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Impact of Stock Market Liquidity on Economic Growth in Nigeria (1980-2020)

ZULAIHATU .A. ZUBAIRU NANA IZE MUSA &
RICHARD N. KYAREM rkyarem@fudutsinma.edu.ng

Abstract
The study examines the impact of stock market liquidity on economic growth in Nigeria by exploring the long-run relationship as well as the causal direction between them spanning from 1980 to 2020. The study proxy economic growth by real GDP per capital and stock market liquidity by turnover ratio and value traded ratio while non-oil revenue and gross fixed capital are incorporated as control variables. ARDL model techniques was employed to examine the impact of the variables in the model whilst Toda-Yamamoto was used to capture the direction of causality among the variables. The study found that though long run relationship does exist among the estimated variables, stock market liquidity is not a significant driver of economic growth in Nigeria in the long-run. On the other hand, the result of Toda-Yamamoto non causality exogeneity test revealed a bi-directional causality between economic growth and stock market liquidity in Nigeria. Based on the finding, it is recommended that security and exchange commission should enact policies that ensure that securities are diversified and investments are channeled towards real production sectors that has the potentials to impact the Nigerian economy.

Keywords*: Economic growth, Stock market liquidity, ARDL, TY and Structural break*

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I. Introduction

The widespread of stock markets in emerging economies in the 1980s was as a result of the perceived potentials embedded in its capability to enhance future economic growth (Weber, Davis & Lounsbury, (2009). Many financial analysts have argued that the quality of stock market activities is what determines the growth rate of an economy. In this light, Rousseau &Wachtel (2000) raised four distinctive characteristics of stock market that are potential determinant of economic growth. One of the most essential of these characteristics is the degree of liquidity of stock market which is the ability of investors to easily exchange financial instrument and make gains without much encumbrance, a key characteristic perceived to accentuate entrepreneurship activities.

The liquidity of stock market is one of the multiple dimensions by which stock market development is gauged. A liquid market ensures allocation and information efficiencies which curtail the usual market friction. More specifically, a liquid market offers a number of benefits which include, first, allowing financial institutions to accept larger asset-liability mismatches which helps individual institution to efficiently manage crisis as well as reducing the risk of central bank involvement. Second, it enable stock market to use indirect monetary instrument which helps to improve the stability of monetary policy; third, it makes financial asset more attractive to investors: Fourth, it allow companies to have direct and permanent access to equity issues; lastly, it enables investors to exit the market or switch investment with ease (El-Wassal, 2013; Sarr&Lybek 2003). All these functions are expected to culminate into long-term economic growth.

Many financial researchers have identified the role of a liquid market in spurring economic growth. The distinctive role of stock market hinged on stock market liquidity which afford buyers and sellers of financial instrument to transact seamlessly (Onyele, Ikuagwu&Onyekachi-Onyele 2020). Conversely,stock market liquidity encourages multitude of investments in long term projects and hence economic growth. This claim is supported by Kim (2013) who posits that illiquid market discourages investment in high-return projects.

Similarly, stock market liquidity is identified as one of the essential characteristics of the market which promotes smooth running of the market and whose absence limit the activities of the market (Naik & Reddy, 2021). Avalanche of studies have identified important linkages between market liquidity and stock returns (Bradranian et al 2015; Chang et al, 2010; Lam & Tam, 2011). The presence of stock market liquidity is important to traders and firms as it determine the magnitude of their returns, assist them to gauge the cost of capital, accelerate their values by improving their corporate governance mechanisms and help them in devising appropriate strategies for maximizing their returns (Li et al., 2012; Naik& Reddy, 2021). In a similar way, the degree of market liquidity has been linked to the strength of the market in absorbing shock in the face of

economic crisis (Nneji 2015). Hence, stock market liquidity is identified as a significant parameter in determining economic growth and stability (Naes et al, 2011; Smimou, 2014) mentioned in Naik and Reddy (2021).

Despite the substantial theoretical literature on the linkage between stock market liquidity and economic growth, many empirical researchers have produced contradictory results as to the ability of stock market liquidity in predicting future economic growth. While one strand of empirical literature reiterates the relevance of stock market liquidity in determining future economic growth (Levine & Zervos,1998; Chipaumire & Ngirande, 2014; Kim,2013; Kyle, 1984; Holmstrom&Tirole 1993; Scharfstein 1988).,the other strand has demonstrated an insignificant relationship between stock market liquidity and economic growth (Araoye, Ajayi&Aruwaji, 2018; Osakwe & Ananwude, 2017; Erasmus, 2016; Odhiambo, 2010; Switzer, 2016). Specifically, Bhide (1993) and Delong et al (1989) opined that the liquidity of the market is the very factor that hinders corporate governance and encourage private divestment which has negative impact on the economy.

Furthermore, the direction of causality has remained an issue of serious debate. Studies on this aspect reported contradictory results of unidirectional causality from stock market development to economic growth (like Næs,Skjeltorp & Ødegaard (2011); on the other hand, Parkash & Sundararajan, (2012), Kim, (2013), Skjeltorp & Ødegaard (2009) found a unidirectional causality from economic growth to stock market liquidity while El-Gayar found a bi-direction causality between economic growth and stock market development. This makes further research like this one inevitable in verifying the Nigeria case.

Based on the strategic position of financial development on the economic growth and the much claimed linkages between stock market liquidity and economic growth in literature, this study aimed at examining the long run relationship between stock market development and economic growth in Nigeria and also explore the direction of causality between stock market liquidity and economic growth in Nigeria. More so, most of the studies like Naes et al (2011), Skjeltorp & Ødegaard (2009), etc. that investigated the causal relationship utilizes Pairwise Granger causality test which is not suitable for multivariate models. This thus, employs Toda-Yamamoto non causality test to identify the causality result. Also, this present study contributes to the existing literature by incorporating non-oil revenue into the stock market liquidity and economic growth nexus in Nigeria so as to unravel new findings relevant to policy makers and investors. This is necessary because non-oil revenue is becoming increasingly significant in the economic growth trajectory of Nigeria. Furthermore, to the best of the authors' knowledge, the literature on the long-term equilibrium relationship between stock market liquidity and economic growth as well as their direction of causality is relatively scanty in Nigeria which makes this study a viable contribution to the existing literature.

Following this introduction, section 2 of this paper explore the relevant literatures, section 3 explain the methodology of the research. section 4 presents the results and discussion of findings whilst conclusion, recommendation and area for further research are presented in section 5.

II. Literature Review

2.1 Theoretical literature.

This study hangs on two theories of liquidity preference by Kaynes (1936) and the endogenous growth model of the Pagano, (1993) variant. Stock market liquidity develop its root from the theory of liquidity preference proposed by Keynes (1936) which states that investors prefer to hold money for three distinct motives which are transactions, speculative and precautionary motives. In other words, liquidity preference is linked to the demand for a perfectly tradable asset with stable value (Dow, 1999). Investors are enthused by the gain they stand to make by parting with their fund and since people are naturally risk averse, they can only be willing to risk their fund in anticipation for higher reward. The processes and decisions that results into liquidity preferences of transactions, speculations or precautionary uses of money or assets form an integral part of economic growth process using variables and initiatives as entailed in endogenous growth models.

The endogenous growth model which posits that economic growth can be linked to factors within the economy provides an insight about how stock market liquidity can enhance growth. According to the model, growth rate can be influenced by technology, preferences, income distribution and institutional arrangement (Pagano, 1993). This theory applies to stock market liquidity in that a liquid market allows investors to alter their investment based on their preference (as expounded in the Keynesian hypothesis)., Decisions could be altered in various proportions between transaction, speculative and precautionary utilization of resources as well as a switch from short term investment to long-term investment or an exit from one sector of the economy to another when they perceive crisis.

Stock markets liquidity offer a number of benefits which makes them attractive to investors. First, liquid markets allow investors to accept large asset-liability mismatches which enables individual institutions to efficiently manage crisis thus reducing the risk of associated with central bank's involvement as last resort. Second, liquid market allows central bank to employ indirect monetary instruments which foster stable monetary transmission mechanism. Third, they render financial asset more attractive to investors hence,

promoting investment in productive sectors. Fourth, they allow companies to enjoy continuous access to capital through equity issues (El-wassal 2013: Sarr&Lybek 2002).

From the liquidity preference theory, it is obvious that investors are motivated to engage their wealth in high risky venture with high interest rate which means that investors prefer to hold their wealth in liquid form if the interest rate is discouraging. Pagano (1993) in explaining the role of financial intermediation in growth enhancement pointed out that financial intermediation improves allocation of funds to projects with higher marginal productivity of capital which helps to promote growth in two ways via provision of risk sharing which induce individuals to invest in riskier but more productive technologies and via information assessment to evaluate alternative investment projects. A liquid market thus serves as a vehicle for implementation of the information available by allowing investors to easily shift their assets to less riskier portfolios in the face of crisis known as "flight to quality" (Switzer & Picard, 2016).

(Switzer & Picard, 2016) provide a profound analogy of how stock market liquidity can predict future economic growth. They premised their argument on finance theory which suggested that stock markets are "forward looking". Market participants process news and information which reveal the upcoming economic condition that often induce trade thereby causing relative stock prices and stock market indices to fluctuate and since trading level are directly related to trade, its logical to expect aggregate liquidity to convey information about the future macroeconomic condition.

The demostration of stock market liquidity and economic growth by Levine (1991) is a direct acceptance of theoretical relevance of the Keynesian – endogenous growth theory's relevance as employed in this study. Levine (1991) showed that in a more liquid market it is less difficult and less expensive to trade which increases the incentive to invest in long-term project because investors can easily sell their stock if they need their savings before the project matures. Thus, liquidity foster economic growth because it provides avenue for investment in long-term and high-return projects which promote economic growth (Levine &Zervous, 1998).

2.3 Overview of Nigerian Stock Market

Nigerian Stock Market used interchangeably with Nigerian Stock Exchange (NSE hereafter) provides a platform for the exchange and sales of long-term financial securities (equity, debt and bond). NSE was found in 1960 as Lagos Stock Exchange (LSE) but began legal operation on August 25, 1961. In 1977, LSE was renamed NSE. The NSE deals with 12 different sectors which include, consumer serviced sector, basic materials, consumer goods, finance, health, industrial, technology, oil and gas, agriculture, construction/real estate, information and communication technology, and natural resources sectors.

In 1986, NSE joined other emerging markets to embrace financial liberalization as part of Structural Adjustment Program (SAP) under the auspices of World Bank and International Monetary Fund (IMF) who rallied for stock markets deregulations. This new policy saw an upsurge in the activities of NSE evident in the consistent surge in its development indices. Conversely, total market capitalization increased from N16348.40 million to N466058.70 million in 2000 and in 2006, the figure rose to N5.12 trillion. The market enjoyed a decade-long boom and hit its highest in March 2008 (Oji, 2019). The global financial crisis of 2008-2009 had a bad turn on NSE. Consequently, the NSE began to recede as financial assets took flight to safety in fixed income securities. The subsequent recession experienced in 2014-2016 in Nigeria due to global oil price downturn exacerbated the condition of the NSE. Oji (2019) noted that poll trading figures from market operators on their domestic and Foreign Portfolio Investment (FPI) flows, domestic transaction on the nation's bourse decreased by whooping of 66.68 per cent from N3.556 trillion in 2007 to N1.185 trillion in 2018.

However, the NSE recorded a strong performance in 2020 despite the global economic downturn caused by COVID 19 pandemic and lockdown. Stock market closed on a bullish trend. The NSE All Share Index increased by 48.88 per cent whilst market capitalization surged by 62.37%. In the same vein, market turnover activities accelerated compared to the preceding years. The value and the volume of shares traded were N95.35 billion and 1,018.09 billion respectively. This performance was fueled in part by investors asset switch following moderation in fixed income yield occasioned by the restriction placed on non-banking institutions and individuals from purchasing OMO bills and the successful listing of key market players (CBN Annual activity report, 2020). meanwhile, economic growth contracted by 3.20 per cent compared with 2.20 growth recorded in 2019.

According to CBN report (2020), The NSE remained concentrated in few securities as financial sector accounted for a whooping of 68 per cent of the volume of equity traded, followed by construction/real estate with 10.32 per cent, and conglomerates with 5.23 per cent, the remaining sectors accounted for 16.5 per cent which is an evidence of low degree of diversification.. Similarly, NSE is small compared with international exchanges such as Johannesburg Stock Exchange (JSE) and New York Stock Exchange (NYSE). For instance, NSE market capitalizations relative to GDP is 6 per cent in 2020 compared with JSE and NYSE whose market capitalization relative to GDP are 87.6 per cent and 108.2 per cent respectively. This also signifies low liquidity which may militate against stock market impact on the Nigeria economic growth and development.

2.4 Indicators of stock market development.

There are five important characteristics/dimensions of liquidity which are immediacy, depth, tightness, resiliency and breadth (El-Wassal 2013, Sarr & Lybek, 2002). Immediacy refer to ease with which orders can be executed, depth refers to the existence of abundant offers either actual or potential buy and sell above or below the current price of asset , tightness refer to low transaction cost such as the difference between buy and sell , resiliency refer to the way in which new orders can flow quickly to address imbalances in the market and breadth means that the order are many and numerous without adverse effect on prices. These terms reflect the different dimensions by which asset can be transfer quickly into legal tender without adverse effect on prices. Due to the multi-dimension nature of liquidity, no single measure can concurrently measure the overall aspect of liquidity. El-Wassal (2013) noted that a comprehensive measure of liquidity should be able to incorporate all the cost involve in trading such as time cost and the uncertainty associated with finding a counterpart and finalizing the trading.

Liquidity measures are classified into four by Sarr & Lybek (2002) which include, (1) transaction cost measures which measures the cost of trading in the secondary market; (2) Equilibrium based measures that measures the movement of prices towards equilibrium prices, which also serves as a measure of resiliency; (3) Volume based measure that categorized liquid market based on the volume of transaction to price variability, a measure of breadth and depth; (4) Market-impact measures that differentiate price movement due to liquidity of other factors such as the arrival of new information or general market condition which is often use to determine resiliency and the speed of price discoveries. The researchers concluded that there is no single unambiguous measure that captures all the five dimensions of market liquidity, as earlier mentioned.

Notwithstanding, there are two indicators of market liquidity which have gained a remarkable concession in the literature. These are turnover ratio, which measure value traded relative to the market capitalization and value traded ratio, which measures stock traded relative to the size of the economy. Turnover ratio indicates the number of times an average share exchange hands which reflect low cost. A high turnover ratio indicates market liquidity; however, it is argued that a high turnover ratio may also increase speculation activity in the market (EL-Wassal, 2013). The degree of market liquidity is not determined by the size of the market. For instance, A small, liquid market may have high turnover ratio with low value traded ratio. This is deduced from some stock markets which are on different scales. Conversely, Nigeria, Zimbabwe and, South African stock markets had turnover ratio as low as 5 per cent despite their substantial market capitalization relative to GDP. On the contrary, Korea and German had 90 percent turnover ratio signifying high liquidity (Demirgûk-kunt& Levine, 1999).

2.4 Empirical literature

The existing literature on the relationship between stock market liquidity and economic growth nexus produced conflicting results. Levine and Zervos (1998) found that stock market liquidity as measured by turnover ratio and value traded ratio, is positively and significantly correlated with future economic growth, capital accumulation and productivity even after controlling for economic and political factors. However, in a critical appraisal of Levine and Zervos (1998) model by Zhu, Ash &Pollin (2002) shows that if outliers are properly accounted for, stock market liquidity may no longer exert positive and significant impact on economic growth thus, they conclude that stock market liquidity is not a robust determinant of economic growth.

Skjeltorp & Ødegaard (2009) explore whether the information content of aggregate market liquidity in Norway is an essential indicator of financial asset real economic activity. The study utilized all liquid equities at the Oslo Stock Exchange (OSE) covering the period of 1980-2008. The independent variables examined are real GDP, Unemployment rate, real consumption and real investment rate. Relative spread and illiquidity ratio were used as independent variables. The result of the Granger causality test revealed a unidirectional relationship flowing from real economic activities to stock market liquidity.

Odhiambo (2010) in a study of the causal relationship between stock market development and economic growth in south Africa between the period of 1990 to 2005 found that turnover ratio and value of stock traded which are notable measure of market liquidity causes economic growth.

In a quest to determine the direction of causality between stock market liquidity and Economic growth in US from 1947 through 2008 and in Norway from the period of 1980 through 2008, Naes et al (2011) employ multi-proxy for economic growth such as real GDP, growth in unemployment rate, real consumption growth and real growth in private investment. Whilst the study measures stock market liquidity using Amihud (2002) illiquidity ratio, Roll (1984) implicit spread estimator, and Lesmond, Ogden and Trzika measure. The utilizes granger causality technique and found a unidirectional relationship running from stock market liquidity to economic growth.

In the same vein, Parkash & Sundararajan (2012) investigated causality between stock market liquidity and economic growth in India covering the period from 2009-2011 using the same measures utilized by Naes et al (2011).The study revealed that stock market liquidity possesses useful information in predicting current and

future economic growth but the same in not true of economic growth to stock market liquidity which implies a unidirectional causality flowing from stock market liquidity to economic growth.

Similarly, Kim (2013) employs data from 1995 Q2 to 2011Q4 to determine how stock market liquidity forecast economic growth in Korea. the study finds that stock market liquidity is positively and significantly correlated with future economic growth in Korea. The Granger causality result based on their study found a unidirectional causality running from stock market liquidity to economic growth.

Chipaumire & Ngirande (2014) employs OLS model to analyze data spanning from 1995 through 2010 to explore the relationship between stock market liquidity and economic growth in South Africa and conclude that stock market liquidity drives South Africa economic growth.

Ogunlinola & Motilewa, (2015) in their study of the relationship between stock market liquidity and economic growth in Nigeria which covers the period of 1980 to 2012 using the two conventional measures of stock market liquidity such as turnover ratio and value traded ratio finds that Nigerian stock market does not contribute significantly to economic growth in Nigeria. El-Gayar, (2015) applied multiple regression and event analyses to examine the causal relationship between the Egyptian Stock Exchange liquidity and business cycle. The study found a bi-directional relationship between real GDP and Egyptian Stock Exchange.

Erasmus (2016) explored the relationship between stock market and economic growth in Nigeria from 1987 to 2014. Study explored two dimensions of stock market development such as size and liquidity and found that stock market liquidity contributes insignificantly to economic development in Nigeria. The study controlled the relationship by foreign direct investment, credit to private sector, and government expenditure.

Ananwude & Osakwe (2017) explored the long run and short run relationship between stock market development and economic growth in Nigeria from 1981 to 2015 focusing on two dimensions of stock market development which are size and liquidity. The study measured liquidity by turnover ratio and employed ARDL model, found that stock market liquidity does not contribute significantly to economic growth in Nigeria within the study period.

III. Methodology

3.1 Sources of data and description of variables

Annual time series data spanning from 1981-2020 is utilized in this study. The data were sourced from World Bank Development Indicators (WDI hereafter) (2022) and Central Bank (CBN) Statistical bulletin, volume 31 (2020). Variables for this study are selected based on the study objectives in line with the theoretical and empirical literatures that underpin it. The period of the study is informed by the notable transformation that occurred in that period through the deregulation of financial system.

Economic Growth is the dependent variable proxy by real gross domestic product per capital (Y). It is sourced from WDI. The variables of interest are value traded ratio (VTR), that is value traded relative to GDP and turnover ratio (TOR) which is value traded relative to total market capitalization. The variables of interest are computed by the authors based on the data from CBN statistical bulletin. The control variables include (NOR) sourced from CBN statistical bulletin; real interest rate (INT) and gross fixed capital formation (K) sourced from WDI.

3.2 Model specification

The empirical model for this study is derived from endogenous growth made of $Y = AK_t$ presented by Pragano (1993) with little modification to suit the objective of the study. Thus, Aggregate output is a function of capital stock, non-oil revenue, interest rate and aggregate market liquidity, Hence, the model is stated as following.

$$Y = \beta_o + \beta_1 SML_t + \beta_2 K_t + \beta_3 NOR_t + \beta_4 INT + \epsilon_t \quad (1)$$

Where, Y is the gross domestic product per capital; SML represent a vector of stock market liquidity indicators such as total value traded ratio of GDP (VTR) and total value traded relative to stock market capitalization otherwise turnover ratio (TOR) ; K denotes gross fixed capital formation; NOR represent non-oil revenue; INT represent real interest rate,ϵ_t denote stochastic disturbance term. All variables are in their natural log except interest rate.

3.3 Estimation technique

The relationship between stock market liquidity and economic growth is assessed through a three-step procedure which include, pre-estimation technique which entail testing the presence of unit root in the series; estimation technique which involve testing for cointegration among the variables of estimation as well as their direction of causality, and post estimation which encompasses robustness check of the applied model.

3.3.1 Unit root testing

The time invariance of regression coefficient underscores the application of linear regression models, but time series data usually exhibit a non-stationary process which means that the mean, variance and

covariances are time dependent and varying, thus, failure to test for stationarity of the data may lead to spurious regression. Non-stationary time series data are made stationary by differencing. The degree of integration depends on the number of times a variable is differenced to become stationary.

Augmented Dickey-Fuller (ADF) (1979) test and Philips-Perron (PP) (1988) test are employed in this study to test for the stationarity of the series. The major setback of these tests is that they do not take into consideration the effect of structural break. Therefore, Zivot-Andrew (1992) unit root test that account for a single break in the series is employed complement the aforementioned conventional unit root test employed in this study.

3.3.2.1 Cointegration

The long-run equilibrium relationship between economic growth and stock market liquidity indicators and other control variables is tested using Auto Regressive Distributed (ARDL hereafter) model constructed by Pesaran, Shin & Smith (2001). ARDL is the preferred choice because it is applicable regardless of whether the series are integrated at level. I(0) or order 1 i.e, I(1). In addition, the ARDL has reparameterization property which directly generate the error correction model. The procedure entails estimating the ARDL bound testing model which goes by the following equation.

$$\Delta Y_t = \alpha_o + \sum_{i=1}^{q} \gamma \Delta Y_{t-i} + \sum_{i=1}^{p} \varphi \Delta Z_{t-1} + \sum_{i=1}^{p} \omega SML_{(t-1)} + \theta_1 Y_{t-1} + \theta_2 X_{t-1} + \theta_3 SML_{t-1} + \mu_t \quad (2)$$

Where, all the variables remain as previously defined in equation 1, α_0 is the intercept, Δ denotes the change operator and μ_t represent represents the stochastic error term. Thereafter the F-statistic test was used to test the long-run relationship among the variables. The null hypothesis of no cointegration is rejected if the F-statistics is greater than the critical values (5% and 10%). There are usually three conclusions that can be drawn from the value of F-statistics. First, long-run cointegration is said to exist if the F-statistics is greater than the upper critical (5% or 10%) bound values. Second, the conclusion of no cointegration is drawn if the F-statistics is less than the lower critical values (5% or 10%). Third, the relationship is inconclusive if the value of F-statistics is between the upper I(1) and lower I(0) critical (5% and 10%) bound values.

If cointegration exist among the variables of estimation, the Error correction Test (ECT) framework of the ARDL is then employed to determine the speed of adjustment back to equilibrium in the event of distortion as well as the short run dynamic relationship among the variables. The ECT is model presented in equation three as follows:

$$Y_t = \theta_0 + \sum_{i=1}^{q} \theta_1 Y_{t-i} + \sum_{i=1}^{p} \theta_2 Z_{t-1} + \sum_{i=1}^{p} \theta_3 SML_{t-1} + \varphi ECT_{t-1} \quad (3)$$

Where, φ represents the speed of adjustment back to equilibrium, ECT denote error correction term. The coefficient of the ECT is expected to be negative and significant.

The diagnostic tests include the goodness of fit, Jarque-Bera residual normality test, Breusch-Godfrey test for serial correlation, Auto Regressive Conditional Heteroscedasticity test for constant variance, RESET denotes Regression Equation Specification Error Test and Cumulative sum and cumulative sum of squares for stability of the model.

3.3.2.2 Toda-Yamamoto Test for Causality

In order to test for the direction of causality between economic growth, stock market liquidity indicators and the control variables employed in the study, TY (1995) causality framework was adopted. This causality test uses Chi-square distribution which surpasses the F-distribution that has low-power. This framework is not conditioned on the degree of integration of variable nor cointegrating status amongst the variables of estimation. The model to be estimated is given as follows;

$$In\, X_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} InY_{t-1} + \sum_{j=k+1}^{d} \alpha_{2j} InY_{t-i} + \sum_{i=1}^{k} \delta_{2j} In\, X_{t-j} + \sum_{j=k+1}^{d} \delta_{2j} InX_{t-1} + \varepsilon_{2t} \quad (8)$$

$$In\, X_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} InX_{t-1} + \sum_{j=k+1}^{d} \beta_{2j} InX_{t-i} + \sum_{i=1}^{k} \theta_{2j} In\, Y_{t-j} + \sum_{j=k+1}^{d} \delta_{2j} InY_{t-1} + \varepsilon_t \quad (9)$$

IV. Empirical Results

4.1 Descriptive statistics

Table 1 shows the mean, median, minimum, maximum, standard deviation, skewness, kurtosis, Jarque-Bera statistics and its probability for all the variables. The result of the descriptive statistics shows that only Real

gross domestic product per capital has a normal distribution, the rest of the variables are asymmetric. All the variables are free from multicollinearity as evident in variance inflation factor results presented in appendix 1 Table 1.

Table 1: Descriptive statistics

Variables	Y	Vtr	Tor	Nor	K	Intr
Mean	1778.113	72.80496	5.957721	1118.497	5.70E+10	0.434224
Median	1586.049	15.25383	5.479831	407.6496	5.43E+10	4.326392
Maximum	2550.470	371.8639	17.55881	4725.600	1.05E+11	18.18000
Minimum	1317.360	0.105019	1.019290	2.984100	3.75E+10	-65.85715
Std. Dev	444.8003	98.31867	3.403460	1449.174	1.33E+10	14.44028
Skewness	0.509591	1.492547	0.940612	1.137608	1.286375	-2.680369
Kurtosis	1.618476	4.804103	4.700685	2.962014	5.521595	12.58348
Jarque-Bera	4.912235	20.27596	10.71888	8.630086	21.62914	200.9676
Prob.	0.085767	0.000040	0.004704	0.013366	0.000020	0.000000
observations	40	40	40	40	40	40

Source: Authors computation

4.2 Unit root test result

The unit root test results from ADF and PP tests are presented in Table 2. The results show that our variables are a mix of stationary and non-stationary variables. The log of real GDP per capital, the log of value traded ratio, the log of turnover ratio, the log of non-oil revenue are non-stationary and are thus integrated of order one I(1) for both ADF and PP tests. The log of gross capital formation is not stationary going by the t-statistics of ADF but stationary by the PP test. However, real interest rate is found to be stationary in both tests.

Similarly, Zivot-Andrew unit root test which identify a single break in the series is presented in Table 3. As shown in Table 3, real gross domestic product per capital is non-stationary in the trend in 1994. In order to account for this, a shift dummy was created that assumes the value of zero in periods before the break and 1 from the period of the break and beyond. It is crucial to note that one stationarity series have both economics and statistical consequences. The economic consequence is that shock to the variables has permanent effect which also implies the absence of mean reversion. On the other hand, the statistical implication of non-stationarity is that Ordinary least square estimate becomes inefficient estimator and may produce spurious results except in an exceptional case where the regressors are strictly exogenous. This condition is hardly met in real situation, this necessitated the application of ARDL model which is not conditioned on strict exogeneity of the series and also allow for the mixture of stationary and non-stationary series to be applied in an equation.

Table 2: ADF and PP unit root test results

Variables	ADF t-statistics		PP t-statistics	
	I(0)	I(1)	I(0)	I(1)
RGDP	-1.292	-3.797*	-0.490	-3.797*
VTR	-0.872	-5.797*	-0.872	-5.802*
TOR	2.707	-4.335*	5.010	-4.330*
NOR	-2.446	-7.308*	-0.810	-7.360*
GFCF	-2.232	-5.083*	-3.408**	-5.643
INTR	-7.360*	-9.968	-7.134*	-28.498

Note: * and ** represent 1% and 5% level of significance respectively.
Source: Authors computation.

Table 3: Zivot & Andrew unit root test with structural break

Variables	Intercept		Trend	
	t-statistics	Break date	t-statistics	Break date
RGDP	-2.9978**	2002	-2.3843	1994
VTR	-2.9937**	1996	-2.8629*	2008
TOR	-3.2966*	1997	-2.4982**	2014
NOR	-2.7713*	1995	-4.5228*	2002
GFCF	-6.2950	2001	-5.3606*	2013
INT	-8.5981**	1997	-7.4960	2014

Note: ** and * represent 5% and 10% respectively.**
Source: Authors computation

4.3 Cointegration results

The ARDL bound testing result is presented in table 4. The F-stat value of 9.02 and 5.77 which are above the critical values clearly indicate that long-run equilibrium relationship exist amongst economic growth, stock market liquidity indicators and control variables employed in this study in the two specifications.

Conversely, value traded ratio and gross fixed capital formation have negative relationship with economic growth in the long-run whilst turnover ratio, non-oil revenue and interest rate positively correlate with economic growth. however, the coefficients are not statistically significant. The implication of this result is that stock market liquidity is not a significant driver of economic growth in Nigeria. This result is in tandem with the findings of Ogunlinola & Motilewa, 2015; Erasmus 2016; Ananwude & Osakwe 2017).

Similarly, ARDL bound test and long-run results from the model with structural break is not statistically different from what was obtained in the model without structural break. All the coefficients maintained their signs. The coefficient of the shift dummy however has an inverse but insignificant relationship with economic growth.

Table 4: ARDL Bound test and long-run results for both models

Model 1 (break dummy not incorporated)						**Model 2: (shift dummy incorporated)**					
Test statistics		Critical bound				Test statistics		Critical bound			
F-stat	k	95%		90%		F-stat	k	95%		90%	
I(0)	I(1)	I(0)	I(1)			I(0)	I(1)	I(0)	I(1)		
9.02	5	2.39	3.38	2.08	3	5.77	6	2.27	3.28	1.99	2.94

Long-run test results

Model without structural break			**Model with Structural break**		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
LVT_Y	-0.083738	0.6998	LVT_Y	-0.014944	0.8943
LTOR	0.418545	0.2986	LTOR	0.197100	0.3067
LNOR	0.258076	0.3142	LNOR	0.202801	0.1347
LGFCF	-1.707057	0.1476	LGFCF	-1.081156***	0.0711
INT	0.008921	0.3580	INT	0.003428	0.4443
C	47.76561***	0.0917	DUM	-0.262222**	0.0390
C	33.03574**	0.0235			

Note: ** and * represent 5% and 10% significance level respectively.**
Source: Authors computation

Table 5: Short-run dynamic and Error correction term result

Model without structural break			**Model with structural break**		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(LVT_Y)	-0.011384	0.4222	D(LGDP(-1))	-0.246664***	0.0568
D(LVTR(-1))	0.036058**	0.0214	D(LVT_Y)	-0.00448	0.7915
D(LTOR)	0.005642	0.7091	D(LVTR(-1))	0.049003**	0.0141
D(LTOR(-1))	-0.062966*	0.0028	D(LTOR)	-0.006301	0.7517
D(LGFCF)	-0.032624	0.3430	D(LNOR)	0.00902	0.5835
ECM(-1)*	-0.090289*	0.0000	D(LNOR(-1))	-0.036411**	0.0478
D(LGFCF)	-0.030249	0.3881			
ECM(-1)*	-0.187659*	0.0000			
Diagnostics results					
Adjusted R-squared	0.72		Adjusted R-squared	0.76	
S.E of Regression	0.02		S.E. of regression	0.02	
F-stat	296.8(0.00)		F-stat	257.18(0,00)	
BG	3.198(0.202)		BG	0.587(0.746)	
JB	1.189(0.552)		JB	0.805(0.668)	
ARCH	0.973(0.323)		ARCH	2.371(0.124)	
RESET	0.127(0.724)		RESET	0.422	

Note: *, ** and *** denotes 1%, 5% and 10% level of significance respectively; () denote probability values; SE is Standard Error of regression; BG denotes Breusch-Godfrey serial correlation test; JB denotes Jarque-Bera residual normality test; ARCH denotes Autoregressive Conditional Heteroskedasticity; RESET denotes Regression Equation Specification Error Test

4.4 Short-run dynamic results

The result of the short-run is presented in Table 5. The short-run dynamic result prior to the incorporation of a shift dummy is presented in Table 5. only the coefficients of value traded ratio and turnover ratio are found to be statistically significant such that a 1% increase in the lagged value of value traded ratio lead to 3.6% increase in real GDP per capital; and a 1% increase in the lag values of turnover ratio will materialize into 6.3% decrease in the value of real GDP per capital.

After incorporating a shift dummy, more variables were found to be statistically significant. The first lag of the coefficients of GDP per capital, value traded ratio, turnover ratio, and non-oil revenue are statistically significant with mix signs. Consequently, a 1% increase in the lagged values of real GDP per capital, turnover ratio, and non-oil revenue will lead to 24.7% ,0.84% and 0.36 decrease in the value of real GDP per capital respectively. However, a 1% change in the value of the lagged coefficient of value traded ratio will lead to 4.9% increase in real GDP in the short run. However, there seems to be no significant difference in the values of stock market liquidity indicators.

4.5 Diagnostic test results

The coefficients of the error correction term, which show the speed of adjustment back to equilibrium for both models are negative and significant which implies that there is long-run convergence among the variables of estimation. The coefficients of the error correction term is 0.090 for the initial model without structural break. The implication of this is that 9% of the distortion in the previous year is corrected in the present year. However, when the shift term is incorporated into the model, the speed of adjustment accelerated to 18.8%.

In the same vein, the value of R-squared is 72% and 76 % for the initial model and model with shift dummy which implies that the regressors accounted for 72% and 76% of the variation in the dependent variable. The models are free from autocorrelation evident in the probability of the BG. The ARCH results revealed that the models are homoscedastic, their residual are normally distributed evident in JB residual normality test results, the models areare free from specification error as shown by the RESET result.

4.6 Stability test results

Both models are stable as shown by their respective cumulative sum (CUSUM) and cumulative sum of square (CUSUM of square) graphs as shown in appendix 2A and 2B, Figure 1 through 4 for both models. As can be seen in the plots, the stability line remains within the 5% stability boundary which implies that both models are stable. The implication of this is that any recommendation made from the findings are reliable.

4.7 Toda-Yamamoto (TY) test results.

The condition for applying TY test are duly met. The model is stable as evident in the stability polynomial circle and AR root graph; there is no point lying outside the stability zone. Similarly, the VAR is also homoscedasticity for joint and individual components going by the results of the VAR heteroskedasticity test presented in appendix 3. There is no autocorrelation up to lag 5 shown by the autocorrelation table presented in Table 5 of Appendix 3.

The results of TY causality test presented in table 6 show that both stock market liquidity indicators have bidirectional relationship with economic growth which is constant with the finding of El-Gayar (2015).Similarly, interest rate which is the cost of capital also demonstrated feed-back causality. Meanwhile, non-oil revenue and gross fixed capital formation results demonstrated a unidirectional causality running from the duo to economic growth.

Table 6: Dependent variable: RGDP

Excluded	Chi-sq	df	Prob.
LVTR	30.561*	4	0.0000
LTOR	34.906*	4	0.0000
LNOR	34.854*	4	0.0000
LGFCF	29.619*	4	0.0000
INT	43.662*	4	0.0000
All	284.415*	20	0.0000
Independent variable: RGDP			
Excluded	Chi-sq	df	Prob.
LVTR	8.417***	4	0.0774
LTOR	18.099*	4	0.0012
LNOR	3.873	4	0.4234
LGFCF	3.271	4	0.5135
INT	27.789*	4	0.0000

Note: * and * denotes 1% and 5% level of significance respectively**

V. Conclusion and Recommendations

This paper aim at examining the long-run equilibrium and short-run dynamic relationship as well as direction of causality between stock market liquidity and economic growth in Nigeria between the period of 1985 and 2020. Two proxy of stock market liquidity were employed such as value traded stock relative to the size of the economy and value traded stock relative to market capitalization. Albeit there is a long-run convergence amongst the variables of estimation, both proxies of stock market liquidity have mixed but statistically insignificant effect on economic growth in Nigeria in the long-run. On the other hand, the lagged values of both proxies have a negative and statistically significant effect on economic growth in the short-run. However, the result of the Toda-Yamamoto causality test revealed that there is causality running from both proxy of stock market development to economic growth with feedback which implies a bidirectional relationship. This study concludes that the Nigerian stock market is not yet liquid enough to impact significantly on economic growth because it is concentrated on few stocks which are not development inclusive. Based on the findings, the following recommendations are presented.

First, security and exchange commission should enact policies that ensure that securities are diversified and investments are channeled towards real production sector that has the potentials to impact the Nigerian economy..

Second, infrastructure should be put in place to accommodate small and medium scale entrepreneurs who can easily access fund for their enterprise so that the economy can flourish enough to develop the financial sector in return since there exist a causal relationship between stock market liquidity with feedback.

This study can be extended in the future by looking at the asymmetric relationship between stock market liquidity and economic growth so as to unravel new findings.

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APPENDIX

Table 1: MulticollinearityTest

Variable	Coefficient	Centered
Variables	Variance	VIF
VTR	0.284735	4.352204
TOR	129.8706	2.378749
NOR	0.001118	3.712241
GFCF	6.61E-18	1.840633
INTR	5.365283	1.769050
C	19142.14	NA

Source: Authors' computation

Appendix 2A: Stability plots for model without structural break

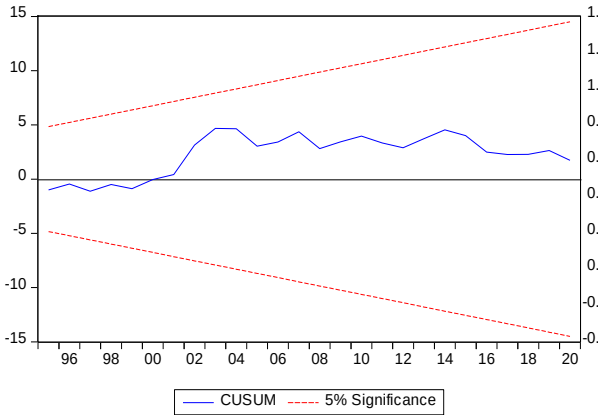

Figure 1: CUSUM plot

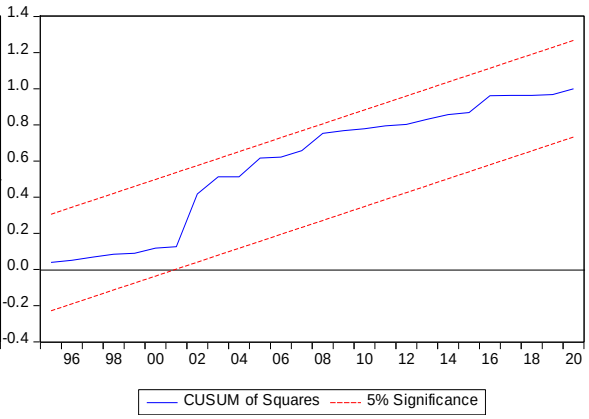

Figure 1B: CUSUM of square plot

Appendix 2B: Stability plots for model with structural break

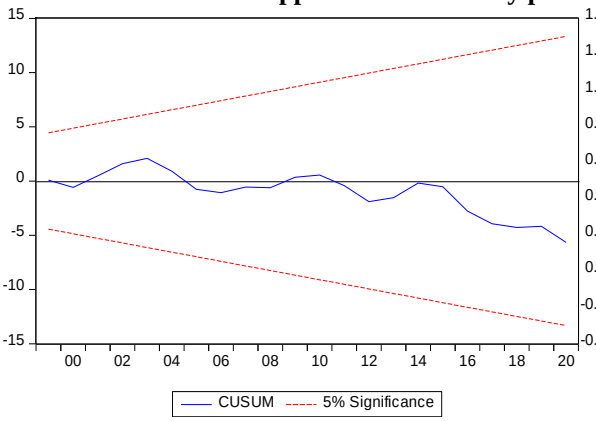

Figure 2A: CUSUM plot

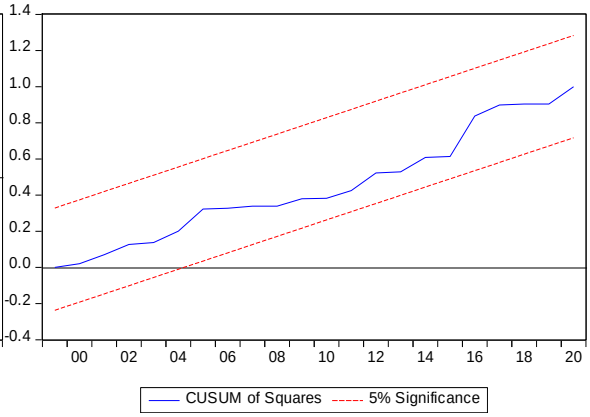

Figure 2B: CUSUM of square plot

Appendix 3: Toda-Yamamota Robustness Tests

Table 2:Lag length criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-187.3304	NA	0.001861	10.74058	11.00450	10.83269
1	8.519308	315.5356*	2.67e-07	1.860038	3.707477*	2.504844
2	43.05104	44.12388	3.45e-07	1.941609	5.372567	3.139105
3	94.24092	48.34600	2.46e-07	1.097727	6.112203	2.847913
4	158.4976	39.26797	1.76e-07*	-0.472089*	6.125907	1.830789*

source: Authors computation

Table 3: Serial Correlation LM test

Lag	LM test	df	Prob.
1	48.28464	36	0.0970
2	43.51588	36	0.2038
3	34.38699	36	0.5712
4	35.46416	36	0.5207
5	50.00185	36	0.0721

source: Authors computation

VAR Stability plot

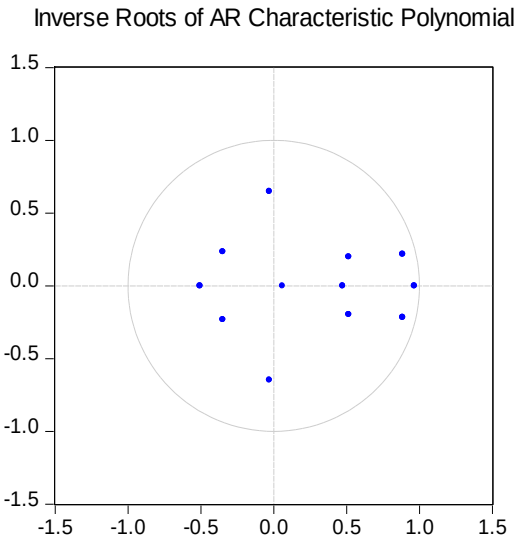

Figure 3: Auto regressive polynomial graph