



## **Firm-Specific and Macroeconomic Determinants of Banks Liquidity: Empirical Investigation from Ethiopian Private Commercial Banks**

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### **Jel Classification**

F65, G21, G32, M41.

### **Abstract**

This study aimed to examine the firm-specific and macroeconomic variables which can affect the liquidity position of private commercial banks in Ethiopia. For the current study, secondary data were extracted from audited annual financial reports of eight purposefully selected private commercial banks covering the period of 2011-2017. The panel data was analyzed by adopting the balanced panel fixed effect regression model. The study revealed that firm (bank) specific factors namely the size of banks, loan growth and deposit are found to be significant determinants of the banks' liquidity. Moreover, macroeconomic determinants consisting of interest rate margin, national bank bills purchase, GDP and annual inflation have a significant influence on the liquidity of private commercial banks of Ethiopia. This study recommends that private commercial banks in Ethiopia should be more concerned with the macroeconomic environment in addition to the internal environment in formulating strategies to enhance their liquidity position. Despite its limitations, this study contributes to the scarce knowledge of firm-specific and macro-economic determinants of banks liquidity by giving equal attention to the long aged banks and banks that were emerged on later periods.

## **1. Introduction**

In modern periods, many banks in the world have faced liquidity problems mainly due to mismanagement of liquidity. The liquidity position of banks as a major issue became apparent in the aftermath of the worldwide financial crunch, which resulted in a number of major commercial banks with serious liquidity issues went bankrupt (Bhati, Zoysa, & Jitaree, 2012). Both investors and borrowers are concerned about liquidity (Diamond et al., 2015). Lacking liquidity can bring about investor's loss of certainty. To guarantee investor's certainty, administrative bodies need to settle some base breaking points of liquidity of banks (Bagh, 2017). Liquidity can be taken as a fundamental concern to the financial strength of financial institutions, particularly in the banking industry. It underlines the development and progression of banks as it ensures the proper functioning of financial markets (Sekoni, 2015).

Banks are playing a pivotal role in channeling funds from depositors to investors constantly (Jenkinson, 2008). However, commercial banks liquidity can be taken as one of the crucial factors contributing to the severity of banking crises. Many profitable banks faced difficulties in managing their own funds due to the misunderstanding of liquidity risk (Munteanu, 2012). Similarly, some banks in spite of having a lot of assets, the sudden withdrawals and the lack of liquid funds lead to a huge loss as a result of taking out emergency loans. Thus, mistakes in liquidity planning and implementation affect bank operations and might exhibit a long term effect on the economy (Edem, 2017). This may affect a bank's earnings and capital and in extreme circumstances may result in the collapse of an otherwise solvent bank (Njeri, 2014; Kashif et al., 2013).

Liquidity handling system of the private banks in Ethiopia is affected by many challenges such as failing to attract new retail or wholesale to deposit, an imbalance in loan and deposit and challenges of cash flow forecasting risk. Therefore, they are challenged by a shortage of liquidity. According to the National Bank of Ethiopia (NBE) annual report (2011), Ethiopian banks were faced with liquidity credit risk and operational risks more severely than other types of risks. Admassu and Asayehgn (2014) cited in the study of Assfaw (2018) stated that at present-day, the Ethiopian banking sector is in a rudimentary and fragile state. The problem of a non-performing loan was widespread among state owned-banks in the early 1990s that contributed to their insolvency.

The focus of many empirical studies carried out on the commercial banking industry of Ethiopia was on examinations of factors influencing the profitability of banks, and limited attention was given to consider determinants of banks liquidity. Even existing works of literature on determinants of banks liquidity did not show accurately what determines the liquidity of banks in Ethiopia. It was still arguing issue among different researchers. Moreover, the liquidity analysis of banks in Ethiopia was made by previous researchers largely on long aged banks and less attention was given to the banks that were emerged on later periods. The current study, therefore, aimed at investigating the effect of firm-specific and macro-economic determinants of liquidity of Ethiopian private commercial banks by giving equal attention to newly emerged and long aged banks.

## **2. Review of Empirical Literature**

### **2.1. Banks liquidity and its Measurement**

Liquidity of banks means the capability of a bank to meet its obligations due at any time, especially to repay customer deposits or to make a payment on the client's order (Vodová, 2016). To describe liquidity determinates of banks, there are two most widely used approaches; liquidity gap approach (flow approach) and liquidity ratio approach (stock approach). Though both approaches are intuitively applying, the liquidity ratio approaches are more common in practice due to the availability of a more standardized method (Edem, 2017; Laurine, 2013).

The most popular stock ratios which are used in different studies, for example, the study of Vodová (2012), employed two most convenient liquidity measures; loan to deposit ratio and a liquid asset to deposit ratio. Liquid asset to deposit ratio which indicates the extent to which the bank's total liquid assets are composed of deposits from customers and other financial institutions, and loan to deposit ratio which signposts what proportion of the explosive money of the bank is concentrated in loans which are illiquid, and liquid asset to total asset ratio which gives information about the long-term liquidity shock absorption ability of a bank. Other scholars such as Vodová (2011) and Vodova (2013) used four ratios such as the ratios of liquid assets to total assets, liquid assets to deposits plus short term borrowing, loans and advances to total assets and loans and advances to customers deposit plus short term financing.

## **2.2. Determinants of the Liquidity of Private Commercial Banks**

Different works of the literature showed that different scholars adopted different explanatory variables in examining the determinants of liquidity of commercial banks across countries.

### **2.2.1. Firm(Bank)-Specific Factors**

#### **1. Capital Adequacy**

Capital Adequacy is one of the factors that significantly affect bank liquidity (Mazreku, Morina, Misiri, Spiteri, & Grima, 2019) and it comprises paid-up capital, undistributed profit (retained earnings), legal reserve or other reserves and surplus fund which are kept aside for contingencies (Patheja, 1994). It negatively affects the liquidity risk of banks (Laurine, 2013). It can be measured by total equity capital to total asset (Boadi, Li, & Lartey, 2016; Assfaw, 2018). The study of Melese (2015) revealed that capital adequacy has statistically significant and positive impacts on the liquidity of commercial banks. That means bank liquidity increases with higher capital adequacy of banks (Vodov, 2011; Singh & Sharma, 2016; Vodova, 2013; Vodová, 2011; Shamas, Zainol, & Zainol, 2018).

H<sub>1</sub>: The effect of capital adequacy on the liquidity level of Ethiopian private commercial banks is positive and statistically significant.

#### **2. Bank Size**

Bank size is defined broadly as the bank's net total asset that is included to capture the economies or diseconomies of scale. Many scholars used natural logarithm of the total assets as the proxy to measure the size of banks (Singh & Sharma, 2016; Melese, 2015). The Study of Vodov (2011) and Singh & Sharma (2016) indicated that the bank's liquidity is decreasing with the increment of the size of the banks. Conversely, the studies of Melese (2015), Mehdi and Abderrassoul (2014), Malik (2013) and Shaha, Khan, Shaha, and Tahir (2018) found out that size of banks has a positive effect on the bank's liquidity i.e. larger banks are more liquid than smaller banks.

H<sub>2</sub>: The influence of the size of banks on banks liquidity is positive and statistically significant.

#### **3. Asset Quality**

Asset Quality is taken as one of the influencing factors of banks liquidity. It determines the quality of bank loans. Good asset quality is essential for the build-up of liquidity as this

enhances the banks' capability to fulfill its obligations on the liability side in a timeous manner. The study of Assfaw (2018) and Melese (2015) measured it by the ratio of provisions of a loan to total loan provided and the lower the loan loss provision to total loan ratio indicate the quality of the asset of the bank is relatively better than the other banks. In the study of Sudirman (2015), asset quality has a positive effect on liquidity of banks, i.e. the greater asset quality ratio is, the greater liquidity ratio is or the worse asset quality of a bank is, the more liquid the bank will be. But, there is a negative relationship between asset quality measured by non-performing loan/total loan and liquidity. This means the growth of non-performing loan reduces the level of liquid assets of banks (Mazreku, Morina, Misiri, Spiteri, & Grima, 2019; Tibebe, 2019).

H<sub>3</sub>: Asset quality represented by loan losses provisions to total loans ratio has a statistically significant and negative influence on the liquidity of banks.

#### **4. Profitability of the bank**

Profitability is considered by different researchers as one of the determinants of banks liquidity. For providing information concerning the performance and survival of many businesses, liquidity and profitability are key variables. Profitability measured by return on asset (ROA) has a positive impact on the liquidity of banks (Singh & Sharma, 2016; Roman & Sargu, 2015; Melese, 2015) which is inconsistent with standard economic theory. But, Mehdi and Abderrassoul (2014) found out that the return on asset has a negative impact on the liquidity position of banks.

H<sub>4</sub>: The effect of profitability on the liquidity of banks is negative and statistically significant.

#### **5. Deposit**

Deposit is highly determining the position of the banks' liquidity. The demand for liquidity may arrive at an inconvenient time and force the fire-sale liquidation of illiquid assets. It is measured by total deposits to total assets ratio. The study of Shah, Khan, Shaha & Tahir (2018) indicated that deposit measured by share of deposit to total asset has a statistically negative effect on the level of liquidity. But, other studies revealed that deposits had a positive and statistically significant effect on bank liquidity; i.e. as demand deposits increase, liquid assets holdings also increase (Mazreku, Morina, Misiri, Spiteri, & Grima, 2019).

H<sub>5</sub>: Deposit has a positive and statistically significant effect on the liquidity of banks.

## 6. Loan Growth

Loan growth is also another important determinant of banks liquidity. It can be measured as  $(\text{Loan at time } t - \text{Loan at a time } (t-1)) / (\text{Loan at time } t-1)$ . Loans & advances are the major earning asset of the bank. They are granted to customer from the amount collected from depositors of the bank that are considered as illiquid assets and generate higher revenue to banks. Therefore, the increase in loan means an increase in illiquid assets and decrease liquid assets. The studies of Tam & Tu (2017) and Melese (2015) found out that loan growth has a negative but insignificant effect on the liquidity of banks in Vietnam. The study of Fekadu (2016) found out that there is an inverse relationship between loan growth and liquidity. Since loans are illiquid assets, an increase in the number of loans means an increase in illiquid assets in the asset portfolio of a bank that decreases banks liquidity (Tibebu, 2019).  
H<sub>6</sub>: The influence of the growth rate of the loan of banks on banks liquidity is statistically significant and negative.

### 2.2.2. Macroeconomic Factors

#### 1. Real Gross Domestic Product (GDP)

Real gross domestic product is an indicator of the financial health of a country. It is also a macroeconomic factor that affects bank liquidity. The theory of bank liquidity and financial fragility stated that when the economy is at boom, banks became optimistic and upsurge their long term investment and reducing their holding of liquid assets while in the period of recession the reverse is true. But, sometimes banks prefer high liquidity due to lower confidence in reaping profits during an economic downturn. That means a real gross domestic product has a significant positive impact on a bank's liquidity (Sheefeni & Nyambe, 2016; Boadi et al., 2016; Mazreku, Morina, Misiri, Spiteri, & Grima, 2019). Conversely, the study of Vodova (2013), Vodová (2011), Sheefeni & Nyambe (2016), Mehdi and Abderrassoul (2014) and Singh & Sharma (2016) presented that liquidity is inversely related to GDP.

H<sub>7</sub>: GDP has a positive and statistically significant effect on the liquidity of banks.

#### 2. Inflation

Inflation reflects a state where the demand for goods and services is more than their supply in the economy. When there is inflation, the repayment of loans is affected and saving is discouraged since the money is worth more today than on later periods and inflation, therefore, affects the liquidity of the Commercial Banks. The studies of Mehdi and

Abderrassoul (2014), Malik (2013) and Vodová (2011) found out that the inflation rate has a negative impact on the liquidity position of banks. That means during inflation, the cost of living will rise and deposits are expected to be reduced and as result, liquidity will be affected negatively. On the contrary, it has a positive impact on the liquidity of banks (Singh & Sharma, 2016; Vodova, 2013; Ahmad, 2017).

H<sub>8</sub>: There is a positive and statistically significant relationship between inflation and liquidity of banks.

### **3. Interest Rate Margin**

Interest rate margin (spread) is the amount of interest rate paid by borrowers that force liquidity holders to part it. The spreads have a positive effect on liquidity risk of banks in Zimbabwe (Laurine, 2013). When the size of the interest rate margin/ liquidity premium increases, lenders give up their liquid money. This implies that an increase in interest margin stimulates bank to focus more on lending activity and as a result, the share of liquid assets is decreasing (Vodová, 2012; Tibebu, 2019). Conversely, if the interest rate spread increases, the liquidity rate increases (Malik, 2013; Mazreku, Morina, Misiri, Spiteri, & Grima, 2019).

H<sub>9</sub>: Interest rate margin (spread) has a statistically significant and negative influence on the liquidity of banks.

### **4. N-Bill Purchase**

It was stated under the study of Lelissa (2014) that since 2011 private commercial banks in Ethiopia have been compulsory to purchase NBE-Bills amounted 27% of new loans disbursement. The proxy that is used to measure N-bill purchase is NBE Ratio which is the ratio of a number of Bills purchased by private banks to total loans & advance of private banks. The study of Lelissa (2014) indicated that bill purchase has a negative and significant effect on banks performance in Ethiopia. The study of Fekadu (2016) also depicted that NBE-Bill purchase has a statistically negative impact on a commercial bank's liquidity level.

H<sub>10</sub>: There is a negative and statistically significant relationship between N-BILL purchase and the liquidity of banks.

## **3. Materials and Methods**

### **3.1. Study Design and Sources Data**

This study employed a quantitative research approach and an explanatory research design. There was a critical review of the secondary balanced panel data obtained from audited

annual financial statements of the seven years' periods (2011- 2017 (G.C)) of the selected Ethiopian private commercial banks and from annual reports of Ethiopian National Bank.

### 3.2. Sample Size and Sampling Technique

The Seven Years (2011- 2017 (G.C)) of data was selected from audited financial reports of Ethiopian National Bank (NBE) and eight purposively selected private commercial banks of Ethiopia (Dashen Bank, Awash International Bank, Wegagen Bank, Nib International Bank, Berhan International Bank, Oromia International Bank, Zemen Bank, and Abay Bank). These banks were purposively selected from 16 private commercial banks of Ethiopia (NBE 2016/2017) because of the presence of well-organized audited financial statements in these selected study periods. Moreover, as the study entailed National Bank bill purchase (N-Bill) ratio in the study as one of the predictor variables which was introduced by Ethiopian National Bank since 2011, years before this year were excluded from the study.

### 3.3. Methods of Data Analysis

After the data collection process has been accomplished, descriptive and inferential data analysis methods have been customized. For seeking what is intended for, the data were analyzed using descriptive statistic such as mean, standard deviation, minimum and maximum, and balanced panel fixed effect regression model were applied. Stata 14 software was used for processing and analyzing the data. Different classical linear regression diagnostic tests were performed at a five percent significance level.

### Conceptual Frame Work of the Study

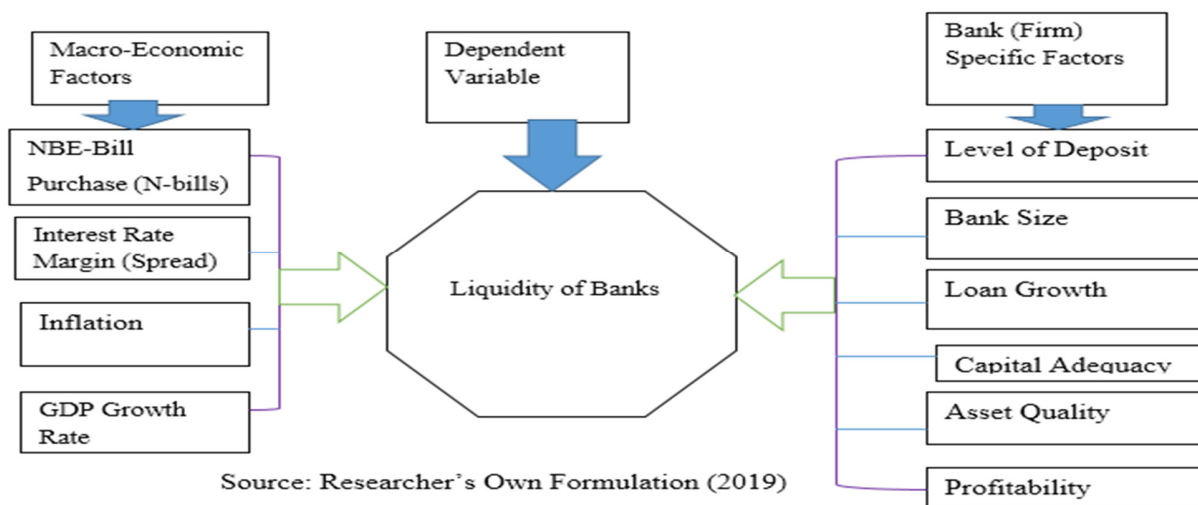


Figure 1. Determinants of liquidity position of Ethiopian private commercial Banks



**Table 1:** Description of variables, their measurements, and their likely sign

	S.No	Variables	Description of Measurement (proxies)	Conception	Expected sign
Dependent	1	Liquid assets to deposit ratio	Liquid Assets/ Customers' Deposit	L1	
	2	Loan to deposit ratio	Loans and Advances/Customers' Deposit	L2	
Independent Variables	1	Loan Growth	Annual changes of a loan of each bank $(Lt_2 - (Lt_1) / Lt_1)$	LG	-
	2	Deposit	Total Deposit/Total Asset	DEP	+
	3	Profitability (ROA)	Net Income/ Total Asset	PROF	-
	4	NBE-Bill Purchase (N-bills)	NBE-bill/ Total Loans and advance	N-BILL	-
	5	Bank size	Natural log of Total Assets	BS	+
	6	Asset Quality	Loan Losses Provisions/Total Loans	AQ	-
	7	Capital Adequacy	Total Equity/Total Asset	CA	+
	8	Interest rate margin (spread)	$\left( \frac{\text{Interest earned from loans}}{\text{Total loans and Advances}} - \frac{\text{Interest paid on Deposit}}{\text{Customers deposit}} \right)$	IRM	-
	9	Economic Activity	The annual growth rate of real gross domestic product	GDP	+
	10	Inflation	Annual Rate of Inflation (Consumers price index)	INF	+

**Source:** Researcher's formulation (2019)

### 3.4. Specification of the Regression model

In order to examine the bank's specific factors and macro-economic variable affecting the liquidity of the selected banks, a balanced panel fixed effect regression analysis was formulated as follows:

For each liquidity ratio,  $Y_{it} = \alpha + X_{it} \beta + \delta_i + u_{it}$

Where  $Y_{it}$  represents one of the two dependent variable ratios (banks' liquidity ratio  $i$  at time  $t$ ),  $X_{it}$  was explanatory variable vector of bank  $i$  at time  $t$ ;  $\alpha$  was intercept/constant term,  $\beta$  was coefficient which represents explanatory variables slope;  $u_{it}$  was the random error term (scalar) and  $\delta_i$  represents fixed effect. Subscript  $i$  represented cross-section (banks) and  $t$  represented time-series dimensions (years).

$$L1_{it} = \alpha + \beta_1 (CA_{it}) + \beta_2 (AQ_{it}) + \beta_3 (BS_{it}) + \beta_4 (PROF_{it}) + \beta_5 (LG_{it}) + \beta_6 (DEP_{it}) + \beta_7 (N-BILL_{it}) + \beta_8 (IRM_{it}) + \beta_9 (INF_{it}) + \beta_{10} (GDP_{it}) + \delta_i + u_{it} \text{----- (Model 1)}$$

$$L2_{it} = \alpha + \beta_1 (CA_{it}) + \beta_2 (AQ_{it}) + \beta_3 (BS_{it}) + \beta_4 (PROF_{it}) + \beta_5 (LG_{it}) + \beta_6 (DEP_{it}) + \beta_7 (N-BILL_{it}) + \beta_8 (IRM_{it}) + \beta_9 (INF_{it}) + \beta_{10} (GDP_{it}) + \delta_i + u_{it} \text{----- (Model 2)}$$

Where:

*L1* represents the ratio of the liquid asset to the total deposit of bank *i* at time *t* and *L2* = represents the ratio of loan to the total deposit of bank *i* at time *t*,  $\alpha$  = Constant;  $\delta_i$ =represents fixed effect in bank *i*;  $u_{it}$  =Error term for bank *i* in year *t*  
 $\beta_1, \beta_2, \dots$ .....Coefficient indicating the rate of change of financial performance as of the predictors.

*CA<sub>it</sub>* denotes Capital adequacy of bank *i* in year *t*

*AQ<sub>it</sub>* denotes Asset quality of bank *i* in year *t*

*BS<sub>it</sub>* denotes Bank's size of bank *i* in year *t*

*PROF<sub>it</sub>* denotes Profitability of bank *i* in year *t*

*LG<sub>it</sub>* represents Loan growth of bank *i* in year *t*

*DEP<sub>it</sub>* denotes Deposit for bank *i* in year *t*

*N-BILL<sub>it</sub>* denotes Level of purchase of National Bank bills by bank *i* in year *t*

*IRM<sub>it</sub>* denotes Interest rate margin of bank *i* in year *t*

*INF<sub>it</sub>* represents the general inflation rate in year *t*

*GDP<sub>it</sub>* represents a yearly rate of real gross domestic product in year *t*

*i* = Bank index; *t* = year index that ranges from 2011-2017

These two models are applied to view the effect of the same set of explanatory variables on liquidity from two different perspectives. For instance, L1 considers liquid assets while the L2 denotes the effects on liquidity with loans of the banks.

## 4. Results and Discussion

### 4.1. Diagnostic Tests of the Regression Model

#### 1. Normality (Bera-Jarque) Test

The Jarque-Bera test statistics were conducted to test the null hypothesis that the residuals ( $u_{it}$ ) are normally distributed. When residuals are normally dispersed, the Bera-Jarque statistics should be insignificant which means that p-value at bottom of the normality screen

should be greater than 0.05 (Brooks, 2008). In this case, Jarque-Bera test statistics display insignificant p-values (i.e., Prob > chi2 = .0968 and Prob > chi2 = .3838 for L1 and L2 respectively). Therefore, all data employed are consistent with normal distribution assumptions.

## **2. Test of Heteroscedasticity**

To check for Heteroscedasticity (the assumption of the change of the errors to be constant), the Breusch-Pagan/Cook-Weisberg test was carried out. The test result indicated that there was no problem of Heteroscedasticity since the values of the test were insignificant i.e. p-values were greater than five percent level of significance (Prob > chi2 = 0.1630 and 0.3105 for L1 and L2 respectively).

## **3. Test of Autocorrelation**

To detect the autocorrelation problem of the study, the Durbin and Watson (d) test were conducted. The autocorrelation problem decision rules stated that there is no positive or negative autocorrelation if it is  $1.765 < d < 2.235$  and positive autocorrelation does not exist if it lies  $1.335 \leq d \leq 1.765$  (Brooks, 2008). The test result demonstrated that Durbin-Watson (d) amount for L1 and L2 are 2.212144 and 1.72005 respectively. Therefore, the result exhibited the absence of positive or negative autocorrelation in the models. Besides, Breusch-Godfrey LM test for autocorrelation was conducted and the result indicated that the residuals are not serially correlated as it is insignificant at 5% (Prob > chi2=0.2114 and Prob > chi2=0.2655 for model  $L_1$  and model  $L_2$  respectively).

## **4. Multicollinearity Test**

The test of multicollinearity problems of explanatory variables of the study was made using analysis of the Pearson correlation coefficient. Accordingly, the multicollinearity problem exists when the correlation between the two explanatory variables is more than 0.70 (Kennedy, 2008).

**Table 2:** Correlation matrix

Variables	L1	L2	PROF	IRM	BS	CA	AQ	DEP	N-BILL	LG	GDP	INF
L1	1											
L2	-0.546	1										
PROF	0.030	0.085	1									
IRM	-0.432	0.134	0.137	1								
BS	-0.750	0.412	0.087	0.422	1							
CA	0.049	0.009	-0.001	-0.117	0.007	1						
AQ	0.076	-0.248	0.006	0.012	-0.088	-0.063	1					
DEP	-0.459	-0.304	-0.137	0.261	0.263	-0.217	0.093	1				
N-BILL	-0.348	0.238	0.111	0.33	0.135	0.078	-0.271	-0.154	1			
LG	0.217	-0.026	-0.063	-0.294	-0.493	-0.076	-0.075	-0.043	-0.139	1		
GDP	0.268	-0.208	-0.028	-0.251	-0.099	-0.111	0.007	-0.021	-0.293	-0.038	1	
INF	0.530	-0.271	-0.037	-0.273	-0.347	0.337	-0.153	-0.307	-0.141	0.216	-0.248	1

**Source:** Researcher’s own computation, 2019

As table 2 exhibits, since the Pearson correlation coefficients of predictors are a smaller amount than 0.50, a multicollinearity problem does not exist.

**4.2. Descriptive Statistic Analysis**

This part of the study stated the number of the observation based on the data that was being collected and the result of a descriptive statistic of the tested variables of the data over the entire study time period from 2011 to 2017.

**Table 3:** Result of Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
L1	56	.374	.162	.111	.791
L2	56	.586	.071	.429	.73
PROF	56	.027	.008	-.008	.052
IRM	56	.091	.017	.027	.122
AQ	56	.746	.052	.576	.84
BS	56	9.885	.436	8.66	10.623
CA	56	.152	.039	.096	.345
DEP	56	.746	.052	.576	.84
N-BILL	56	.397	.136	.082	.686
LG	56	.419	.326	-.013	1.86
GDP	56	.099	.011	.08	.114
INF	56	.129	.095	.072	.341

**Source:** Researcher’s own computation, 2019

As Table 3 depicts, the mean value of L1 is 0.374 which shows that percentage of L1 is 37 % which is above the minimum requirement of National bank of Ethiopia (NBE) which is 15% and having 0.111 (below minimum requirement of NBE) of minimum and 0.791 maximum values (above minimum requirement of NBE) with the standard deviation of 0.162. The L2 has a mean value of 0.586 (58.6 %) with a minimum and maximum value of 0.429 and 0.73 respectively while the standard deviation is 0.071. The profitability measured by ROA is 0.027 on average, which shows that around 2 cents after tax were generated from 1 ETB investment on assets of banks with -0.008 minimum and 0.052 maximum value with the standard deviation of 0.008. Further, Bank size (BS) measured as Ln of total assets has a very high mean of 9.885 this shows that percentage is more than 100 with a range of 8.66 minimum and 10.623 maximum values while the standard deviation is 0.436. The mean of asset quality (AQ) is 0.746 this shows that the percentage of AQ is 74.6 % and the standard deviation of 0.052. The mean value of capital adequacy (CA) is 0.152 that shows that the percentage of CA is 15.2 % with a minimum value of 0.096 and the maximum value 0.345 and a standard deviation of 0.039.

While the mean value for Interest Rate Margin (IRM) was 0.091; this shows that percentage of IRM is 9.1% which is very low and ranging between 0.027 of highest and 0.122 of lowest value with a low standard deviation of 0.017. On average, deposit (DEP) is 0.746; this shows that the percentage of DEP is 74.6 % and its standard deviation is 0.052 and ranging between 0.576 to 0.84 of maximum and minimum value. The mean value of bill purchase is 0.397 which shows that for every 1 ETB loan provided to borrowers, there will be around 40 cents invested on the purchase of a bill of National banks of Ethiopia having 0.082 of minimum and 0.686 maximum values with the standard deviation of 0.136. The Loan Growth has a mean value of 0.419 (41.9 %) with a lowest and highest values of -0.013 and 1.86 respectively while the standard deviation is 0.326. On average, the GDP for the period of 2011-2017 was 9.9% with 8% minimum and 11.4% maximum value with the standard deviation of 0.011. Finally, Annual general inflation (INF) has a higher mean value of 12.9% with a range of 7.2% minimum and 34.1% maximum values while the standard deviation is 0.095.

#### **4.3. Model Specification Test (Fixed effect Versus Random effect)**

In most financial studies, there are two most commonly applicable panel data estimator models: fixed effect model (FEM) and the random effect model (REM). FEM estimates are

more robust, unlike REM estimates as they do not depend on the assumption that individual error term ( $u$ ) is not correlated to the repressors ( $\beta$ s) (Singh & Sharma, 2016). The Fixed effect model (FEM) assumes that differences of an individual bank are captured by differences in the intercept parameters, whereas, the random effect model (REM) treats individual firm differences as random rather than fixed (Leykun, 2016). Moreover, the Housman model specification test was conducted and the balanced panel fixed effect regression model was preferred.

#### 4.4. Results of Model Estimation

The estimation results of the panel fixed effect the regression model of private commercial banks in Ethiopia for the two models (L1 and L2) were presented as follows:

**Table 4:** Determinants of banks liquidity measured by L1

L1	Coef.	St.Err	t-value	p-value	Sig.
PROF	0.087	0.237	0.37	0.715	
IRM	1.463	1.036	1.41	0.166	
BS	-0.414	0.052	-7.91	0.000	***
CA	-0.117	0.079	-1.47	0.150	
AQ	-0.014	0.097	-0.14	0.887	
DEP	-0.598	0.347	-1.72	0.093	*
N-BILL	-0.401	0.088	-4.55	0.000	***
LG	-0.066	0.034	-1.92	0.063	*
GDP	1.723	0.968	1.78	0.083	*
INF	0.282	0.150	1.89	0.067	*
_cons	4.772	0.563	8.47	0.000	***
Mean dependent var	0.374	SD dependent var		0.162	
R-squared	0.880	Number of obs		56.000	
F-test	27.859	Prob > F		0.000	
Akaike crit. (AIC)	-154.186	Bayesian crit. (BIC)		-131.907	
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity: Prob > chi2 = 0.1630					
Breusch-Godfrey LM test for autocorrelation: Prob > chi2 = 0.2114					
Durbin-Watson d-statistic (11, 56) = 2.212144					
Jarque-Bera normality test: 4.669 Chi (2) = 0.0968					

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Researcher's own computation (2019)

**Table 5:** Determinants of banks liquidity measured by L2

L2	Coef.	St.Err	t-value	p-value	Sig.
PROF	0.100	0.139	0.72	0.478	
IRM	-1.955	0.608	-3.22	0.003	***
BS	0.230	0.031	7.49	0.000	***
CA	0.025	0.046	0.54	0.592	
AQ	-0.052	0.057	-0.92	0.365	
DEP	-0.502	0.204	-2.47	0.018	**
N-BILL	0.095	0.052	1.84	0.074	*
LG	0.028	0.020	1.39	0.174	
GDP	-0.947	0.568	-1.67	0.104	*
INF	-0.067	0.088	-0.76	0.452	
_cons	-1.085	0.330	-3.29	0.002	***
Mean dependent var	0.586	SD dependent var		0.071	
R-squared	0.733	Number of obs		56.000	
F-test	10.430	Prob > F		0.000	
Akaike crit. (AIC)	-213.920	Bayesian crit. (BIC)		-191.641	
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity: Prob > chi2 = 0.3105					
Durbin-Watson d-statistic ( 11, 56) = 1.72005					
Jarque-Bera normality test: 1.915 Chi(2) = .3838					
Breusch-Godfrey LM test for autocorrelation: Prob > chi2 =0.2655					

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Researcher's own computation (2019)

As it was depicted on table 4 and table 5, the fixed effect regression result of liquidity as the dependent variable and six firm-specific and four macro-economic variables as explanatory variables of eight private commercial banks for the period of 2011-2017. The overall, goodness of the models was measured using the adjusted R-square whose value was 88% for model L1 and 73.3% for the model L2. This means that the model employed in this study has good predicting power. F-statistics for both models is significant at one percent significance level, signifying that all explanatory variables jointly can influence the rate of 88% and 73.3% for L1 and L2 respectively. This shows that the overall fit of the models developed was very good.

For the current study, liquid assets to customers' deposit ratio (L1) measures the bank's liquidity where the banks cannot get borrowing from other banks; the higher the ratio the better liquid the bank became, and loans and advances to customers' deposit ratio (L2) that measures the percentage of accumulation of the volatile funding of the bank in loans that are illiquid; the higher the ratio is a sign of lower liquidity position of banks, in which the results have to be inferred in a reverse i.e. negative sign of the coefficient implies a positive effect on liquidity and conversely.

The study indicated, contrary to the hypothesis, bank size was found to have a negative and significant impact on the liquidity of banks measured by L1 at less than 1% level of significance. The result of the fixed effect regression model indicates that increase in an asset of banks by 1 ETB, being other factors held constant, results in a 44 cents decrease in banks liquidity measured by the L1. But, the size of banks has a positive and significant impact at one percent significance level on L2. The result indicates that an increase in asset by 1 ETB, other things citrus paribus, leads to a 23 cents increase on the liquidity of banks measured by L2. The two models confirmed that the size of the bank has a negative effect on the liquidity of commercial banks. This might be due to the fact that “too big to fail” hypothesis which assumes if big private commercial banks consider themselves as big they may fail to hold enough liquid assets. This result is consistent with the finding of Vodová (2012) and Tam & Tu (2017) but in contradiction with the results of Mashamba (2015) and Mehmed (2014).

Consistent with the expectation, it was also found that growth of rate loan was negatively and significantly affecting the liquidity of banks measured by L1 at less than 10% level of significance. The result of fixed effect regression model indicates, being other factors held constant, a one percent increase in loan growth of banks leads 6.6% decrease in banks liquidity measured by the liquid asset to total customers' deposit. The result is contrary to the finding of Mashamba (2015).

The deposit was also found to have a negative and significant impact on the liquidity banks measured by L1 and L2 at less than 10% and 5% level of significance respectively. The estimation result of the FEM indicates that a one ETB increase in banks deposit will have a decreasing effect of 60 cents and increasing effect of 50 cents on banks liquidity measured by L1 and L2 respectively. This means, if the majority of the depositors of the bank are business firms, corporations, schools, college etc., the bank will have to maintain high liquidity because of unpredictable. This is similar to the findings of Shah, Khan, Shah, and Tahir (2018), Ibish Mazreku, Fisnik Morina, Valdrin Misiri, Jonathan V. Spiteri (2019) and Laštůvková (2017). Conversely, if the deposits are mostly made by individual customers and are of personal nature, the bank can operate with less liquid cash. This makes the deposit by banks has a controversial impact on the liquidity of commercial banks.

Furthermore, persistent with the hypothesis, the interest rate margin was found to have a



negative and significant impact on the liquidity of banks measured by L2 at less than 1% level of significance. The result of fixed effect regression model indicates that a one percent increase in loan interest rate margin of banks, being other factors held constant, had a 195.5% decline on the second measures of banks liquidity which is L2. It suggests that the higher interest rate margin did not motivate banks to provide more loans rather it stimulates them to hold more liquid assets. This is consistent with the finding of Mutu & Corovei (2013) however contrary to the findings of Vodová (2012) and Tibebu (2019).

Moreover, the empirical result of the study indicates that national bills purchase has a negative and positive significant impact on the liquidity of banks measured by L1 and L2 at less than 1% and 10% level of significance respectively. The estimation result of the model summarizes that one ETB purchase of N-Bill, other factors remain constant, resulted in 40 cents and 10 cents decrease in liquidity position of banks measured by L1 and L2 respectively.

In line with the hypothesis, the result of the study indicates that GDP has positive and negative significant impacts on the L1 and L2 at less than 10% significance level respectively. The result of the model designates that as the growth rate of GDP of the country increased by 1%, being other factors held constant, there will be a 172.3% increase and a 94.7% decrease on L1 and L2 respectively. This encapsulates that a 1% increase in growth rate of GDP of the country, other factors remain constant, resulted around 2 ETB and 95 cents increase in liquidity position of banks measured by L1 and L2 respectively. This result is tandem with the results of Bunda & Desquilbet (2008), Chagwiza (2014) and Wójcik-Mazur & Szajt (2015) but contrary to the finding of Issues, Aymen, & Moussa (2015) and Tam & Tu (2017).

Finally, consistent with expectations, the result of the current study indicates that annual inflation positively and significantly affects the liquidity of banks measured by L1 at a 10% level of significance. The result of FEM indicates that when inflation of the country increases by 1%, being other factors held constant, there will be a 30 cent increase on banks liquidity measured by the L1. This may be due to the fact that whenever there is rise in rate of annual inflation, the money purchasing power will be dropped and banks refrain from long term investment, prefer holding less risky liquid assets, provide small amount of loans and advances and invest in short term money market securities through an economic agents and

then commercial banks upsurge their liquidity. This result is consistent with the findings of Vodová (2012), Sudirman (2015), Wójcik-Mazur & Szajt (2015) and Milic & Solesa (2017) but contrary with the findings of Al-Harbi (2017), Chagwiza (2014) and Sheefeni & Nyambe (2016).

## **5. Conclusion**

The study was intended to investigate the firm-specific and macro-economic determinants affecting the liquidity of private commercial banks in Ethiopia using secondary data for the period of 2011-2017. The fixed effect multiple regression model was customized comprising of two dependent variables (liquid assets to customers' deposit ratio (L1) and loan and advances to customers' deposit ratio (L2)) and ten independent variables (banks' profitability, quality of asset, capital adequacy, size of banks, deposit, growth rate of loans, interest rate margin, N-bill purchase, GDP and annual inflation rate). The findings of the study proved that the size of banks has a negative effect on the banks' liquidity. Furthermore, it was indicated that the growth rate of loans negatively and significantly influences the banks' liquidity. It was also found out from the study that deposit by banks has a controversial impact on the liquidity of banks i.e. the influence might be favorable and adverse.

Moreover, as empirical findings of the study showed, the influence of interest rate margin on the bank's liquidity was positive and statistically significant i.e. the higher interest rate margin generated, more encouragement of banks to hold more liquid assets. It was also portrayed from findings of the study that banks liquidity was influenced negative and significant by national bills purchases of banks. Besides, the effect of the country's GDP on the liquidity position of banks was positive and statistically significant. Finally, consistent with expectations, there was a positive and statistically significant influence of the annual inflation rate on the banks' liquidity.

Hence, the study recommends that private commercial banks in Ethiopia should be more concerned with the macroeconomic environment in addition to the internal environment as a cornerstone of their policy and in formulating strategies to enhance their liquidity position. More importantly, liquidity management should aim at a tradeoff between lending and the risk of insolvency of banks.

## 6. Limitations and suggestions for future research

The study employed only ten firm-specific and macro-economic determinant of the liquidity of private commercial banks in Ethiopia and there might be other variables that were not held by the model and indeed ought to be incorporated in the future studies. Besides, the study used only secondary data of seven years from only 8 banks. This relatively smaller sample size of banks and study periods might limit the results of the study to generalize for the population. Thus, future studies can be conducted by taking larger sample sizes by increasing both study periods and the number of banks. Besides, the focus of the study was only on quantitative (financial) data and non-financial measures which may have influence were not treated and might need further investigation. Therefore, studies can be carried out in the future by taking into account the financial (quantitative) data as well as non-financial (qualitative) aspects of determinants of banks liquidity.

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