

Determinants of Bank Liquidity and Its Impact on Bank Profitability in Ethiopia

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The objective of the study is to explore determinants of bank liquidity and its impact on bank profitability in Ethiopia by using two-stage least square (2SLS) balanced panel estimation method from 2014-2019. The two dependent variables to be considered under 2SLS balanced panel estimation methods were liquidity risk and bank profitability. The first equation i.e. liquidity risk specified as a function of major explanatory variable i.e. bank profitability, real GDP growth, net loan growth, and foreign exchange availability. Whereas, the second equation i.e. bank profitability specified as a function of bank liquidity, non-interest income, non-interest expense and expectation. The empirical result of the first equation of the study reveals that bank profitability, foreign exchange availability, and real GDP growth have positive significant impact on bank liquidity while net loan and advance has a negative significant impact on bank liquidity. The empirical result of the second equation depicts that bank liquidity has positive effect on bank profitability even if it is insignificant but total non-interest income and expectation have a positive significant effect on bank profitability. Since the paper has also tested some diagnostic check, the result shows that the model has passed the diagnostic test.

Keywords: bank profitability, bank liquidity, two-stage least square method, balanced panel estimation

Introduction

The banking sector is always deemed to be one of the most vital sectors for the economy to be able to function. Banks in developing countries play an effective role in their economic development. The majorities of people in such countries are poor, unemployed, and engaged in traditional agriculture. There is acute shortage of capital. People lack initiative and enterprise. Means of transport are undeveloped. Industry is depressed. The commercial banks help in overcoming these obstacles and promoting economic development. Thus banks in developing country help in mobilizing saving for Capital Formation to provide short-term, medium-term, and long-term loans to industry, in financing both internal and external trade, financing consumer activities and help in successes of monetary policy.

Even if the banks have the above function, according to Jenkinson (2008) banks expose to a large number of risks which include liquidity risk, credit risk, foreign exchange risk, market risk, interest rate risk among others. Among these deferent bank risks, this paper tried to look the determinants of liquidity risk and its impact on bank profitability. Bank liquidity risk is the risk that a bank may be unable to meet short term financial demands. The primary purpose of bank liquidity is to meet all relevant regulatory requirements.

According to Mishkin and Eakins (2009), managers of banks have to make sure that the bank has enough ready cash to pay its depositors when there are deposit outflows—that is when deposits are lost because depositors make withdrawals and demand payment. Moreover the Basel Committee on Banking Supervision (2008) defined liquidity as the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses.

Thus effective liquidity risk management helps to reduce the frequency and severity of banks' liquidity problems, in order to lower their potential negative impact on the financial system and broader economy and to protect deposit holders. In addition to avoid a downgrade from the responsible agencies to a level below the bank's target rating, effective liquidity risk management is needed.

Statement of the Problem

The notion of bank liquidity has received substantial attention from both researchers and popular academics. Various studies have been carried out to investigate the bank liquidity and its determinants. Keynes (1936) has presented Liquidity Preference Theory and recognized three reasons on why people demand and prefer liquidity. The transaction motive of holding cash means daily transactions of the company to keep the business wheel turning. The precautionary motive reflects that a company must also keep liquidity for meeting unforeseen or unexpected cash out flows. Speculative reason refers to that business units prefer liquidity to take advantage of special investment opportunities which will result in increasing the profit of banks.

In literature, there are different findings about the relationship between liquidity and banks profitability, for instance Said and Tumin (2011) and Bourke (1989) consider liquidity risk as an important internal determinant of bank profitability among other firm specific variables such as credit risk, capital adequacy, expenses management, business diversification, bank size, etc., together with industry and macroeconomic variables, while Molyneux and Thornton (1992) found that there is weak relationship between the liquidity level and bank profitability.

So issues about the relationship between bank liquidity and profitability have roots in the existing literature and also it is debatable either negative or positive relationships between them, thus it needs further research and exploration especially in Ethiopian case. Furthermore, almost all studies have done on separate study which is either determinants of liquidity or determinants of profitability. Therefore, to fill this gap the study has tried to do determinants of bank liquidity risk and its impact on bank profitability in single study using two-stage least square (2SLS) estimation procedure.

Objectives of the Study

The broad objective of the study is assessing the determinants of liquidity and its impact on bank profitability in Ethiopia. Specifically, the objectives are: to empirically test the determinants of bank liquidity, to empirically test the impact of bank liquidity on profitability, and to draw up the conclusion and recommendation based on the result of finding.

Literature Review

Theoretical Review

Liquidity means the capacity to produce cash on demand at a reasonable cost. A bank is considered to be liquid if it has ready access to immediately spendable funds to reasonable cost at precisely the time those funds are needed. No doubt, the most liquid asset is cash in the vaults of a bank. It is necessary for a banker to keep a

certain percentage of the deposits in the form of liquid cash as reserve, either in his own vaults with central bank. But such liquid cash does not earn anything and remains idle. So the banker should invest his excess money in some assets which are liquid in a nature and any consider liquidity ahead of profitability if there is any question of choice.

There are three different liquidity theories which are self-liquidating or real bills doctrine, shift ability theory, and anticipated income theory. According to self-liquidating or real bills doctrine, self-liquidating (real bills doctrine) theory is a traditional and conservative banking theory. The main theme of this theory is that the earning asset of a bank should be limited to short-term self-liquidating productive loans that include self-liquidating commercial paper or short term loan intended to provide the current working capital, which in itself is of a self-liquidating nature. The advantage of the “self-liquidating theory” of commercial bank asset is mainly derived from the fact that such loans are considered to liquidate themselves automatically out of the sale of goods covered by such a transaction.

The second liquidity theory is shift ability theory; the main theme of this theory is that bank must arrange portfolio in such a way that it can have desired liquidity. While according to anticipated income theory which is the last liquidity theory, liquidity increases though maintaining cash and near cash assets even, but it forgoes income opportunity. Thus from the above theoretical literature of liquidity the paper draws that banks having good assets quality and sufficient portfolio investment have important role in keeping their optimal liquidity.

Empirical Review

Previous studies have reported many factors that determine liquidity of banks. A number of studies found liquidity of the banks is determined by macroeconomic variables and bank specific factors. Here the study tried to review some literature that conducted previously on determinants of bank liquidity:

Pavla (2013) investigated determinants of bank liquidity in Hungary. Therefore the paper was aimed to identify determinants of liquidity of Hungarian commercial banks using panel data regression during 2001 to 2010. The paper found that bank liquidity is positively related to capital adequacy of banks, interest rate on loans, and bank profitability and negatively related to the size of the bank, interest margin, monetary policy interest rate, and interest rate on interbank transaction. In addition the result showed that the relation between the growth rate of gross domestic product and bank liquidity is ambiguous.

Leonard (2009) examined the determinants of liquidity risk for commercial banks in Kenya between 2010 and 2014. Multiple regression analysis was used to evaluate the determinants of liquidity risk. Capital adequacy ratio, liquid assets ratio, ownership type, size, and leverage were regressed on loan to deposit ratio. The result of regression indicated that capital adequacy had positive effect on liquidity risk while liquid asset ratio, ownership type, size, and leverage had negative effect. The study concluded that capital adequacy ratio, liquid asset ratio, ownership type, size, and leverage were significant determinants of liquidity risk. Moreover, the study recommended that bank managers can effectively manage liquidity risk by collectively focusing on capital adequacy, liquid asset ratio, ownership type, size, and leverage.

In their study of determinants of liquidity among government owned nationalized banks of India within the period 1996 to 2012, Shyam, Anura, and Wissuttorn (2013) OLS regression shows that the most significant factors influencing liquidity in nationalized banks of India are: call rate, cash reserve ratio and statutory liquidity ratio, gross domestic products, among the macroeconomic factors and capital to total assets and log of total assets for bank specific factors.

Form IMF working series, Corinne, Camila, Priscilla, and Svetlana (2012) employed determinants of banks' liquidity buffers in Central America. Using a panel of about 100 commercial banks from the region, they found that the demand for precautionary liquidity buffers is associated with measures of bank size, profitability, capitalization, and financial development. Deposit dollarization is also associated with higher liquidity, reinforcing the monetary policy and market development challenges in highly dollarized economies. Improvements in supervision and measures to promote dollarization, including developing local currency capital markets, would help enhance financial systems' efficiency and promote intermediation in the region.

Pavla (2010) aimed to identify on determinants of commercial banks' liquidity in the Czech Republic. The paper considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis. The paper found that bank liquidity is positively related to capital adequacy, interest rates on loans, share of non-performing loans, and interest rate on interbank transaction and negatively related to inflation rate, business cycle, and financial crisis. But the paper found that the influence of banks size is ambiguous.

Nigist and Dr. Laximikantham (2015) applied balanced panel fixed effect regression model to analyses determinants of banks liquidity commercial banks in Ethiopia using bank specific factors. The data covered the period from 2007-2013 for the sample of 10 commercial banks in Ethiopia and used secondary data. The result of the study revealed that capital adequacy and profitability have statistically significant impacts on liquidity of Ethiopian commercial banks while bank size has positive and statistically significant impact on liquidity. Nonperforming loan and loan growth were found to be statistically insignificant/have no any impact on liquidity of Ethiopian commercial banks for the tested period.

In addition Alemayehu (2016) also examined determinants of liquidity of commercial banks of Ethiopia by considering bank specific factors and macroeconomic factors. The bank specific factors include bank size, capital adequacy, profitability, non-performing loans, and loan growth while the macroeconomic factors include Gross Domestic Product, general inflation and national bank bill. The panel data were used for the sample of eight commercial banks in Ethiopia from 2002 to 2013 year and estimated using Fixed Effect Model (FEM). The findings of the study show that capital strength and profitability had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth and national bank bill had a negative and statistically significant relationship with banks' liquidity. However, the relationship for inflation, non-performing loans, bank size, and Gross Domestic Product were found to be statistically insignificant. The study recommended that banks must have increased their outreach to tens of millions of people by opening up more and more branches every year through country, and have significantly improved their banking service by introducing new product and services like agent banking, mobile banking and internet banking through the application of modern technology. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the government regulation and the macroeconomic environment together in developing strategies to improve the liquidity position of the banks.

Methodology

Determinants of Bank Liquidity

This research considered the following bank specific variables and macroeconomic variables to examine the determinants of bank liquidity.

Table 1

Explanation of Dependent and Independent Variables along with Their Proxies

Variable	Symbol	Equation
Liquidity of bank	L	$L = \frac{\text{Liquid Assets}}{\text{Net Current Deposit}}$
Bank profitability	ROA	$ROA = \frac{\text{Net Profit}}{\text{Total Assets}}$
Capital adequacy of banks	CA	$CA = \frac{\text{Bank Equity}}{\text{Total Assets}}$
Size of banks	BS	Natural logarithm of bank total assets
Net loan and advance of banks	LG	Natural logarithm of net total loans and advance of the bank
Non-performing loan	NPLR	$NPLR = \frac{\text{NPL}}{\text{Total loan and advance}}$
Growth rate of real Gross Domestic Product	GRGDP	The percentage changes in all finished goods and services produced within a country's borders
Real foreign exchange availability	RFEA	The competitiveness of the commodity in the international market

Impact of Bank Liquidity on Bank Profitability

This research considered the following specific variables to estimate the impact of bank liquidity on bank profitability.

Table 2

Explanation of Dependent and Independent Variables along with Their Proxies

Variable	Symbol	Equation
Bank profitability	ROA	$ROA = \frac{\text{Net Profit}}{\text{Total Assets}}$
Liquidity of banks	L	$L = \frac{\text{Liquid Assets}}{\text{Net Current Deposit}}$
Ratio of non-interest expense to total assets	RNIE	$RNIE = \frac{\text{Fixed Operating Cost}}{\text{Total Assets}}$
Ratio of non-interest income to total assets	RNII	$RNII = \frac{\text{Non - Interest Income}}{\text{Total Assets}}$

Model Specification

The models specified to examine determinants of bank liquidity and their impacts on bank profitability were bank liquidity model and bank profitability model.

Therefore, to analyze the determinants of bank liquidity model specified as:

$$LNL_{ti} = f(LNROA_{ti}, GRGDP_t, LNRFEA_t, LNLOAN_{ti})$$

$$LNL_{ti} = \beta_1 + \beta_2 ROA_{ti} + \beta_3 GRGDP_t + \beta_4 LNLOAN_{ti} + \beta_5 LNRFEA_t + \varepsilon_1 \quad (1)$$

where t indicates the time period and i indicates the cross-section unit.

The model to specify the impact of bank liquidity on profitability was:

$$ROA_{ti} = f(LNL_{ti}, LNRNIIN_{ti}, LNRNIE_{ti}, lagLNROA_{ti})$$

$$LNROA_{ti} = \beta_6 + \beta_7 LNL_{ti} + \beta_8 LNRNIIN_{ti} + \beta_9 LNRNIE_{ti} + \beta_{10} lagLNROA_{ti} + \varepsilon_2 \quad (2)$$

where t indicates the time period and i indicates the cross-section unit.

Look at now the equations.

If ε_1 increases in a particular time period, L will also increase.

If L increases, ROA will also increase because of the Equation (2).

If ROA increases in the Equation (2), L also increases in the Equation (1) where it is an explanatory variable.

The above explanation depicts that the system is simultaneous equations systems and there is endogeneity problem in the system because the dependent variable's error terms are correlated with the independent variables. Therefore OLS estimators of the model parameters are invalid (inconsistent) under the existence of endogenous explanatory variables.

Thus this paper applied 2SLS estimation method which is similar to Samuel (2013) method of estimation which was done on Ghanaian banks. It is a consistent estimator of the model parameters in the presence of endogenous explanatory variables.

Panel Unit Root Test

Testing for unit root in panel data is now common practice among empirical researcher after Levin and Lin (1993) established the foundation for panel unit root tests. Recently different literature has proposed a number of tests for unit roots in panel data. Among those, Levin, Lin, and Chu test (LLC) and Im-Pesaran-Shin (IPS) panel unit root test are the most common one. For this study, the paper has chosen LLC because it depends upon the independence assumption across cross section. In addition LLC is restrictive in the sense it requires $P(\text{coefficient } \gamma_{it-1})$ to be homogenous across i. LLC begins by specifying a separate ADF regression for each cross-section as follows:

$$\Delta y_{it} = \rho_i y_{it-1} + \sum_{L=1}^{\rho_i} \theta_{iL} \Delta y_{it-1} + \alpha_i d_{it} + \varepsilon_{it}$$

where d_{it} is a deterministic component and $\rho_i = 0$ means the y process has a unit root for individual i, while $\rho_i < 0$ means that the processes is stationary around the deterministic parts.

When testing the unit root test if all variables are stationary at level, then the paper estimates the model by two-stage least square estimation method while the variables are non-stationary, before estimating the model co-integration test is mandatory.

Two-Stage Least Square Estimation Method

The study employed panel applied 2SLS estimation method which is similar to Samuel (2013) because the dependent variable's error terms are correlated with the independent variables. Therefore OLS estimators of the model parameters are invalid (inconsistent) under the existence of endogenous explanatory variables. It is a consistent estimator of the model parameters in the presence of endogenous explanatory variables.

Result and Discussion

Unit Root Test

The Levin, Lin, and Chu test of unit roots is used to determine the order of integration of the variables. Table 3 reports the LLC test for the variable at level of the variable in logarithmic form under the assumption of with trend and intercept.

Table 3

Levin, Lin, and Chu Test (LLC) Unit Root Test

Variables	At level	
	With trend and intercept	Prob.
LNFEA	-2.461	0.0069
LNL	-5.839	0.0000
LNLOAN	-8.729	0.0000
LNRNIE	-7.327	0.0000
LNRNIN	-6.408	0.0000
LNROA	-4.899	0.0000
RGDPG	-7.072	0.0000

Source: Author's estimation using EViews 8.

LLC test of unit roots indicates all variables are stationary at level stationary at 1 percent significance level i.e., they are I (0). Since all variables are stationary at level, then the paper estimates the model by two-stage least square estimation method.

Two-Stage Least Square Estimation Result

The regression by two-stage least square estimation method conducted with the panel data includes the trend term, variable coefficient, standard deviation, t-statistics, and p-value. The independent variables with coefficient are mentioned in the regression.

Table 4

2SLS Estimation Result

	Coefficient	Std. error	t	P > t
Equation LNL				
LNROA	0.1917934	0.1126374	1.70	0.091
RGDPG	0.0642309	0.0252858	2.54	0.012
LNLOAN	-0.2787416	0.0478168	-5.83	0.000
LNRFEA	0.1380782	0.0715159	1.93	0.055
Trend	-0.0018916	0.0022099	-0.86	0.393
Equation LNROA				
LNL	0.1819383	0.1477708	1.23	0.220
LNRNIN	0.4538919	0.0898997	5.05	0.000
LNRNIE	-0.0121385	0.0945754	-0.13	0.898
lagLNROA	0.4686249	0.0952234	4.92	0.000
Trend	-0.0047265	0.0023546	-2.01	0.047

Source: Author's estimation using EViews 8.

By using general-to-specific modeling the paper selects the above parsimonious model, thus from the estimated model inflation and real GDP growth; non performing loan (NPLR) and net loan and advance is highly correlated while dummy for NBE bill, capital adequacy of banks (CA), and bank size have unexpected sign and statistically insignificance, due to this reason the model exclude inflation, non performing loan, dummy for NBE bill, capital adequacy of banks (CA), and bank size.

Discussion on Findings

Liquidity Equation

Bank liquidity and profitability—Table 4 depicts that bank profitability has a positive and significant impact on bank liquidity at 10% level of significance with coefficient of 0.19. This implies that a one percent increase in bank profitability improves bank liquidity by 0.19 percent. Bank profitability reflects the efficiencies of the bank; this creates lower working cost and additional source of funding for banks as a result of these; banks are able or more liquid to fund in assets and to meet obligation without incurring losses. This finding is similar to finding of Alemayehu (2016) and Pavla (2013).

Bank liquidity and real GDP growth—As we understand from Table 4, real GDP growth has a positive and significant impact on bank liquidity at 5% level of significance with coefficient of 0.064. The significance of the RGDPG coefficient in liquidity equation reveals that when real gross domestic product (GDP) increases by one percent, liquidity will increase by 0.064 percent. The reason behind this is economic growth increase business activity which increases per capital income of the country through creating job opportunities. The results of higher average income diminish saving investment gap and create more money in the system through saving in the banks. This result is similar to finding of Shyam et al. (2013) Mohamed and Ben (2015).

Bank liquidity and net loan and advance—Even if bank loan is typically the largest assets and predominant source of income for banks, net loan and advance has a negative significant impact on bank liquidity. This implies that as net loan and advance increases the risk that borrower will fail to pay on due dates increase this decreases the liquidity of banks. Thus a one percent increase in net loan and advance will decrease the bank liquidity by 0.278.

Bank liquidity and foreign exchange availability—With regard of foreign exchange availability, foreign exchange availability correlates positively with bank liquidity. This dimension reflects that increase in foreign exchange availability supports, maintains, and provides level of confidence to market that a country can meet its external obligation which assists the bank from unexpected withdrawal of deposit through building up of public confidence.

Profitability Equation

Bank profitability and liquidity—When we come to the profitability equation, bank liquidity has positive effect on bank profitability even if it is insignificant. This result depicts that if the banks are more liquid it has the ability to increase the profitability through generating revenue, increase capital and extend credit.

Bank profitability and total non-interest income—The estimated result of profitability equation illustrates that service charge & commission income (total non-interest income) has positive significant effect on bank profitability. The coefficient elasticity of total non-interest income 0.454 indicates that a one percent increase of total non-interest income increases bank profitability by 0.454 percent; the reason behind this is banks that increase noninterest income which could reduce risk and the increased noninterest income could lead to more diversification as a result that bank profitability increases.

Bank profitability and total non-interest expense—In addition the result shows that total non-interest expense has an insignificant and negative impact on bank profitability.

Bank profitability and expectation—Lastly the result demonstrates that last year bank profitability has a significant positive impact on current year bank profitability with the coefficient 0.469 indicate. This finding is similar to rational expectations theory which says that people use all available information, past and current, to

predict future events. If profit was higher than normal in the past, people will take that into consideration, along with current economic indicators, to anticipate its future performance.

Conclusion

The aim of this paper was to quantify determinants of liquidity and its impact on bank profitability in Ethiopia: using 2SLS balanced panel estimation method during 2014-2019. The rationality behind this paper was the relationship or direction between bank liquidity and profitability which is debatable. Furthermore, almost all studies have done on separate study which is either determinants of liquidity or determinants of profitability. Therefore to fill this gap the study has tried to done determinants of bank liquidity risk and its impact on bank profitability in single study using 2SLS estimation procedure. In this paper, panel data (from 2014-2019) of public and selected private banks are used to examine the determinants of bank liquidity and its impact on bank profitability in Ethiopia which are obtained from the national bank of Ethiopia.

The empirical result found bank profitability, foreign exchange availability, and real GDP growth have positive significant impact on bank liquidity while net loan and advance has a negative significant impact on bank liquidity. To confirm the statistical validity of fully 2SLS model specification, the researcher has tested normality and overall significance of the variable. Then the researcher found that the model has passed the diagnostic test and the explanatory variables are jointly significant to explain the dependant variable which is liquidity risk. In addition the empirical result of 2SLS estimate illustrates that, bank liquidity has positive effect on bank profitability even if it is insignificant but total non-interest income and expectation have a positive significant effect on bank profitability. Here also the explanatory variables are jointly significant to determine the bank profitability.

Recommendations

The recommendations coming out of this study will be useful for several parties, including regulatory bodies, entities, academics, preparers, auditors, and accounting professionals, as the finding indicates bank profitability has a positive and significant effect on bank liquidity. So in this regard the bank should increase profitability in order to maintain their liquidity by improving of their employers' efficiency, expand their branch into new market sectors, or develop new products or services. Foreign exchange availability in this study appeared as important determinant and has positive impact on bank liquidity. With this regard, the study recommends that the banks should encourage exporters by giving incentives and priorities on credit. In addition the paper found that net loan and advance has a negative significant impact on bank liquidity. Though net loan and advance has negative impact, it is the most important source of income for the bank; this negative impact exaggerates when non-performing loan is increase. So in order to decrease the non-performing loan the bank should be cost conscious in handling, monitoring, and processing a loan. The profitability equation shows that total non-interest income has a positive significant effect on bank profitability. Thus the bank should diversify and inaugurate source of non-interest income through research and development. In addition the bank should give more attention to reduce operating expenses.

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