment by effectively utilizing labor, plant, and capital to combat economic downturns; ensuring price stability to control inflation, which adversely affects real income and purchasing power; fostering sustainable economic growth through an increase in the production of goods and services and improvements in citizens' income; and achieving equilibrium in the balance of payments by balancing total payments and receipts, thus avoiding chronic deficits or surpluses.

Major Instruments of Monetary Policy According to Onoh (2017), the instruments of monetary policy can be divided into two categories: direct (qualitative) instruments and indirect (quantitative) instruments. Direct instruments, which include reserve requirements, special deposits, moral suasion, selective credit control, direct credit control, and prudential guidelines, are selected based on the specific goals of monetary policy and the country's economic situation. In contrast, indirect instruments rely on adjustments to monetary variables, such as monetary aggregates, interest rates, or exchange rates, to influence goals indirectly. The effectiveness and choice of these instruments depend on the banking sector's development and the overall economic landscape, with commonly used indirect instruments including open market operations, central bank lending, interest rates, exchange rates, rediscount rates, and cash reserve requirements.

Stock Market

The stock market is a market which deals in long term loans (Jhingan, 2004). It supplies firms with fixed and working capital and finance medium term and long term borrowings of the federal, states and local governments. Thus, the stock market encompasses of institutions and mechanisms

through which medium term funds and long term funds are pooled and made available to corporate entities and governments. The stock market has been recognised as an institution that contributes to the socio-economic growth and development of emerging and developed economies. Donwa and Odia (2017) noted that this is made possible through some vital roles played, such as channelling resources, promoting reforms to modernize the financial sectors, financial intermediation capacity to link deficit to surplus sector of the economy, and a veritable tool in the mobilization and allocation of savings among competitive uses which are critical to the growth and efficiency of the economy. Stock markets are one of the relevant constituents of the financial system, which help firms or companies to raise capital by issuing their shares and also create an enabling environment which allows for trading of the shares. The stock market forms an integral part of financial system and serves important functions in an economy by means of providing liquidity for investors. There is no generally acceptable definition of stock market as various authors have tried to define stock market but none of these definitions has been universally accepted.

Measures of Stock Market Development.

According to Odo, Anoke, Onyeisi, and Chukwu (2017), the measures of stock market development in Nigeria encompass several key indicators: market capitalization, which reflects the size of the capital market by calculating the share price multiplied by the number of outstanding shares; the All Share Index, a statistical measure that captures the overall market direction and performance by averaging share prices across all companies listed on the stock exchange; stocks traded (total value), representing the total value of shares traded over a specific period, which helps assess whether market size corresponds with trading activity; and total new issues, referring to securities that have been registered and offered to the public for the first time, including both debt and equity, thus highlighting the market's capacity for new capital generation.

Theoretical Framework

Monetarism Theory

Monetarism is an economic theory primarily attributed to Milton Friedman in 1956, a Nobel Prize-winning economist. Milton Friedman developed Monetarism in 1956 and the central tenet of monetarism is that the money supply is the main driver of economic activity and inflation. Monetarists believe that managing the growth rate of the money supply can stabilize the economy, control inflation, and influence overall economic output. The role of monetary policy which is of course influencing the volume, cost and direction of money supply was effectively conversed by Milton Friedman whose position is that inflation is always and everywhere a monetary phenomenon. He recognises that in the short run, increase in money supply can reduce unemployment but can also create inflation and so the monetary authorities should increase money supply with caution (Onyemaechi, 2015). The monetarist essentially adopted Fisher's equation of exchange to illustrate their theory, as a theory of demand for money and not a theory of output, price and money income, by making a functional relationship between the quantities of real balances demanded by a limited number of variables. Monetarists like Friedman (1968)

emphasized money supply as the key factor affecting the wellbeing of the economy. Thus, in order to promote steady of growth rate, the money supply should grow at a fixed rate, instead of being regulated and altered by the monetary authority (ies). Friedman equally argued that since money supply is substitutive not just for bonds but also for many goods and services, changes in money supply will therefore have both direct and indirect effects on spending and investment respectively. The monetarist introduces an additional factor in the determination of interest rate, which is price expectation; an increase in supply of money has a liquidity effect on income effect and price effect. Also in the monetarist thinking, they felt it more important of money in explaining macro-economic behavior and therefore, monetary policy was given attention in the neoclassical school. Symbolically, the monetarist conception of money transmission mechanism can be summarized below:

$\uparrow\text{OMO} \rightarrow \uparrow\text{MS} \rightarrow \text{Spending} \rightarrow \uparrow\text{GNP}$

The monetarist argument centres on the old quantity theory of money. If velocity of money in circulation is constant, variation in money supply will directly affect prices and output or income (GNP), M. L. Jhingan, Monetary Economics 6th Edition, P. 418 – 419). This theory is relevant to this study. Central Bank of Nigeria (CBN) often adjusts interest rates to control inflation and stabilize the economy. According to monetarism, higher interest rates can lead to a reduction in money supply growth, which in turn can slow down economic activity and control inflation. Higher interest rates increase the cost of borrowing for businesses, which can reduce corporate profits and negatively affect stock prices. Investors may also shift their investments from stocks to fixed-income securities, which offer more attractive returns during periods of high interest rates. Also, the Central Bank of Nigeria (CBN) influences the money supply through open market operations, reserve requirements, and other monetary policy tools. Monetarism posits that controlling the growth rate of money supply is crucial for maintaining price stability. Thus, rapid expansion of the money supply can lead to inflation, eroding purchasing power and investor confidence. Inflation uncertainty can increase market volatility and lead to capital flight.

Efficient Market Hypothesis

The Efficient Market Hypothesis was developed by Fama in 1965. The Efficient Market Hypothesis (EMH) is a financial theory that posits that financial markets are "informationally efficient," meaning that asset prices reflect all available information at any given time. The concept of Efficient Market Hypothesis was defined as the market which adjusts speedily to available information. It assumes that the value of the market price of stocks is linear function available information which does not give room for excess return on stocks through the messaging of any market information. The efficiency of stock market has over the years attracted the attention of research in financial economies especially the stock market of the developing countries. This is because the functioning of the capital market is a policy structure for achieving macroeconomic goals. Fama (1965) observed that stock market where successive price changes in the individual securities are independent is by their definition, a random walk market. Fama assumed that

sufficient but not necessary conclusions for efficiency are: The absence of transaction cost in the process of the security trading. ii. Availability of the required information without lost. iii. There is consensus agreement between the parties on the implication of current information for the available price and distribution of future price. The efficient market hypothesis was categorized into three according to speed to which the information affects the stock price. iv. The Weak form of efficient-market-hypothesis. v. The Semi-strong form efficient market hypothesis. vi. The Strong-form efficient market hypothesis

The Weak-Form Efficient Market-Hypothesis: This assumed that the current price of any stock can not contain any valid information to predict and forecast the future price behaviour of the stock. Excess return cannot be earned in the long run by investment strategies based on historic share value of the stock. This implies that fluctuation in stock price, up and down is not the function of information that were not available in the time series but noted that fluctuation of share price is random.

The Semi-Strong Form Efficient Market-Hypothesis: This is of the opinion that public available information such as financial statement strategy and past history are fully reflected in current price of the stock price and that no excess returns can be earned by trading on the information. This captured some classes of investors by evaluating the earnings and the profit position of the firms before and other investment. This was the case of the stock prices of the banking industry in Nigeria in the banking sector crisis in 2008 that was caused by the margin loans.

The Strong-Form Efficient Market-Hypothesis: This advocate that all information both public and private is fully reflected in the price and there is no avenue for excess return. The availability of legal barriers to both private and public information renders the strong form of efficient relevant hypothesis except where these laws are ignored.

Empirical Review

Tubotamuno and Oladosu (2024) examined the impact of monetary policy on Nigeria's stock market performance from 1985 to 2022, using the monetary policy rate, money supply, lending rate, and treasury bill rate as proxies for monetary policy, while stock market capitalization served as the performance measure. Data were sourced from the Central Bank of Nigeria and analyzed using descriptive statistics, the ADF unit root test, and the ARDL approach. The findings revealed that the monetary policy rate negatively and nonsignificantly affects stock market capitalization, while both money supply and treasury bill rate positively and significantly influence it. Conversely, the lending rate has a negative but significant impact on stock market capitalization in Nigeria.

Anyanwu and Ohurogu (2024) carried out an empirical analysis of the impact of interest rates and money supplies on stock market liquidity in Nigeria. The study made use of annual time series data which were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and Nigerian Exchange Group (NGX) reports. By using vector autoregression estimation techniques with variance decomposition and impulse response function, the study found that the interest rate has a significant negative impact on stock market liquidity while the money supply has a positive and significant impact on stock market liquidity in Nigeria.

Nugraha and Sari (2023) aimed to examine the effect of money supply and interest rate on stock price in Indonesia and Malaysia. The study used the composite stock price index in analyzing macroeconomic effects on stock prices. The research period is used during 2000-2020, using the money supply and interest rates as macroeconomic variables in Indonesia and Malaysia. The results of the study show that both the money supply and interest rates have an influence on stock prices in Indonesia, while research in Malaysia shows that only interest rates have an influence on stock prices. Research in two emerging market countries shows different patterns of influence, this shows that Arbitrage Pricing Theory has different patterns of influence.

Shirya, Njoka and Abdul(2023) examined the relationship between monetary policy instruments and financial performance of commercial banks in Nigeria. The study was anchored on Keynesian theory and employed causal research design. The Nigerian banking populace is 21 commercial banks, so census approach was adopted. Panel data was utilized and inferential statistical methods were used to analyze the data. The result of regression analysis showed that open market operations had positive and significant effect on the earning performance of commercial banks in Nigeria. The results also showed that monetary policy reforms had positively and significantly intervened on the relationship between open market operations and financial performance of commercial banks in Nigeria of a most distinctive finding of the study.

Eghosa and Amenze (2022) used Vector Error Correction Model (VECM) causality framework to examine the influence of Monetary Policy instruments on stock market performance in Nigeria. Monthly data ranging Jan 2010 to Jun 2019 were sourced and analyzed with the VECM methodology after the preliminary test of descriptive statistics, correlation analysis, ADF stationarity test, Johansen co-integration test and Akaike Information Criteria (AIC) were satisfied according to theoretical requirement. Findings showed that Monetary Policy instruments of Broad Money Supply (BMS) and Inflation Rate (INFR) were significant determinants of stock market return (proxied by all share index) in the short run. BMS, INFR, Interest Rate (INTR), Exchange Rate (EXR) and Market Capitalization (MCAP) (controlled variable) significantly impact stock market performance in the long run.

Omodero, Adetula and Adeyemo (2021) empirically determined stock market reactions to monetary policy modifications in Nigeria using annual time series data on all share indices, money supplies, interest rates and exchange rates from 1998 to 2018. The study adopted multiple regression and the results showed that the money supply has a significant favourable influence on

the all-share index. In contrast, the interest rate has an immaterial harmful effect on stock market output.

Alugbuo and Chika (2020) investigated the effect of monetary policy on stock market performance in Nigeria for the period 1981-2018. The specified model of the study was estimated using the ARDL model to determine the level of impact that one variable has on the other. While E-views 10 statistical software was employed in computing the result, time series data were obtained from World Bank national accounts data and OECD National Accounts data files and the study established that Lending interest rate had a positive relationship with all share index and also was statistically significant in the current year while money supply had a negative relationship with All Share Index (ASI) in the current year and in the previous lags i.e 1st, 2nd and 3rd years lag periods in the short run period but was found to have a positive relationship with All Share Index in the long run and was statistically significant at 5% level of significance, Consumer Price Index (CNPI) had a negative relationship with ASI in the current and in the 1st years lag periods and finally, Treasury Bill Rate (TRBR) had a negative relationship and significant impact on ASI in the current year period but was also found to have a positive and strong impact on ASI in the 1st lag period.

Anaele and Umeora (2019) studied the relationship between monetary policy and Nigerian capital market performance from 1986 to 2017. The monetary policy tools employed by the study included the economic policy rate, cash reserve ratio, liquidity ratio and loan-to-deposit balance while using all share index as a proxy for capital market performance. The results from the autoregressive distribution lag (ARDL) regression method indicated that the monetary policy rate, cash reserve ratio and loan-to-deposit ratio are adversely and considerably interrelated with capital market output. Additionally, the liquidity ratio had an affirmative correlation with capital market productivity.

Osakwe and Chukwunulu (2019) used the ordinary least squares regression technique to determine whether monetary policy (money supply, interest rate and exchange rate) influenced stock market performance in Nigeria from 1986 to 2015. The results of the study indicated that the money supply and exchange rate have positive and significant impacts on stock market price movement whereas the interest rate has an insignificant negative effect on stock market price movement.

In the study of Echekeba, Ananwude and Lateef (2018), the empirical effect of monetary policy tools on performance of the Nigerian capital market was re-examined. Explicitly, this study evaluated the effect of monetary policy rate, 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 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.

METHODOLOGY

This study used ex-post-facto research design to examine the effect of monetary policy on stock market development in Nigeria. The study made use of annual time series data gathered from Central Bank of Nigeria (CBN) statistical bulletin and Nigerian Exchange Group (NGX). The data covered from 1990 to 2023.

Model Specification

The theoretical foundation for the model is the Monetarism Theory. The model highlights how changes in monetary policy will have both direct and indirect effects on spending and investment which will in turn affect the financial market. On an empirical basis, the model of Tubotamuno and Oladosu (2024) was adopted and structurally modified. To show the functional relationship, the model can be written as;

$$\text{MCAP} = (\text{INR}, \text{M2}, \text{LQR}, \text{EXR}) \quad (3.1)$$

To show the linear mathematical relationship, the model can be written as;

$$\text{MCAP} = \beta_0 + \beta_1\text{INR} + \beta_2\text{M2} + \beta_3\text{LQR} + \beta_4\text{EXR} \quad (3.2)$$

Including the stochastic or error term (\mathbb{Q}_t) in our econometric model, our model will become;

$$\text{MCAP} = \beta_0 + \beta_1\text{INR} + \beta_2\text{M2} + \beta_3\text{LQR} + \beta_4\text{EXR} + \mathbb{Q}_t \quad (3.3)$$

A Priori Expectation: The a priori expectation evaluates the parameters in terms of its meeting the standard economic theory expectation. Economic theory explains the nature of the variables being used and their relationship with one another. The evaluation therefore is based on whether the parameter conforms to economic postulations or not. Specifically, the following nature of relationship is expected: $\beta_1 < 0$; $\beta_2 > 0$, $\beta_3 < 0$. $\beta_4 < 0$.

Where: MCAP = market capitalization, INR = Interest rate, M2 = Money supply, LQR = Liquidity ratio, EXR = Exchange rate, f = Functional relationship, β_0 = regression intercept, β_1 - β_4 = Coefficients of independent variables, \mathbb{Q}_t = Stochastic or error term which captures the impact of variables that are not included in the model.

The Autoregressive Distributed Lag (ARDL) model specifications of the above models are given as;

$$\begin{aligned}
\Delta \ln(MCAP_t) = & \beta_1 + \beta_{1i} \Delta \ln(MCAP_{t-1}) + \beta_{2i} \Delta(INR_{t-1}) + \beta_{3i} \Delta \ln(M2_{t-1}) + \beta_{4i} \Delta(LQR_{t-1}) \\
& + \beta_{5i} \Delta(EXR_{t-1}) + \sum_{t=1}^p \alpha_{1i} \Delta \ln(MCAP_{t-1}) + \sum_{t=1}^q \alpha_{2i} \Delta(INR_{t-1}) \\
& + \sum_{t=1}^q \alpha_{3i} \Delta \ln(M2_{t-1}) + \sum_{t=1}^p \alpha_{4i} \Delta(LQR_{t-1}) + \sum_{t=1}^p \alpha_{5i} \Delta(EXR_{t-1}) \\
& + \varepsilon_{1i}
\end{aligned} \tag{3.4}$$

Where: Δ = Difference operator P = Lag of dependent variable q = Lag of independent variable t = Time β_0 = Constant or Intercept $\alpha_1 - \alpha_5$ = Coefficient of short run dynamic model $\beta_1 - \beta_5$ = Coefficient of long run equilibrium

Estimation Techniques

In analysing the data, this study first adopted descriptive statistics technique to determine the descriptive statistics of all the variables of the study. Followed by this, Correlation Matrix was used to detect multicollinearity among the variables. Furthermore, Augmented Dickey-Fuller (ADF) approach was adopted to determine the stationary of the data. The auto-regressive distribution lag [ARDL] model was used to determine the long-run and short-run relationship between the independent and the dependent variables. Lastly, some diagnostic tests were conducted to ensure that the data meet the assumptions of economic model such as normality, linearity, homoscedasticity, independence of error and stability if there was a problem in the model and the stability of the model.

ANALYSIS AND DISCUSSION OF RESULTS

Table 1: Descriptive Statistics

	MCAP	INR	M2	LQR	EXR
Mean	11548.15	18.03441	12471.22	50.04941	158.4297
Median	6075.870	17.77000	4462.655	47.65000	130.7550
Maximum	49520.37	29.80000	47295.44	104.2000	516.5800
Minimum	16.30000	11.55000	47.42000	26.39000	8.040000
Std. Dev.	14307.13	3.790013	14784.69	15.50916	133.1360
Skewness	1.299238	0.830065	0.985456	1.329849	1.038497
Kurtosis	3.726309	4.595603	2.655549	5.830484	3.421259
Jarque-Bera	10.31276	7.511137	5.671119	21.37131	6.362761
Probability	0.005763	0.023387	0.058686	0.000023	0.041528
Sum	392637.0	613.1700	424021.3	1701.680	5386.610
Sum Sq. Dev.	6.75E+09	474.0184	7.21E+09	7937.620	584931.3
Observations	34	34	34	34	34

Source: Authors' Computation, 2024.

The summary statistics as seen in Table 1 shows weak stock market development in Nigeria as measured by market capitalization averaged ₦1 548.15 billion over thirty-four (34) years periods. There was high fluctuation in stock market, as market capitalization fluctuated between ₦49520.37 billion and ₦16.3 billion. Interest rate (INR), broad money supply (M2), liquidity ratio (LQR) and exchange rate (EXR), which were used as proxies for monetary policy, have average values of 18.0%, ₦12471.2 billion, 50% and 158.4% with median values of 17.8%, ₦4462.6 billion, 47.7% and 130.8% as well as maximum values of 29.8%, ₦47295.4 billion, 104.2% and 516.6% and minimum values of 11.6%, ₦47.4 billion, 26.4% and 8% respectively. The volatility constructs as evaluated through standard deviation values indicate that interest rate (INR) and liquidity ratio (LQR) are highly volatile components with values of 3.8% and 15.5% respectively while the less volatile component is exchange rate (EXR) with a value of 133.1%. Also, market capitalization (MCAP) and broad money supply (M2) have a standard deviation of ₦14307.1 and ₦14784.7 billion, respectively. It is also shown in this table that all the variables (market capitalization, interest rate, broad money supply, liquidity ratio) are positively skewed.

Table 2: Correlation Matrix

	$InMCAP_t$	INR_t	$InM2_t$	LQR_t	EXR_t
$InMCAP_t$	1				
INR_t	-0.310280	1			
$InM2_t$	0.490149	-0.68820	1		
LQR_t	0.339002	-0.32006	0.35014	1	
EXR_t	0.521435	-0.64666	0.448729	0.504259	1

Source: *Authors' Computation, 2024.*

In econometrics, the correlation matrix is a popular tool for examining the relationships between variables. It gives a correlation coefficient matrix that quantifies the degree of linear relationship between two variables. For the purpose of this study, correlation matrix was used to detect multicollinearity. The result of the correlation matrix in Table 2 indicated that interest rate (INR), broad money supply (M2), liquidity ratio (LQR), exchange rate (EXR) all have mixed of weak positive and negative relationships with market capitalization (MCAP). Hence, there is sufficient statistical evidence to conclude that there is absence of multicollinearity problem among the variables.

Table 3: Augmented Dickey-Fuller (ADF) Test Results

ADF					
Variables	Level	1 st Difference	5% Critical Value	I(d)	Stationary @
$InMCAP_t$	-2.399458	-4.386842***	-2.957110	I(1)	First Difference
INR_t	-3.554850**	-	-2.954021	I(0)	Level
$InM2_t$	6.689329***	-	-2.954021	I(0)	Level
LQR_t	-3.006960**	-	-2.954021	I(0)	Level
EXR_t	3.348269**	-	-2.954021	I(0)	Level

Note: *, **, and *** denote significance at 10%, 5% and 1%, respectively

Source: *Authors' Computation, 2024.*

It has become a necessity in modelling to determine the order of integration of series in order to avoid a situation of spurious results. As a result, this study tested the integration properties of the series using Augmented Dickey-Fuller (ADF) approach. The result of the ADF indicates that interest rate (INR), broad money supply (M2), liquidity ratio (LQR) and exchange rate (EXR) series do not have unit root at levels. This further indicates that interest rate (INR), broad money supply (M2), liquidity ratio (LQR) and exchange rate (EXR) are stationary at levels, that is, order I(0). However, it was discovered that market capitalization (MCAP) has unit root at level. Following first differencing of its series, market capitalization (MCAP) became stable and stationary at first different, that is, order I(1). In summary, the test of unit root points to the series being of I(0) and I(1). This gives sufficient statistical foundational backing to employ bounds cointegration test and autoregressive distributed lag (ARDL) method of Pesaran Shin and Smith (2001).

Table 4: ARDL Bounds Cointegration Test

	Critical Value Bound		F-Statistics
$F_{MCAP}(MCAP/INR, M2, LQR, EXR)$ K = 4			12.48636***
Significance	I(0) Bound	I(1) Bound	
10%	2.2	3.09	
5%	2.56	3.49	
2.5%	2.88	3.87	
1%	3.29	4.37	

Note: Null hypothesis: No level relationship; K = number of regressors; *, ** and *** denote significance at 10%, 5% and 1% level, respectively.

Source: *Authors' Computation, 2024.*

In order to determine if there is cointegration among market capitalization (MCAP), interest rate (INR), broad money supply (M2), liquidity ratio (LQR), exchange rate (EXR), a bounds test was conducted. However, the bound test indicates the presence of a long-run relationship among market capitalization (MCAP), interest rate (INR), broad money supply (M2), liquidity ratio (LQR), exchange rate (EXR) given that the F-statistic value of 12.48636 is higher than the 5% upper bound critical value of 3.49. By this, the null hypothesis is rejected, which leads to the study concluding that there is a cointegrating relationship among the variables.

Table 5: Results of Estimated Autoregressive Distributive Lag (ARDL) Long-Run Coefficients

Dependent Variable = $\ln MCAP_t$				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INR_t	-0.010335	0.003296	-3.135976	0.0202
$\ln M2_t$	1.457461	0.131930	11.04719	0.0000
LQR_t	-0.106222	0.080476	-1.319929	0.2350
EXR_t	0.054027	0.015450	3.496979	0.0129
C	-5.951375	1.855007	-3.208276	0.0184

$$EC = \text{LOG}(MCAP) - (-0.0103 * INR + 1.4575 * \text{LOG}(M2) - 0.1062 * LQR + 0.0540 * EXR - 5.9514)$$

Source: Authors' Computation, 2024.

The result of the long-run estimate of the ARDL model indicates that the interest rate has a negative coefficient value of -0.010335 and a p-value of 0.010335. This implies that the interest rate has a negative and significant effect on market capitalization. Hence, a percentage increase in the interest rate will lead to a 1.0% significant decrease in market capitalization in the long-run. Also, broad money supply has a positive coefficient value of 1.457461 and a p-value of 0.0000. This implies that broad money supply has a positive and significant effect on market capitalization. Hence, a percentage increase in broad money supply will lead to a 145.7% significant increase in market capitalization in the long-run. Moreover, the liquidity ratio has a negative coefficient value of -0.106222 and a p-value of 0.2350. This implies that the liquidity ratio has a negative and non-significant effect on market capitalization. Therefore, a percentage increase in the liquidity ratio will lead to a 10.6% insignificant decrease in market capitalization in the long-run. Lastly, the exchange rate has a positive coefficient value of 0.054027 and a p-value of 0.0129. This implies that the exchange rate has a positive and significant effect on market capitalization. Hence, a percentage increase in the exchange rate will lead to a 5.4% significant increase in market capitalization in the long-run.

Table 6: Results of Estimated Autoregressive Distributive Lag (ARDL) Short-Run Coefficients

Dependent Variable = $InMCA P_t$				
$D(InMCA P_t)$	0.117896	0.173197	0.680700	0.5052
$D(InMCA P_{t-1})$	0.006698	0.015637	0.428335	0.6738
$D(INR_t)$	-0.339855	0.142267	-2.388863	0.0288
$D(INR_{t-1})$	-0.016761	0.017716	-0.946083	0.3574
$D(InM2_t)$	0.032956	0.013984	2.356656	0.0307
$D(LQR_t)$	-0.002791	0.002805	-0.995150	0.3336
$D(LQR_{t-1})$	-0.003206	0.001684	-1.903427	0.0741
$D(EXR_t)$	0.006792	0.003034	2.238445	0.0389
CointEq(-1)*	-0.036923	0.008243	-4.479395	0.0003

$R^2 = 0.658517$; $Adjusted R^2 = 0.534341$; $Durbin-Watson\ stat = 2.109168$

Source: Authors' Computation, 2024.

The result of short-run estimate of the ARDL model indicates that interest rate has a negative coefficient value of -0.339855 and p-value of 0.0288 at levels. This implies that interest rate has a negative and significant effect on market capitalization. Hence, a percentage increase in interest rate will lead to 34% significant decrease in market capitalization in the short-run. Also at initial level, broad money supply has a positive coefficient value of 0.032956 and p-value of 0.0307. This implies that broad money supply has a positive and significant effect on market capitalization. Hence, a percentage increase in broad money supply will lead to 3.7% significant increase in market capitalization in the short-run. Moreover, liquidity ratio has a negative coefficient value of -0.002791 and p-value of 0.3336 at initial level. This implies that liquidity ratio has a negative and non-significant effect on market capitalization. Therefore, a percentage increase in liquidity ratio will lead to a 0.3% insignificant decrease in market capitalization in the short-run. Lastly, exchange rate at initial level has a positive coefficient value of 0.006792 and p-value of 0.0389. This implies that exchange rate has a positive and significant effect on market capitalization. Hence, a percentage increase in exchange rate will lead to 0.7% significant increase in market capitalization in the short-run.

Furthermore, the results of the short-run dynamic coefficients associated with the long-run relationships obtained from the error correction model are also given in Table 6. The signs of the short run dynamic interactions are consistent with that of the long run relationship. The estimated error correction coefficient of -0.036923 (with p-value of 0.0003) is highly significant, has the correct sign, and imply a low speed of adjustment to equilibrium after a shock. This implies that approximately 4% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year. Lastly, the Adjusted R-squared value of 0.534341 from the results of the short-run estimates of the ARDL model in Table 6 indicated that the estimated model is well

fitted as the systematic changes in explanatory variables (interest rate, broad money supply, liquidity ratio and exchange rate) explained approximately 53 percent (R-squared) variation in market capitalization while the remaining 47% is explained by other variables of factors outside the model.

Table 7: Diagnostic Test Results

Test	Null Hypothesis	X ² Value	X ² Prob	Remark
Jarque-Bera	Normal distribution exists	0.368699	0.33878	Normal residuals
Breusch-Godfrey LM	Serial correlation does not exist	1.978315	0.1611	Serial independence
Breusch-Pagan-Godfrey	Homoscedasticity exists	2.098781	0.0815	Constant Variance
Ramsey RESET	Model is stable	3.425185	0.0766	correctly specified model

Source: Authors' Computation, 2024.

The ARDL model was subjected to diagnostic tests to ensure the model is devoid of any classical linear regression problem such as normality, serial dependence, heteroscedasticity and stability issues. The summary of the tests are reported in Table 7. The study observed that the model used in examining how monetary policy affects stock market development in Nigeria has normal residuals, serially independent, has homoscedastic errors and highly stable.

DISCUSSION OF FINDINGS

The findings of the study indicated that interest rate has a negative and significant effect on market capitalization of stock market in Nigeria. On the other hand, broad money supply and exchange rate have positive and significant effect on market capitalization of stock market in Nigeria. However, liquidity ratio has a negative and non-significant effect on market capitalization of stock market in Nigeria. These findings are related to the findings of many scholars such as Tubotamuno and Oladosu (2024), Anyanwu and Ohurogu (2024), Omodero, Adetula and Adeyemo (2021) as well as Osakwe and Chukwunulu (2019). Specifically, Tubotamuno and Oladosu (2024) found that money supply and treasury bill rate have a positive and significant effect on stock market capitalisation in Nigeria while lending rate has a negative but significant effect on stock market capitalisation in Nigeria. Also, the result of Anyanwu and Ohurogu (2024) indicated that interest rate has a significant negative impact on stock market liquidity while money supply has a positive and significant impact on stock market liquidity in Nigeria. Relatedly, the finding of Omodero,

Adetula and Adeyemo (2021) showed that money supply has a significant favourable influence on the all-share index of the stock market. Lastly, Osakwe and Chukwunulu (2019) established that the money supply and exchange rate have positive and significant impacts on stock market price movement whereas the interest rate has an insignificant negative effect on stock market price movement

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study adopted Autoregressive Distributive Lag (ARDL) approach to empirically determine the effect of monetary policy on stock market development in Nigeria from 1990 to 2023. The findings of the study indicated that interest rate, broad money supply, liquidity ratio and exchange rate are important monetary policy variables that affect market capitalization of stock market in Nigeria. Based on the findings, the study concluded that monetary policy is an important stabilization policy that plays a significant role in the development of stock market in Nigeria.

Recommendations

Based on the findings and conclusion, the following policy recommendations are proffered:

- i. Central Bank of Nigeria should aim for a balanced approach in setting the Monetary Policy Rate (MPR) in determining interest rate paths in order to help manage market expectations.
- ii. Central Bank of Nigeria (CBN) should monitor money supply growth closely and implement policies to ensure it aligns with economic growth rates. Using tools like open market operations (OMOs) to manage liquidity can help maintain stability.
- iii. Central Bank of Nigeria (CBN) should periodically review and adjust liquidity ratio requirements to ensure they are neither too stringent (which could stifle lending) nor too lax (which could lead to financial instability).
- iv. Central Bank of Nigeria (CBN) should use a combination of market interventions and policy tools to stabilize the Naira, ensuring that exchange rate fluctuations are minimized. Aligning exchange rate policies with macroeconomic fundamentals can help achieve long-term stability.

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