Monetary Policy Rates and Liquidity Decisions of Deposit Money Banks in Nigeria

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Abstract

This study analyses the effect of monetary policy rates on banks' liquidity decisions within the Autoregressive Distributive Lag framework using aggregate time series data. Three monetary policy rates are considered: treasury bills rate, monetary policy rate and cash reserve ratio, while banks' liquidity decision is proxied by liquidity ratio. The sample comprises yearly data from 1981 to 2018. The results show that treasury bills rate, monetary policy rate and cash reserve ratio all jointly have no statistically significant impact on banks' liquidity ratio. However, individually, while both treasury bills rate and monetary policy rate have no significant effect on banks' liquidity ratio, the effect of cash reserve ratio is positive and significant at 5% level. The relationships between monetary policy rates and banks' liquidity ratio have no lagged effects.

Key words: Monetary policy rate, banks' liquidity decision,

Introduction

The conduct of monetary policy has continued to be the main focus of policy makers, researchers and other relevant stakeholders. According to CBN (2012) monetary policy is a deliberate action of the monetary authorities to influence the quantity, cost and availability of money and credit in order to achieve desired macroeconomic objectives of internal and external balances. Monetary policy is conducted through varying money supply and other monetary variables such as interest rate with the aim of managing the amount of money in the economy. The objectives of monetary policy include price stability, employment generation, economic growth and balance of payment equilibrium. Broadly, monetary policy can be classified as expansionary or restrictive, depending on the policy thrust of the government. While expansionary monetary policy increases the money supply, the aim of restrictive monetary policy is to reduce money supply. The choice between expansionary and restrictive monetary policy depends on the policy objective of the monetary authorities. For instance, the monetary authorities would adopt a restrictive monetary policy during rising inflation and when the economy is not in recession. On the other hand, when the economy is in recession and unemployment is high, an expansionary monetary policy would be desired.

In Nigeria, the Central Bank of Nigeria (henceforth CBN) has the statutory mandate and responsibility for the conduct and implementation of monetary policy. The monetary policy is conducted through the Monetary Policy Committee (henceforth MPC). The MPC conducts the monetary policy using variety of policy instruments such as open market operations, monetary policy rate, reserve requirement and exchange rate. However, the policy instrument often used by MPC is the monetary policy rate (CBN, 2011). The CBN does this by changing the target for the overnight interest rate, that is, the rate at which banks and other financial institutions borrow

money from each other. A change in the target rate leads to changes in other interest rates, thereby affecting everyone's spending and borrowing decisions. The target rate is set periodically and reassessed at the subsequent MPC meeting.

Generally, the effectiveness of monetary policy largely depends on its effects on bank behaviour. This is because banks play an important role in the monetary policy transmission mechanism. However, many historical events and episodes, including the 2007 global financial crisis, have raised doubt on the efficacy of monetary policy in this regard (Berger & Bouwman, 2014). According to Morris and Sellon (1995), if bank lending plays a central role in the monetary transmission mechanism, changes in bank lending practices or in the role that banks play in financial markets can alter the transmission mechanism and have important policy implications.

This study examines the effect of monetary policy rates on liquidity decisions of deposit money banks in Nigeria using the ARDL model. This study is distinct in that it considers three monetary policy rates: monetary policy rate, treasury bills rate and cash reserve ratio, and their effects on banks' liquidity using aggregated macro-level data. To the best of our knowledge, this empirical strategy has not been considered previously.

The rest of the study has four sections: The next section contains the review of some recent empirical studies. Section 3 contains the description of data and methods. Section 4 contains empirical analysis and discussion. Section 5 concludes the study.

Theoretical Framework

The systematic risk theory of bank liquidity provision, which is anchored on information asymmetry, contends that liquidity provision of banks exposes them to runs (Diamond & Dybvig, 1983; Santos, 2001). Asymmetric information about banks' assets makes them vulnerable to an additional source of runs, the release of information on the value of those assets, (Jacklin & Bhattacharya, 1988). In order to provide liquidity services, a bank's balance sheet should be such that the value of its liquid deposits is greater than the liquidation value of its assets (Santos, 2001). Under these circumstances, given that depositors' expectations about the value of their deposits depend on their place in line at the time of withdrawal because of the first come, first served rule, a run can occur without the release of adverse information about the bank's assets and even when there is perfect information about the bank's assets. However, when there is asymmetry of information about the banks' assets, as happens when banks provide monitoring services because this requires them to hold a large portion of their assets in the form of illiquid loans, the interbank market will not generally be able to provide depositors with full liquidity insurance. A bank run that is triggered by the release of information indicating poor performance by the bank may be beneficial because it is a source of discipline (Santos, 2001). In contrast, a run triggered by depositors' panic or by the release of information when there is asymmetry of information among depositors about bank returns will not be beneficial. In this case, the run is costly because it forces the premature liquidation of assets, thus disrupting the production process. Furthermore, it may trigger contagion runs, which may culminate in a system failure (Santos, 2001). It is this risk of a system failure that forms the basis of the classical argument proposing mechanisms to insure banks against liquidity shocks despite their interference in the free functioning of markets.

Empirical Review

Kassim, Majid and Yusof (2009) used the structural VAR framework to examine how monetary policy (interest rate) shocks affect the balance sheet items of two banking groups; conventional and Islamic banks, in a dual banking system, focusing on Malaysia. While interest rate is measured by the overnight policy rate of the Bank Negara Malaysia, bank balance sheet items include Islamic bank financing and deposits, and conventional bank loans and deposits. Both consumer price index and industrial production index are incorporated in the VAR model. The VAR model also includes real exchange rate as the control variable since Malaysian economy is largely open to international trade. Their data consist of monthly time series observations on these variables from January 1999 to December 2006. They find that the sensitivity of Islamic banks' balance sheet items to monetary policy shocks is relatively high compared to conventional banks, and that unexpected changes in interest rate have more deleterious effects on Islamic banks than the conventional banks. They attributed their findings to lack of capacity, limited options for the players and poor risk management practices that characterise the Malaysian Islamic banks. Bordeleau and Graham (2010) used a panel two-stage Generalized Method of Moments with time fixed effects to examine how liquid asset holdings affect bank profitability focusing on large U.S. and Canadian banks. They used panel data consisting of 55 US bank holding companies and 10 Canadian banks that are observed quarterly from 1997Q1 to 2009Q4. Their finding indicates a non-linear relationship between liquid assets holding and bank profitability. Holding some assets in liquid form improves bank profitability up to a point after which further holding of liquid assets diminishes bank profitability. However, this relationship between liquid assets holding and profitability differs for different banks according to their business models and general economic conditions.

Sukmana and Kassim (2010) considered how Islamic banks influence the monetary policy transmission mechanism in Malaysia within the structural VAR framework using monthly data from January 1994 to May 2007. They specify a VAR (4) model incorporating industrial production index, Islamic financing, Islamic deposits and Overnight interest rate. Their structural analysis is based on impulse response and variance decomposition. A dummy variable is included in the model to account for the effect of Asian financial crisis, which occurred between June 1997 and May 1998. They find that Islamic banks significant influence the monetary policy transmission process in Malaysia. Specifically, their findings indicate that the effect of monetary policy on the real economy is significantly influenced by both Islamic banks' deposits and financing. Akhtar, Ali and Sadaqat (2011) investigated liquidity risk management in conventional banks versus Islamic banks in Pakistan from 2006 to 2009 using both correlation and regression analyses. A sample of 12 banks (6 Islamic banks and 6 conventional banks) is used. Liquidity risk is measured by cash to total assets ratio, while return on assets, return on equity, capital adequacy ratio, bank size (logarithm of total assets) and networking capital (ratio of short-term claims less short-term debt to net assets) all are used as the explanatory variables. They find similar results for both Islamic and conventional banks, with all the explanatory variables having positive coefficients, except return on equity whose coefficient is negative. However, while the effects of both ROA and ROE are significant at 10% level for Islamic banks, the effects of net working capital and capital adequacy are significant at less than 1% and 10% levels respectively for conventional banks.

Berger and Bouwman (2014) used quarterly data frequency from 1984Q1 to 2008Q4 to examine how monetary policy affects bank liquidity creation in US using two empirical approaches; namely, single equation model and VAR approaches. They identified five crisis periods over the sample period and test whether the effect of monetary policy is different during these periods versus normal periods, and whether the amount of liquidity created can predict an impending crisis. They also examined the effects of monetary policy on banks relative to their sizes. Monetary policy is measured by federal fund rates and monetary policy shocks suggested by Romer and Romer (2004), while Berger and Bouwman's (2009) preferred liquidity creation measure was used. They found that monetary policy affects liquidity creation during no crisis periods only for small banks, and that during financial crises, the effects of monetary policy are weaker for all banks. Also, they found that controlling for other factors, the amount of liquidity created helps to predict impending bank crisis.

Ogunbiyi and Ihejirika (2014) used multiple regression to analyse the effect of interest rates on bank profitability, focusing on deposit money banks. They use annual time series data from 1999 to 2012 for different interest rate variables; lending rate, deposit rate, minimum rediscount rate, treasury bills rate and interbank rates, and different performance indicators; return on equity, return on assets and net interest margin. They find that maximum lending rate, deposit rate and real interest rate all have a negative link with return on assets, and the individual significance of these relationships all are established at 5% level. Also, real exchange rate is found to be negatively related to return on equity, with the effect of the former being significant at 8% level. However, there is no evidence that the relationship between interest rate variables and net interest margin is statistically significant.

Akomolafe, Danladi,Babalola and Abah (2015) employed a static panel data framework to analyse the impact of monetary policy on bank performance in Nigeria using a sample of five selected commercial banks for the period from 2003 to 2013. Their empirical model includes profit before tax as the dependent variable while interest rate and money supply are the explanatory variables. The model also includes capital adequacy and management efficiency (the ratio of interest income to interest expense) as additional regressors. They employ the three conventional methods under the panel data framework; pooled regression, fixed effects and random effects, and compare their estimation results using Hausman specification test. Their results show that while both pooled regression and random effect estimates are largely comparable, the fixed effects method gives the most plausible estimates for the specified model. The fixed effects results show amongst others that the two monetary policy variables have a positive relationship with bank profitability, and their effects are statistically significant at varying levels. While the effect of money supply is significant at less than 1% level, the effect of interest rate is significant almost at 5% level.

Udeh (2015) used the Pearson correlation to investigate the impact of monetary policy instruments on bank profitability in Nigeria between 2005 and 2012 focusing on Zenith Bank. The study finds that the effect on profit before tax of Zenith Bank of cash reserve ratio, liquidity ratio and interest rate is insignificant. On the contrary, he finds that the effect of minimum rediscount rate on the profit before tax of the bank is statistically significant. Khan, Ahmad and Gee (2016) used the two-step panel dynamic GMM method to examine the effect of bank competition on the monetary policy transmission through bank lending channel for five ASEAN countries from 1999 to 2014. They also examine the role of banks' characteristics; size, capitalization and liquidity, on the relationship between monetary policy shocks and banks. Bank competition is proxied by four different measures; the 5-Bank concentration ratio, Hirschman

Herfindahl Index, Lerner Index and Boone Indicator. On the other hand, bank lending is measured by the annual percentage change in banks' loan volume while changes in short-term interest rate to proxy monetary policy. They find that the level of competition has a direct influence on the effect of monetary policy shocks on bank lending decisions. However, Boone Indicator shows that the level of competition has a negative influence on the effect of monetary policy shocks and bank loans. They also find that the effect of bank competition is stronger for highly capitalized, highly liquid and large banks. Mamatzakis and Bermpei (2016) used quarterly US data from 2007Q2 to 2013Q2 to consider the relationship between unconventional monetary policy and bank performance within the panel data framework, and this relationship varies according to the levels of bank assets diversification and deposit funding. They measure bank performance in terms of return on assets, return on equity, net interest margin and pre-tax operating income while unconventional monetary policy is measured by central bank assets and excess reserve. They also control for the effect of Federal deposit insurance coverage by including bank-specific dummy variable. Their empirical model also include as control factors other bank-specific variables; namely, bank size (natural logarithm of total assets), the ratio of equity to total assets, loans to total assets ratio, liquid assets to total assets ratio and Z-score, and both country-level and state-level variables; GDP growth rate, inflation rate, unemployment, non-performing loans and federal fund rate. They find amongst others that bank performance is negatively related to unconventional monetary policy, and this negative relationship is mitigated for banks with high asset diversification and low deposit funding.

Borio, Gambacorta and Hofmann (2017) used bank-level data to investigate the effect of monetary policy on profitability of 109 large international banks that have their headquarters in 14 developed countries for a period of 18 years from 1995 to 2012. The 14 developed countries include Australia, Austria, Belgium, Canada, France,Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, UK and USA. Bank profitability was measured by net interest income, non-interest income, provisions and pre-tax income, all as ratio of total assets, while monetary policy variables include slope of the yield curve, three-month interbank rate and interest margin defined as the difference between the 10-year government bond yield and three-month interbank rate. Monetary policy variables are weighted averages across the jurisdictions where each sampled bank gets funding. These policy variables also entered their empirical model in quadratic form, implying that a non-linear relationship was specified. However, the slope of the yield curve was included to control for the effects of unconventional monetary policy. Further, the authors controlled for the influence of three macroeconomic variables; namely, nominal GDP growth rate, stock market indices and house prices, and six bank-specific variables; namely, bank size (natural logarithm of total assets), bank leverage (equity-to-total assets ratio), bank liquidity (the liquidity-to-total assets ratio), the share of short-term liabilities, cost to income ratio and asset volatility (the standard deviation of the annual percentage change in the market value of a firm's assets). The system GMM method panel framework was used to estimate the specified relationships. They found amongst others that the level of short-term rates is positively related to interest rate structure and return on assets, and that interest rate structure and return on assets are non-linearly related. Dell'Ariccia, Laeven and Suarez (2017) examined the relationships between short-term interest rates, bank leverage and bank risk taking using confidential loan-level data on newly created loans in U.S. loan rating from 1997Q1 to 2011Q4. They find that short-term interest rate and ex-ante risk taking by banks are negatively related and that the effect of interest rate depends on the degree of bank capitalization, with poorly capitalized banks having a less pronounced effect. The differential effects of

interest rates between strongly and weakly capitalized banks is an increase in risk ratings of about one-tenth to one-eight its standard deviation.

Meshack and Nyamute (2017) used the multiple regression frameworks to examine the effect of monetary policy on commercial bank financial performance. Specially, they examine the effects of central bank rate, cash reserve ratio and open market operation on return on assets of all commercial banks listed in the Nairobi stock exchange as at June 2015. They find that the relationship between open market operation and bank performance is weakly positive while central bank rate and cash reserve ratio both have a negative relationship with bank performance. However, the effect of central bank rate is found to be statistically insignificant. Ndubuaku and Ozioma, Chiaka and Samuel (2017) used a simple regression framework to investigate the impact of monetary policy regimes on commercial bank performance in Nigeria, focusing on two policy regimes; SAP and post SAP periods. While commercial bank performance is measured by total assets value, deposit mobilization, credit to private sector, while monetary policy rate is used as the only explanatory variable. Their sample covers from 1986 to 2013. They find that none of the performance indicators is influenced by monetary policy during the SAP period, all of them are influenced by monetary policy during the post SAP regime. Thus, monetary policy regimes have significant impact on commercial bank performance in Nigeria.

Alper, Binici, Demiralp, Kara and Ozlu (2018) examined the relationships between reserve requirements, bank balance sheets and bank lending decisions within a dynamic panel data framework using bank-level monthly data from June 2010 to December 2015. They define liquidity ratio, which is the main study variable of interest, as the ratio of total sovereign debt securities held by commercial banks in their trading portfolio to total liabilities. They identify new gateway way through which monetary policy shocks transmits to real economic variables such as inflation and output. An increase in reserve requirements can walk itself into the real sector through a decline in bank liquidity and loan supply. They show that central bank policies significantly affect both the funding needs and the liquidity decisions of the banking sector. The consequent changes in bank liquidity position, in turn, significantly affect the bank lending decisions. They conclude that to the extent that bank liquidity ratios can be influenced by changes in reserve requirements, liquidity channel provides an alternative transmission mechanism for monetary policy.

Methodology

Data Description

The data used comprises yearly time series from 1981 to 2018. The dependent variables liquidity ratio (LR), while the explanatory variables are monetary policy rate (MPR), treasury bills rate (TBR) and cash reserve ratio (CRR). All data were sourced from the CBN database.

Table 1 presents the summary statistics for the study variables. Figures 1 and 2 show the time series plots for the variables. From Table 1, we can see that over the sampled period, Liquidity Ratio averaged 46.90% ($\sigma = 9.69$), with a maximum of 65.10% and a minimum of 29.10%. This shows that that Nigerian deposit money banks are highly liquid. Also from Table 1, we can see that MPR ($\bar{x} =$

$13.06, \sigma = 4.10$) has the highest mean value but the lowest standard deviation, while CRR ($\bar{x} = 8.66, \sigma = 6.20$) has the lowest mean value but the highest standard deviation. The mean value of TBR is 11.85% while its standard deviation is relatively high at 4.68%. The maximum value of TBR is highest at 26.90%, followed by MPR at 26.00% and then by CRR at 22.50%. On the other hand, MPR has the highest minimum value at 6.00%, followed by TBR at 3.71% and lastly by CRR at 1%. From Figure 1, we can see that there is no observable trend in the data as liquidity ratio fluctuated around its mean value over the sampled period. From Figure 2, we can see that the three monetary policy rates exhibit different patterns for different periods, reflecting the different monetary policy regimes that have been implemented by the CBN over time. Thus, while LTDR appears to follow a stationary trend, MPR, TBR and CRR all appear to follow s stochastic trend.

Table 1: Summary statistics for LTDR and LR (1981 - 2018)

Variable	$\bar{x}$	Max	Min	σ	S	K	JB
LR	46.90	65.10	29.10	9.69	0.22	2.45	0.79 (0.670)
TBR	11.85	26.90	3.71	4.68	0.86	4.33	7.62 (0.022)
MPR	13.06	26.00	6.00	4.10	0.66	4.23	5.23 (0.072)
CRR	8.66	22.50	1.00	6.20	0.92	3.15	5.33 (0.069)

p-values in brackets

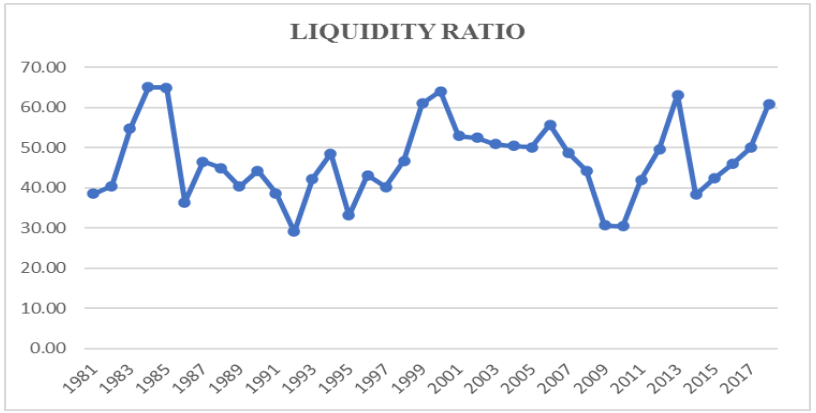

Figure 1: Time series plot for Liquidity Ratio

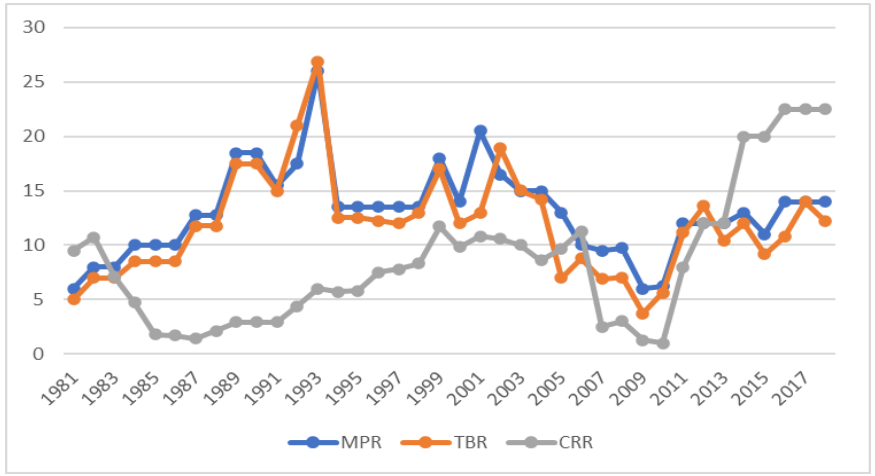

Figure 2: Time series plot for TBR, MPR and CRR

Method and Models

To empirically test the effect of monetary policy rates on banks' liquidity, we employ the autoregressive distributive lag (ARDL) framework. Apart from being a dynamic framework, the ARDL model is widely used because of its unique way of modeling time series variables irrespective of their order of integration. The simple ARDL model for banks' liquidity ratio is given by:

$$LR_t = \beta_0 + \beta_1 LR_{t-1} + \beta_2 TBR_t + \beta_3 TBR_{t-1} + \beta_4 MPR_t + \beta_5 MPR_{t-1} + \beta_6 CRR_t + \beta_7 CRR_{t-1} + e_t \quad (1)$$

Where β_0 is the regression constant, ϵ_t is the classical white noise error term; and β_1 is the autoregressive coefficients that capture the effect of lagged banks' liquidity ratio. Further, β_2 is the contemporaneous coefficient on TBR; β_3 is the lagged coefficient on TBR; β_4 is the contemporaneous coefficient on MPR; β_5 is the lagged coefficient on MPR; β_6 is the contemporaneous coefficient on CRR; β_7 is the lagged coefficient on MPR. However, the optimal lag selection would be based on Akaike information criterion.

Data Analysis and Discussion

Stationarity Tests

Table 2 shows the stationarity tests for LR, TBR, MPR and CRR. As this shows, whereas the data on liquidity ratio, treasury bills rate and monetary policy rate are generated by a stationary process, the data on cash reserve ratio are generated by an integrated process. Thus, the variables have different levels of integration, hence, justifying the use of ARDL model for capturing the relationships between monetary policy rates and banks' liquidity decisions.

Table 2: ADF stationarity test results; p-values are in bracket

Variable	ADF tau statistic and Probability		Conclusion
	Level Data	First Difference Data	
LR	-3.6486** (0.0093)	–	I(0)
TBR	-2.9451** (0.0498)	–	I(0)
MPR	-3.0798** (0.0369)	–	I(0)
CRR	-2.3977*** (0.3743)	-5.3233 (0.0000)	I(1)

**test equation includes constant no trend

*** test equation includes both constant and trend

Estimation Results

Tables 3 and 4 present the ARDL estimation results for the relationship between CBN policy rates and bank liquidity ratio. Optimal lag selection was based on AIC (see Figure 4). From Table 3, like the case of loan to deposit ratio, we can see that $LR(-1)$ ($\beta_1 = 0.3870$, p-value $= 0.0231$) has a positive and significant coefficient, indicating that banks' liquidity ratio move in the same direction with its previous value. The coefficient of 0.3870 shows that a 1% increase in banks' liquidity ratio in the current period would lead to about 0.38% increase in banks' liquidity ratio one period after. This implies that in Nigeria, the previous liquidity decisions of deposit money banks can help predict their liquidity decisions. Also, from Table 3, we can see that while TBR ($\beta_2 = -0.0143$, p-value 0.9496) has a negative coefficient, both MPR ($\beta_3 = 0.0474$, p-value $= 0.8697$) and CRR ($\beta_4 = 0.0867$, p-value $= 0.0351$) have positive coefficients. This indicates that liquidity ratio moves in opposite direction with treasury bills rate but moves in the same direction with both monetary policy rate and cash reserve ratio. The p-values indicate that only the coefficient on CRR is statistically significant at 5% level. The Wald statistic, which tests the joint significance of CBN policy rates, has a p-value of 0.1132, indicating that the test is insignificant even at 10% level. This shows that treasury bills rate, monetary policy rate and cash reserve rate collectively has no significant effect on banks' liquidity ratio.

From Table 4, we can see that the DW statistic (= 2.0333) almost has its ideal value and is much greater than the R^2 (= 0.3130), an indication that our results are not spurious. The $\bar{R}^2$ of 0.2244 shows that the estimated model explains only approximately 22% of the observed variation in banks' liquidity ratio. Thus, our preferred ARDL model is poorly fitted as more than 75% of the liquidity ratio variance are due to unmodelled factors. The F-statistic has a p-value of 0.0173, indicating that the overall regression is significant at 5% level. Further, while the serial correlation LM statistic is associated with a p-value of 0.8217, the Heteroskedasticity white statistic is associated with a p-value of 0.1586. This indicates that both model specification tests are insignificant, hence, our estimated model has no specification bias as there are no serial correlation and heteroskedasticity in its residuals.

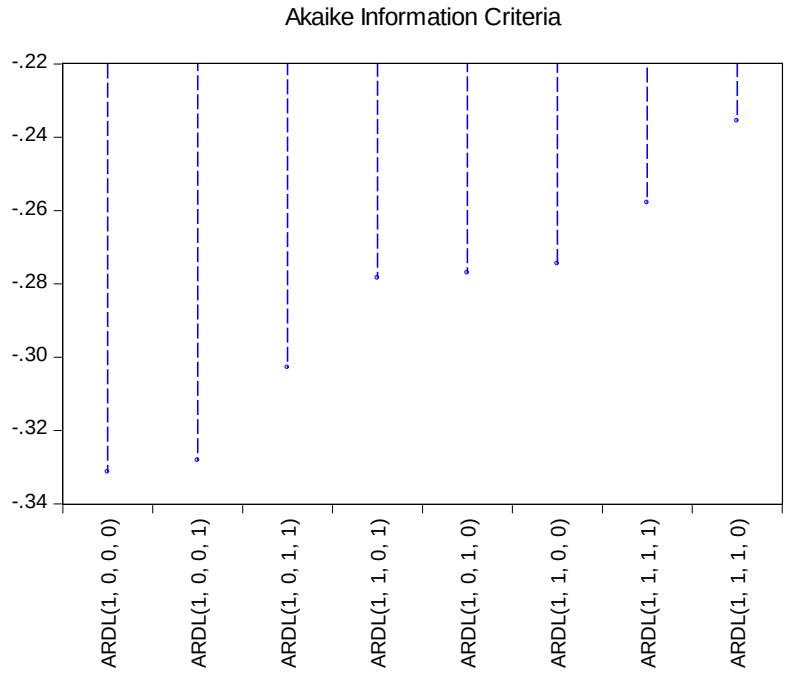

Figure 3: AIC for model selection

Table 3: Estimation Results

Variable	Coefficient	p-value
LR(-1) (β_1)	0.3870	0.0231
TBR (β_2)	-0.0143	0.9496
MPR(β_3)	0.0474	0.8697
CRR (β_4)	0.0867	0.0351
Constant (β_0)	2.1075	0.0027
$Wald$ ($\beta_2 = \beta_3 = \beta_4 = 0$)	5.9676	0.1132

p-values in brackets

Table 4: Goodness of Fit Statistics and Model Specification Tests

Statistic	Value
R^2	0.3130
$\bar{R}^2$	0.2244
F-statistic	3.5319 (0.0173)
Durbin-Watson (DW)	2.0333
BG LM statistic (2)	0.3927 (0.8217)
White statistic (with cross term)	19.169 (0.1586)

p-values in brackets

Discussion of Findings

Our objective is to examine the effect of monetary policy rates on bank liquidity decision. Economic theory suggests a negative relationship between central bank policy rate and bank liquidity. An expansionary monetary policy that leads to a decrease in central bank rates would increase banks' liquidity, which would in turn increase banks' credit supply and leads to economic growth. Further, the systematic risk theory of bank liquidity provision (Diamond & Dybvig, 1983, Santos, 2001) states that due to asymmetric information problem between depositors and banks, the latter must hold adequate liquidity to minimize bank runs. However, holding excess liquidity weakens monetary policy transmission mechanism (Saxegaard, 2009). Based on these theories, we expected that CBN policy rate exerts a highly significant effect on banks' liquidity decisions. Our results show that CBN policy rate has no significant effect on aggregate banks' liquidity ratio. The Wald statistic in Table 3, which tests the joint significance of TBR, MPR and CRR, has a probability of 0.1132, indicating that the joint test is insignificant even at 10% level. This may suggest that bank liquidity plays an insignificant role in the monetary policy transmission. This finding, therefore, contradicts the systematic risk theory of bank liquidity provision as well as the findings of Berger and Bouwman (2014) and Alper, Binici, Demiralp, Kara and Ozlu (2018). Both studies find that monetary policy significantly affect bank's liquidity creation and decisions. On the individual monetary policy rates, our results suggest that banks' liquidity is negatively related to TBR has a negative but positively related to both MPR and CRR. However, only the effect of CRR is statistically significant at 5% level. The coefficient of 0.0867 in Table 3 shows that a restrictive monetary policy that raises the cash reserve ratio by 1% would increase aggregate banks' liquidity ratio by approximately 0.09%. Therefore, while increasing both monetary policy rate and treasury bills rate would not have any significant effect, increasing cash reserve ratio would affect aggregate banks' liquidity decision.

Conclusion

Using aggregate time series data at annual frequency from 1981 to 2018, we find evidence that treasury bills rate, monetary policy rate and cash reserve ratio all jointly have no statistically significant impact on banks' liquidity ratio. However, individually, while both treasury bills rate and monetary policy rate have no significant effect on banks' liquidity ratio, the effect of cash reserve ratio is positive and significant at 5% level. The relationships between monetary policy rates and banks' liquidity ratio have no lagged effects.

Recommendation

Bank management should continue to emphasize compliance with prudential guidelines particularly as it relates to minimum liquidity ratio.

Reference

Akhtar, M. F., Ali, K., & Sadaqat, S. (2011). Liquidity risk management: A comparative study between conventional and Islamic banks of Pakistan. *Interdisciplinary Journal of Research in Business, 1*(1), 35-44.

Akomolafe, K., Danladi, J., Babalola, O., & Abah, A. (2015). Monetary policy and commercial banks' performance in Nigeria. *Public Policy and Administration Research, 5*(9), 158-166.

Alper, K., Binici, M., Demiralp, S., Kara, H., & ÖZLÜ, P. (2018). Reserve requirements, liquidity risk, and bank lending behavior. *Journal of Money, Credit and Banking, 50*(4), 817-827.

Berger, A.N., and Bouwman, C.H. (2009). Bank liquidity creation. *Review of Financial Studies*, 22(9), 3779-3837.

Berger, A. N., & Bouwman, C. H. (2014). *Bank Liquidity Creation, Monetary Policy, and*. and Financial Crises Working Paper.

Berger, A. N., & Bouwman, C. H. (2017). Bank liquidity creation, monetary policy, and financial crises. *Journal of Financial Stability, 30*, 139-155.

Bordeleau, É. Graham, C. (2010): The impact of liquidity on bank profitability. *Bank of Canada Working Paper2010-xx, ISSN*, 1701-9397

Borio, C., Gambacorta, L., & Hofmann, B. (2017). The influence of monetary policy on bank profitability. *International Finance, 20*(1), 48-63.

Central Bank of Nigeria (2011). Understanding monetary policy series (No 3). *Central Bank of Nigeria Monetary Policy Framework.*

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy, 91*(3), 401-419.

Dell'Ariccia, G., Laeven, L., & Suarez, G. A. (2017). Bank leverage and monetary policy's risk-taking channel: Evidence from the united states. *The Journal of Finance, 72*(2), 613-654.

Jacklin, C. J., & Bhattacharya, S. (1988). Distinguishing panics and information-based bank runs: Welfare and policy implications. *Journal of Political Economy, 96*(3), 568-592.

Kassim, S. H., Majid, M. S. A., & Yusof, R. M. (2009). Impact of monetary policy shocks on the conventional and Islamic banks in a dual banking system: Evidence from Malaysia. *Journal of Economic Cooperation and Development*, *30*(1), 41-58.

Mamatzakis, E., & Bermpei, T. (2016). What is the effect of unconventional monetary policy on bank performance? *Journal of International Money and Finance, 67*, 239-263.

Meshack, K. M., & Nyamute, M. W. (2017). The effect of monetary policy on financial performance of the commercial banks listed on the Nairobi securities exchange. *American Journal of Finance, 1*(1), 74-87.

Morris, C. S., & Sellon, G. H. (1995). Bank lending and monetary policy: Evidence on a credit channel. *Federal Reserve Bank of Kansas City Economic Review, 80*(2), 59-75.

Ndubuaku Victor, C., Ozioma, I., Chiaka, N., & Samuel, O. Impact of monetary policy (interest rate) regimes on the performance of the banking sector in Nigeria. *IOSR Journal of Economics and Finance (IOSR-JEF), 8(4, 16-32.*

Ogunbiyi, S. S., & Ihejirika, P. O. (2014). Interest rates and deposit money banks' profitability nexus: The Nigerian experience. *Oman Chapter of Arabian Journal of Business and Management Review, 34*(2350), 1-16.

Romer, C. D., & Romer, D. H. (2004). A new measure of monetary shocks: Derivation and implications. *American Economic Review*, *94*(4), 1055-1084.

Santos, J. A. (2001). Bank capital regulation in contemporary banking theory: A review of the literature. *Financial Markets, Institutions & Instruments, 10*(2), 41-84.

Saxegaard, M. (2009). *Excess Liquidity and Effectiveness of Monetary Policy*. IMF Working Paper, 2006 (5): 3-30.

Sukmana, R., & Kassim, S. H. (2010). Roles of the Islamic banks in the monetary transmission process in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(1), 7-19.

Khan, H. H., Ahmad, R. B., & Gee, C. S. (2016). Bank competition and monetary policy transmission through the bank lending channel: Evidence from ASEAN. *International Review of Economics & Finance, 44*, 19-39.

Udeh, S. N. (2015). Impact of monetary policy instruments on profitability of commercial banks in Nigeria: Zenith bank experience. *Research Journal of Finance and Accounting*, *6*(10), 190-205.