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Macroeconomic Policies and Stock Market Liquidity: Evidence from Nigeria

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Abstract

This study investigated the effect of macroeconomic policies on stock market liquidity in Nigeria using annual time series data that spanned from 1986 to 2018. Specifically, the paper analyzed how monetary and fiscal policies interactions affect stock market liquidity. Stock market liquidity was measured by stock turnover ratio. Unit root test confirmed that the variables were of mixed integration which necessitated the application of ARDL technique. The ARDL bounds testing revealed that a long-run relationship existed between fiscal and monetary policies instruments, and stock market turnover ratio. In the long-run, it was found that government debt had negative and significant effect on stock market turnover ratio while monetary policy variables such as monetary policy rate and cash reserve ratio had significant effect on stock market turnover, but only the policy rate was positive. In the short-run, all the explanatory variables were significant apart from monetary policy rate which was, though, significant after one period lag and liquidity ratio which was not significant at any level. The results of the ECM suggested that stock market liquidity was affected by the interactions of fiscal and monetary policies instruments in Nigeria. Consequently, the paper concluded that macroeconomic policies that would enforce sustainable and efficient financial market towards improving stock market liquidity be strictly implemented.

Keywords: Stock market, Liquidity, Turnover ratio, Macroeconomic policies, Fiscal policy, Monetary policy.
JEL Classification: C32; E44; E63; F42; G2; H50.

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Ethical: This study follows all ethical practices during writing.

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Contribution of this paper to the literature
This study contributes to prior studies by showing that fiscal-monetary policy interactions affect financial market liquidity in Nigeria for the period 1986-2018.

1. Introduction

An economic environment that is poorly managed is bound to deplete financial market activities (Nasir, Soliman, Yago, & Wu, 2016). Unfortunately, the Nigerian economy has been grouped among the most volatile economies in recent days due to lapses in macroeconomic policies, leading to a breakdown in economic activities in recent years. These economic problems have led to severe liquidity squeeze and credit crunch in the Nigerian financial system. Consequently, as a prominent component of the financial system, the Nigerian stock market has underperformed due to its susceptibility to economic upheavals resulting from poor economic policies such as, fiscal and monetary policies (Nwaogwugwu, 2018). In recent years, due to laggard implementation of fiscal and monetary policies to cushion economic vagaries, the Nigerian stock market have been plagued with global financial crisis and economic recession of 2008/2009 and 2016 respectively. Also, the lack of vibrant fiscal and monetary policies to shield the Nigerian stock market from the adverse effects of economic crisis has led to downward trend in key performance parameters of the market as displayed in Figure 1. The figure shows that during the global financial crisis (2008/2009 precisely), market capitalization which had leapfrogged from ₦5,120.90 billion in 2006 to ₦13,181.69 billion in 2007 dropped persistently to ₦7,030.84 billion in 2009, while all share index which had accelerated from 33,189.30 points in 2006 to 57,990.20 points in 2007 dropped to 20,827.17 points in 2009. Likewise, due to the adverse effects of economic recession witnessed in 2016, market capitalization fell from ₦17,003.39 billion to ₦17,003.39 billion in 2015 to ₦16,185.73 billion in 2016 as the all share index crashed from 28,642.25 points in 2015 to 26,874.62 points. As a result, empirical inquiry into the relative role of fiscal and monetary policies in enhancing stock market activities in Nigeria has remained an enduring issue.

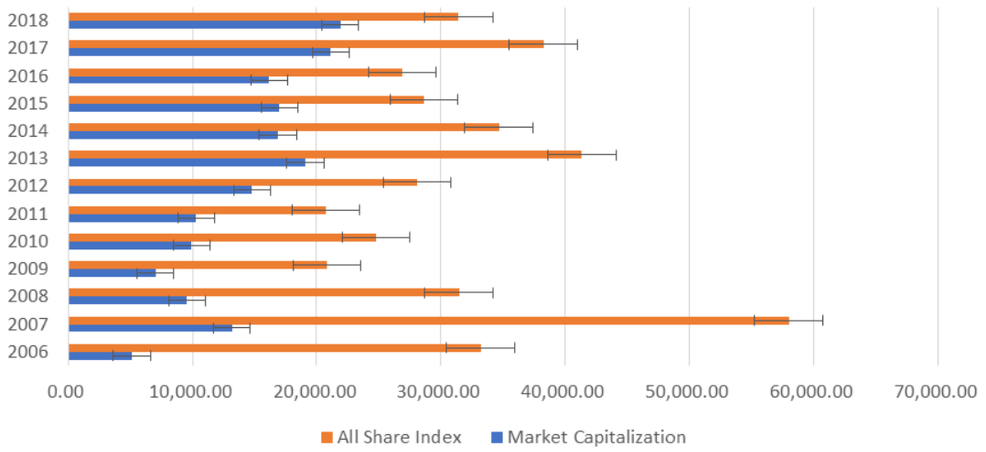

Figure-1. Trend analysis of all share index and market capitalization in Nigeria.
Source: Central Bank of Nigeria Statistical Bulletin, vol. 29, 2018.

The core objective of monetary and fiscal policies is the maintenance of economic and financial stability. Achieving these objectives is dependent on the effectiveness of monetary and fiscal policies coordination. Fiscal policy encapsulates government revenue collection (through taxes) and spending decisions, while monetary policy is related to those decision on money supply and interest rate in an economy. The overriding objective of fiscal policy is to mitigate unemployment rate by creating an investment friendly economy where available resources are gainfully utilized for more productivity. Regarding monetary policy, the all-important objective is the maintenance of price and exchange rate stability by ensuring that quantity of money supply is as prescribed by the monetary authorities. Hence, it can be seen that the ultimate goal of both policies is to ensure macroeconomic stability which is required for repositioning financial markets on a sustainable growth trajectory (Hsing, 2013). For instance, higher tax collection (with government expenditures remaining constant) depletes expected return of financial assets which eventually deter stock market liquidity (Onoh, 2016). On the other hand, increase in public debt due to budget deficit causes surge in short-term interest rate which, in turn, reduces the value of discounted cash flow from a financial asset (like a share) and then signals a decrement in stock market liquidity (Ernest, 2011). Since fiscal activities could influence interest rates, monetary authorities' interventions to moderate interest rate creates an interaction mechanism between monetary and fiscal policies (Isola, Somoye, Babajide, & Nwanji, 2018).

This paper focused on the stock market amidst other segments of the financial market for several reasons. This is particularly due to the wealth effect associated with the stock market (see, Nasir et al. (2016)). Additionally, Bhattacharya, Bhattacharya, and Basu (2019); Ellington (2018); Onoh (2016) had indicated that stock market liquidity is an important indicator of future outlook of the financial market. Hence, it is established that the crucial role of stock markets hinged on the liquidity it affords investors who invest in stocks, compared to less liquid investments such as real estate. One reliable measure of stock market liquidity is the turnover ratio (Abdul-Khaliq, 2013; Bhattacharya et al., 2019). As such, a well-functioning stock market is desirable when the turnover ratio increases; the higher the shares turnover, the more liquid company shares would be. A liquid stock market is that in which financial assets are easily purchased and sold with minimal loss of value. In general, liquidity entails the extent of trade-off existing between the price and speed at which stocks are sold. As such, a liquid market has a mild trade-off where quick selling does not cause much decline in stock prices (Ellington, 2018). Conversely, in a stock market that is relatively illiquid, rapid selling of financial assets would require some amount of price cut. Consequently, adequate liquidity activates efficient financial intermediation which requires vibrant macroeconomic

policies to be sustained. Since liquidity reflects stock market viability, several studies have advocated the use of fiscal and monetary policies instruments for its maintenance and sustenance.

The pioneering studies of Friedman and Meiselman (1963); Andersen and Jordan (1968) which supported the preference of monetary policy over fiscal policy in the United States have been challenged for diverse reasons by subsequent studies like Goldfeld and Blinder (1972); Friedman. (1977); Darrat (1986) based on the premise that fiscal policy is more prominent than monetary policy. However, this has not been the case in recent literature where recent empirical works such as Afonso, Alves, and Balhote (2019); Nwaogwugwu (2018); Tawfiq and Tahtamouni (2018); Isola et al. (2018); Orekoya (2017) revealed that though fiscal policy and monetary policy might have varying effects on stock market activities, an interaction of the two policies is of utmost importance in explaining changes in stock market activities. On the other hand, a gap this study aims to fill borders on the fact that studies carried out in Nigeria such as Nwaogwugwu (2018); Orekoya (2017) suffer from model misspecification as they failed to incorporate public debt, cash reserve ratio and bank liquidity ratio (ratio of banks' liquid assets to its liabilities) in the fiscal-monetary policy mix as these variables are important components of macroeconomic policies (Alade, 2017; Ukeje, 2012). However, a vital issue that has often stressed the minds of researchers and economist alike is the discernment of how the dependence, independence and interactions between monetary and fiscal policies could drive the economy either closer or further away from its goals and objectives. Obviously, one of the fundamental objectives of fiscal and monetary authorities is to foster effective and efficient economy, of which the stock market is an integral part. It is based on the foregoing that this paper investigates the extent to which stock market liquidity is being affected by fiscal and monetary policy actions in Nigeria. This objective was achieved by using yearly time series data from 1986 to 2018 and autoregressive distributed lag (ARDL) technique of data analysis.

2. Conceptual Framework

The conceptual note explaining the interaction between fiscal and monetary policies as they influence productivity, prices, rate of returns and by extension stock market liquidity have been categorized into two (2) strands of literature (Afonso et al., 2019; Tawfiq & Tahtamouni, 2018). The first strand emphasizes that the two policies are either substitutes or complements to each other. The second focuses on the competing or conflicting effect which explains both that policies move in opposite direction through the strategic fundamentals relating to the interaction between the policies based on the game theory framework (the use of mathematical models of strategic interaction among rational decision-makers).

Linkages between these two policies instruments towards any direction has effects on overall financial system, most especially the stock market. In a situation both policies tick towards the same direction, one would discover that either contractionary or expansionary of one policy instrument would lead to either contractionary or expansionary of the other (Ellington, 2018). In the same vein, it is also averred that in a situation when both policies follow the same direction such that inflation is kept in check while counter cyclical policies are implemented, the results would be that either of the two policies will lead, while the other play the complementary role by following (Nasir et al., 2016). This is because funds required by government and corporate organizations are often large hence effective macroeconomic policies (fiscal and monetary policies) would foster stock market liquidity to raise such funds required by government and companies (Onoh, 2016).

As indicated in the literature, the interaction between fiscal and monetary policies manifests through the effect of public inter-temporal budget constraint on monetary policy which emphasizes that government endeavour to fund her expenditures through tax collection, debt, and seignorage. Here, the pitfall could be that, when confronted with laggard fiscal policy amidst a complementary role by monetary policy, there is the likelihood that the monetary policy instruments would become sluggish if fiscal system experience insolvency, thus resulting to inflationary pressure in the future. On the other hand, through the impact of fiscal policy instruments on components of monetary policy, especially the discount rate (monetary policy rate). According to Chatziantoniou, Duffy, and Filis (2013) this effect is seen through a situation when a country's debt profile is heavily dominated in hard currencies as exchange rate depreciation would accelerate the debt burden which will cause appreciable surge in interest rate and adverse effects on stock prices and by extension stock market liquidity.

Figure 2 below summarizes the conceptual framework of this paper assuming loose fiscal and monetary policies. The diagram depicted in Figure 1 shows that economic actions associated with fiscal or monetary policies might effectively achieve desirable macroeconomic objectives if they are isolated. As such, a mixture of policies is emphasized, where appropriate implementation of fiscal policy is accompanied by a suitable level of monetary policy. Hence, the interactions between fiscal and monetary policy fundamentals as well as interest rates (monetary policy rate/discount rate) shows that the analysis of stock market activities cannot be completely isolated from such policy influences. This is the situation as changes in either fiscal or monetary policy instruments (like government spending, taxes and discount rate) could have an instantaneously influence on interest rates and then propel investors to revalue their holdings in equity. In other words, the value of investor's wealth (including equity holdings) which is reflected in the sum of discounted future cash flows (and/or dividends), is often affected by an expansionary or contractionary fiscal or monetary policy either be means of discount rate or expected revenue or both. Consequently, it is more appropriate to carry out a concurrent analysis of both policies when investigating stock market activities.

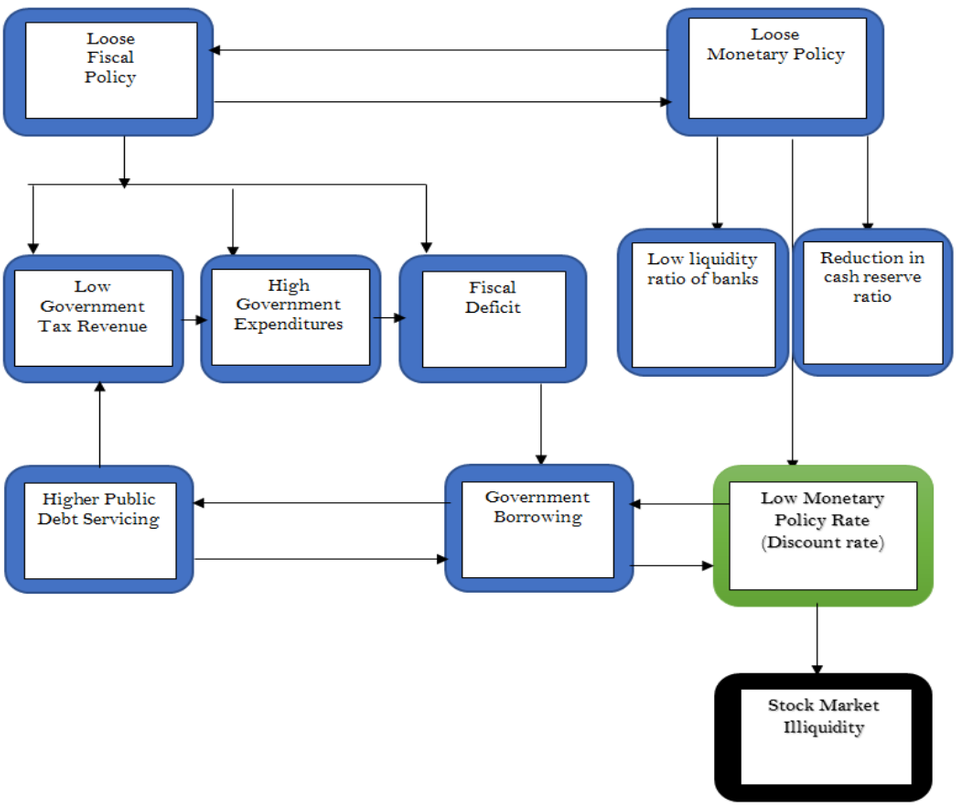

Figure-2. Conceptual framework.

3. Theoretical Review

As affirmed by Agnello and Sousa (2010); Iacoviello (2005); Bernanke and Kutner (2005) monetary policy could affect stock market activities through five (5) fundamental channels, viz; the,

1) Interest rates channel.
2) Credit channel.
3) Wealth effect mechanism.
4) Exchange rate channel.
5) Monetary mechanism.

The first channel of monetary policy transmission is the interest rate channel which is hinged on the Keynesian hypothesis that changes in in interest rate could affect cost of capital, thereby causing alterations to present value of expected cash flows of corporate organizations in the future. This implies that upward trend in interest rates might provoke a downward trend in firms' cash flows, hence resulting to lower liquidity and stock prices.

The second channel, which the wealth effect mechanism encapsulates an indirect transmission mechanism of monetary policy based on interest rate adjustment. This channel sees deliberate changes to interest rate by monetary authorities as a means through which investments as well as stock market liquidity can be controlled. Here, swings in corporate investments would likely alter firms' market value as well as their future financial status. Specifically, the credit mechanism offers explanations that additional investments induces increment in future cash flows, hence accelerating the market value of firms listed in the stock market which in turn spurs stock market liquidity (Onoh, 2016).

On the other hand, the third channel which examined the wealth effect mechanism opined that the ability to influence stock market prices centres on the fact that higher interest rates causes stock prices to fall which automatically transmit to low market liquidity. Also, the exchange rate channel explains that increased interest rate induces appreciation of domestic exchange rate, thus leading to higher imports and lower exports which negatively influence the stock market liquidity. Also, the fifth approach is the monetary mechanism which is based on the Tobin's Q theory of investments observed that increased interest rates will result to decrease in stock valuation thereby shifting liquidity from the stock markets to the bond market thereby causing stock prices to fall.

On the other hand, the theoretical stance through which fiscal policy actions affect activities of a stock market follows three major hypotheses, namely, the;

1) Keynesian positive effect.
2) Classical crowding out effect.
3) Richardian neutrality hypothesis.

The Keynesian theoretical foundation centres on the application of automatic and discretionary stabilizing measures by fiscal authorities in such a manner that propels aggregate consumption, boosts economic productivity as well as accelerate stock returns. This hypothesis is based on the notion that fiscal policy instruments (government tax revenue and expenditures) positively affect the stock market. Hence, policy makers utilize budget deficit, taxes as well as other discretionary measures to alter the prevailing interest rate, thereby causing significant improvement in stock market performance.

Regarding the classical crowding out effect, it is believed that the adverse effects of fiscal policy instruments on the real economy is transmitted to the stock market. This hypothesis shows that instruments of fiscal policy could potentially crowd out loans in the financial markets and hinder private sector investments, thereby having inverse effects on stock prices which could also affect liquidity.

With respect to the Richardian neutrality hypothesis, takes a mid-point approach to affirm that fiscal policy has no individual ability to effectively influence the behaviour of stock markets and other components of the financial sector in an economy with inadequate input from instruments of monetary policy. The Richardian neutrality hypothesis further states that the ability of fiscal policy to drive aggregate demand is hindered due to disequilibrium position existing between public debt and private savings of rational households.

4. Empirical Review

The collective effect of fiscal-monetary policies on stock markets have been well established by prior empirical works in recent years. Nwaogwugwu (2018) analyzed the impact of macroeconomic policies on stock market behavior in Nigeria with the aid of ARDL bounds testing approach. The findings showed that money supply, interest rate, government spending and taxation had statistically significant impact on the stock market in the short and the long-run. Similarly, Isola et al. (2018) examined the impact of fiscal and monetary policies on stock market behaviour using monthly data and ARDL estimation technique. The results showed that the interaction between the two economic policies influenced stock returns in Nigeria. The ARDL estimation showed evidence of long-run relationship between stock returns and Monetary-fiscal policy mix. Also, Orekoya (2017) applied structural VAR on quarterly time series data from 1990Q1 to 2016Q4 to analyzed the interacting impact of fiscal and monetary policy tools on the Nigerian stock market. The study concluded that the Nigerian stock market responded rapidly and significantly to fiscal and monetary policies instruments.

Away from Nigeria, Chibi, Benbouziane, and Chekouri (2019) analyzed the dynamic interaction between monetary and fiscal policies in Algeria for the period of 1963-2017 using ARDL estimation approach. The reactions between fiscal and monetary authorities indicated that fiscal policy was not responsive to monetary policy instruments during the period but monetary policy tools was responded to instruments of fiscal policy. The study concluded that fiscal policy was dominated monetary policy in Algeria. Similarly, Tawfiq and Tahtamouni (2018) discussed the impacts of the monetary and fiscal policies on stock market returns in Jordan during the period 2006 to 2016. A multiple regression analysis technique was used for the data analysis. The paper revealed that there was a long-run cointegrating relationship between monetary-fiscal policies interaction and stock returns. Again, Nasir et al. (2016) analyzed financial markets` responses to fiscal and monetary policy interaction in the UK using Vector Auto-regression (VAR) model on monthly data from January 1985 to August 2008.The study found that equity and bond markets showed responded negatively to interaction of both policy actions. Also, Chatziantoniou et al. (2013) employed a SVAR to investigate the collective impact of monetary and fiscal policy shocks on stock market performance in Germany, UK and the US. The empirical results showed that both policies influenced the stock market. It was found that the two economic policies were very significant in explaining stock market developments. In the same vein, Hsing (2013) focused on analyzing the impacts of fiscal and monetary policies on stock market performance in Poland during 1999.Q2 to 2012.Q4. The paper found that the index of Poland's stock market was not affected by government deficits but was negatively influenced by the money market rate. Ernest (2011) examined the joint impact of fiscal and monetary policy instruments on the Ghanaian stock market. Empirical evidence from the study indicated that interaction between the two policies were transmitted to the stock market through interest rate which suggested that such policies might have simultaneous influence on stock market activities in Ghana.

5. Sources of Data and Description of Model Variables

The dataset used for this paper included diverse macroeconomic policy indicators covering both fiscal and monetary policies as well as stock market liquidity. The dependent variable is stock market liquidity. This study followed prior empirical works such as Bhattacharya et al. (2019); Abdul-Khaliq (2013) to proxy stock market liquidity with turnover ratio, measured as the ratio of total value of shares traded to total market capitalization. Though, the turnover ratio does not reveal performance of the company behind the stock but it does supply information on how easily an investor can sell the shares of a company. Additionally, the data used for the study were collated from the Central Bank of Nigeria (CBN) statistical bulletin, vol. 29, 2018, and National Bureau of Statistics.

With regards to fiscal policy, three kinds of variables were incorporated into the estimation model. The first is government revenue (both tax and non-tax) which happens to be one side of the policy, government expenditures which occupies the other hand of the policy and government borrowings which helps bridge the resource gap when government revenue falls short of government expenditures. Fiscal policy instruments are designed by the government to influence quantum and allocation of collected revenue and expenditures towards achieving sustainable economic development and by extension stock market stability (Alade, 2017). The tax revenue was expressed as a ratio of GDP to determine how well a government directs and manages its economic resources through taxation. Also, government expenditures to GDP ratio was used to measure government size while government debt to GDP ratio indicated debt overhang (Kenton, 2019).

Monetary policy is concerned with the use of monetary instruments such as the discount rate (also known as the monetary policy rate), cash reserve requirements and liquidity ratio of banks to influence overall economic activities by a Central Bank (Ukeje, 2012). With cash reserve requirements, the Central Bank mandate commercial banks to hold part of their deposit liabilities as vaults with the Central Bank which help control bank lending, thus put supply of money on check as higher reserves limit bank loans and vice versa. The monetary policy rate on the other hand, represents the interest rate at which the Central Bank lends to financially sound Banks thereby affecting credit supply which in turn limits or enhances stock market activities through availability of investible funds. Also, bank liquidity ratio as applied to monetary policy entails the amount of liquid assets recommended by the CBN to be kept by banks in order to meet their day-to-day financial obligations, most especially, customer withdrawals (Alade, 2017).

Consequently, an understanding of how diverse macroeconomic policy variables operate, their ability to reinforce each other, and how policy shocks might arise will help policy makers in managing policy direction. Fiscal and monetary policies could reinforce one another in stimulating lower risk inherent in long-term interest rates

structure. The point of interaction between the two macroeconomic policies arises when government borrows to fund expenditures due to shortfalls in expected revenue. Higher government borrowing could reach a point when the debt might be difficult to repay. Hence, under this condition, the Central Bank might be forced to monetize the debt by embarking on seignorage, leading to excess liquidity with the attendant lower interest rate which automatically cause a downward trend in stock market liquidity as low interest rates signals low returns, hence stock market liquidity is influenced. Under this circumstance, the monetary authorities should notify the fiscal authorities of the impacts of public borrowing on reaching their monetary objectives (of which stock market liquidity is one).

6. Model Development

The theoretical framework of this study encompasses representative household facing income constraint, utility and preferences as presented in Equation 1:

$$Max\ c_t l_t\ \mathrm{U} = E_0 \sum \beta_t\ \mathrm{u}(c_t l_t) \qquad (1)$$
$$t = 0$$

Equation 1 above shows that with efforts aimed at maximizing utility of household (U), maximization of various streams of consumption (c) as well as leisure (l); *E0* is the expectations operator (rational expectations) based on policy makers observing all macroeconomic variables; (0; 1) denotes the discount factor, while u is immediate utility function while c_t and l_t are consumption and leisure levels at time *t*. It is assumed here that the said household portfolio contains two varieties of financial assets i.e. Stock(s) and Public Bonds (b). The household wealth is acquired via two sources to make up financial wealth, that is, an amalgam of income gained from financial assets (stocks and bonds) as well as non-financial wealth (H) which connotes returns on labour. Therefore, the aggregate financial wealth (A) would be as stated in Equation 2:

$$A = \sum_{i=1}^{\infty} s + b \qquad (2)$$

Based on Equation 2 above, this paper followed the theoretical model adopted by Nasir et al. (2016); Nasir. and Soliman (2014) in which intertemporal household consumption depended on financial wealth as represented in Equation 3:

$$C = mpc_w[A + \mathrm{H(Y)}]$$
$$\approx mpc_w \mathrm{A} + mpc_y \mathrm{Y} \qquad (3)$$

Where *C* represents consumption, *A* represents the financial wealth comprising stocks and bonds ($A = \sum_{i=1}^{\infty} s + b$), *H* represents component of human wealth and *Y* indicates value associated with expected income of labour after taxes.

The coefficient of proportionality (*mpc*) measures the marginal propensity to consume out of financial wealth as well as income. Equation 3 can be rewritten as:

$$\frac{\Delta C}{C}\left[mpc_w \frac{A}{C}\right]\frac{\Delta A}{A} + \left[mpc_y \frac{Y}{C}\right]\frac{\Delta Y}{Y} = \sum mpc_w \frac{A_j}{C}\frac{\Delta A_j}{A_j}\Big] + \left[mpc_y \frac{Y}{C}\right]\frac{\Delta Y}{Y} \qquad (4)$$
$$e_w \qquad 1 - e_w \qquad e_{wj}$$

The implication of Equation 4 is that the wealth elasticity of consumption (e_w) is dependent on mpc_w and wealth consumption ratio of each of the component *j*.

The national income (Y) equation is given by Equation 5:

$$Y = C + I + G + X - M \qquad (5)$$

Where, *I* denotes investments, G represents Government spending, while (X-M) represents the balance of trade (exports less imports), obviously, *C which denotes* consumption is an integral part of national income. Consequently, based on Equation 5, the influence of financial wealth (*A*) on financial assets (such as, stocks and bonds) would be automatically transmitted to consumption.

Now, assuming the household invests in financial assets, let's say stocks (s) or bonds (b) or a combination of both (which are instruments of the stock market) which are influenced by economic policies (monetary and fiscal policies), as such the relationship between monetary policy and financial wealth is expressed by Equation 6:

$$\text{Financial Wealth (A)} = \sum_{i=0}^{n} \frac{A_{ti}^{e}}{(1+ri)^{ti}} \qquad (6)$$

In Equation 6, A_{ti}^{e} = expected financial wealth from stocks and bonds; and,
r represents the rates of interest (monetary policy rate).

For the nexus between fiscal policy and financial wealth, the specification of Ardagna (2009) for the US stock market and fiscal policy was adopted as expressed below in Equation 7:

$$Financial_{ijt} = \sum_{i=1}^{n}\left(Fiscal_{ijt}\right) \qquad (7)$$

From Equation 7, $Financial_{ijt}$ denotes the stock market and $Fiscal_{ijt}$ represents the fiscal stance at a certain period, let's say time t_i.

Hence, recognizing the effect of interactions between fiscal policy and monetary policy on stock market activites as stated by empirical studies such as Chibi et al. (2019); Tawfiq and Tahtamouni (2018) Equations 6 and 7 were merged. Hence, the model was represented as follows:

$$Financial\ wealth\ (A)_{(stock,bond)} = \sum_{i=1}^{n}\left(Fiscal_{ijt} + \frac{A_{ti}^{e}}{(1+ri)^{ti}}\right) \qquad (8)$$

Hence, Equation 8 implies that stock market activities = f($Fiscal_{ijt}$, $Monetary\ policy_{ijt}$)

Having established from the theoretical framework the fiscal and monetary policies influence stock market activities, it is believed that stock market liquidity would respond to changes in such macroeconomic policies. Hence, given that fiscal policy according to Alade (2017) has three major components, that is, government collected tax revenue, public expenditures and government debt, while Ukeje (2012) also indicated that monetary policy is transmitted through the discount rate (monetary policy rate) as well as monetary authority's prescriptions of cash reserve ratio and liquidity ratio of deposit money banks in Nigeria. Hence, Equation 8 was restructured to capture the aforementioned components of fiscal and monetary policies as shown in Equation 9:

$$TNR_t = \beta_0 + \beta_1 REV_t + \beta_2 EXP_t + \beta_3 DBT_t + \beta_4 MPR_t + \beta_5 CRR_t + \beta_6 LQR_t + \mu_t \quad (9)$$

Where,
TNR_t = Stock market turnover ratio (measure of stock market liquidity) at time *t*.
REV_t = Government collected tax revenue at time *t*.
EXP_t = Government expenditures at time *t*.
DBT_t = Government borrowing at time *t*.
MPR_t = Monetary policy rate at time *t*.
CRR_t = Cash reserve ratio at time *t*.
LQR_t = Liquidity ratio at time *t*.
β_0 = Constant.
β_1 - β_6 = Coefficients of the explanatory variables.
μ_t = Error term.

7. Data Estimation Techniques

The study applied autoregressive distributed lag (ARDL) bounds test approach for the study. The bounds testing was used to determine if the long-run relationship between the variables in the model. If the variables are cointegrated, the long-run ARDL model will be estimated and also the speed of adjustment will be found. In ARDL analysis, long-run and short-run coefficients are estimated simultaneously, and model could be developed and utilized for cointegration test even if all the variables were not stationary after first differencing 1(1), or at level i.e. 1(0). ARDL model is used when the variables are of mixed integration at order one, 1(1) and at level, 1(0), but none is integrated at second differencing, 1(2) (Pesaran, Shin, & Smith, 2001). The ARDL bounds testing specification of Equation 9 was expressed as error correction mechanism (ECM) to test for cointegration between the variables in view. Equations 10, 11 and 12 denotes the bounds test, long-run estimates and the ECM, respectively.

$$\Delta TNR_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta TNR_{t-i} + \sum_{i=0}^{p} \delta_2 REV_{t-i} + \sum_{i=0}^{p} \delta_3 EXP_{t-i} + \sum_{i=0}^{p} \delta_4 DBT_{t-i} + \sum_{i=0}^{p} \delta_5 MPR_{t-i} + \sum_{i=0}^{p} \delta_6 CRR_{t-i} + \sum_{i=0}^{p} \delta_7 LQR_{t-i} + \beta_1 \Delta TNR_{t-1} + \beta_2 REV_{t-1} + \beta_3 EXP_{t-1} + \beta_4 DBT_{t-1} \; \beta_5 MPR_{t-1} + \beta_6 CRR_{t-1} + \beta_7 CRR_{t-1} + \mu_t \quad (10)$$

After cointegration is established, the estimation of the long-run relationship followed equation 11 below:

$$\Delta TNR_t = \delta_0 + \beta_1 TNR_{t-1} + \beta_2 REV_{t-1} + \beta_3 EXP_{t-1} + \beta_4 DBT_{t-1} + \beta_5 MPR_{t-1} + \beta_6 CRR_{t-1} + \beta_7 LQR_{t-1} \mu_t \quad (11)$$

Equation 12 below displays the short-run relationship and the error correction mechanism:

$$\Delta TNR_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta TNR_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta REV_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta EXP_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta DBT_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta MPR_{t-i} + \sum_{i=0}^{p} \delta_6 \Delta CRR_{t-i} + \sum_{i=0}^{p} \delta_7 \Delta LQR_{t-i} + \theta ecm_{t-i} + \mu_t \quad (12)$$

Where,
δ_0 = Constant
δ_1 - δ_6 = short-run elasticities (coefficients of the first-differenced explanatory variables)
β_1 - β_6 = long-run elasticites (coefficients of the explanatory variables)
θ = Speed of adjustment
ecm_{t-i} = Error correction term lagged for one period
Δ = First difference operator
p = Lag length

Before estimating the ARDL model, the data were individually tested for unit root. This stage is very necessary as most macroeconomic time series contain unit root and any regression involving non-stationary series produces spurious regression output. The test for stationarity of data was done with Augmented Dickey Fuller (ADF) unit root test approach (Dickey & Fuller, 1979). The model ADF model is specified in Equation 13:

$$\Delta y_t = \beta_0 + \beta_1 t + \beta \lambda y_{t-1} + \sum_{j-1}^{p} \delta_j \Delta y_{t-j} + \mu_t \quad (13)$$

Where, y_{t-1} are lagged value of y_t at first difference; Δy_{t-j} denotes change in lagged value; δ indicates the lag length; Δy_t represents first difference of y_t and μ_t is the error term.

8. Empirical Results

Table-1. ADF unit root test results.

Variable	ADF t-Statistic	1% level ***	5% level **	Prob.
At level, I(0):				
TNR	-2.9660	-4.2732	-3.5577	0.1569
REV	-1.6357	-4.2732	-3.5577	0.7558
EXP	-3.5979	-4.2732	-3.5577	0.0459**
DBT	-2.8078	-4.2845	-3.5628	0.2052
MPR	-3.746099	-4.2732	-3.5577	0.0334**
CRR	-4.813282	-4.3239	-3.5806	0.0032***
LQR	-3.239788	-4.2732	-3.5577	0.0949
At first difference, I(1):				
TNR	-4.046886	-4.3239	-3.5806	0.0186**
REV	-5.069506	-4.2967	-3.5683	0.0016***
EXP	--	--	--	--
DBT	-4.6743	-4.2845	-3.5628	0.0039***
MPR	--	--	--	--
CRR	--	--	--	--
LQR	6.0678	--	--	0.0001***

Note: *** prob. < 0.01 and ** prob. < 0.05.

8.1. Unit Root Test

The preliminary test of ADF unit root test was performed to confirm if the data are stationary. The results are displayed in Table 1 below:

The test statistics of EXP, MPR and CRR were greater than their respective critical values at 5% level; hence the null of unit root was rejected for the aforementioned variables. On the other hand, TNR, REV, DBT and LQR became stationary after taking their first difference at 5% level. Hence, the ADF test results shows that the data series were of mixed integration, that is, a combination of I(0) and I(1) variables. This circumstance necessitates the application of the ARDL estimation technique (Pesaran et al., 2001).

8.2. Bounds Testing for Cointegration

Having established the stationarity status of the variables, the study proceeded with the ARDL bounds testing to establish a possible long-run relationship among the variables understudy. Here, the null hypothesis of absence of cointegration is rejected if the *F*-test is greater than the critical value at 5% level of the *I*(0) and *I*(1) regressors, and vice versa . The outcome of the bounds testing was presented in Table 2 as shown below:

Table-2. Bounds testing results.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	9.137388	10%	1.75	2.87
k	6	5%	2.04	3.24
		2.5%	2.32	3.59
		1%	2.66	4.05

The bounds testing results shows that the null hypothesis is rejected at 1% level of significance as there is evidence of cointegrating relationship in the model motivated by the explanatory variables (components of fiscal and monetary policy). This implies that stock market turnover ratio (TNR), government tax revenue (REV), public expenditures (EXP), government debt (DBT), monetary policy rate (MPR), cash reserve ratio (CRR) and liquidity ratio (LQR) are bound by a long-run relationship. The long-run relationship among the variables was confirmed as the calculated F-ratio (TNR, REV, EXP, DBT, MPR, CRR and LQR) = 9.1373 which happens to be greater than the is upper bound critical value of 4.05 at the 1% level of significance. The implication of this cointegrating relationship is that stock market turnover ratio (measure of stock market liquidity) followed changes in fiscal and monetary policy components over a long period. Hence, it was concluded that fiscal and monetary policy collectively explained variations in TNR. This affirms the findings of prior empirical works like Chibi et al. (2019); Nwaogwugwu (2018); Tawfiq and Tahtamouni (2018)); Isola et al. (2018); Chatziantoniou et al. (2013) that interaction between fiscal and monetary policy variables explains stock market behaviour.

8.3. Long-run Estimation of the ARDL Model

After ascertaining the cointegration relationship, the study proceeded with the estimation of long-run and short-run dynamics using the autoregressive distributed lag (ARDL) and error correction mechanism (ECM). The results of the ARDL long-run coefficients were displayed in Table 3 as shown below:

Table-3. Long-run estimated coefficients.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TNR(-1)	-0.866820	0.177348	-4.887683	0.0009
REV(-1)	0.182759	0.109592	1.667630	0.1297
EXP(-1)	-0.088269	0.382022	-0.231057	0.8224
DBT(-1)	-0.351970	0.106571	-3.302687	0.0092
MPR(-1)	1.623542	0.762389	2.229546	0.0421
CRR(-1)	-0.561272	0.219833	-2.553174	0.0310
LQR(-1)	0.007696	0.113877	0.067581	0.9476

Note: Selected Model - ARDL(1, 3, 3, 3, 3, 1, 1).

The long-run estimated coefficients revealed that one period lag of TNR, DBT, MPR and CRR were the most significant variables that affected current year's TNR. The coefficient (-0.866820) and the probability value (0.0009) of TNR(-1) indicated that the observed value of stock market turnover of the previous year had significant effect on current year's turnover ratio. Though, the coefficient of REV(-1) was positive (0.182759), the p-value (0.1297) showed that government collected revenue had no significant effect on TNR. The estimated coefficient (-0.088269) of EXP(-1) is indicative of the fact that government expenditures exerted negative effect on TNR, but the associated p-value (0.8224) suggested that the effect of EXP on TNR was not significant in the long-run. Also, government borrowing which was measured by debt overhang (total debt to GDP ratio), that is, DBT(-1) emerged with negative (-0.351970) and significant (0.0092) which implied that increase in government borrowing could significantly deter TNR in the long-run. The long-run coefficients also revealed that MPR(-1) had a positive (1.623542) and significant (0.0421) long-run effect on TNR which implied that increase in monetary policy rate caused significant surge in TNR. The result was also indicative of a positive (-0.561272) and significant (0.0310) of CRR(-1), which indicates that TNR declined significantly in the long-run due to increase in cash reserve ratio. On the other hand, LQR(-1) emerged with a positive (0.007696) coefficient but wasn't significant (0.9476), thus showing that prescribed increase in liquidity ratio of banks caused TNR of the stock market to accelerate but at a slow pace.

These findings implied that fiscal policy instruments (government revenue and expenditures) did not directly affect stock market liquidity (measured by turnover ratio) in the long-ru but indirectly through government borrowings due to fiscal deficit. This finding was in consonance with the Richardian neutrality hypothesis that

fiscal policy has no individual ability to influence the behaviour of stock markets and other components of the financial sector in an economy without monetary policy playing a complementary role. On the other hand, the study observed that monetary policy rate and cash reserve ratio were monetary policy tools that significantly explained stock market liquidity in the long-run. Thus, this is in tandem with interest rate and credit channels of monetary policy transmission that deliberate changes to interest rate by monetary authorities is a means through which stock market as well as other financial activities are controlled.

8.4. Short-run Estimation of the ARDL Model

The error correction mechanism (ECM) gave information on the speed of adjustments and short-run coefficients of the ARDL model while the differenced coefficients of the independent variables indicated the short-run dynamics. Directly, the ECM estimation provides information on the speed at which the stock market liquidity (measured by turnover ratio) returns to equilibrium after a shock to the independent variables (components of fiscal and monetary policies). The results were presented in Table 4:

Table-4. Error correction mechanism results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REV)	0.447793	0.055425	8.079221	0.0000
D(REV(-1))	-0.317043	0.068979	-4.596203	0.0013
D(REV(-2))	0.136133	0.058195	2.339257	0.0441
D(EXP)	0.684444	0.162833	4.203346	0.0023
D(EXP(-1))	-0.108068	0.186918	-0.578156	0.5773
D(EXP(-2))	-1.013950	0.160921	-6.300928	0.0001
D(DBT)	-0.233940	0.040295	-5.805708	0.0003
D(DBT(-1))	0.312268	0.049118	6.357518	0.0001
D(DBT(-2))	0.279972	0.040877	6.849186	0.0001
D(MPR)	0.173522	0.148382	1.169430	0.2723
D(MPR(-1))	-0.797467	0.147932	-5.390774	0.0004
D(MPR(-2))	-0.261833	0.099839	-2.622554	0.0277
D(CRR)	-0.907645	0.140365	-6.466304	0.0001
D(LQR)	-0.063470	0.034927	-1.817217	0.1026
ECT(-1)	-0.866820	0.083955	-10.32487	0.0000
R-squared	0.920010			
Adjusted R-squared	0.845352			
Durbin-Watson stat	2.253422			

In Table 4, the short-run dynamic coefficients revealed that REV and EXP had positive effect on stock market turnover while DBT had a negative effect which buttressed the undesirable effects public debt burden could have on the Nigerian financial system (Sunday, Agbaeze, & Onyele, 2018). Also, while MPR emerged with a positive coefficient, LQR and CRR had negative coefficients which entails that alterations to banks' liquidity and reserves bears diminishing effects on stock market turnover ratio in the short-run as it limits commercial banks' ability to increase in loans to private sector which in turn affects stock market activities (Orekoya, 2017). The short-run dynamics denoted by the differenced *(D)* coefficients of the explanatory variables indicated that all the components of fiscal policy considered for this study has significant effect on stock market turnover ratio. However, it was observed that government collected revenue, public expenditures and government debt had immediate significant effect on stock market turnover ratio. This was observed by the p-values (0.0000, 0.0023 and 0.0003) associated with D(REV), D(EXP) and D(DBT), respectively which were less than the 0.05 critical value. This implies that increase in revenue collection, especially through taxation, higher public expenditures as well as increased debt burden arising from deficit financing received rapid change to stock market turnover. On the other hand, it was observed that while the monetary policy rate and liquidity ratio did not have immediate effect on stock market turnover ratio as indicated by their respective p-values (0.2723 and 0.1026) as linked with D(MPR) and D(LQR), cash reserve ratio had an immediate effect on stock market turnover ratio as indicated by the p-value (0.0001) of D(CRR), but TNR was strongly predicted by the first and second lag of MPR, that is MPR(-1) and MPR(-2) . This shows that both fiscal and monetary policy were important in determining short-run turnover ratio of the Nigerian stock market than monetary policy. The significance of MPR and CRR validates the theoretical postulation of the Keynesians that fiscal policy affects the stock market as policy makers utilize budget deficit, taxes as well as other discretionary measures to alter the prevailing interest rate, thereby causing significant change in stock market activities.

The ECT indicates the speed of adjustment mechanism towards restoring equilibrium following a shock in the long-run. The observed coefficient of the error correction term (ECT) was found to be negative (-0.8668) and statistically significant (0.0000). A negative and statistically significant ECT indicates how rapidly stock market turnover return to equilibrium after a shock or discrepancies to macroeconomic policies in the long-run. In absolute term, the relatively high adjustment mechanism denoted by the coefficient -0.8668 (86.68%) associated with the ECT implies a rapid adjustment process in the model. This shows that in the current year, approximately 86.68% of previous year's disequilibrium or shocks adjusted back to long-run equilibrium. The ECT further indicated the presence of a long-run relationship between components of macroeconomic policies and stock market liquidity in Nigeria. On the other hand, the adjusted R-squared (0.845352) points to the fact that interaction of monetary policy and fiscal policy explained significant proportion of TNR. This implies that approximately 84.53% of the total variations in stock market turnover (TNR) was collectively explained by fiscal policy (government revenue, government expenditures and public debt) and monetary policy instruments (MPR, cash reserve ratio and liquidity ratio). The Durbin-Watson value (2.253422) which is approximately two (2) indicated the absence of serious problem of autocorrelation in the ECM.

8.5. Diagnostic Tests

The last issue addressed in the analysis is associated with the reliability of the ARDL model. For this reason, diverse diagnostic tests were performed. The diagnostic tests were serial correlation, heteroscedasticity, Ramsey's RESET test as well as Jarque-Bera normality test. The results reported in Table 5 indicated that the ARDL is free from challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model. This implied that the results from the ARDL estimation were robust and reliable for making inferences. Also, the plot of the CUSUM and CUSUMSQ showed that the model was stable as the graphs lied within the 5% significance level boundaries see Figures 3 & 4.

Table-5. Residual diagnostic tests.

Test	Stat. (Prob.)	Conclusion
Bruesch-Godfrey (autocorrelation)	0.088463 (0.9163)	No traces of higher-order autocorrelation
Bruesch-Pagan (heteroscedasticity)	0.518096 (0.8914)	No evidence of heteroscedasticity
Ramsey RESET (omitted variables)	0.695151 (0.5066)	No omitted variables
Jarque-Bera (normality)	1.103582 (0.5759)	Residuals are normally distributed

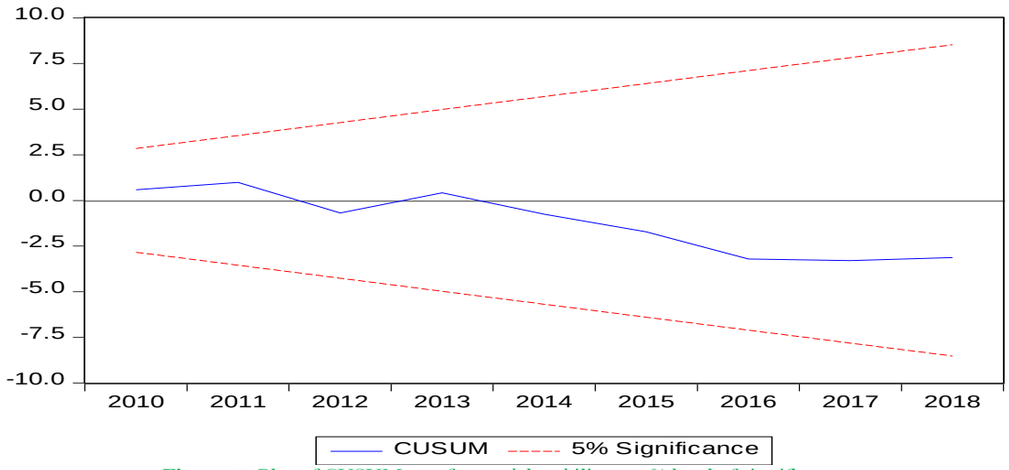

Figure-3. Plot of CUSUM test for model stability at 5% level of significance.

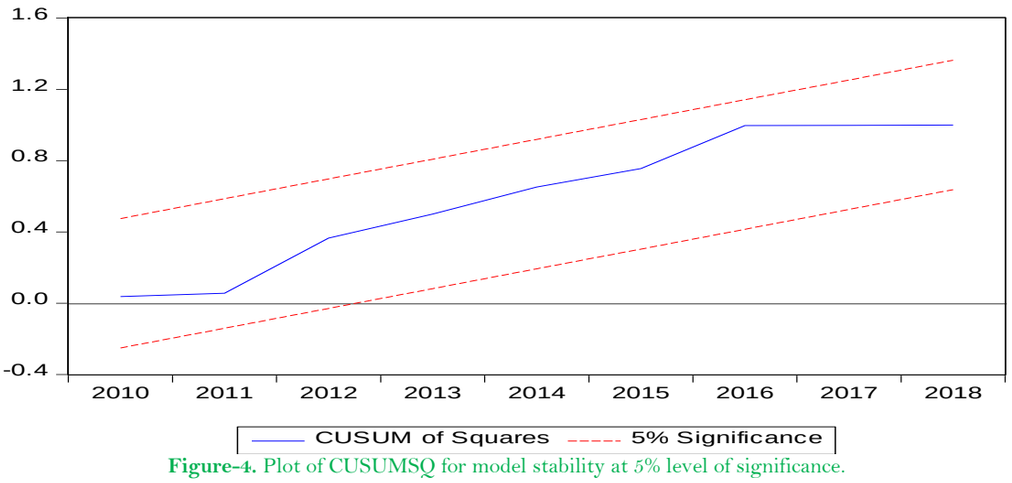

Figure-4. Plot of CUSUMSQ for model stability at 5% level of significance.

9. Conclusion and Policy Implications

The effect of fiscal and monetary policies interaction on stock market activities have attracted attention in existing literature. Nevertheless, there is dearth of knowledge as to how interaction of such macroeconomic policies affects stock market liquidity in Nigeria. Consequently, this paper extended the frontiers of knowledge in this perspective by investigating how interactions between fiscal and monetary policies affect stock market liquidity in Nigeria. This objective was achieved by using the ARDL-Bounds testing approach for the analysis of annual time series data from 1986-2018. The empirical analysis was hinged on the Richardian neutrality hypothesis that fiscal policy has no individual ability to influence stock market behaviour of stock markets without the complementary role of monetary policy. Based on the bounds testing, there was evidence that both macroeconomic policies (fiscal and monetary policies) interacted in the long-run and that this interaction significantly affected stock market liquidity (measured by turnover ratio) in Nigeria. In addition, the long-run estimation showed that government debt which was aimed at cushioning fiscal deficit, monetary policy rate and cash reserve ratio strongly predicted stock market turnover ratio in the long-run. The short-run dynamics indicated that all the independent variables (components of fiscal and monetary policies) had significant effect on stock market liquidity in Nigeria. Based on these findings, the paper concludes that policies that will foster sustainable and effective macroeconomic policies towards improving stock market liquidity (as proxied by turnover ratio) be strictly implemented. This implies that

macroeconomic policies in Nigeria should be well-coordinated by disciplined fiscal and complementary monetary stance.

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