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Determinants of Stock Trading Volume in Nigeria: Money Demand Approach

Saibu Olufemi Muibi¹, Alenoghena Raymond Osi², Olaniyi Evans³, Tewogbade Seun⁴

Abstract

This study has investigated the determinants of stock trading volume using the demand for money approach. In order to establish the magnitude and direction of relationship between stock trading volume and other macroeconomic variables such as broad money, interest rate, foreign direct investment, exchange rate, income and global financial crisis for the period 1985 to 2014, an ARDL model was set up. The results showed that the exogenous variables studied have long run equilibrium relationship with the volume of transactions in the stock exchange. Specifically, while money supply exhibited strong positive significant relationship with stock volume, interest rate and exchange rate impact was negative and significant. The impact of income and foreign direct investment was positive but not significant. The dynamic error correction model shows that the system converges back to equilibrium at a speed of 41.3%. The CUSUM test reveals that irrespective of the downward trend in the volume of trading on the exchange in Nigeria for the period, stock trading volume has remained stable. The study recommends that policy makers in the country should take into account the influence of money supply, interest rate and exchange rate in the course of planning the target volume level of trading transactions on the floor of the Nigerian Stock Exchange.

JEL Classification: C32, G10, G14.

Keywords: Stock Markets, Trading Volume, Exchange Rate, Broad Money, ARDL.

1. Introduction

The stock market plays a major role in supporting the growth of the various sectors of the economy of any nation. The activities in a stock market constitute a measurement tool that gives a general idea about the trend of industrial prosperity as well as the stability of a country's economic performance. Movements in a country's stock prices are often affected by changes in fundamentals of the economy and the expectations about future prospects of these fundamentals. The remarkable amount of information contained in equilibrium prices has been the subject of countless studies, both theoretical and empirical, and with respect to financial securities (Kumar, 2008). Several distinct literatures devoted solely to prices have been developed and indeed, constitute the set of widely cited strands of modern economics is the asset-pricing literature. However, while several studies in economic models of financial markets have been developed in trying to explain the behaviour of prices, variability, forecasting and information content, far less attention has been devoted to explaining the behaviour of trading volume (Andrew and Jiang, 2011). Recent studies have proposed trading volume as an important proxy for investor overconfidence and liquidity. As a result, there is an increasing interest in the literature to improve the understanding of trading volume and on why investors trade. The main reasons for trading identified in the literature are information asymmetries, differences of opinion, portfolio rebalancing needs, taxes, and life-cycle considerations (Kumar, 2008). An assessment of trading volume is at the very essence of the performance of stock market. Besides serving as

¹Department of Economics, University of Lagos, Akoka Lagos, Nigeria

²Department of Economics, University of Lagos, Akoka Lagos, Nigeria

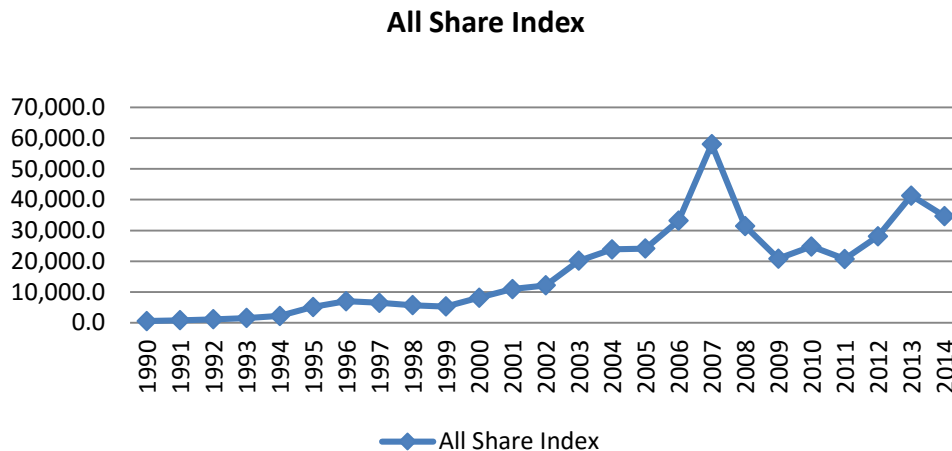
³Department of Economics, University of Lagos, Akoka Lagos, Nigeria

⁴Department of Economics, University of Lagos, Akoka Lagos, Nigeria

the barometer to measuring the tempo of economic activities, the stock market also serves as to improve liquidity in the financial system, yield profits to investors and encourage savings in the course of a country's economic development (Bell and Rousseau, 2001)

Since the world-wide depression that dampened activities in the Nigerian stock market in 2007 and 2008 there have been efforts in search for ways to improve activities via trading the Nigerian stock market. The period of the depression witnessed to massive loss of income for investors. According to Bello (2014) this has translated into loss of confidence in the market by investors and market operators. The primary segment of the market which experienced boom from 2004 to 2006 has become virtually non-existent in recent times. What existing corporate concerns have try to do in effort to raise fresh funds from the stock market have been basically rights issue (i.e. raising funds from existing shareholders). The secondary market, though active has been on the low scale. Fig 1 shows the trend of trading in the Nigerian Stock Market using the All Share Index from 1900 to 2014. The trend shows a continuous upward increase in trading activities on the exchange from 1990 to 2007 when there was a peak at N58 trillion. There was a sharp fall in the index following the crash in the market that was occasioned by the world depression. It can be observed that since the crash, the market has never really recovered enough to attain the tempo before the peak in 2007. Since the experience of the crash, a lot of investors have been skeptical about the justification for investing on Stocks in the Nigerian capital market.

Fig 1 – All Shares Index



The effort to improve trading volumes in the market since the crash has not yielded desired returns. This study joins in the search for ways to improve trading volume in the Nigerian stock exchange.

Studies have shown that the economic growth of a country may be is directly related with some variables like Government Spending, Foreign Direct Investment, Remittances, Inflation, Interest rate, Money supply, Exchange rate and many others (Aurangzeb, 2012). The movement in the stock prices is also found to be affected by changes in the same macroeconomic variables and more so, the expectations and future prospects of these fundamentals. Stock market index therefore, constitute the measurement index of a country's economic performance of over time.

Recent studies have proposed trading volume as an important proxy for investor overconfidence and liquidity (Kumar, 2008). As a result, there is an increasing interest in the literature to improve the understanding of trading volume and on why investors trade. The main reasons for trading identified in the literature are information asymmetries, differences of opinion, portfolio rebalancing needs, taxes, and life-cycle considerations. Some other authors have argued that trading volume increase with level of institutional ownership, volatility of stock returns, trading costs, size of the firm being traded, past stock prices and company's dividend history. Some of these factors can provide clues to liquidity providers in search of reliable forecasts of trading intensity and help portfolio managers devise efficient trading strategies.

Regulators and policymakers are also in search of ways to improve the liquidity and efficiency of financial markets.

This study aims to ascertain the determinants of stock trading volumes in the Nigerian stock exchange. Consequently, the study specifically examines the roles of Money Supply, Interest Rate, Exchange Rate, National Income and the Global Economic Crises on Stock Trading Volumes in Nigeria. The study believes that perhaps, policy makers could take account of the variables that exhibit strong relationship with stock trading volumes.

While there is abundant literature on the determinants of stock pricing or performance of the stock market in Nigeria, the literature is scanty on the specific determinants of stock trading volume in the market.

The rest of the paper is structured as follows: Section 2 presents the theoretical overview and literature while section 3 articulates the review of the relevant empirical literature. The preoccupation of section 4 is the specification of the model and estimation techniques. Section 5 presents the empirical findings and policy implications.

2. Theoretical Literature

Theoretical models reviewed in this study starts with the Fisher's quantity theory of money. This is followed by a discussion on the Keynesian theory of liquidity preference and Milton Friedman's restatement of the money demand theory. This section is rounded up with a link between money demand and the volume of share transaction.

• The Quantity Theory of Money Demand

The Theoretical groundwork of this paper begins with the quantity theory of money by Irvin fisher (1911) and extends to the Keynes's theory of money demand. The quantity theory of money demand is explained using the equation of exchange. The initial quantity theory equation is just only a mathematical identity (Friedman, 1971).

$$MV=PT.....1$$

Where:

M = money supply

V = velocity of circulation of money (M)

T= volume of transactions

P = price level

The difference between the quantity identity and the quantity theory lies in the assumptions relating to the velocity of circulation which was previously assumed to be constant. Fisher posited that velocity of circulation, though independent of the money supply and the price level but not constant. V depends on the density of population, commercial customs, rapidity of transport, and other technical conditions but not on the quantity of money and deposits or on the price level. The volume of trade, like the velocity of circulation of money, is the independent of the quantity of money.

The volume of transactions (V) is intuitively a function of the Price level (average price of transactions), velocity of circulation of money, and Money supply.

$$T=F (M/P, V).....2$$

This equation was later modified by the Cambridge School and they presented a slightly different version of the old equation by replacing with. Though, modification is due to the fact that there is a problem inherent with the original Fisher equation because the number of transactions in an economy is difficult to calculate.

At this juncture, we adopt equation 2 to the phenomenon understudy; the determination of the stock market transactions. The availability of various data over the years does make the argument for the original usage of the original Fisherian quantity of money demand. Therefore, equation 2 can be reformed:

$$T_s = F(M/P, V) \dots \dots \dots 3$$

Where:

- T_s = the total volume of stock market transactions Traded
- M_s = the total Money demand
- M/P = real money demand
- V = Velocity of Money in circulation
- P_s = Consumer Price index

Since, the conclusion of fisher on velocity of circulation is that it is not a constant rather an economic variable which depends on other factors outside the volume of money supply and the price level. Furthermore, the application of the quantity theory of money is still much relevant within the context of the Nigeria environment as the medium of financing fiscal deficits is still tied to increasing the money supply by the government.

• Keynes's Theory of Money Demand

Keynes theory of money demand analysis begins with the renaming of the “objects” as “motives” for holding money balances and categorized them as the transactions, precautionary and speculative motives.

Keynes held the view that the transaction motive of holding money was due to the lag between the time of receipts of income (Ogiriki and Andabai, 2014) and the payments that households make as well as the firms, While the precautionary motive depicts “provision of Security”.

Though, he did not present a rigorous analysis of the precautionary and transaction motives but assumed that the two motives are very sensitive to changes in the rate of interest, rather they are income-sensitive.

The third motive; speculative motive indicate that individuals desire to hold money is based on their knowledge and understanding of the bond market. The individuals form expectations concerning the interest rate which is the returns on the bond. This implies that as the interest rates rise in the present period, most investors expect that the rate of the interests to decline in the future, then few of the investors will hold money; vice-versa when the interest rates are expected to rise in the future. Keynes assumed that individuals either hold money or bond. Therefore, Keynes, overall demand for money shows that both Transaction and Precautionary motive is positively income-sensitive and the speculative demand for money depends negatively on the rates of interest.

$$M^d = M^{tr} + M^{sp} = M(Y, R) \dots \dots \dots 3$$

Though, Keynes affirmed that the amount of cash which an individual decides to hold to satisfy the transactions motive and the precautionary-motives is not entirely independent of what he is holding to satisfy the speculative motive (Apere and Karimo). However, he posited that it is a safe first approximation to regard the amounts of these two sets of cash-holding as being largely independent of one another.

$$M^{tr} = M^{tr} + M^{pr} = f(Y) \dots \dots \dots 4$$

$$M^{sp} = M(R) \dots \dots \dots 5$$

Therefore,

$$(M/P)^d = (Y, r)$$

• Friedman's Restatement of the quantity theory of money

Friedman in the whole of his reformulation can be discovered that he developed demand for money based within the context of the microeconomic theories of consumer behavior as well as the producer's

demand for inputs. He believed that nothing is special about money per se since it is just of the several existing assets and it is just one form in which a consumer can hold his wealth and a productive enterprise hold his capital (Friedman, 1971). He posited that the demand for real money balances was made identical to of other consumer goods, with real variables being one of the goods in the consumer's utility function. The real balance (real money demand) is viewed as an asset with the real value of stocks, bonds and physical assets as alternative forms of holding wealth and incorporated into the individual's utility function. For firms, real balances were a durable good, similar to physical capital; with both appearing as inputs in the production function. Therefore, the main determinants of the individual's demand for real balances were the real yields on other assets (bonds, equities and physical assets), the rate of inflation, real wealth and ratio of human to non-human wealth (Dodzi et al, 2014).

$$M^d/P = f(Y_p, r_b - r_m, r_e - r_b, \lambda - r_b) \dots \dots \dots 6$$

Where M^d/P = demand for real money balances

Y_p = Permanent income which consist the actual Permanent income of the individual and his transient income(technically, the present discounted value of all expected future income , but more easily described as expected average long-run income).

r_b = expected return on bond

r_m = expected return on money

r_e = expected return on equity

λ = expected inflation rate

$r_b - r_m$ = represent the expected return on bonds relative to money

$r_e - r_b$ = represent the expected return on equities relative to money

$\lambda - r_b$ = represents the expected returns on goods relative to money which is also the expected rate of capital gains that occurs when their prices.

• Link of Volume of Stock Market Transactions, Demand for Money and Velocity of Circulation

The link between the volume of stock market transactions demand for money and velocity of circulation can be established right from the behavioral function 3 derived from the fisher's initial Transaction statement of the quantity theory.

$$T_s = F((M/P). V) \dots \dots \dots 3$$

Where:

T_s = the total volume of stock market transactions Traded

M_s = the total Money supply

M/P = real money demand

V = Velocity of Money in circulation

P_s = Consumer Price index

Intuitively, the stocks market transaction is a function of the real money demand and the velocity of the money circulation. Furthermore, recalling from equation, it has been established that the real money demand for money holding is a function of the Nominal income and the interest rate on government bonds.

Substitute $(M/P)^d = (Y, r)$ into equation three, we derive

$$T_s = F((M/P(Y, r), V)) \dots \dots \dots 7$$

$$T_s = F(Y, r, V) \dots \dots \dots 8$$

Equation 8 implies that Volume of stock market transactions is therefore a function of the Nominal Income, the Interest rates of the government bonds and other alternatives such as the savings and the Time deposits. In addition, the velocity of the money supply is also a factor considered to determine the stock market transactions. Since, the independence of velocity from the influences of money supply and prices still holds and the fact it is now an economic variable that can be determined by other factors such as population

density, commercial customs, and Public infrastructures such as Information Technology, Transport, financial innovations, foreign direct investment, foreign capital investment, capital inflow, fiscal spending and other technical conditions.

The next issue is to explore the links between the variables under study after establishing the behavioral relationships that exist through the various theoretical lanes.

3. Empirical Literature

Pal & Mittal (2011) examined the long run relationship between two Indian capital markets and some macroeconomic variables such as interest rates, inflation, and exchange rate and gross domestic savings. They use the quarterly data from January 1995 to December 2008 and with the help of unit root test, co integration and error correction mechanism they found out that the inflation rate have the significant impact on both capital markets whereas interest rate and foreign exchange rate have the impact on one capital market. Gross domestic saving played insignificant role in both markets. The study can be made for longer period with some other macroeconomic variables gives us more comprehensive results.

Ahmed & Imam (2007) investigates the relationship between stock market and different macroeconomic variables such as money supply, Treasury bill rate, interest rate, GDP, industrial production index. They use series of tests such as unit roots, co integration, and vector error correction models. They analyze the Monthly data series for the period of July 1997 to June 2005 and they found that generally there exists no long run relationship between stock market index and macroeconomic variables but interest rate change or T-bill growth rate may have some influence on the market return.

Ayunku and Etale (2014) in their study examined the determinants of stock market development in Nigeria for the period of 1977-2010. The study specifically investigated the long run and short run relationship between the variables, using ex-post facto research design and the utilization of Johansen Co-integration and Error Correction Model (ECM) approach. The empirical result indicates that market capitalization, credit to private sector and exchange rates are all important determinants of stock market development both in the long run and short run in Nigeria as these variables have positive effect and thus stimulate economic growth in Nigeria while inflation and saving rate had negative impact on stock market development in Nigeria.

Afolabi (2014) examine the roles, functions, rules and regulations of the capital market in share pricing in Nigeria between 1988 - 2011. The paper identifies and discusses the factors and the various theories responsible for changes of share price over time. They utilized OLS in their analysis of the variables involved. The paper examines the market capitalization effects on share prices, and found that a negative relationship exist between share prices and inflation. Furthermore, the paper observed that market capitalization (MCAP) and exchange rate (EXRT) are very good determinants of share prices movement, while inflation (INFL) is not.

Garcia and Liu (1999) studied the macroeconomic determinants of stock market development during the period 1980 to 1995 using pooled data from 15 industrial and developing countries and found that real income, saving rate, financial intermediary development and stock market liquidity are important determinants of stock market capitalization. They observed that macroeconomic volatility does not prove significant and that stock market development and financial intermediary development are complements and not substitutes.

Yartey [12] examined the institutional and macroeconomic determinants of stock market development using a panel data of 42 emerging economics for the period of 1990 to 2004 and found that income level, gross domestic investment banking sector development, private capital flows and stock market liquidity are important determinants of stock market development in emerging market countries. The results further indicate that political risk, law and order and bureaucratic quality are important determinants of stock market development because according to him they have the viability of external finance. He stressed that the result suggests that the resolution of political risk can be important factor in the development of emerging markets.

Humpe and Macmillan (2007) applied the co integration analysis to find out the relationship between key macroeconomic factors and stock prices in the U.S and Japanese capital markets with the data for the period of 1971 to 1990 and found out that there is single co integrating vector exist in the US which suggest that there is a positive relationship between stock prices and industrial production exists on the other hand these stock prices are negatively related with the CPI and interest rate. Insignificant but positive impact of money supply exists in this market. Whereas the Japanese data they found out there are two co integrating vectors. The first one explores that there is positive relationship between industrial production and stock prices whereas the negative one with the money supply and the second vector identifies there is a negative influence of CPI and long term interest rates on industrial production.

Fang & Miller (2002) identifies the effect of volatility in Korean foreign exchange market on Korean stock market with the GARCH-M model and the daily data of those variables from 3rd of January 1997 to 21st of December, 2000 and they found out that the Korean foreign currency market impact in three different ways on the stock market. The first channel suggests that exchange rate negatively affect stock market returns. Secondly the depreciation volatility positively affects these returns and at last stock market return volatility responds to exchange rate depreciation volatility. If they include some more macroeconomic variables such as money supply or interest rates their result would have much more considerable while taking the decision of investment.

Merikas & Merika (2006) try to re-examine the hypothesis which suggest the stock market have negative impact on real economic activities in Germany. They collect the data of 41 years from 1960 to 2000 and build the VAR model. They used CPI as the measure of inflation while real rate of return of DAX stock index was used as stock market returns. They conclude that the stock prices are negatively related with the growth of employment in the country while the GDP growth rate have the positive relation with stock market. This study could be done with adding more variables into the model which generates more appropriate results.

4. Data Construction and Methodological Discussions

• Data

Annual data for stock trading volume, real GDP (constant 2000 US\$), interest rate, broad money and FDI over the period of 1985-2014 are collected from the World Development Indicators (WDI, 2015) while data for price of stocks are collected from CBN statistical bulletin. This is the longest period of data availability in Nigeria. Furthermore, the dummy variable, CRISIS, represents the global financial crisis period and is formed by taking the value for 2007 and 2008 period as 1 and the other periods as 0.

• Model Specification

This study, like earlier studies which give weight to monetary forces in economic activities, employ the so-called Quantity Theory of Money. Devised by the Yale economist Irving Fisher (1867-1947) in his book *The Purchasing Power of Money*, The Fisher Identity, or The Equation of Exchange, in its simplest form, is expressed as:

$$M.V = P.T \quad (1)$$

M = Money Supply

V = Velocity of Circulation (the number of times money changes hands)

P = Average Price Level

T = Volume of Transactions of Goods and Services

Equation (1) can be rewritten in terms of real volume of transactions as,

$$T = M/P.V \quad (2)$$

Where M/P is real money supply.

The Quantity Theory of Money in Equation (2) can be applied to the stock market as,

$$\text{VOLUME} = \text{MONEY} \times \text{ASI} \quad (3)$$

Where,

Volume = Stock trading volume

Money = Broad money

ASI = All Share Index which shows the changing average value of the share prices of all companies on a stock exchange

Equation (3) can be extended by including other variables which influence stock trading volume and expressed in log-linear form as,

$$\ln \text{VOLUME} = \alpha_0 + \alpha_1 \ln \text{MONEY} + \alpha_2 \text{ASI} + \alpha_3 \text{INTEREST} + \alpha_4 \text{EXCRV} + \alpha_5 \ln \text{FDI} + \alpha_6 \ln \text{GDP} + \alpha_7 \text{CRISIS} + \xi \quad (4)$$

Where,

INTEREST = Interest rate

EXCRV = Exchange rate volatility

FDI = Foreign Direct Investment

GDP = Gross Domestic Product

CRISIS = Dummy for the 2007/2008 Global financial crisis

• ARDL Cointegration Approach

As developed by Pesaran et al. (2001), the ARDL cointegration approach has a number of advantages compared to Johansen & Juselius (1990) cointegration techniques:

- i. It is applicable whether the variables are purely I (0) or I(1), or mutually cointegrated.
- ii. It requires smaller sample size (Ghatak & Siddiki, 2001)
- iii. It can assess both short-run and long-run effects at once (Bentzen & Engsted, 2001).

The ARDL procedure is implemented thus:

$$\Delta \ln V_t = c_0 + \sum_{i=0}^q c_i \Delta \ln V_{t-i} + \sum_{i=0}^q d_i \Delta E_{t-i} + \lambda_1 \ln V_{t-1} + \lambda_2 E_{t-1} + u_{1t} \quad (5)$$

Where V_t is the trading volume; E_t are the explanatory variables such as stock price, real GDP, real interest rate, broad money, credit and FDI. The real GDP, broad money, credit and FDI series are transformed into natural logarithms since a log-linear specification, compared to simple specifications, provide efficient results (Shahbaz, 2010). c_0 and e_0 are the drift component; p is the maximum lag length⁵; Δ is the first difference operator; and u_t denotes the white noise residuals.

The first step in the ARDL bounds testing approach is F-test of the joint significance of the lagged level variables. Let's assume that $H_0: \lambda_1 = \lambda_2 = 0$ (against $H_a: \lambda_1 \neq \lambda_2 \neq 0$) is the null hypothesis of the non-existence of a long-run relationship. The null hypothesis of no long-run relationship is accepted if the calculated F-statistic falls below the lower bound; while the null hypothesis of no cointegration among the variables is rejected, if the calculated F-statistic exceeds the upper critical bound.

The second step is the estimation of the short-run and long-run parameters by means of the error correction model (ECM).

$$\Delta \ln V_t = l_0 + \sum_{i=0}^q m_i \Delta \ln V_{t-i} + \sum_{i=0}^q n_i \Delta E_{t-i} + \alpha \text{ECM}_{t-1} + \Omega_{1t} \quad (6)$$

⁵ Pesaran et al. (2001) highlights the importance of choosing the appropriate lag length.

The negative sign of the ECM_{t-1} coefficient must statistically significant to ensure the convergence of the dynamics to long-run equilibrium. Following Pesaran & Pesaran (2009), the diagnostic tests are the tests for normality, functional form, serial correlation, and heteroscedasticity.

5. Empirical Findings

The descriptive statistics of the variables of interest are as shown in Table 1.

Table 1: Descriptive Statistics

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Observations
VOLUME	2.61E+09	1.52E+08	5.12E+09	2.366376	7.548555	53.86036	30
ASI	14217.15	7169.883	15281.74	0.960292	2.852578	4.637971	30
EXCR	77.64	97.02	63.80807	0.048271	1.296544	3.638854	30
FDI	3.04E+09	1.73E+09	2.84E+09	0.876819	2.202254	4.63956	30
GDP	9.22E+10	6.61E+10	4.75E+10	0.86162	2.260801	4.394968	30
INTEREST	-0.48481	3.227297	17.90544	-0.85464	3.294054	3.760116	30
MONEY	3.97E+12	8.68E+11	5.81E+12	1.359892	3.346235	9.396382	30
CRISIS	0.066667	0.000000	0.253708	3.474396	13.07143	187.1492	30

Stock trading volume, real GDP, broad money, and FDI are more volatile than real interest rate and all share index. Thus, in continuation of this analysis, stock trading volume, real GDP, broad money, and FDI are transformed into natural logarithms.

Next, we used the Augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) to check the order of integration, because most macroeconomic variables are characterized by unit-root processes (Nelson & Plosser 1982). The unit root test are presented in Table 4.2

Table 2: ADF Test Unit Root Test

Variable	t-statistics	Decision
$\ln VOLUME_t$	-7.224* (0.000)	I(1)
$\ln MONEY_t$	-3.371353 (0.021)	I(1)
$\ln FDI_t$	-10.910* (0.000)	I(1)
$\ln GDP_t$	-4.254* (0.003)	I(1)
ASI_t	-5.087* (0.000)	I(1)
$INTEREST_t$	-5.418 (0.000)	I(0)
$EXCR_t$	-5.078 (0.000)	I(0)
$CRISIS_t$	-3.818 (0.007)	I(0)

Stock trading volume, real GDP, broad money, FDI and all share index series are non-stationary - integrated of order one, I(1). Only interest rate, exchange rate volatility and crisis are stationary at level. Note that ARDL is applicable whether the variables are purely I(0) or I(1).

We select the optimal lag length based on the Schwarz criterion: 2 is the optimal lag order.

The results of the ARDL Bounds Test is as shown in the Table 4. The F-statistic is 3.515225, which is higher than the 5% critical value for the upper bound. For that reason, we *strongly reject* null hypothesis of no cointegration (i.e. long-run relationship) between trading volume and its determinants at the 5% significance level. This result indicates that there is a unique co-integrating relationship, meaning that all the determinants of trading volume can be treated as “long-run forcing” variables for the explanation of trading volume in Nigeria.

Table 4: ARDL Bounds Testfor Cointegrating Relationship

Test Statistic	Value	K
F-statistic	3.515225**	7
Critical Value Bounds		
Significance	Lower Bound	Upper Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Source: Eviews 9

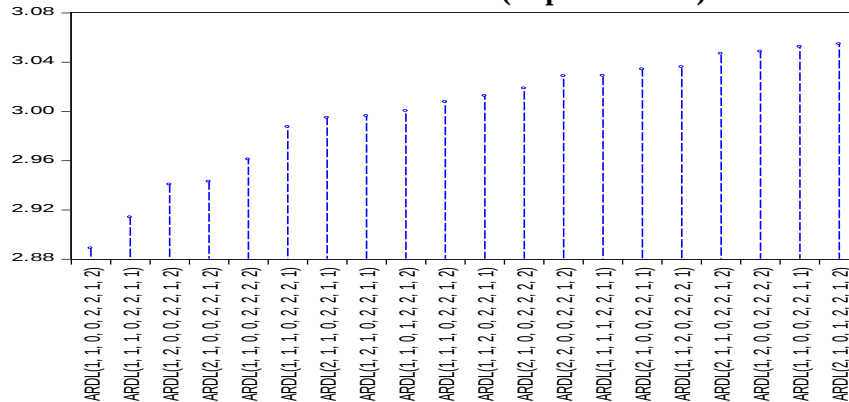
**denotes statistical significance at the 5% level. k is the number of regressors.

Having confirmed that stock trading volume and its determinants are cointegrated, the long-run parameters of the ARDL(1, 1, 0, 0, 2, 2, 1, 2), selected based on Schwarz Criterion, is therefore estimated and the results presented in Table 5.

The Schwarz criterion (SC) is the basis for determining the lag orders for the regressors, resulting in a rather parsimonious model specification. SC tends to select a simpler model specification than some other information criteria.

In total, 4374 ARDL model specifications were considered. Although an ARDL(1, 1, 0, 0, 2, 2, 1, 2) was finally selected based on Schwarz Criterion, we can also see how well some other specifications performed in Table 5. With the choice of ARDL(1, 1, 0, 0, 2, 2, 1, 2), there is no risk of "over-fitting" the model

Table 5: Schwarz Criteria (Top 20 Models)



The estimated long-run coefficients, as shown in Table 5, are highly significant. Consistent with the a-priori expectations, the coefficient of the money supply, past all share index, FDI and GDP is positive while that of the domestic interest rate, exchange rate volatility ad 2007/08 financial crisis is negative.

Table 5: Estimated Long-Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnMONEY	3.270762	0.602578	5.427950	0.0002
ASI	0.000091	0.000037	2.437475	0.0330
lnFDI	0.186633	0.680888	0.274102	0.7891
INTEREST	-0.184194	0.059868	-3.076664	0.0105
lnGDP	5.466792	2.730188	2.002350	0.0705
EXCRV	-0.053482	0.020698	-2.583942	0.0254
CRISIS	-2.455056	1.161311	-2.114039	0.0582
C	30.546435	23.413878	1.304629	0.2187

ARDL(1, 1, 0, 0, 2, 2, 1, 2) selected based on Schwarz Criterion

The error correction representation of ARDL model, as shown in Table 6, is derivable from the long-run coefficients. The adjusted R^2 is 0.92, meaning that the model fit the data well. Additionally, the F-statistics reject the null hypothesis that the regressors have zero coefficients. Essentially, the ECM(-1) coefficient have the required negative sign (-0.412531) and is significant, reinforcing the findings of the ARDL Bounds cointegration test. The system converges back to equilibrium at a speed of 41.3%.

Table 6: Error Correction Representation of ARDL Model
(Dependent Variable is D (lnVOLUME))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnMONEY)	17.627745	4.819771	3.657382	0.0038
D(ASI)	0.000129	0.000040	3.238609	0.0079
D(lnFDI)	0.263625	0.957245	0.275400	0.7881
D(INTEREST)	-0.097269	0.048930	-1.987908	0.0723
D(INTEREST(-1))	0.100853	0.043123	2.338721	0.0393
D(lnGDP)	8.048751	5.610882	1.434489	0.1792
D(lnGDP(-1))	18.246926	5.502778	3.315948	0.0069
D(EXCRV)	-0.031820	0.014531	-2.189708	0.0510
D(CRISIS)	-0.569604	0.886165	-0.642774	0.5335
D(CRISIS(-1))	-1.197532	0.631817	-1.895379	0.0846
ECM(-1)	-0.412531	0.094559	-4.362687	0.0011
ECM = VOLUME - (3.2708*lnMONEY + 0.0001*ASI + 0.1866*lnFDI - 0.1842*INTEREST - 5.4668*lnGDP - 0.0535*EXCRV + 2.4551*CRISIS + 30.5464)				
R2 = 0.92				
F-stat = 7.4128 [0.001]				
SBC = 2.8889				
Serial Correlation (LM) = 2.869 [0.109]				
Ramsey's Reset Test = 2.3112 [0.128]				
Heteroscedasticity (LM) = 1.868 [0.081]				
Normality (LM) = 0.662 [0.718]				

First, not surprisingly, there's a long-run equilibrium relationship between the stock trading volume and its determinants. Secondly, there is a relatively quick adjustment in the stock trading volume when its determinants change.

Our results confirm that the past values of the all share index are positively related to trading volume, in line with such studies as Le Quang & Mehmed (2009). According to the sequential arrival of information hypothesis, the dissemination of information is sequential from one person to another. A single piece of information reaches one trader at a time, reacting to the information and thus generates a positive relationship between trading volume and past values of all share index. Theoretically, according to the efficient market hypothesis, this is not supposed to be the case if the market is efficient and absorbs new information speedily. Brennan and Cao (1997) easily explained this phenomenon that investors predict the future based on past trends and take their trading decisions accordingly.

The negative impact of the interest rate arises through the psychological effect it has on investors and consumers. A rational investor should therefore be aware of the potential effects behind the relationship between interest rates and the stock market is fairly indirect. Interest Rates and the stock market tend to move in opposite directions. Investors are rational, an increase in interest rates will prompt them to move money away from the equity market to the bond market.

The negative impact of the exchange rate volatility is significant, consistent with Agrawal, Srivastav, & Srivastava (2010).. Exchange rate movements indicates both the current and future state of the economy. High fluctuations in exchange rates significantly affects stock trading volume. The link, according to Ambunya (2012), is through the information content of exchange rate movement on stocks.

Both in the short-run and in the long-run, trends in FDI is not a significant determinant of the movement of the stock trading volume. This finding is consistent with Arčabić, V., Globan, T., & Raguž, I. (2013) which suggested the absence of a long-term relationship between FDI and the stock market. It is understandable that FDI can indirectly affect the growth of stock markets via rapid technological progress and economic growth, then it as well. It is also understandable that FDI can encourage policy makers to embrace market-friendly regulations, thus increasing the confidence of investors, the development and the volume of trade on domestic stock markets. It is, however, likely that the institutional environment in Nigeria has dampened the positive impacts of FDI on stock trading volume.

Money supply has a positive significant impact on stock trading volume, consistent with Maskay who established that the stock market responds more favorably to an increase in the money supply. A study by Sellin (2001), as well, argues that the money supply affects the stock market when change in money supply alters expectations about future monetary policy. Copious amounts of money circulating in the economy both makes more money obtainable to invest in stocks and also makes other investment instruments, such as bonds less inviting.

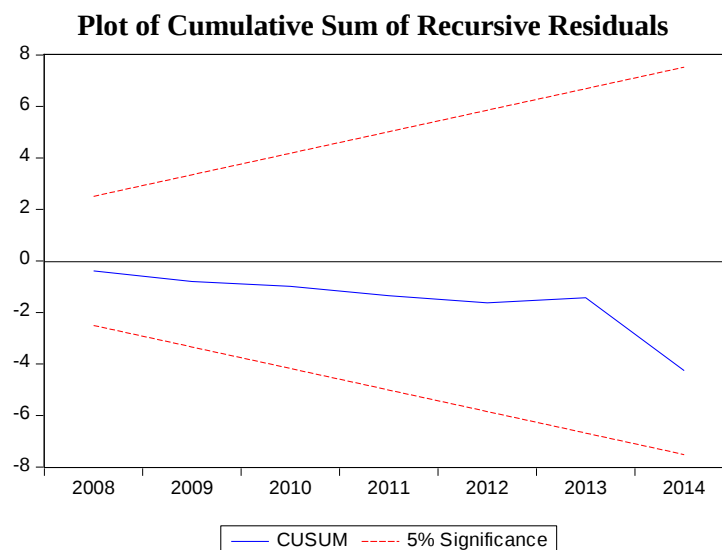
What is the reason for such a positive relationship between GDP and stock trading volume? The level of economic activity in a country often depends on the stock market amongst other variables. This happens because the two variables tend to move together in the same direction over time. According to Duca (2007), countries doing well in terms of GDP performance tend to experience gains in domestic stock exchanges.

The 2007/08 financial crisis played a significant role in declines in wealth and a downturn in economic activity worldwide. The Nigerian Stock Exchange experienced the worst decline in its history, with drops of around 35.6%. In Nigeria, the consequence was capital market downturn, damaging effects on the balance sheet of banks by accumulative provisioning for bad debt and reduction in profitability, and divestment by foreign investors with attendant tightness. The Nigerian Stock market has remained depressed since.

Using the CUSUM test proposed by Brown, Durbin, and Evans (1975), the stability of the long-run coefficients and the short-run dynamics are examined consistent with Pesaran and Pesaran (1997).

Specifically, the CUSUM test makes use of the cumulative sum of recursive residuals based on the first set of n observations and is updated recursively and plotted against break points.

As shown in Figure 3, the plot of the CUSUM stays within the critical bounds of 5% significance level (denoted by the pair of straight lines drawn at the 5% level of significance). Therefore, the null hypothesis that all the coefficients in the error correction model are stable cannot be rejected, indicating no evidence of any significant structural instability.



6. Conclusion and Policy Implications

This study has investigated the determinants of stock trading volume using the demand for money approach. In order to establish the magnitude and direction of relationship between stock trading volume and other macroeconomic variables such as broad money, interest rate, foreign direct investment, exchange rate, income and global financial crisis for the period 1985 to 2014, an ARDL model was set up. The results showed that the exogenous variables studied have long run equilibrium relationship with the volume of transactions in the Nigerian stock exchange. Specifically, while money supply exhibited strong positive significant relationship with stock volume, interest rate and exchange rate impact was negative and significant. The impact of income and foreign direct investment was positive but not significant. The dynamic error correction model shows that the system converges back to equilibrium at a speed of 41.3%. The CUSUM test reveals despite the downward trend in the volume of trading on the exchange in Nigeria for the period, stock trading volume has remained stable.

The study has arrived at the following policy recommendations: One, policy makers in the country should take into account the influence of money supply, interest rate and exchange rate in the course of planning the target volume level of trading transactions on the floor of the Nigerian Stock Exchange; Two, Investors should be aware of the potential effects depicted in the relationship between interest rates and the stock market. Interest Rates and the stock market tend to move in opposite directions; Three, policy makers should embrace market-friendly regulations, thus increasing the confidence of investors, the development and the volume of trade on domestic stock markets. It is, however, likely that the institutional environment in Nigeria has dampened the positive impacts of FDI on stock trading volume; Four, copious amounts of money circulating in the economy will make more money obtainable to invest in stocks and also makes other investment instruments, such as bonds less inviting.

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APPENDIX

