Market Liquidity and Stock Return in the Nigerian Stock Exchange Market

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ABSTRACT

This research examined the effect of market liquidity, inflation, and exchange rates on stock return in Nigerian Stock Exchange market. The researchers used ex-post facto design and employed secondary data subjected to Auto-regressive Distributive Lag (ARDL) bound test method of analysis within the period of twenty-one years. Findings reveal that in the short run, stock turnover, trading volume, exchange, and inflation rates have affected stock return positively and significantly. In the long run, market turnover has a positive effect. However, inflation and exchange rates have affected stock return negatively and significantly. Then, trading volume has a negative but insignificant effect on stock return, which is all at 5% level of significance. The researchers conclude that market liquidity, exchange, and inflation rates affect stock return. Therefore, the researchers recommend demutualization and transparent structures and adaptive method stabilization in exchange rate policies to increase stock market patronage, minimize transaction costs, and mitigate the market uncertainties.

Keywords: market liquidity, stock return, Nigerian Stock Exchange market

INTRODUCTION

A highly liquid and functional stock exchange market serves as one of the major determinants for economic growth, high productivity, and development. The major issue that investors consider in investment decision in different stock exchange markets across the globe is stock liquidity (the ease of selling the stock immediately after purchasing it, without lowering the price or incurring transaction costs).

The challenges of unpredictable stock return cut across investors in developed, developing, and emerging stock markets. Kahuthu (2017) claimed that most Africa countries stock market returns were unpredictable and declined from the targeted returns due to the illiquid stock of the Africa stock markets. For instance, despite substantial growth in the Nigerian Stock Exchange market, most investors in this market still suffered declined in stock return. It was due to the

problem of low liquidity resulting from disparity in bid-ask spread, high cost of trading, unstable exchange and inflation rates, brokerage commissions, low frequency trading, information and disclosure deficiencies, poor supervision by regulatory authorities, global financial crisis, and political instability (Okoye, Modebe, Taiwo, & Okorie, 2016; Popoola, Ejemeyovwi, Alege, Adu, & Onabote, 2017).

Furthermore, Ariwa, Ani, Onyele, Ekeleme, and Okwuchukwu (2017) stressed that the Nigerian Stock Exchange market lacked the liquidity and efficiency that would ensure availability of long-term funds to users in Nigeria at affordable rates. Various studies outside Nigeria (Akram, 2014; Alnaif, 2014; Amihud, Hameed, Kang, & Zhang, 2015; Assefa & Mollick, 2014; Azar, 2014; Demirgünes, 2016; Kahuthu, 2017; Shammakhi & Mehrabi, 2016) have examined the link between market liquidity and stock return. These studies use firm financial leverage, firm size,

and firm profitability as determinants for stock return. However, they fail to consider how systematic risk is associated with macroeconomic variables (exchange rate and inflation rate) in influencing stock return. This serves as variables gap in the studies outside Nigeria.

Then, studies on market liquidity and stock return within Nigeria (Ariwa *et al.*, 2017; Onoh, 2016; Onoh, Ibekwe, Onoh, & Egbo, 2017; Onoh, Ukeje, & Nkama, 2017) do not consider exchange rate and inflation rate as determinant factors for stock return. These studies use market turnover as a measure for stock liquidity. It is a wrong measure of stock liquidity. They wrongly measure market turnover as the ratio of market capitalization to gross domestic product. Studies such as Abdullahi, Lawal, and Etudaiye-Muhtar (2011), Akram (2014), Assefa and Mollick (2014), Azar (2014), and Bala and Hassan (2018) have established that ratio of market capitalization to gross domestic product only depicts stock market size, not market turnover. Therefore, it is inappropriate of those studies in Nigeria to employ the ratio of market capitalization on the gross domestic product to measure market turnover. Hence, this study measure market turnover as a ratio of the value traded on market capitalization and stock traded volume for stock liquidity. This adds the variable measurement gap.

Relatively, Ariwa *et al.* (2017), Onoh (2016), Onoh *et al.* (2017a), and Onoh *et al.* (2017b) suggested that stock return were unpredictable and declined in the Nigerian Stock Exchange market. It was due to the persistent problems of low-frequency trading, high cost of trading, unstable exchange and inflation rates, brokerage commissions, information and disclosure deficiencies, poor supervision by regulatory authorities, global financial crisis, and political instability. Based on these problems as mentioned earlier and gaps identified in the past studies within and outside Nigeria, it motivates this current study to examine the effect of market liquidity, exchange rate and inflation rate on stock return of the Nigerian Stock Exchange market.

This study is built upon Arbitrage Pricing Theory (APT) developed by Ross (1976b). Ross (1976a) addressed the concern and shortcoming of Capital Asset Pricing Model (CAPM). The APT presents stock pricing model linking expected returns to risk. The model relies on three key prepositions. First, the security return can be described by a factor model. Second, there are sufficient securities to diversify away from the idiosyncratic risk. Third, well-functioning security markets do not allow the persistence of arbitrage opportunities. The model involves identifying macroeconomic variables which influence stock risks and returns.

The application of APT enables investors to relax the restrictions associated with CAPM. Consequently, greater freedom is achieved in the development of the model that explains expected return. In APT, the correlation between an asset and the risk factors associated with it is used to predict its returns. This is achieved by combining exogenous macroeconomic variables in a linear manner (Zaheer & Rashid, 2014). It is worth noting that several macroeconomic factors determine the returns of an asset. Hence, it is upon the stock analyst to select the factors to focus on. According to Alnaif (2014), factor analysis is the widely used method for determining the main factors that influence asset returns in both international and domestic markets. The APT negates the premise that everyone can access a portfolio in satisfying his or her investment needs and suggests a model that explains the drivers of returns.

APT assumes that rational investor holds a well-diversified portfolio. It is only systematic risk the APT takes care of. Consequently, investors are expected to price these factors precisely. In a nutshell, investors who purchase assets which are exposed to these risks expect to be compensated for investing in the assets by the expected returns. In this regard, a factor beta is used to measure an asset's exposure to risks. The following related studies such as Abdullahi (2011), Abdullahi *et al.* (2011), Assefa and Mollick (2014), Azar (2014) and Bala and Hassan (2018) are built upon this theory.

Stock market liquidity and macroeconomic volatility have been critical issues to the determination of stock market returns on investment in developed, developing, and emerging stock exchange markets. The illiquidity, unstable inflation, and exchange rates volatilities in Nigerian Stock Exchange market have resulted in the loss in investors' confidence, low stock market patronage, and declined in stock return. Based on the importance of stock liquidity across stock markets in any economies, this research investigates the effect of market liquidity on stock return in the Nigerian Stock Exchange. The levels of stock market liquidity, exchange, and inflation rates volatilities of an economy determine stock market returns.

METHODS

This research adopts ex-post facto research design by relying on a secondary source as the data. The researchers focus on the effect of market liquidity on stock return in the Nigerian Stock Exchange market within 21 years between 1998 and July 2018. Stock market liquidity represents the independent variable measured by stock turnover. Then, the stock return is the dependent variable while exchange rate and inflation rate served as the control variable.

This research uses Auto-regressive Distributive Lag (ARDL) bound test to model the short run and long run effect of market liquidity on stock return of Nigerian Stock Exchange market. The method is adopted for three reasons. First, the bound test is a simple technique that allows the co-integration relationship to be estimated by Ordinary Least Square (OLS) after the lag order of the model is identified. Second, adopting the bound testing method means that pre-test such as unit root is not required. It is because the regressors can be I(0), purely I(1), or

mutually co-integrated. Third, the long-run and short run parameters of the models can be simultaneously estimated (Haug, 2002).

The functional model in this research is adapted from Kahuthu (2017) who examined the effect of stock market liquidity on stock return in Kenya. The study variables are also based on APT by Ross (1976b). It links the cost of market liquidity and macroeconomic factors with stock return. Therefore, the model specification of Kahuthu (2017) is:

$$R_{ASI} = f(BS, TR) \qquad (1)$$

$$R_{ASIt} = \beta_o + \beta_1 BS_t + \beta_2 TR_t + \mu_t \qquad (2)$$

Where,

R_{ASIt} = Stock return
B_{St} = Bid-ask spread
T_{Rt} = Turnover rate
U_t = Error term

This model is modified to suit the objectives of this study and in line with APT of Ross (1976a, 1976b) which argued that market width as a dimension of liquidity risk and macroeconomic factors were related to stock return. This study controls macroeconomic variables that determine stock return with foreign exchange and inflation rates. This is in line with APT theory and study of Bala and Hassan (2018). Therefore, the model is modified to:

$$R_{ASIt} = \partial_o + \partial_1 STO + \partial_2 MSF_t + \varepsilon_t \qquad (3)$$

In this research, stock turnover is comprised of market turnover and trade volume. It is depicted in Equation (4).

$$R_{ASIt} = \partial_o + \partial_1 MTO_t + \partial_2 TVO_t + \partial_3 MSF_t + \varepsilon_t \qquad (4)$$

Where;

R_{ASIt} = All share index proxied for stock return (ASI_t - ASI_{t-1}/ $ASIt-1$)
STO_t = Stock turnover
MTO_t = Market turnover (value traded/market capitalization)
TVO_t = Trade volume (number of deals)
MSF_t = Macroeconomic factors measured by exchange rate (ER) and inflation rate (INF)
Exchange Rate (ER) = Exchange rate as measured by Naira/USD
ε_t = Error term

The modify model is extended to ARDL bound test model to adjust with the feature of the study variables. The ARDL model specifications of the determinant of stock return (All Share Index (ASI)) is:

$$\Delta lnASI = \partial_0 + \partial_1 lnASI_{(t-1)} + \partial_2 lnMTO_{(t-1)} + \partial_3 lnTVO_{(t-1)}$$
$$+ \partial_4 lnER_{(t-1)} + \partial_5 lnINF_{(t-1)} + \sum_{i=1}^{k} \gamma_{1i} \Delta lnASI_{t-i} +$$
$$\sum_{i=1}^{k} \gamma_{2i} \Delta lnMTO_{t-i} + \sum_{i=1}^{k} \gamma_{3i} \Delta lnTVO_{t-i} + \sum_{i=1}^{k} \gamma_{4i} \Delta lnER_{t-i} +$$
$$\sum_{i=1}^{k} \gamma_{5i} \Delta lnINF_{t-i} + \varepsilon_t \qquad (5)$$

Where,

K = lag length for the Unrestricted Error-Correction Model (UECM)
Δ = first differencing operator
ε = white noise disturbance error term

The co-integrating long-run relationship is estimated using the specification in Equation (6).

$$\Delta lnASI = \partial_0 + \partial_1 lnASI_{(t-1)} + \partial_2 lnMTO_{(t-1)} + \partial_3 lnTVO_{(t-1)} + \partial_4 lnFER_{(t-1)} + \partial_5 lnINF_{(t-1)} + \varepsilon_t \qquad (6)$$

Then, the short-run dynamic model is specified as:

$$\Delta lnASI = \partial_0 + \sum_{i=1}^{k} \gamma_{1i} \Delta lnASI_{t-i} + \sum_{i=1}^{k} \gamma_{2i} \Delta lnMTO_{t-i} +$$
$$\sum_{i=1}^{k} \gamma_{3i} \Delta lnTVO_{t-i} + \sum_{i=1}^{k} \gamma_{4i} \Delta lnER_{t-i}$$
$$+ \sum_{i=1}^{k} \gamma_{5i} \Delta lnINF_{t-i} + \gamma_6 \varepsilon ct_{t-1} + \varepsilon_t \qquad (7)$$

Where,

$\varepsilon ct_{(t-1)}$ = the error correction term lagged for one period
γ = the coefficient for measuring the speed of adjustment in Equation (5)

Based on extant literature review, the aprior expectations for the study variables are; $\partial_1, \partial_2, \partial_3 > 0$; $\partial_4, \partial_5 < 0$

RESULTS AND DISCUSSIONS

The result in Table 1 of the preliminary statistics shows that the skewness and kurtosis indicate that the data relating to each variable are normally distributed. These values are within the cut point of -3,0 to 3,0. The researchers find that the parametric statistical analysis is appropriate for this study. The probability of Jarque-Bera statistics is not significant at 5% level of significance for all the variables. Therefore, the variables are normally distributed.

Table 1 Preliminary Statistics of Study Variables

	LnER	LnMTO	lnINF	lnTVO	LnASI
Mean	67,126	20,138	19,137	7,6409	37,391
Median	87,105	61,158	12,220	5,2900	61,261
Maximum	93,279	94,496	72,730	18,800	14,890
Minimum	28,375	50,459	5,4000	1,4105	21,707
Std. Dev.	65,008	291054	17,770	5,478	503473
Skewness	0,0152	1,5142	1,6718	1,3633	1,3022
Kurtosis	1,336	2,8087	2,679	1,8654	2,3680
Jarque-Bera	3,577	12,690	18,082	3,7878	5,7049
Probability	0,167	0,3018	0,1001	0,5535	0,2507
Sum	2501,038	6,240	593,24	236,87	1,155
Sum Sq. Dev.	126780,3	2,540	9473,3	900,50	7,600
Observation	252	252	252	252	252

(Source: Authors' Computation, 2019)

Table 2 and Table 3 reveal the summary of the unit roots results. From both ADF and PP results, some of the variables (TVO, FER, and INF) are integrated at I(1). Meanwhile, others like ASI and MTO are integrated at I(0) at the absolute term of Mackinnon critical value at 5% level of significance. Since there is a mixed order of integration, it needs to employ the ARDL method to investigate the co-integration properties and dynamic effect among the variables. The asterisk in Table 2 and Table 3 show that ASI and MTO are stationary at level i.e I(0). Meanwhile, TVO, FER and INF are stationary at first difference I(1).

Table 4 examines the existence of multicollinearity among the variables. The correlation coefficient is less than 0,5 for all the variables measured. It shows that there is no existence of multicollinearity among the variables. Furthermore, the result of the Variance Inflation Factor (VIF) shows that the values of 2,67, 1,76, 1,82, 1,13, and 2,90 for MTO, TVO, ER, INF, and ASI respectively are less than 5. Therefore, there is no problem of multicollinearity in the model.

Table 2 Augmented Dickey Fuller (ADF)
Unit Root Results

Variables	ADF @ Level	Order of Integration	P-value	ADF @ first difference	P-value	Order of Integration
LnASI	5,36***	I(0)	2,97	8,16	3,98	-
LnMTO	4,32***	I(0)	2,97	6,63	3,98	-
LnTVO	1,57	I(0)	2,97	4,67***	3,98	1(1)
LnER	2,34	I(0)	2,97	4,99***	3,98	1(1)
LnINF	0,11	I(0)	2,97	4,96***	3,98	1(1)

(Source: Authors' Computation, 2019)

Table 3 Philip Perron (PP) Unit Root Results

Variables	PP @ Level	Order of Integration	P-value	PP @ first difference	P-value	Order of Integration
LnASI	5,98***	I(0)	3,22	9,51	4,14	-
LnMTO	4,88***	I(0)	3,22	7,63	4,14	-
LnTVO	1,99	I(0)	3,22	4,97***	4,14	1(1)
LnFER	2,94	I(0)	3,22	5,68***	4,14	1(1)
LnINF	1,77	I(0)	3,22	5,10***	4,14	1(1)

(Source: Authors' Computation, 2019)

Table 4 Correlation Coefficients
for Multicollinearity Test

Variables	MTO	TVO	ER	INF	ASI	Variance Inflation Factor (VIF)
MTO	1					2,67
TVO	0,32	1				1,76
ER	0,24	0,155	1			1,82
INF	-0,132	-0,350	0,341	1		1,13
ASI	0,233	-0,410	0,312	-0,410	1	2,90

(Source: Authors' Computation, 2019)

The result of the ARDL in Table 5 shows that MTO in two periods lag has a positive and significant effect on ASI at 5% level of significance. Moreover, ER and INF in two periods lag have a negative and significant effect on ASI except for TVO that is insignificant at 5% level of significance. The MTO is significant at 5% level of significance with a positive coefficient of 0,21112. It implies that for every 1% change in MTO, ASI will increase by 2,1%. It indicates that MTO significantly affects stock return in the Nigerian Stock Exchange market at 5% level of significance. This finding is in line with Leirvik, Fiskerstrand, and Fjellvikås, (2017), Kganyago and Gumbo (2015), Shammakhi and Mehrabi (2016), Onoh (2016), Onoh *et al.* (2017a), Kahuthu (2017), Kudryavtsev (2017). They agreed that MTO had a positive and significant effect on stock return. Meanwhile, Udoka, Nya, and Bassey (2018) and Shammakhi and Mehrabi (2016) had different findings.

Conversely, TVO as one the measure of stock liquidity shows the opposite effect but insignificant on ASI with a negative coefficient of -0,006264. It implies that for every 1% change in TVO, ASI will decrease by 0,6%. It shows that TVO does not significantly affect stock return in the Nigerian Stock Exchange market at 5% level of significance. This finding is consistent with the Akram (2014), Amihud *et al.* (2015), Assefa and Mollick (2014), Azar (2014), Demirgünes (2016) and Ariwa *et al.* (2017) but it is not in line with Shammakhi and Mehrabi (2016), Onoh (2016), Onoh *et al.* (2017a), Kahuthu (2017) and Kudryavtsev (2017).

Moreover, ER and INF have a negative and significant effect on ASI at 5% level of significance. It indicates that ER and INF reduce the value of stock return. These findings are consistent with John (2019) and Jepkemei (2017). However, it is not in line with Kolapo, Oke, and Olaniyan (2018). In addition, the finding shows that short run and long run effect exist among the variables. The finding is consistent with APT that systematic macroeconomic risks and stock liquidity cost determine stock market returns.

Furthermore, the value of adjusted R2 explains that 53% of the variation in ASI is explained by the independent variables used in the model. The value of F-statistics for the model is statistically significant at 5% level of significance. Therefore, the model used is considered to be fit since the Prob. (F-statistic) is less than 5% level of significance. Moreover, the value of Durbin Watson (DW) is 1,92 approximately 2,0 for the model. It shows evidence of no serial correlation.

Table 5 Estimating ARDL

Dependent Variable: ASI

Method: ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LnASI (-1)	0,033288	0,054230	0,613819	0,5485
LnASI (-2)	1,824623	0,505229	3,591687	0,0027
LnMTO(-1)	0,445524	0,392402	1,135376	0,2740
LnMTO (-2)	0,211312	0,075020	2,816731	0,0051
LnTVO(-1)	0,252341	0,024511	0,874532	0,2453
LnTVO(-2)	-0,006264	0,075006	-0,083512	0,9335
LnER(-1)	-0,000539	0,001582	-0,340951	0,7390
LnER(-2)	-0,213025	0,053421	-3,987677	0,0001
LnINF(-1)	-6,223775	2,335942	-2,664353	0,0081
LnINF(-2)	-0,753021	0,036121	-3,987677	0,0341
C	3,872067	1,266883	3,056360	0,0091
R-squared	0,636562	Mean dependent var		14292,06
Adjusted R-squared	0,526452	S.D. dependent var		15187,12
S.E. of regression	904,6685	Akaike info criterion		16,48614
Sum squared resid	2,82E+08	Schwarz criterion		16,61676
Log-likelihood	-2922,533	Hannan-Quinn criter.		16,53810
F-statistic	12,25629	Durbin-Watson stat		1,958651
Prob(F-statistic)	0,006521			

*Note: p-values and any subsequent tests do not account for model

(Source: Authors' Computation, 2019)

Table 6 ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	12,703629	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2,72	3,77
5%	3,23	4,35
2.5%	3,69	4,89
1%	4,29	5,61

The result of ARDL bound test in Table 6 shows that there are long run relationships between the variables. Since the F-statistics is greater than the upper bound of Pesaran critical value (3,77, 4,35, 4,89, and 5,61), it implies that there is a significant long run relationship among the variables. From the ARDL bounds test output, F-statistics is more in the upper bound value (12,703629 > 4,35) at 5% level of significance. Therefore, the variables can be said to move in the same direction in the long run.

The error correction factor measures the speed of adjustment from short run disequilibrium to the long run path. The value of the error correction term is -0,418 (41,8%). It satisfies the negativity condition of the framework. The validity is also confirmed by its statistical significance at 5% (t statistics = -3,652718 < 0,0084 or P-value of 0,0211 < 0,05). Therefore, the rate at which short disequilibrium is corrected to the long period is approximately 42%. It also shows that all the variables are statistically significant as their respective t-statistics and their probability values are less than 0,05 except TVO (number of stock dealing). The result can be seen in Table 7.

The outcome of the serial correlation, normality, and heteroscedasticity tests are presented in Table 8. The results indicate that the model passes all the tests. It implies that it has a correct functional form. Its residuals are serially uncorrelated and normally distributed. This conclusion is from the P-values of the diagnostic tests.

Table 7 ARDL Short Run Dynamic
Co-efficient Result

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dln(MTO)	0,007977	0,052245	0,152683	0,8787
Dln(TVO)	0,219289	0,051390	4,267139	0,0000
Dln(FER)	0,213025	0,053421	3,987677	0,0001
Dln(INF)	6,223775	2,335942	2,664353	0,0081
CointEq(-1)	-0,4184	0,006958	-3,652718	0,0084

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dln(MTO)	0,341212	0,056020	3,576742	0,0332
DLnTVO	-0,306251	3,075006	-0,052912	0,1643
DLnFER	-0,634022	0,087426	-4,782677	0,0501
DLnINF	-4,679045	4,093942	-3,890351	0,0381
C	3,872067	1,266883	4,436982	0,0211

(Source: Authors' Computation, 2019)

Table 8 ARDL Model Diagnostic Tests

Tests	Prob.
Serial Correlation-LM test	0.167
Normality test	0.873
Heteroscedasticity	0.570

(Source: Authors' Computation, 2019)

CONCLUSIONS

This research concludes that stock turnover positively and significantly influences stock return. Meanwhile, trade volume, exchange rate, and inflation rate affect stock return in Nigerian Stock Exchange market negatively. Empirical studies on market liquidity and stock return provide evidence of the link between the two variables. Nevertheless, most of the studies on market liquidity in developed countries have used bid-ask spread as the measure for market liquidity. Several literatures have established that apart from bid-ask spread, stock turnover and trade volume can also be variables for measurement of market liquidity, especially in developing and emerging stock market, which most past studies ignore. Similarly, it seems that past studies on market liquidity and returns do not use inflation and foreign exchange rates as control variables influencing stock return in Nigeria in which this current study includes as the control variables.

This research focuses on Nigerian Stock Exchange market among other developing, and emerging stock exchange market thereby limits the findings and conclusion only on Nigerian Stock Exchange market. It cannot be generalized to cover other developing and emerging stock market. This study does not use all the variables measuring stock liquidity because of the nature of the Nigerian Stock Exchange market. Based on the findings and conclusion, the study suggested the following policy recommendations. First, Nigerian Stock Exchange market regulators should implement stock market policies such as demutualization structure and transparent policy. It will increase stock market patronage and minimize transaction costs and uncertainty in the market to encourage upturn in stock turnover, which increases stock return. Second, it is suggested that the stock investors adopt trading volume based criterion in their investment decision to enable an increase of higher returns on their investment. Third, there is a need for stock market regulators to loose some stringent registration and operating procedures to enable more investors and organizations to participate fully in the market. Fourth, Central bank of Nigeria should employ deflationary fiscal and monetary policies to manage inflation and avoid higher rates of inflation that may reduce the value of stock return in Nigerian Stock Exchange market. Fifth, Central bank of Nigeria should also employ adaptive method stabilization in exchange rate policy to achieve exchange rate stability.

Moreover, further research should be carried out on comparative studies among developing and emerging stock market on market liquidity and returns. Similarly, further study should include other variables like Amivest liquidity measure, Amihud illiquidity measure, price impact measure of liquidity, and return to a volume measure of liquidity depending on the characteristics of their stock market.

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