

IMPACT OF DYNAMIC MODEL FOR BANK LIQUIDITY ON PROFITABILITY TRADE OFF

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Abstract

Liquidity provides a buffer to a bank against insolvency but an excess has a tendency to adversely affect profitability chain. In view of this, I employed data on Nigerian banks for an empirical analysis of the evolution of a turning point in profitability distribution and establish a tradeoff in a model. Consistent with empirical evidence, acid test, current ratio and loans to deposits ratio as measures of liquidity have negative effects on net profit margin being a proxy for profitability significant only at 10 percent level. These findings suggest that continuous increase in liquidity does not result in continuous bank-profitability.

Introduction

The persistent failure of financial institutions all over the world brings to bare the need to re-emphasize the role liquidity plays in bank management. Though several reforms have been introduced in many countries to address bank insolvency, a lot is still left unresolved. In Nigeria, an Asset Management Company (AMCON) was established in the year 2010 with the main objective of bailing out some banks. This however brought some sanity into the banking system but solvency issues are still a matter of concern to the supervisory authorities and industry operators alike. In most jurisdictions including Nigeria, the supervisory and regulatory authorities place benchmarks and monitor solvency status of banks.

The Central Bank of Nigeria in conjunction with the country's monetary policy committee consistently declares targets for the management of bank liquidity and solvency concerns. From the introduction of these measures and the effects recorded as applicable to developed and developing economies, liquidity plays a central role in mitigating risk and sustain the health of banks and this is supported by empirical evidence found in Gryglewicz (2011), Jarrand, Sandy and Maxwell (2014), Valentin and Sraer (2020) as well as Fabio, Massimillano and Phillip (2020).

Essentially, banks are required to have some cushion to absorb shocks in the event of crisis or distress so that the effects that would ordinarily lead to loss of depositors' funds could easily be avoided. It

is expected that managers of banks would put in place liquidity targets aimed at achieving corporate goals which revolve around profitability, firm value and solvency. In the same vein, the regulatory authorities always ensure that banks maintain appropriate levels of liquidity in their coffers at any point in time to be able to attend to their cash and related needs. The Central bank of Nigeria declares as a requirement for banks in the country that a minimum of thirty (30) percent of their deposit liabilities should be maintained as liquidity ratio and proper surveillance is conducted from time to time to ensure compliance. On the other hand, liquidity has opportunity costs and this is well documented in both theoretical and empirical finance literature e.g. Banerjee (2009), Berk, DeMarzo and Harford (2013), Smith (1980), Deloof (2001) and Zainudin (2006). This portends that decisions concerning corporate liquidity are as important as investment because there are both real and opportunity cost implications in them.

Furthermore, liquidity management is at two levels viz: industry level and firm level. Industry level liquidity is robustly documented for both developing and developed countries. For instance, Diamond, Yunzhi and Rajan (2020) and Miam, Sufi and Verner (2020) provide evidence that industry liquidity is a key factor in the provision of credit and the maintenance of economic sustainability particularly in emerging markets. Firm level liquidity is not as well documented as industry level. However, the available literature provides mixed evidence in terms of the relationship between liquidity and performance.

For instance, Wang (2002) is among studies that provide results showing that the relationship between liquidity and corporate performance is significant and positive.

There are also a few other studies that tend to disagree with these findings portending that the relationship is negative e.g. Martínez-Sola, García-Teruel, and Martínez-Solano (2013), Owoputi, Olawale and Adeyefa (2014), Sarakiri (2020), Le and Nguyen (2020).

This background indicates that the relationship between liquidity and profitability is still a debate. Kano (2021) adopts the unit discount factor to create a tradeoff for an exchange rate in a two-country trading system within a global currency market. In this study, we will extend the research to determine an appropriate liquidity position a bank must maintain as a trade-off point to achieve desired level of profitability without necessarily compromising the realization of other corporate goals such as solvency and market value of shares.

Nigeria provides a unique opportunity for a study on the relationship between liquidity and bank profitability for a number of reasons. Firstly, much of the banking literature deals with Europe, Japan, the United States and maybe South Africa within the African continent. Two, the country has witnessed remarkable transformation and tremendous reforms in its banking sector added to the dynamics of growth that has been at the front burner in global affairs recently.

Thirdly, banking is one of the fastest growing industries in Nigeria and has become the biggest channel through which resources from social and commercial activities are transmitted to the real economy and beyond. This is a clear pointer to the fact that the banking system is the backbone of the country's economy because its stock market is relatively underdeveloped.

Furthermore, it is imperative to note that the liquidity to assets ratio of the country is rising over the years which are not too healthy for a country that has been involved as an active member of various organizations sub-regionally, regionally and even globally.

This study contributes to the literature by testing the trade-off theory using bank level data in Nigeria. Our target is to calibrate a planning model from the empirical analysis that can be used to estimate net profit margin at given levels of bank liquidity. Interestingly, the dynamic panel data methodology adopted in this study as stipulated by Arellano and Bond (1991) eliminates endogeneity and other biases or restrictions associated with empirical models.

The remainder of this study has the following structure: The next section reviews related literature. Section 3 describes the data, variables and entire empirical framework, while section 4 contains the main analysis and the results supported with some discussion. Section 5 then concludes the study.

Theoretical and Conceptual framework

The trade-off and agency theories, though associated with capital structure explanations have wide applicability in financial economics. The trade-off theory tries to establish a nexus between the benefits of corporate tax induced profit from debt utilization and the cost implications on that which can lead to financial distress. It also explains the relationship between liquidity and bank performance in terms of how excess liquidity could be seen as counterproductive to performance whereas inadequacy is considered unhealthy for growth both at the bank level and the industry level.

The agency cost theory as introduced by Jensen (1986) dwells on the excesses of managers such as control of resources, empire building and the use of discretionary powers which are likely to be compounded by information asymmetries. The theory supports increased leverage which ordinarily imposes financial discipline on them so that such excesses and perks can be curtailed which is in line with the expense theory articulated by Williamson (1963). Within the context of these two theories, optimum liquidity is well defined and it is crucial to the life of the organization as argued by Schwert (2020).

Brealey, Myers and Marcus (2001) support empirical evidence found in Demircuc-Kunt and Huizinga (1999) as well as Demircuc-Kunt and Maksimovic (1998) in providing a definition for net profit margin which is seen as the proportion of a firm's revenue that finds its way to profitability. Mathematically, it is derived by the ratio of net income to turnover. However, banks are peculiar in the way they raise funds for their operations with customer deposits accounting for much of their cash holdings. In view of this, it would be necessary to adjust their net profit margin by writing back interest on debt to net income in order to arrive at a net profit margin that is more reliable as a measure of bank profitability.

On the other hand, liquidity is measured in this study by three variables such as acid test ratio (ATR), current ratio (CR) and loans to deposit ratio (LDR). These measures to a large extent define bank liquidity appropriately within our context and in the succeeding section; attempts shall be made to articulate the link liquidity has with bank performance in the light of previous works in the subject matter.

Review of related studies

Gallinger and Healey (1991) posit that liquidity has implications for the going concern status of the firm and this is supported by Bodie and Merton (2000). In the light of this, it can be argued that liquidity standards are meant to sustain solvency and be able to achieve goals for which such standards are set. Viewing the findings of Zainudin (2006), firm level liquidity has the tendency to be counterproductive with implications for lemon, real and opportunity costs. This provides the basis to re-emphasize the role which managers have to play in meeting requirements and maintain appropriate levels of liquidity to sustain the growth and survival of organizations.

This is crucial for banks in view of their operations particularly in the light of depositors' funds which occupy large part of their balance sheet and the need to maintain enough liquid assets to sustain cash demand.

Miam, Sufi and Verner (2020) studied industry level liquidity and find that bank profitability can affect liquidity through the operating cycle within an economic system. This can stimulate credit expansion and is likely to boost the productive capacity of the real sector and induce bank customers to return sufficient cash to the bank which would enhance the liquidity of banks again. This finding though is rare among studies on firm level liquidity but explains the theoretical principle in the literature that profitability provides a link back to firm liquidity.

However, just as the firm level, industry level liquidity can also be counterproductive because it can lead to recession through glut which calls for caution in the management of the level of liquidity in a system at any point in time. When banks expand their credit supply there

is the tendency for an economy to experience boom through growth in the real sector. This can be realized through two channels i.e. increase in industry capacity and higher household demand for goods and services. This finding is consistent with the hypothesis of the household demand channel that credit supply can boost both the consumption and tradable goods sectors and such expansion can amplify business cycle. This role of credit supply in industry liquidity is well emphasized in emerging markets where the financial systems are yet to be well developed and availability of funds both as startup capital and for business expansion is still an issue.

Gryglewicz (2011) provides new insights relating to the impact of liquidity on the financing operations of the firm showing that changes in solvency affect liquidity and vice versa. The study reveals some stylized facts about liquidity which center on the dynamics of investment, financing and cash with some reasonable degree of costs and flexibility. Based on this, it is suggest-able for banks to develop framework to have dynamic cash policy aimed at maintaining reasonable levels of cash reserves to sustain cash flows in view of their peculiar requirements for liquid assets from their day-to-day operations.

A very recent study by Altavilla, Boucinha, Holton and Ongena (2021) using novel bank survey data and balance sheet information supports these facts with a conclusion that credit supply and demand are both influenced by bank liquidity and resilience. It is noteworthy that the influence is stronger in unconventional times and these findings are derived after controlling for demand for loans, borrower quality and bank strength. Another recent study by Hirtle, Kovner and Plosser (2020) suggest that there is a direct relationship between

the quality of liquidity management and bank performance among banks in the United States.

After controlling for bank size and other characteristics, they find a positive effect on profitability and growth from more effective supervision and then a negative effect running to riskiness of the banks from higher quality in management. These results underscore the special role of managerial efficiency which encompasses effective liquidity management in mitigating risk and stabilize the health of a bank for better performance. These findings agree with the empirical results found in Valentin and Sraer (2020), Jarrand, Sandy and Maxwell (2014) as well as Fabio, Massimillano and Phillip (2020) portending that there is a positive relationship existing between effective liquidity management and bank performance with an indication that liquidity sustains solvency and this leads to better performance of banks.

Schwert (2020) reveals that banks provide better atmosphere for growth of businesses particularly in emerging markets in view of their deep understanding of the economic system and responding to needs of businesses especially in the management of cost of financing. To this end, it is clear that effective pricing of loans is a panacea for enhanced profitability and such loans provide good avenues for firms to boost their liquidity levels. Wei, Jitao and Zhu (2021) introduced the concept of credit default swap (CDS) as a means of managing liquidity crisis and shows that skill in credit default swap strategy significantly correlates with portfolio returns for mutual fund holdings.

In a related development, Goldberg and Nozawa (2021) concluded that liquidity shocks strongly explain variations in asset returns with the use of a cross-sectional and

time series empirical analysis. These studies form a basis to argue that credit risk management is key in managing bank liquidity and by extension being capable of promoting bank profitability. Central to this analysis is that for a bank to perform very well, there must be a proper mechanism for adjusting non-performing loans (NPL) in their balance sheets to be able to show results for sound risk management.

As argued by Amihud and Mendelson (2008), liquidity decisions of a firm are also among the important determinants of its market value. However, it appears that this argument has not been fully established in the literature as there seems to be only few empirical studies focusing on the effect of liquidity decisions on firm value. Even so, a review of such studies shows that there are mixed evidence on the effect of liquidity on firm value. Wang (2002) examines whether liquidity management of a firm has a significant relationship with its operating performance and corporate value for quoted firms in both Tokyo and Taiwan. They find that good liquidity management leads to higher operating performance and firm value which is measured by Tobin Q.

Martínez-Sola, García-Teruel and Martínez-Solano (2013) examined the effect of cash holding on firm value for an unbalanced panel of 472 US industrial firms from 2001 to 2007 using the Arellano and Bond's (1991) panel GMM framework. While firm value is measured by both Tobin Q and market to book value ratio, cash holding is measured by the ratio of cash and cash equivalents to total assets. Variables such as intangible assets to total assets ratio (growth), natural logarithm of gross sales (size) and debt to equity ratio (leverage) are used as control factors. They find amongst others that cash holding has a nonlinear concave relationship with firm value.

Mule, Mukras and Nzioka (2015) used the panel data framework to examine the effect of corporate size on both profitability and market value for 53 quoted companies in Kenya. The sample covers from 2010 to 2014 while the data are observed annually. While firm value and firm size are measured by Tobin Q and logarithm of sales revenue respectively, profitability is measured by both return on assets (ROA) and return on equity (ROE). Further, ownership concentration, financial leverage, firm age, management efficiency and asset tangibility all are modeled as control factors. The results show that while firm size has a negative but not significant effect on firm market value, it has a positive effect of profitability.

Du, Wu and Liang (2016) used the Pearson correlation analysis to examine the relationship between firm liquidity and corporate value for listed companies in China for the 2013 financial year. Firm liquidity is measured by cash ratio while firm value is measured by Tobin Q. Control variables included in the model are profitability (ROE), size (natural logarithm of total assets), growth, leverage and industry concentration. They find amongst others that while firm value is positively related to liquidity, it is negatively related to size.

These relationships are also statistically significant. Sikes and Verrechia (2015) provide new explanation of the cross-sectional variations in dividends tax capitalization which is traced to gaps between statutory dividends and capital gains tax rates. Their empirical results confirm the theory stipulating that such gaps are the product of weak management and the lower the gap the better the results. Furthermore, it is argued that liquidity provides the impetus needed for growth in expected returns and this is induced by the

dividends tax rates through the channel of capital gains as such taxes are recapitalized.

In Nigeria, Owoputi, Olawale and Adeyefa (2014) analyzed the determinants of bank profitability between 1998 and 2012 within the panel data framework using the random effects approach. The panel sample consists of 150 observations involving 10 deposit money banks. While profitability is proxied by ROA, ROE and net interest margin, the explanatory variables fall into three groups: namely, bank-specific (capital adequacy, asset quality, bank size, liquidity, productivity, operating expenses management and deposits), industry-specific (concentration and industry growth), and macroeconomic variables (economic growth, inflation and interest rate). They find that all the bank-specific variables are significant determinants of bank profitability. However, while the coefficients on inflation and interest rate both are significant and have a negative sign, there is no evidence suggesting that real GDP growth as well as industry-specific variables are significant determinants of bank profitability.

Also, in Nigeria, Ozili (2015) investigates the determinants of bank profitability measured by net interest margin and return on assets. The specified profitability models include as explanatory factors four bank-specific variables (capital adequacy ratio, cost to income ratio, asset quality and bank size) and two macroeconomic variables (growth in real GDP and inflation). A BASEL capital regulation regime dummy is also included in the regression models as a control variable.

Based on annual panel data comprising 6 banks and 8-year period from 2006 to 2013, he finds, amongst others, that capital adequacy and asset quality are the main determinants of net interest margin of the sampled banks. However, the results

show no evidence that BASEL capital regime has a significant impact on bank profitability.

The foregoing has shown that there is sufficient empirical evidence that supports the link between liquidity management and corporate profitability justifying measures put in place to ensure relative ease, cost and speed with which assets can be converted into cash and maintain adequate availability of funds consistently under conditions that are likely to vary at all times. Apparently

therefore firms or banks that sustain such level of liquidity are likely to achieve desired corporate goals including but not limited to maximizing shareholders wealth. What then is the appropriate level of liquidity to be maintained by firms is the question and this study as set out, should be able to provide answers.

Methodology Variables and Data

The variables which are selected based on observations from previous studies, are hereby described in a table presented below:

Variables	Proxy	Symbols	Sign
Net Profit Margin		NPM	
Liquidity	Acid test ratio	ATR	-
	Current ratio	CR	+
	Loan to deposit ratio	LDR	-
Credit risk (control)	Non-performing loan ratio	NPL	-
Size (control)	Total Assets	TA	+

Based on the above variables, the data for the study were derived mainly from sources such as the annual reports and fact books of the individual banks downloaded from their official websites covering from

2009 to 2019. The eleven (11) listed Nigerian banks are FBN, POLARIS, UNITY, FIDELITY, FCMB, GTB, ECOBANK, UNION, STERLING, UBA and WEMA. The data analysis is done using EViews 11.

Variables	\bar{x}	Max	Min	σ	S	K	CV
NPM	7.14	10.02	3.32	1.45	0.00	2.32	19.53
ATR	51.27	115.28	26.29	17.15	1.47	5.63	33.14
LDR	64.70	100.39	0.51	16.34	-0.36	4.06	25.29
CR	20.69	36.01	11.05	5.19	0.61	3.14	25.19
NPL	8.11	74.01	1.19	10.29	3.96	21.05	127.49
TA	1942.15	7147.03	150.93	1586.50	1.31	3.93	81.71

Table 2 shows the descriptive statistics for the variables. As this Table clearly shows, net margin has a mean value of 7.14% with a standard deviation of 1.45%, suggesting that banks recorded high net margins are also associated with high volatility. The large cross-sectional variance in net margin is also evident in the large difference between the minimum and

maximum values ($10.02 - 3.32 = 6.7\%$). Further, the Table shows that two bank-specific variables recorded high cross-sectional variability with their coefficient of variation (CV) being highest and they are non-performing loan ratio (NPL) and total assets (TA).

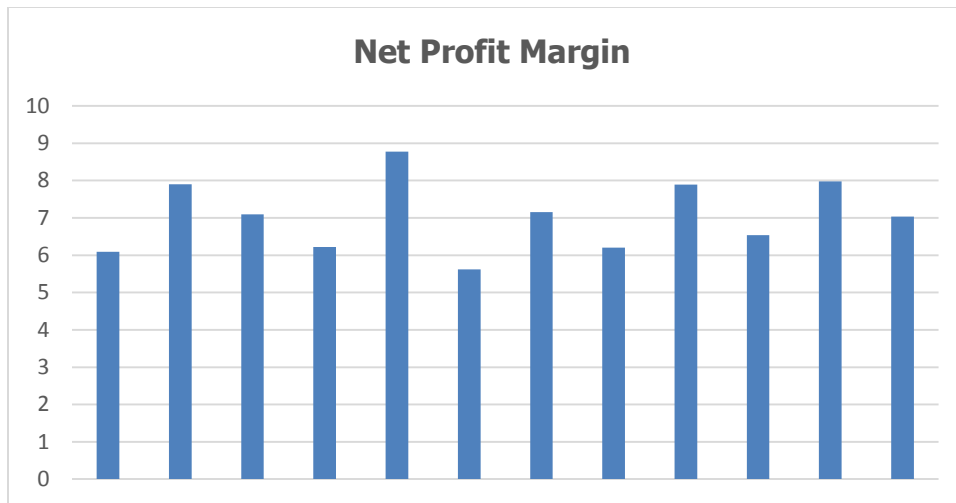


Figure 1: Mean of Net Profit Margin

Figure 1 above shows the average net profit margin of the selected banks over the study period. We can see that the net profit margin varies considerably across banks, with bank e represented by the 5th bar being the highest in mean value, while bank k recording second highest mean, then followed by i and b in that order. On other hand, we have f being the lowest in mean value, followed by a, h and d respectively.

Models

We specify the econometric model in respect of liquidity and profitability relationship for banks in Nigeria as follows:

$$NPM_{it} = \beta_0 + \beta_1 X_{it} + \gamma_i + \epsilon_{it}$$

(1)

For $i = 1, 2, \dots, 11$ represents the number of banks in our sample, $t = 1, 2, \dots, 11$ representing the number of years. The constant term, λ_0 represents the average estimate of net profit margin being the dependent variable as proxy for profitability when all other right-hand side variables are zero, while the error term, ϵ_{it} represents the regression residuals. Further, X_{it} contains bank liquidity variables such as the acid test, current ratio and the loan to deposit measure as well as the control

variables of non-performing loans rate and size designated by natural logarithm of total assets.

The unobserved bank liquidity variables represented by γ_i is expected to vary only cross-sectionally, hence, there is no time index attached to it. We expect the fixed effects assumptions to hold so that the unobserved cross-sectional differences would not only help to explain the observed cross-sectional variation in net profit margin but would also correlate with the observed bank liquidity factors that are likely to affect it. This modeling approach is consistent with Udom, Agboegbulem, Atoi, Adeleke, Abraham, Onumonu and Abubakar (2016).

Although, the fixed effects method is employed as our main empirical framework, the above models are static in nature and impose two restrictive assumptions: (1) profit is not persistent and (2) the relationship between net profit margin and the liquidity variables has only one-way causal structure. However, it may be the case that net profit margin can be influenced by its own previous trend and failing to capture this possibility would induce endogeneity bias in the model. To control this possible specification bias, we consider

the dynamic panel data method based on the Arellano-Bond first difference GMM framework. The model for this framework is given as follows:

$$\Delta NPM_{it} = \psi_1 \Delta NPM_{it-1} + \psi_2 \Delta X_{it} + \Delta e_{it}$$

Where

ψ_1 And ϕ_1 are dynamic coefficients which capture the degree of persistence in net profit margin. Although, the Arellano-Bond approach explicitly controls the heterogeneity bias through first difference operation, it however requires valid instruments to overcome the endogeneity bias induced by the lagged dependent variable. Consistent with previous studies, for example Altunbas, Binici and Gambacorta (2017), our selection of instruments is consistent with Blundell and Bond (1998) who argue that while endogenous explanatory variables (in first difference form) are instrumented by their lag levels, exogenous variables (also in first difference

form) are their own instruments. The validity of our instruments would be tested using the Sargan test. However, the consistency of the GMM model also depends on the strength of the assumption that its residuals do not contain second-order serial correlation. We employ the Arellano-Bond residual-based test to address this problem.

Empirical Results

We impose an assumption of no dynamic effects and estimate a static fixed effects model without the persistence term or lagged net profit margin. The approach does not consider the possible feedback effect between net profit margin and bank-level variables. The fixed effects results are presented in Table 3 showing a model with acid test measure, current ratios and the loans to deposit ratios of the banks as variables regressing net profit margin using credit risk and size of the banks as control variables.

Table 3: Static Fixed Effects Results; parenthesis contains standard errors

* Significance at 10% level; ** Significance at 5% level

Explanatory Variables	Coefficients
CONSTANT	7.2611** (3.1352)
ATR	-0.0139* (0.0078)
LDR	-0.0141* (0.0082)
CR	-0.0271 (0.0332)
NPL	-0.0072 (0.0176)
LTA	0.2957 (0.2991)
R^2	0.6783
\bar{R}^2	0.6011
F-ratio	8.5786***
DW	1.8655

The results show that acid test (AT) ratio has significant relationship with net profit margin. The AT coefficient has a

negative sign in the model, indicating that higher liquidity leads to lower profitability. Therefore, liquidity is a significant

determinant of banks' net profit margin in Nigeria. This negative effect is unsurprising as it may not be unconnected to the high liquidity ratio which the individual banks have consistently maintained over time. As reported earlier in Table 2, the average liquidity ratio of these banks stood at 51.3% which is far above the 30% regulatory standard, hence its adverse effect on profitability. This finding is consistent with the liquidity-profitability trade-off theory of finance as well as several previous studies including Owoputi, Olawale and Adeyefa (2014).

The results also show that current ratio (CR) has a negative relationship with net profit margin (NPM). This negative coefficient indicates that a higher current ratio is associated with lower net profit margin. However, as indicated by the p-values (asterisks), the effect of CR on NPM is statistically insignificant. Hence, current ratio is not a significant determinant of banks' net profit margin in Nigeria. This result contradicts several previous studies including Ozili (2015), Owoputi, Olawale and Adeyefa (2014), Wani, Haque and Raina (2019), and Mesfin and Ram (2019).

Like the acid test indicator, loan to deposit ratio (LDR) has a significant effect net profit margin. The LDR coefficient has a negative sign, indicating that higher loans relative to deposit leads to lower net profit margin. This finding confirms the trade-off theory between liquidity and profitability. Hence, extending more loans without the corresponding increase in customer deposit has a deleterious effect on bank profitability.

The results show a negative relationship between non-performing loan ratio and net profit margin. The coefficient on NPL has the expected negative sign in the

profitability model, implying that low credit risk is associated with high bank profitability. However, like current ratio, the effect of NPL on NPM is not statistically significant. Therefore, credit risk is not a significant determinant of banks' net profit margin in Nigeria. Although, this finding disagrees with previous Nigerian studies (Owoputi, Olawale and Adeyefa (2014) and Udom, Agboegbulem, Atoi, Adeleke, Abraham, Onumonu and Abubakar (2016)), it clearly reflects the intervening role of AMCON in reducing the burden of high non-performing loans in the banking sector and its negative consequences.

Furthermore, the results show that the relationship between bank size and net profit margin is positive but not significant. Although, the coefficient on LTA is relatively sizable, it is not statistically significant even at 10% level. In contrast with previous findings such as Owoputi, Olawale and Adeyefa (2014), and Ozili (2015), this finding implies that size is not among the significant determinants of banks' net profit margin. Hence, the size of a bank does not matter for its profitability in Nigeria.

Dynamic GMM Estimation Results (Robustness Analysis)

For robustness check, we relax the assumption of static relationship and estimate the dynamic GMM model using the Arellano-Bond first difference approach. As stated previously, this approach not only incorporates persistence parameter in the net profit margin model, but it also controls both the heterogeneity in panel data caused by differences across banks, and endogeneity bias induced by the lagged dependent variable. The results are shown in Table-4

Table 4: Dynamic GMM results; parenthesis contains standard errors

Explanatory Variables	Coefficients
NPM(-1)	0.2103 (0.4101)
ATR	-0.0831 (0.1460)
CR	0.2633 (0.6071)
LDR	-0.0493 (0.0941)
Control Variables :	
NPL	-0.0797 (0.1826)
LTA	-0.3930 (2.6332)

Source: EViews Output and based on research data.

Diagnostic test:

Instrument Rank	9
P-value (J-statistic)	0.6048
P-value AR (2)	0.7696

Source: E-Views Output.

First, the two model diagnostic tests suggest that our GMM models have no specification problems. The J-statistic (Sargan test) is not significant, showing that all the selected instruments are valid. The Arellano-Bond residual test is also not significant, showing that second-order autocorrelation is not contained in the residual series. Therefore, the reported panel GMM results are consistent as expected.

The coefficient on the lagged dependent variable is not significant, although, as expected, it has a positive sign. This indicates that net profit margin does not depend on its previous value, hence its data are not generated by a persistence process. In other words, bank net profit is not persistent in Nigeria. This result contradicts the findings of Hanzlik (2018) and Angori, Aristei and Gallo (2019).

Also, most of the explanatory variables have signs that are consistent with

those of the fixed effects in Table 3, although, none of them is statistically significant. The variables whose coefficients retain their initial signs are acid test ratio and loan to deposit ratio. The consistency of these signs confirms that our static fixed effects results are robust. Therefore, the relationship between net profit margin and liquidity variables has no dynamic effect.

Summary and Conclusion

This study examines the relationship between bank liquidity and profitability in Nigeria using static and dynamic models under the GMM framework. The data used comprise a panel of 11 listed banks covering the period 2009 to 2019. The results show that acid test ratio, current ratio and loans to deposit measure as indicators of bank liquidity have negative effect on profitability with acid test and loans to deposit ratios showing statistical significance though at ten percent level. These results are derived after controlling the influence both credit risk and

bank size have on the relationship. However, the empirical analysis also shows that the effects are not dynamic or influenced by persistence factors suggesting that profits recorded in previous years do not influence current outcomes.

Our study suffers some limitations and research in the future should consider the use of alternative variables. Furthermore, the study only examines one country within a limited period, implying that there is need to investigate this link in other emerging markets whose banking structure would have analogous circumstances with Nigeria as well as cover an extended period so that robust checks can be conducted.

References

- Angori, G., Aristei, D. & Gallo, M. (2019). Determinants of banks' net interest margin: Evidence from the euro area during the crisis and post-crisis period. *Sustainability*, 11(14), 3785.
- Boucinha, M., Holton, S., Altavilla, C. & Ongena, S. (2021). Credit supply and demand in unconventional times, *Journal of money, credit and banking* 53(1), 271-293.
- Arellano, M. & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of economic studies*, 58(2), 277-297.
- Banejee, B. (2009). *Fundamentals of financial management*, PHI learning, New Delhi.
- Berk, J. DeMarzo, P. & Harford, J. (2013). *Fundamentals of corporate finance*, Pearson, England.
- Deloof, M. (2001). Belgian intragroup relations and the determinants of corporate liquid reserves, *European financial management*, 7(3), 375-392.
- Demirguc-Kunt, A. & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence, *World bank economic review*, 13: 379-408.
- Demirguc-Kunt, A. & Maksimovic, V. (1998). Law, finance and firm growth, *Journal of finance*, 53(6), 2107-2137.
- Diamond, D.W., Yunzhi, H., & Rajan, R.G. (2020). Pledgeability, industry liquidity and financing cycles, *Journal of finance*, 75(1), 419-461.
- Goldeberg, J. & Nozawa, Y. (2021). Liquidity supply in the bond market, *Journal of finance*, 76(2). 755-796.
- Gryglewicz, S. (2011). A theory of corporate financial decisions with liquidity and solvency concerns, *Journal of financial economics*, 99(2011), 365-385.
- Hanzlík, P. (2018). *Key determinants of net interest margin of banks in the EU and the US* (Unpublished master's thesis). Charles University.
- Hirtle, B. Kovner, A. & Plosser, M. (2020). The impact of supervision on bank performance, *Journal of finance*, 75(5), 2765-2808.
- Jensen, M. (1986) Agency costs of free cash flow, corporate finance and takeovers, *American Economic Review*, 76, 323-329.
- Le, Tu D. Q. & Ngo, T. (2020). The determinants of bank profitability: A cross-country analysis. *Central Bank Review* 20: 65-73.

- Martínez-Sola, C., García-Teruel, P. J., & Martínez-Solano, P. (2013). Corporate cash Holding and firm value. *Journal of Applied Economics*, 45(2), 161-170.
- Miam, A., Sufi, A. & Verner, E.(2020). How does credit supply affect the real economy? The productive capacity and the household demand channel, *Journal of finance*, 75(2),949-994.
- Mesfin, E. A., & Ram, B. (2019). Determinants of net interest margin in selected commercial banks in Ethiopia. *IJSRR*, 8(1), 1646-1655.
- Owoputi, J. A., Olawale, F. K., & Adeyefa, F. A. (2014). Bank specific, industry specific and macroeconomic determinants of bank profitability in Nigeria. *European scientific journal*, 10(25).
- Ozili, P. K. (2015). Determinants of bank profitability and BASEL capital regulation: Empirical evidence from Nigeria. *Research Journal of Finance and Accounting*, 6(2), 124-131.
- Kano T (2021). Exchange rates and fundamentals: A general equilibrium exploration, *Journal of money, credit and banking*, 53(1), 95-117.
- Sarakiri, J.A. (2020). Liquidity, size and firm value: Evidence from Nigerian economy, *World Journal of finance and investment*, 5(1), 12-20
- Sikes, S.A. & Verrechia, R.E. (2015). Dividend tax capitalization and liquidity, *Review of accounting studies*, 20(4), 1334-1372.
- Smith, K.V. (1980). Profitability versus liquidity tradeoffs in working capital management, *Readings on working capital* St Paul MN: West Publishing Company, 549-562.
- Udom, I. S.,Agboegbulem, N. T.,Atoi, N. V., Adeleke, A. O., Abraham, O., Onumonu, O. G., & Abubakar, M. (2016). Modelling banks' interest margins in Nigeria. *CBN Journal of Applied Statistics*, 7(1), 23-48.
- Wang, Y.J. (2002). Liquidity management, operating performance and corporate value: evidence from Japan and Taiwan, *Journal of Multinational Financial Management* 12,159-179.
- Wani, A. A.,Haque, S. I., & Raina, S. H. (2019). Impact of macroeconomic and bank-specific indicators on net interest margin: An empirical analysis. In *Understanding the Role of Business Analytics* (pp. 45-64). Springer, Singapore.
- Wei, J., Jitao, O. & Zhongyan, Z. (2021). Mutual fund holdings of credit default swaps: Liquidity, yield and risk, *Journal of finance*, 76(2), 537-586.
- Zainudin, N. (2006). Liquidity – Profitability trade-off: Is it evident among Malaysian firms and SMEs? *International journal of management science*, 13(2), 107-118.

