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Gbenga Festus Babarinde[*]
Modibbo Adama University, Yola, Nigeria

Bashir Ahmad Daneji[**]
Modibbo Adama University, Yola, Nigeria

Mamoud Abdul Jalloh[***]
Camusat SL Ltd., Freetown, Sierra Leone

Tajudeen Idera Abdulmajeed[****]
Nasarawa State University, Keffi, Nigeria

FINANCIAL INCLUSION IMPLICATIONS ON THE LIQUIDITY OF THE NIGERIAN CAPITAL MARKET

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[*] Contact information (corresponding author): liftedfgb@gmail.com, Department of Banking and Finance, Modibbo Adama University, Yola, Nigeria, phone: +2348060801953; ORCID ID: https://orcid.org/0000-0002-5613-9883.

[**] Contact information: badaneji@yahoo.com, Department of Banking and Finance, Modibbo Adama University, Yola, Nigeria, phone: +2348065725700; ORCID ID: https://orcid.org/0000-0001-5709-8334.

[***] Contact information: abdulmoud99@gmail.com, Camusat SL Ltd., Freetown, Sierra Leone, phone: +23275461725; ORCID ID: https://orcid.org/0000-0001-8461-8243.

[****] Contact information: idera4ever@yahoo.com, Department of Banking and Finance, Nasarawa State University, Keffi, Nigeria, phone: +2347031117236; ORCID ID: https://orcid.org/0000-0002-5661-2570.

Abstract: The objective of this study was to examine the implications of financial inclusion on capital market liquidity in Nigeria. Therefore, we applied Vector Autoregression (VAR) technique to the analysis of the quarterly time series data obtained from Central Bank of Nigeria's statistical bulletin and World Development Indicators for the period, 2008Q1 to 2018Q4. Findings of this study reveal that deposit penetration, bank penetration and credit penetration have positive but non-significant impact on stock market turnover ratio in Nigeria. Furthermore, unlike deposit penetration which exerts negative and non-significant influence on the value of shares traded ratio; bank penetration and credit penetration have positive but non-significant impact on the value of shares traded ratio in Nigeria. The study posits that financial inclusion exerts no significant influence/implications on stock market liquidity in Nigeria with a very negligible variation in the latter (stock market liquidity) explained by the former (financial inclusion). It is therefore recommended that accounts and bank penetrations should be re-engineered towards their translations to high volume and value of capital market transactions rather than mere financial penetration without any capital market implications in Nigeria.

Introduction

Financial inclusion as an initiative is targeted at ensuring that formal financial services are made accessible and affordable, primarily to low-income people (Omar & Inaba, 2020). Thus, financial inclusion is borne out of the desire to engage as many people as possible in the financial activities through the official channels (Ashraf, 2021). Historically, Nigeria's financial inclusion has its root in the rural banking scheme which was introduced in 1977 to promote the habit of banking among the rural population. Other initiatives like compulsory establishment of rural branches of deposit money banks (DMBs), establishment of people's banks, community banks, microfinance banks and the formal launch of the National Financial Inclusion Strategy (NFIS) in Nigeria, are all geared towards achieving financial inclusion in the country.

The prime goal of financial inclusion is to facilitate all-inclusive participation of people in the formal financial system in order to improve the standard of living in the society (Islam, 2018). Financial inclusion empowers the poor and vulnerable members of the society and also acts as a catalyst to economic growth of a nation. It provides access to payments and savings thereby opening up new viable markets for financial services providers, which, in turn, increases fiscal revenues for governments and provides employment opportunities for local communities (Blake, Propson, Monteverde & Chidambaram, 2018). Financial inclusion is also regarded as a strong predictor of economic development (Ashraf, 2021). Financial inclusion helps to make financial services more acces-

sible to all by ensuring that there is a robust financial market (Ofori-Abebrese, Baidoo & Essiam, 2020).

Despite the significance of financial inclusion, this policy initiative has been mitigated by various problems which according to Ozili (2020a), include political interference, high cost of doing business, high financial illiteracy, the state of the economy, uneven financial development, corruption, and increased discrimination occasioned by Fintech.

There should be a synergy among various indicators of financial development in an economy such that an improvement in one aspect of the financial system should positively encourage the improvement of others. Hence, the stock market is expected to improve further when there is high financial inclusion in the country. One of the expected areas of improvement is in the liquidity of the capital market. Theoretically, the extent to which people could access and afford available financial services through various outlets should spur more capital market transactions, in the form turnover and value of shares traded in the capital market. This assertion is premised on the fact that the more the financially-excluded are brought back into the financially-inclusive populace brackets in an economy, the higher tendency of the people to transact in and access the capital market and hence, the improvement in the liquidity of the market.

Despite the perceived theoretical connection between financial inclusion and stock market liquidity, most extant empirical studies focused on the nexus between financial inclusion and economic growth (Okoye, Adetiloye, Erin & Modebe, 2016); poverty/standard of living (Ogbeide & Igbinigie, 2019; Ratnawati, 2020); investment (Babarinde, 2021); financial stability/sustainability (Morgan & Pontines, 2014). The scanty past studies which examined the empirical connection between financial inclusion and stock market also reported divergent findings. For instance, in Ghana, Akakpo (2020) uncovers the significant effect of financial inclusion on stock market participation unlike in Nigerian case where Migap, Ngutsav and Andohol (2020) indicate lack of causal relationship between the two variables. Furthermore, Ozili (2020a) argues that despite the fact that the level of financial inclusion in Nigeria is high relative to other African countries, the use of financial institutions to save in Nigeria remain low. Could the level of financial inclusion in Nigeria explain the liquidity of the capital market in the country? This question has not received the deserved attention by past studies most especially in a developing country like Nigeria. This gap is what this study attempts to fill.

Therefore, the kernel of this study is to investigate the impact of financial inclusion on liquidity of the Nigerian stock market between 2008 and 2018. Specifically, this study is aims to assess the impact of credit penetration on stock market liquidity in Nigeria, evaluate the impact of deposit penetration on stock market liquidity in Nigeria, and examine the impact of bank penetration on stock market liquidity in Nigeria.

Literature review

Conceptual Literature

The capital market is a financial market where financial securities in form of shares, stocks, bonds, debentures, loan stocks are traded. Dimensions of performance of stock market in literatures include size, development, resilience, concentration, liquidity, etc.

Generally, liquidity refers to the ease with which financial assets could be turned to cash with little or no loss in value, as fast as possible. However, in capital market parlance, liquidity is the ease with which a financial instrument can be converted into cash and it also means the ability of a stock market to absorb large volumes for trading without significant variation in prices as well as the ease with which securities can be converted into cash (Nwude, 2018). The author further describes market liquidity as the ease with which investors can buy and sell securities at close to the current quoted prices in the security market. Therefore, liquidity is an indication of the marketability of the shares, stocks, bonds, debentures and securities traded in the capital market. From literature, two most common indicators of stock market liquidity have been identified, namely, stock market turnover ratio and value of shares traded ratio. Stock market turnover ratio is the ratio of value of shares traded to the market capitalization and the value of shares traded ratio is the ratio of value of shares traded to the nominal Gross Domestic Product (GDP) in an economy.

Financial inclusion is the degree to which people, most especially the rural populace, the poor, the illiterate and those financially excluded from the formal financial services, have access to, make use and afford to enjoy financial services to enjoy the basic social facilities (Babarinde, Ndaghu, Abdulmajeed & Enoruwa, 2021). Ogbeide and Igbinigie (2019) also describe financial inclusion as the provision of contact to and usage of different and affordable fi-

nancial services. Financial inclusion is the provision of, and access to, financial services to all members of population, particularly the poor and the other excluded members of the population (Ozili, 2018). Therefore, financial inclusion is the availability, accessibility and affordability of financial services to people, especially those vulnerably excluded from the formal financial services in an economy.

In this study, three basic dimensions of financial inclusion are accessibility, availability and affordability indicators and each of them is measured in this study as deposit penetration, bank penetration and credit penetration respectively. Deposit penetration has been defined as the number of deposit accounts per thousand population and indicates the accessibility of basic banking services like account ownership, loan, etc. (Lakshmanasamy, 2020). Furthermore, the author explains loan penetration (or credit penetration) as the number of loans/credit accounts per thousand population and it indicates the availability of loans and volume of credit circulated in the economy. Babarinde (2021) conceptualizes bank penetration (branch penetration) as the number of financial institutions, like DMBs in the economy and it signifies to somewhat extent the availability of financial services in an economy.

Theoretical Literature

This study reviewed the public good theory and the systems theory of financial inclusion beneficiary propounded by Ozili (2020b). Ozili's (2020b) public good theory of financial inclusion considers financial inclusion as a public good, such that there is extension of formal financial services to the entire population and there is no restriction or discrimination or exclusivity in terms of access to finance for everyone. According to Ozili (2020b), these services should be accessed and made available to all without paying for it. Public good theory considers all members as the potential beneficiary of financial inclusion services considered to be a public good provided at the cost of the government but free to the populace.

The systems theory of financial inclusion according to Ozili (2020b) implies that financial inclusion will improve the workings of the sub-systems it relies on such that the efficiency and effectiveness of the sub-systems will determine the success or failure of a financial inclusion agenda, and the existing sub-sys-

tems (economic, financial and social) in a country are the ultimate beneficiaries of financial inclusion, under the systems theory perspective.

Empirical Literature

Migap et al. (2020) examine the link between financial inclusion and capital market growth in Nigeria. The study argues that there is no causal relationship between financial inclusion and capital market. However, in Ghana, Akakpo (2020) investigates the impact of financial literacy and financial inclusion on stock market participation and found that financial inclusion has positive significant impact on stock market participation in the country. Babarinde (2021) submits that financial inclusion exerts significant effect on investment in Nigeria.

Ratnawati (2020) examines the effect of financial inclusion on economic growth, poverty, income inequality, and financial stability in selected Asian countries. The study shows that the partial impact of financial inclusion dimension on economic growth, poverty alleviation, income inequality, and financial stability in most Asian countries of Asia has not been optimal. Ofori-Abebrese et al. (2020) estimate the effects of financial inclusion on welfare in 33 sub-Saharan African countries. The study reveals that financial inclusion has positive effect on welfare in the sub-region. Similarly, Ogbeide and Igbinigie (2019) confirm the significant impact of financial inclusion in poverty alleviation in Nigeria.

Furthermore, in the Nigerian context, Okoye et al. (2016) reported that financial inclusion causes poverty alleviation but has no significant impact on economic growth in Nigeria. In another study, Morgan and Pontines (2014) assess the relationship between financial stability and financial inclusion and found positive effects of the latter on the former. Lakshmanasamy (2020) examines the effects of the determinants of deposit and credit penetration in India. The author posits that in deposit penetration, income and industrialization plays a vital role in the states of India. Further findings from the study reveal that population density and bank branch networking have implications on credit penetration in the country.

In sum, the empirical review technically exposes the relative scarcity of studies on the financial inclusion implications on capital market liquidity, most especially in a developing country like Nigeria. The very few ones reported a divergent findings of positive nexus in Nigeria (Migap et al., 2020) and no causality between the two variables in Ghana (Akakpo, 2020).

Research methodology and research process

Research Design and Data Description

This study's aim is to determine the implications of financial inclusion on stock market liquidity in Nigeria based on *ex-post facto* research design. The research design entails the use historical (past) data in establishing the relation between variables of interest. Hence, secondary data on quarterly basis (2008Q1–2018Q4) computed from the available annual time series obtained from Central Bank of Nigeria's statistical bulletin (2019) and World Development Indicators (2019) were used in the analysis of the financial inclusion implications on capital market liquidity in Nigeria.

Description of the Variables of Study

Stock market turnover ratio (SMTR) is total value of shares traded as a ratio of market capitalization at NSE (TVST/market capitalization). This is the indicator of stock market liquidity. Financial inclusion is operationalized based on three dimensions: accessibility, affordability and availability, with their respective measures as commercial bank branches (per 100,000 adults) (that is bank penetration); borrowers from commercial banks (per 1,000 adults) (that is credit penetration); and depositors with commercial banks (per 1,000 adults) (that is deposit penetration). The operationalization of the variables of study are in line with previous studies like Ogbeide and Igbinigie (2019), Lakshmanasamy (2020), and Babarinde et al. (2021).

Estimation Technique and Procedures

Financial inclusion's implication on the liquidity of capital market in Nigeria was examined in this study through the lens of Sims's (1980) Vector Autoregression (VAR) technique. The choice of VAR is justified on the grounds that the technique is not limited by theory but flexible and hence all variables are treated as endogenous in the model and it can also be applied in modelling dynamic and interdependent relationship among variables of interest (Sims, 1980; Lesotho, Motlaleng & Ntsosa, 2016). The preliminary test performed before VAR estimation proper are unit root test and test of cointegration.

Time series data to be used are expected to be stationary, that is, constant variance over time and the covariance value between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed (Gujarati & Porter, 2009). Therefore, it is important to check whether a series is stationary or not before using it in a regression. In evaluating the unit root property of the time series, the augmented Dickey-Fuller (ADF) unit root test was conducted to determine the stationarity or otherwise of each variable as well as ascertain the level of integration of the variables. However, if the time series are found to be non-stationary, the order of integration is ascertained and the stationary form of the variable is added to the VAR model (Garcıa-Ascanio & Mate, 2010).

The ADF is expressed as in equation (1):

$$\mathbf{\Delta y_t = \alpha_t + \ \text{ø} y_{t-1} + \sum_{i=1}^{n} ß_i \Delta y_{t-i} + \varepsilon_t} \tag{1}$$

The null (H_o) and alternative (H_1) hypotheses of the ADF unit root test are stated thus:

$$H_0: \text{ø} \ = 0 \ \ non - stationary, that\ is, there\ is\ unit\ root$$
$$H_1: \text{ø} < 0 \ \ stationary, that\ is, there\ is\ no\ unit\ root$$

After ascertaining the unit root property of the series, this study performed test of cointegration among the series. Cointegration is a measure of long-run relationship or equilibrium between variables which are individually non-stationary. To ascertain whether or not there is cointegration, the Johansen and Juselius cointegration test was conducted. The Johansen and Juselius cointegration test is only applicable to variables that are non-stationary and are integrated of the same order one (Gujarati & Porter, 2018). The Johansen's (1991) cointegration model is specified in equations (2) to (4):

$$\mathbf{\Delta y_t = \mathbb{\Pi} y_{t-1} + \sum_{i=1}^{p-1} \mathbb{\Gamma}_i \Delta Y_{t-i} + ß\, x_t + \ \varepsilon_t} \tag{2}$$

$$\Delta \mathbf{y_t} = \mathbb{\Pi} \mathbf{y_{t-1}} + \sum_{\mathbf{i=1}}^{\mathbf{p-1}} \mathbb{\Gamma_i} \Delta \mathbf{y_{t-i}} + ß\, \mathbf{m_t} + \varepsilon_t \quad (3)$$

$$\Delta \mathbf{y_t} = \mathbb{\Pi} \mathbf{y_{t-1}} + \sum_{\mathbf{i=1}}^{\mathbf{p-1}} \mathbb{\Gamma_i} \Delta \mathbf{y_{t-i}} + ß\, \mathbf{m_t} + \varepsilon_t \quad (4)$$

The pattern continues until all the series are represented in the equations.

The null hypothesis of the test is that the series are not cointegrated and it is rejected when the calculated value exceeds the critical value at 5% level; and hence the conclusion that the series are cointegrated. However, if the computed value is less than the critical value at the 5% level, the null hypothesis is not rejected and the conclusion is that the series are not cointegrated.

Following the study of Alade, Adeusi & Alade (2020), this study applied Sims's (1980) Vector Autoregression (VAR) model as estimation technique. The technique enjoys the strength of flexibility and simplicity (Suharsono, Aziza & Pramesti, 2017) and is useful for modelling multivariate time series data that are autoregressive in nature.

In addition to the VAR model, Variance Decompositions (VDC) and Impulse Response Function (IRF) are also documented. The variance decomposition (VDC) analysis indicates the quantity of information each variable contributes to the forecast error variance of other variables in a VAR model (Lesotho et al., 2016). VDC separates the variation in an endogenous variable into the component shocks to the VAR and therefore provides information about the relative importance of each random innovation affecting the variables in the VAR. In this study, the VDC of stock market turnover ratio determines the proportion of variations in stock market turnover ratio explained by each of the financial inclusion variables (credit penetration, bank penetration and deposit penetration) over the forecasted periods.

Since there is a limit to the amount of information that the estimates of VAR can provide on the reaction of the system to an innovation, the Impulse Response Functions (IRFs) (Rummel, 2015), trace the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables in the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous

variables. This is based on the idea that a shock to the i-th variable not only directly affects the i-th variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. In this study, the variable of interest is stock market liquidity (measured as stock market turnover ratio). The IRF of stock market turnover ratio describes the reaction of stock market turnover ratio to the measures of financial inclusion (credit penetration, bank penetration and deposit penetration) at the time of the shock and over subsequent (forecasted) periods of time.

Model Specification

Following the model of Lakshmanasamy (2020), this study specified the functional relationship between financial inclusion (measured as deposit penetration, bank penetration and credit penetration) and stock market liquidity in Nigeria. Unlike the referenced work which is annual panel data and India-based situated within OLS technique, this current study employs weekly time series Nigerian Data and situated within the multivariate Vector Autoregressive method (VAR). The VAR models for this study are specified in equations (5) to (8) below.

$$\begin{bmatrix} SMTR_t \\ D(DPP)_t \\ D(BKP)_t \\ D(CRP_t) \end{bmatrix} = \begin{bmatrix} SMTR_{t-1} \\ D(DPP_{t-1}) \\ D(BKP_{t-1}) \\ D(CRP_{t-1}) \end{bmatrix} + \begin{bmatrix} D(DPP_{t-1}) \\ SMTR_{t-1} \\ SMTR_{t-1} \\ SMTR_{t-1} \end{bmatrix} + \begin{bmatrix} D(BKP_{t-1}) \\ D(BKP_{t-1}) \\ D(DPP_{t-1}) \\ D(DPP_{t-1}) \end{bmatrix} + \begin{bmatrix} D(CRP_{t-1}) \\ D(CRP_{t-1}) \\ D(CRP_{t-1}) \\ D(BKP_{t-1}) \end{bmatrix}$$

$$+ \begin{bmatrix} \cup_{t1} \\ \cup_{t2} \\ \cup_{t3} \\ \cup_{t4} \end{bmatrix} \qquad \begin{matrix} (5) \\ (6) \\ (7) \\ (8) \end{matrix}$$

Where:

The prefix 'D' denotes the differenced form of the variables (as in $D(DPP_{t-1})$, $D(BKP_{t-1})$, and $D(CRP_{t-1})$) where the stationary form of the variable is added to the VAR model in line with the suggestion of Garcıa-Ascanio and Mate (2010); SMTR = Stock market turnover ratio; Bank penetration = BKP, credit penetration = CRP and deposit penetration = DPP; $\cup_{t1}$–$\cup_{t4}$ signifies error term for each equation from (5) to (8).

Theoretically, each of the indicators of financial inclusion, credit penetration, bank penetration and deposit penetration, is expected to have significant relationship with liquidity of the capital market in Nigeria.

Empirical results and discussion

Unit Root Tests

The results of the augmented Dickey-Fuller (ADF) unit root test are presented in table 1. The results of the unit root test of stock market turnover ratio (SMTR) show that the variable is stationary in level. However, deposit penetration (DPP), credit penetration (CRP) and bank penetration (BKP), are non-stationary at level but the trio attain stationarity at first difference. In sum, the variables are of mixed order of integration of order one (DPP, CRP, BKP) and order zero (SMTR).

Table 1. Augmented Dickey-Fuller unit root test

Variables	ADF at Level	ADF at First Difference	Integration Order [I(d)]
SMTR	-2.6864		I(0)
	[0.0846]***		
CRP-	-0.5982	-6.4003	I(1)
	[0.8604]	[0.0000]*	
DPP	-0.4843	-2.9065	I(1)
	[0.8844]	[0.0537]***	
BKP	0.1502	-6.9414	I(1)
	[0.9660]	[0.0000]*	

S o u r c e : authors' computation, 2021. Probability values in [ ]; *, ** and *** denotes stationary at 1%, 5% and 10% respectively.

Model Estimation

In applying the Vector Autoregression to the analysis of the nexus between financial inclusion and liquidity of the Nigerian capital market in this study, the stationary form of the financial inclusion variables, deposit penetration (DPP), credit penetration (CRP) and bank penetration (BKP), which are not stationary in level in addition to the stationary variable (stock market turnover ratio (SMTR)) are employed in VAR modelling in line with the suggestion of Garcıa-Ascanio and Mate (2010).

Vector Autoregression Estimation for SMTR

The results of the Vector Autoregression estimation are shown in table 2. The column I of the table reveals the lagged value of stock market turnover ratio is positively signed (0.7705) and significantly (0.0000) related to stock market turnover ratio in its level. This implies the regressive nature of the stock market turnover ratio in Nigeria, as a measure of stock market liquidity in Nigeria indicates deposit penetration, bank penetration and credit penetration to be positively related to stock market turnover ratio. However, none of the coefficient is significant. This implies that financial inclusion indicators of deposit penetration, bank penetration and credit penetration have positive but non-significant implications on liquidity of the Nigerian capital market, measured as stock market turnover ratio.

Table 2. Vector Autoregression (VAR) estimates

	I SMTR	II D(DPP)	III D(BKP)	IV D(CRP)
SMTR(-1)	0.7705	0.0217	0.0021	0.0449
	[0.0000]*	[0.9651]	[0.2224]	[0.0189] **
D(DPP(-1))	0.0020	-0.1266	0.0004	0.0026
	[0.9422]	[0.4831]	[0.5219]	[0.6994]
D(BKP(-1))	3.3012	18.1912	-0.0955	-1.0973
	[0.6772]	[0.7138]	[0.5938]	[0.5632]

Table 2. Vector Autoregression…

	I SMTR	II D(DPP)	III D(BKP)	IV D(CRP)
D(CRP(-1))	0.1032	0.4901	-0.0027	-0.0324
	[0.8738]	[0.9041]	[0.8533]	[0.8350]
C	1.5482	4.7730	-0.0318	-0.4232
	[0.0313] **	[0.2859]	[0.0500] **	[0.0142] **
R-squared	0.7394	0.0293	0.0554	0.1341
Adj. R-squared	0.7112	-0.0755	-0.0466	0.0405

S o u r c e : authors' computation, 2021. Note: * and ** denote significant at 1% and 5% respectively; Probability values in [ ].

Variance Decomposition and Impulse Response Analysis

The results of the Variance Decomposition (VDC) and Impulse Response Analysis are presented in table 3 and fig. 1, respectively. The VDC of stock market turnover ratio reveals that in period 1, stock market turnover ratio accounts for 100 per cent of the variation in itself, with no contributions to its variation from the financial inclusion indicators of deposit penetration, bank penetration and credit penetration. In period two, 99.7 per cent of the variation in the stock market turnover ratio is due to changes in itself while the 0.03 per cent, 0.27 per cent and 0.02 per cent variation in stock market turnover ratio is due to changes in deposit penetration, bank penetration and credit penetration, respectively. Similarly, in the ninth period, 99.56 per cent variation in stock market turnover ratio is due to own changes while deposit penetration, bank penetration and credit penetration contributes about 0.02, 0.36 and 0.03 per cent, respectively to the variation in stock market turnover ratio in Nigeria. In the same vein, in the tenth period, stock market turnover ratio accounts 99.56 per cent for own variation while other variables, deposit penetration, bank penetration and credit penetration has 0.02, 0.36, and 0.03 per cent, respectively to variation in stock market turnover ratio in Nigeria.

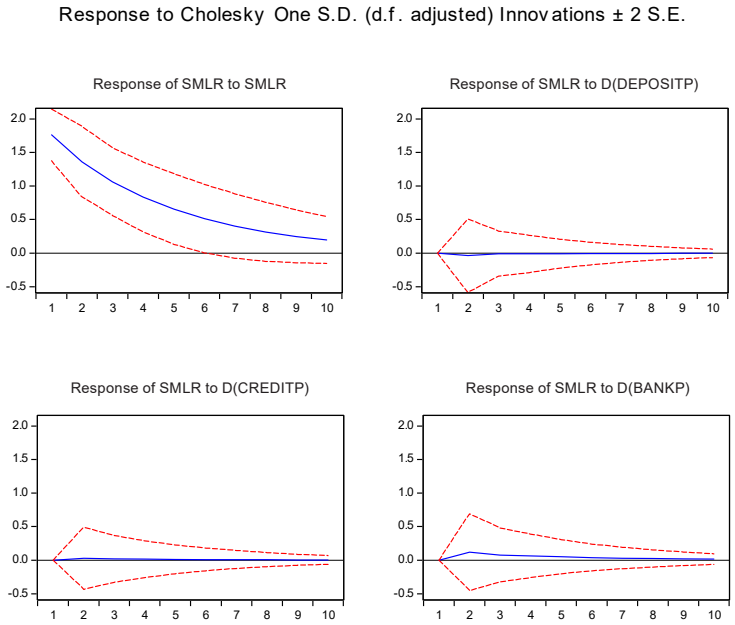
Table 3. Variance decomposition output

Period	S.E.	SMTR	D(DPP)	D(BKP)	D(CRP)
1	1.7613	100.0000	0.0000	0.0000	0.0000
2	2.2300	99.6690	0.0309	0.2735	0.0265
3	2.4713	99.6249	0.0265	0.3173	0.0310
4	2.6092	99.5978	0.0262	0.3423	0.0335
5	2.6903	99.5850	0.0257	0.3544	0.0347
6	2.7391	99.5777	0.0254	0.3613	0.0354
7	2.7686	99.5734	0.0253	0.3653	0.0358
8	2.7866	99.5709	0.0252	0.3676	0.0361
9	2.7976	99.5694	0.0252	0.3690	0.0362
10	2.8043	99.5685	0.0251	0.3699	0.0363

S o u r c e : authors' computation, 2021.

The impulse response functions (IRFs) of the stock market turnover ratio as shown in figure 1 reveals that stock market turnover ratio (SMTR) responds positively to own shocks as well as shocks/innovations in the three indicators of financial inclusions, namely, deposit penetration, bank penetration and credit penetration.

Figure 1. Impulse response functions



S o u r c e : author's computation, 2021.

Discussions of Findings

From the Vector Autoregression estimation of the impact of financial inclusion (credit penetration, bank penetration and deposit penetration) on stock market liquidity in Nigeria, this study indicates deposit penetration, bank penetration and credit penetration to be positively related to stock market turnover ratio. However, none of the coefficient is significant. This implies that financial inclusion indicators of deposit penetration, bank penetration and credit penetration have positive but non-significant implications on liquidity of the Nigerian capital market, measured as stock market turnover ratio. Further insights from VDC analysis reveals that variation in stock market turnover ratio is accounted for financial inclusion as indicated by deposit penetration, bank penetration and credit penetration. The impulse response functions (IRFs) reveals

that stock market turnover ratio (SMTR) responds positively to own shocks as well as shocks/innovations in the three indicators of financial inclusion.

In sum, this study unveils the non-significant impact of financial inclusion on the liquidity of the Nigerian capital market. The results of this study are not in line with a priori expectation. This may not be unconnected with the view that the financial inclusion programme/activities in Nigeria have not been impactful on increasing capital transactions in terms of frequency/volume and value. Our finding is line with that of Migap et al. (2020) who reported the absence of a causal relationship between financial inclusion and capital market in Nigeria. This is not consistent with the findings of Akakpo (2020) in the context of Ghana, who finds a significant impact of financial inclusion on stock market participation in the country. The implications of these findings are that financial inclusion has not been targeting capital market transactions. Financial inclusion has not translated into encouraging capital market liquidity.

Conclusion

In this study, we applied Vector Autoregression, Variance Decomposition and Impulse Response techniques to the analysis of the implications of financial inclusion on capital market liquidity in Nigeria between 2008Q1 to 2018Q4. From the analysis, we established that financial inclusion indicators of deposit penetration, bank penetration and credit penetration have positive but non-significant implications on stock market turnover ratio in Nigeria.

This study therefore concludes that financial inclusion exerts no significant influence on stock market liquidity in Nigeria with a very negligible variation in the latter explained by the former. The implication of the findings of this study is that capital market liquidity is not enhanced by the financial inclusion initiative in the economy of Nigeria. Although each of the three indicators of financial inclusions examined in this study poses to be positively influential on stock market liquidity, none of them could statistically explain liquidity of the Nigerian capital market in the study period. The empirical findings of this study suggests that deposit penetration, bank penetration and credit penetration measures of financial inclusion have the potential of improving the liquidity of the Nigerian capital market but the current pace of financial inclusion has not reached the desired rate of significantly promoting the liquidity of the Nigerian Stock Exchange.

It is therefore recommended that accounts and bank penetrations should be re-engineered towards its translation to high volume and value of capital market transactions than mere penetration without capital market implications in Nigeria. Government should provide special outlets and platforms for vulnerable groups and formerly financially excluded to be able to access and execute capital market transactions through the actuality of the third and the fourth tier of the Nigerian capital market. One approach to attain this is via financial inclusion re-engineering towards capital market development.

References

Akakpo, A.A. (2020). *Financial literacy, financial inclusion and stock market participation in Ghana* (M.Sc. thesis). University of Ghana. http://ugspace.ug.edu.gh.

Alade, M.E., Adeusi, S.A., & Alade, F.O. (2020). Covid-19 pandemic and Nigerian stock market capitalisation. *Ilorin Journal of Economic Policy,* 7(3), 12–23.

Ashraf, M.A. (2021). The impact of mobile financial services on the usage dimension of financial inclusion: An empirical study from Bangladesh. *Copernican Journal of Finance and Accounting,* 10(4), 9–25. http://dx.doi.org/10.12775/CJFA.2021.012.

Babarinde, G.F. (2021). *Financial inclusion and investment in Nigeria: Impact and causality analysis.* Paper presented at the Colmans International Conference held at Bells University of Technology, Ota Nigeria.

Babarinde, G.F., Ndaghu, J.T., Abdulmajeed, T.I., & Enoruwa, K.O. (2021). *Capital market performance: Its implications on external trade in Nigeria*. Paper presented at the 2nd international banking and finance conference held at the University of Nigeria, Enugu Campus, Nigeria.

Blake, M., Propson, D., Monteverde, C., & Chidambaram, M. (2018). *Advancing financial inclusion metrics: Shifting from access to economic empowerment* (White paper). Switzerland: World economic forum and Tata consultancy services.

Garcıa-Ascanio, C., & Mate, C. (2010). Electric power demand forecasting using interval time series: A comparison between VAR and Imlp. *Energy Policy*, 38, 715–725. http://dx.doi.org/10.1016/j.enpol.2009.10.007.

Gujarati, D.N., & Porter, D.C. (2018). *Basic econometrics* (5th ed.). McGraw-Hill Companies: New York.

Islam, M. (2018). Implications of financial inclusion in a country's economic development: A study on South Asia (Bangladesh). *European Journal of Business and Management,* 10(5), 46–54.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica,* 59, 1551–1580.

Lakshmanasamy, T. (2020). Financial inclusion in the states of India: A panel data analysis of accounts penetration. *Journal of Development Economics and Finance,* 1(2), 209–225.

Lesotho, O.K., Motlaleng, G.R., & Ntsosa, M.M. (2016). Stock market returns and exchange rates in Botswana. *African Journal of Economic Review,* 4(2), 16–42.

Migap, J.P., Ngutsav, A., & Andohol, J. (2020). A causal analysis of financial inclusion, capital market and economic growth in Nigeria. *Confluence Journal of Economics and Allied Sciences*, 3(3), 1–14.

Morgan, P., & Pontines, V. (2014). Financial stability and financial inclusion. *ADBI Working Paper*, 488. http://www.adbi.org/working-paper/2014/07/07/6353.financial.stability.inclusion.

Nwude, E.C. (2018). *Investment analysis and portfolio management*. Enugu: El-'Demak.

Ofori-Abebrese, G., Baidoo, S.T., & Essiam, E. (2020). Estimating the effects of financial inclusion on welfare in sub-Saharan Africa. *Cogent Business and Management,* 7, 1839164. http://dx.doi.org/10.1080/23311975.2020.1839164.

Ogbeide, S.O., & Igbinigie, O.O. (2019). Financial inclusion and poverty alleviation in Nigeria. *Accounting and Taxation Review,* 3(1), 42–54

Okoye, L.U., Adetiloye, K.A., Erin, O., & Modebe, N.J. (2016). Financial inclusion: A panacea for balanced economic development. *IBIMA conference*, 28, 4384–4394.

Omar, M.A., & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Economic Structures,* 9(37), 1–25. http://dx.doi.org/10.1186/s40008-020-00214-4.

Ozili, P.K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review,* 18(4), 329–340.

Ozili, P.K. (2020a). Financial inclusion in Nigeria: Determinants, challenges and achievements. *MPRA Paper Working*, 99173. https://mpra.ub.uni-muenchen.de/99173.

Ozili, P.K. (2020b). Theories of financial inclusion. *Working Paper SSRN*, 3526548. http://dx.doi.org/10.2139/ssrn.3526548.

Ratnawati, K. (2020). The impact of financial inclusion on economic growth, poverty, income inequality and financial stability in Asia. *Journal of Asian Finance, Economics and Business,* 7(10), 73–85. http://dx.doi.org/10.13106/jafeb.2020.vol7.no10.073.

Rummel, O. (2015). *Economic modelling and forecasting*: *VAR, SVAR and VECM modelling*. England: Bank of England Centre for Central Banking Studies.

Sims, C.A. (1980). Macroeconomics and reality. *Econometrica,* 48(1), 1–48. http://dx.doi.org/10.2307/1912017.

Suharsono, A., Aziza, A., & Pramesti, W. (2017). Comparison of vector autoregressive (VAR) and vector error correction models (VECM) for index of ASEAN stock price. *AIP Conference Proceedings*, 1913. http://dx.doi.org/10.1063/1.5016666.