

The Effect of Liquidity Risk Management on Financial Performance of Ethiopian Commercial Banks (2010-2021)

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Abstract

Banks are major financial institutions that play a pivotal role in the economic system, diverting financial resources from surplus economic agents to deficit ones. The purpose of this study was to examine the impact of liquidity risk on the financial performance of Ethiopian commercial banks. Liquidity risk management and profitability are key issues in a competitive business environment. Fixed-effect balanced panel regressions were used for data from 13 commercial banks for the sample period of interest from 2010 to 2021. We have selected and analyzed six factors that affect the financial performance of commercial banks in Ethiopia. The results of panel data regression analysis showed that liquidity (LATA), leverage (TLA), and Gross Domestic Product (GDP) had statistically significant effects on financial performance of commercial banks. The Funding Gap Index (FGR), Cash Reserve Ratio (CRR), and Bank Size (SIZE) have no statistically significant impact on central bank financial performance. Liquidity risk has therefore adversely affected the financial performance of Ethiopian commercial banks. The recommendation is that commercial banks may need to review their credit rating methodologies to ensure that only worthy borrowers lend money to reduce the large number of non-performing loans. Lending should provide borrowers with some form of financial education, guidance, and advice on how to allocate borrowed funds. Commercial banks are required to hold sufficient capital in accordance with bank operating rules. In order to increase the operational efficiency of banks, it is necessary to improve the capacity development of bankers. The recommendation is that commercial banks may need to review their credit rating methodologies to ensure that only worthy borrowers lend money to reduce the large number of non-performing loans. Lending should provide borrowers with some form of financial education, guidance, and advice on how to allocate borrowed funds. Commercial banks are required to hold sufficient capital in accordance with bank operating rules. In order to increase the operational efficiency of banks, it is necessary to improve the capacity development of bankers. Ethiopian commercial banks can achieve profitability by increasing the size of their banks. Banks therefore have an opportunity to benefit from economies of scale by increasing their market share in the Ethiopian banking industry.

Keywords: Commercial banks in Ethiopia • Financial performance • Liquidity risk • Economic system • Cash Reserve Ratio (CRR)

Introduction

Liquidity is the bank's ability to meet its cash and collateral obligations without incurring unacceptable losses. Liquidity risk refers to how a bank's inability (whether real or perceived) to meet its obligations threatens its financial position or existence [1]. Banks are major financial institutions that play a pivotal role in the economic system, diverting financial resources from surplus economic agents to deficit ones. Banks facilitate savings and capital formation in the economy. Commercial banks are the fundamental economic institutions in the financial system and economy as a whole. They accept demand deposits, issue loans, and provide other services to the public [2].

In doing this financial intermediary role banks are dependent upon public confidence and requirement to meet increasing customers' needs and expectations. The bank might also lose the self-confidence of its clients if funds are no longer supplied to them well in time. To attain these

expectations banks' liquidity position plays a significant role [3]. The primary function of bank is liquidity creation however, it also a major source of vulnerability.

Bank liquidity refers to the ability of a financial institution to fund assets and meet its obligations when due at a reasonable cost. Banks therefore need to optimally maintain the level of liquidity that allows them to maximize their returns and meet their responsibilities. Liquidity is therefore the first product or provider of banking institutions. Given the sizeable liquidity position in banking, liquidity risk has received significant attention so far [4]. This risk threatens the stability of financial institutions and leads to the weakening and failure of financial institutions. A bank is exposed to liquidity risk if it does not have sufficient liquidity to meet its obligations. Liquidity risk is defined as the lack of sufficient cash and/or equivalents to meet the needs of depositors and borrowers and/or the sale of illiquid assets yielding a yield below part and/or the potential loss resulting from a situation where the asset is not sold. Within desired time due to lack of buyers.

Liquidity risk arises from the Bank's primary activity of converting short-term or non-durable deposits into illiquid assets or long-term commitments/loans. Such scenarios may arise if the Bank is unable to fund its illiquid asset positions on acceptable terms. Scannella defines liquidity risk as a threat to a bank's financial position due to a sudden need for resources that may be caused by an abnormal or unexpected influx of funds into the bank [5]. These financial needs can adversely affect a bank's financial health and profitability through assets, liabilities and off-balance sheet items related to liquidity issues. From a broader perspective, liquidity is the ability of a financial institution to meet its obligations when they fall due, excluding

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unacceptable losses.

Accelerated and sustainable economic growth is now a top priority on the Ethiopian government's political agenda. An advanced financial sector fosters economic competition, consolidates commodity markets, and fosters growth. Moreover, a developed financial system can be a powerful tool for poverty reduction if financial services are extended to rural areas and poor producers. The National Bank of Ethiopia (NBE) has the powers, duties and responsibilities for bank cash management, regulation and supervision [6]. As part of its mandate, the NBE plays an important role in managing the banking system's liquidity position. For banks operating in Ethiopia, each licensed bank must hold liquid assets equal to at least 25% of total liquid liabilities. To meet liquidity needs, each bank must hold at least 20% of its short-term liabilities as primary reserves and 5% of its short-term liabilities as secondary reserves.

Various studies have been conducted in different countries to examine the impact of liquidity risk on commercial bank performance, including Eyob, Sirak, Workneh, Berhanu and Tseganesh. A study by Sirak examined the impact of liquidity on bank profitability. However, a study focused on a single commercial bank, Tseganesh and his Berhanu also explored his two objectives.

First, we identify commercial bank liquidity based on economic performance using bank-specific macroeconomic variables. However, many of Tseganesh's research variables focus on macroeconomic variables, and Berhanu used his NIM as the dependent variable to measure bank performance. Eyob and Workneh examine the impact of liquidity on commercial bank performance. Previously, however, Workneh only measured bank specific internal factors and Eyob used her ROE as the dependent variable to measure bank performance [7].

Financial liquidity risk management and profitability are key issues in a competitive business environment. Therefore, according to the latest research by his Eyob on March 27, 2019 and 2020. The various factors affecting bank liquidity need further investigation. Much effort has been made by academics to establish links between liquidity risk and the financial performance of banks in different locations. While the scope, timing and context of the studies differed, their respective conclusions suggest that liquidity risk management and profitability are key issues in a competitive business environment. Therefore, this paper aims to examine the impact of liquidity risk on banks' financial performance. Much effort has been made by academics to establish links between liquidity-related risks and the financial performance of banks in various locations [8]. Although there are differences in scope, methodology, timing, and circumstances, each conclusion suggests that the relationship between liquidity risk and financial performance is debatable. Therefore, this study aims to answer the following questions:

What is the relationship between liquidity risk and financial performance of Ethiopian banks? This study attempts to test the following six hypotheses.

H_1 : The financial gap to total assets has a significant negative impact on the financial performance of Ethiopian commercial banks.

H_2 : Liquidity has a significant positive impact on the financial performance of Ethiopian commercial banks.

H_3 : Total lending to total assets has a significant positive impact on the financial performance of Ethiopian commercial banks.

H_4 : Reserves for deposits have a significant positive impact on the financial performance of Ethiopian commercial banks.

H_5 : Bank size has a significant positive impact on the financial performance of Ethiopian commercial banks.

H_6 : GDP growth has a significant positive impact on the financial performance of Ethiopian commercial banks.

Materials and Methods

Research design

This study used a descriptive study design to describe in detail the relationships between response and predictor variables. This study design was considered suitable as it involved an unbiased data observation and analysis process. Dulock postulates that descriptive analytical techniques involve a process of systematically and accurately presenting facts and explaining events. Populations and areas of interest designing descriptive analytics also helps reveal relationships and definitions between predefined variables through detailed investigation. This design also limits researchers' ability to influence the outcome of their studies [9].

Sources and methods of data collection

The data sources for this study are secondary sources. Bank-specific data were collected from audited financial statements taken from the balance sheets and income statements of each selected commercial bank included in the sample, with sector-specific macroeconomic data from the NBE annual report 2021. Extracted from data were collected annually from 2010 to 2021 and variable figures are as of 30 June for each year studied.

Study population

The study population includes all commercial banks in Ethiopia. As of June 30, 2021, there were 18 privately owned commercial banks and one public commercial bank, according to NBE reports. These include public banks Ethiopian Commercial Bank (CBE), Dashen Bank S.C (DB), Awash Bank S.C (AB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Abyssinia Bank S.C (BOA), Lion International Bank S.C (LIB), Oromia S.C Cooperative Bank (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Abay Bank (AB), Addis International Bank (ADIB), Debub Global Bank (DGB), Enat Bank (EB), Zemen Bank (ZB), Jijira Bank (HIJ), Zemzem Bank (Zem). The sample frame for drawing the sample includes private and public commercial banks with at least 12 years of experience as of June 30, 2021. As a result, 12 years of data (2009-2021) were used. The reason for using 12 years of data was to allow a reasonable number of observations [10].

Sampling method and sample size

The sampling techniques used in this study are non-probabilistic sampling, and among the non-probabilistic sampling techniques, this study uses evaluative/targeted sampling. As pointed out in, targeted sampling is often used when dealing with small samples or when research needs to select particularly meaningful cases. Therefore, researchers used targeted sampling given the availability of complete data for the selected time period. There are currently 19 commercial banks in Ethiopia, of which he one is state owned and 17 are privately owned. Of these commercial banks, 12 have over 12 years of operational experience and data. Commercial banks with less than 12 years of age were not selected for this study in order to obtain balanced panel data for 12 years. Therefore, 12 commercial banks were selected and we were able to establish relationships between variables from 156 observations (12 banks \times 13 annual data).

Methods of data analysis

To meet the study objectives, the paper was based on panel data collected through structured document review. Collected panel data were therefore analyzed using descriptive statistics and multiple regression analysis to ascertain the influence (relationship) of explanatory or independent variables on the dependent variable. Descriptive statistics for both dependent and independent variables were calculated over the sample period [11]. It transforms raw data into a more meaningful and completes form, allowing researchers to understand ideas clearly. This facilitates statistical analysis between the dependent and independent variables, finally using linear regression to determine the independent variables and finally using linear regression to estimate the profitability

of Ethiopian commercial banks. We determined the relative importance of each independent variable in influencing. To do this, the researcher uses his statistical tools E-views 12 software. The researchers also ran

diagnostic tests to check for violations of Classical Linear Regression Model (CLRM) assumptions (Table 1).

S. No	Variable	Symbol	Formula	Expected result
Dependent variable				
1	Return on asset	ROA	Net income before tax to total assets.	NA
2	Return on equity	ROE	Net income before tax to total equity.	NA
3	Net interest margin	NIM	(Net return on investment-interest paid) average assets.	NA
Independent variable				
4	Funding gap ratio	FGR	Funding gap is defined as the difference between a bank's credit and core deposits.	-
5	Liquidity holding	LAH	Bank's ability to absorb shocks. The higher the ratio, the higher the shock absorption capacity. On the other hand, too high a ratio can be interpreted as inefficiency. This is because liquid assets have low returns and are associated with opportunity costs.	+
6	Loan assets ratio	LAR	Represents the percentage of total assets tied to illiquid loans. The higher the ratio, the lower the liquidity of the bank.	+
7	Cash reserve ratio	CRR	Ratio of cash reserves held in NBE to total deposits.	+
8	Bank size	BS	Natural logarithm of total bank assets.	+
9	GDP growth rate	GDP	Real GDP growth rate	6

NB *NA is stand for not available expected sign because of dependent variables.

Table 1: A summary of the independent variables of the dependent variable and their expected results.

Econometric model specification

In this study, the types of data set use allow using panel of data or longitudinal data model, thus the study used panel/longitudinal data model. It has data comprising both time series and cross-sectional elements [12]. According to Brook, suggest that using panel have important advantages. One of the advantages of using panel data set, providing a wide issue coverage and help to solve difficult problems using panel data than using only time-series or cross-sectional data.

Second advantage of panel data usage, to determine the relationship of variables, the change of variables through time. By only using pure time-series data could not be examining relationship between variable and change overtime. Due to time series data would necessitate a long run of data to be able to conduct any significant hypothesis tests. However, using both cross-sectional and time series data, one can increase the number of degrees of freedom, and can also help to mitigate multicollinearity problems. Third, as will become apparent below, helping the regression model organizing in the right way, facilitate the influence of biasness of omitted variables in regression results. The regression model is as described in the following equation [13].

$$Y_{it} = \alpha + \beta_{xit} + U_{it}$$

Where;

Y_{it} is the explained variable.

α is the intercept parameter.

β (is a $q \times 1$ vector) parameters estimating on the independent variables, and x_{it} (is a $1 \times q$ vector) observations on the independent variables.

U_{it} is the error term which represents all these factors nit includes I denote the study variable and t representing the time of the study.

To find out the relationship of banks liquidity and bank financial performance, a regression model is employing in order to analyze the relation between independent and dependent variables:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + U_{it}$$

As the study has more than one independent variable a multiple regression model should be employe. The regression equation will be:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \beta_n X_{it} + U_{it}$$

Based on the above equation and the variables used in this study, the econometric equation for the model is specified as following:

$$ROA_{it} = \beta_0 + \beta_1(LATA_{it}) + \beta_2(FGR_{it}) + \beta_3(TLA_{it}) + \beta_4(CRR_{it}) + \beta_5(SIZE_{it}) + \beta_6(GDP_{it}) + u_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1(LATA_{it}) + \beta_2(FGR_{it}) + \beta_3(TLA_{it}) + \beta_4(CRR_{it}) + \beta_5(SIZE_{it}) + \beta_6(GDP_{it}) + u_{it} \quad (2)$$

$$NIM_{it} = \beta_0 + \beta_1(LATA_{it}) + \beta_2(FGR_{it}) + \beta_3(TLA_{it}) + \beta_4(CRR_{it}) + \beta_5(SIZE_{it}) + \beta_6(GDP_{it}) + u_{it} \quad (3)$$

Where:

ROA, ROE and $NIM = Co$ -efficients of dependent variable that indicates the financial performance of the bank i at time t ; Roa_{it} it is the return on total assets ratio, ROE return from bank equity and NIM is the earn from investment of bank i at time t :

$\beta_0 =$ Constant term.

$\beta_1 - \beta_6 =$ Co-efficients of independent variables.

$U_{it} =$ Error term.

$FGR_{it} =$ The ratio of fanning gap of bank i at time t ; Financing gap defined as the difference between a bank's loans and customer deposit.

$LATAR_{it} =$ Liquid asset to total asset ratio of bank I at time t , this proxy is the ratio of total liquid asset to total asset.

$TLA_{it} =$ Total loan to total asset ratio of bank I at time t . The proxy is the ratio of total loan to total assets.

$CRR_{it} =$ Cash reserve ratio of bank I at time t , the proxy is the percentage of cash required to be kept in reserves, vis-a-vis a bank's total desists.

$SIZE_{it} =$ the size of bank I at time t . The proxy is natural logarithm of total

bank assets.

GDP_t =GDP growth rate at time t. The growth rate is measured by percentage change in GDP.

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$SIZE_{it}$ =The size of bank i at time t. The proxy is natural logarithm of total bank assets.

GDP_t =GDP growth rate at time t. The growth rate is measured by percentage change in GDP.

Results and Discussion

Variable description

This section presents descriptive statistics for the dependent and explanatory variables used in this study. The dependent variables used in this study were Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM), while the independent variables were Funding Gap Measure (FGR) and Liquidity to Total Assets ratio (LATA), Lending to Assets Ratio (TLA), Cash Reserve Ratio (CRR), Bank Size (SIZE) and Gross Domestic Product (GDP) (Table 2).

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
ROA	156	0.065	0.015	0.02	0.09
ROE	156	0.104	0.016	0.06	0.13
NIM	156	0.047	0.015	0.01	0.08
FGR	156	0.189	0.12	-0.39	0.38
LATA	156	0.04	0.01	0.003	0.13
TLA	156	0.026	0.009	0.02	0.03
CRR	156	0.082	0.03	0.02	0.22
SIZE	156	0.269	0.11	0.5	0.46
GDP	156	0.079	0.03	0.016	0.12

Table 2. Variable description.

As Table 2 shows, the average return on assets is 0.065, indicating a return on assets of 6.5%, with minimum and maximum values of 0.02 and 0.09 respectively. This shows that Ethiopian commercial banks earn an average profit of 0.065 cents per building asset. The standard deviation value was 1.5%. This indicates moderate ROA variability among commercial banks in Ethiopia. The maximum and minimum ROA were 9% and 2%, respectively. The minimum ROA applied to Zemenbank was 2010.

Average ROE was 10.4%. This shows that the Ethiopian commercial bank earns an average of 10.4 cents on his 1 bill capital. The standard deviation value was 1.63%. This indicates a moderate variation in his ROE among commercial banks in Ethiopia. The maximum and minimum ROE were 13.8% and 6%, respectively. The median net interest margin was 4.7%. This shows that Ethiopian commercial banks are earning an average of 0.047 cents per building returned on their investment. The standard deviation value was 1.56%. This indicates a moderate dispersion of NIM among commercial banks in Ethiopia. The maximum and minimum NIM values were 8.2% and 1.2%, respectively [14]. The average Funding Gap (FGR) was 18.9%. These show that Ethiopia's commercial banks have a lending-deposit gap of 0.18 cents, a measure of a bank's ability to cover its lending with deposits. The standard deviation value was 12%. This indicates good FGR dispersion among Ethiopian commercial banks. The maximum and minimum FGR values were -39% and 38%, respectively.

The average liquid to total assets ratio (LATA) for Ethiopian commercial banks, which indicates the level of cash and short-term debits in the financial system, was 4% with a standard deviation of 1.7%. The minimum and maximum LATA values were 0.3% and 13%, respectively [15]. This shows that four of Ethiopia's commercial banks total assets are liquid

assets that can be easily converted into cash. The standard deviation value of 0.017 indicates that there was a moderate deviation from the average liquidity ratio for Ethiopian commercial banks.

The median loan to value ratio (TLA), which measures the ability to withstand stress from increased credit, was 2.6%. This suggests that, on average, Ethiopian commercial banks have lower deposit volatility related to illiquid loans. His TLA across banks had moderate variability toward the mean, as indicated by a standard deviation of 0.9%. The maximum TLA was 3.7% and the minimum was 2.8%. This indicates that there were some commercial banks in Ethiopia with additional liquidity. It measures the banking system's ability to mobilize deposits to meet credit demand and was 8.2% with a standard deviation of 3.5%. The maximum and minimum CRR values were 22.6% and 2.8%, respectively. This indicated that Ethiopian commercial banks kept 8.2% of their deposits in the reserve account of the national bank account, which was very high compared to the national bank of Ethiopia's benchmark (5%) [16].

Commercial Bank Size (BS) is an approximation measured by the Natural Logarithm of Total Assets (LnTOA). The natural logarithm is used to minimize the deviation between maximum and minimum values. The median BS is 26.9% and the average total asset size is surveyed Ethiopian commercial banks during this research period. Among a sample of Ethiopian commercial banks, the maximum total asset value of 46.9% was recorded by CBE in 2010 and the minimum total asset value of -0.5% was recorded by Buna International Bank in 2010. A standard deviation value of 11% indicates a slightly lower BS variance than the average of all sampled commercial banks in Ethiopia. Another external factor is economic growth, with Ethiopia's average GDP for the period 2010-2021 at 7.9%, compared

with 2010-2021 [17].

Correlation analysis

Correlation is a way of indexing the degree to which two or more variables are associated or related to each other. Sample size is an important factor in determining whether the correlation coefficient is nonzero/statistically significant. Correlation coefficient values are always between -1 and +1. A correlation coefficient of +1 indicates that the two variables are perfectly related in the positive linear sense. On the other hand, a correlation coefficient of -1 indicates that the two variables are perfectly related in the negative linear sense. On the other hand, a correlation coefficient of 0 indicates no linear relationship between the two variables. This idea is supported by Mayer, whereas sample sizes approach 100, correlation coefficients around or above 0.20 become significant at the 5% significance level.

Correlation between ROA and explanatory variables

Return on Investment Management's ability to leverage a bank's assets to generate returns or enhance the bank's financial performance. These financial performance measures; ROA were negatively or positively correlated with other explanatory variables. Table 3 below shows the results of correlation analysis between ROA and explanatory variables. The results

	ROA	TLA	LATA	GDP	FGR	CRR	BS
ROA	1	0.021	0.349	0.52	-0.09	-0.165	-0.16
TLA	-	1	0.214	0.144	0.136	-0.016	0.361
LATA	-	-	1	0.294	0.087	-0.372	0.254
GDP	-	-	-	1	0.166	-0.062	0.221
FGR	-	-	-	-	1	0.185	0.267
CRR	-	-	-	-	-	1	0.283
BS	-	-	-	-	-	-	1

Table 3. Correlation analysis between ROA and other explanations.

Correlation analysis between ROE and other independent variables

Return on equity is the net profit per bill of equity. It's about how much the bank makes on the stocks it invests in. Correlation analysis can be applied to find out the relationship between ROE and other explanatory variables. ROE and Lending to Total Assets Ratio (TLA), Gross Domestic Product (GDP), Financing Guarantees (FGR), Liquidity to Total Assets Ratio (LATA) and cash Reserve Ratio® (CRR) are shown in the Table 4. Bank Size (SIZE) is negatively correlated with the financial performance indicator ROE. These explain how commercial banks' return on equity is

	ROE	TLA	LATA	GDP	FGR	CRR	BS
ROE	1	0.171	0.521	0.18	0.031	-0.48	-0.02
TLA	-	1	0.214	0.144	0.136	-0.016	0.361
LATA	-	-	1	0.294	0.087	-0.372	0.2548
GDP	-	-	-	1	0.166	-0.062	0.22
FGR	-	-	-	-	1	0.185	0.267
CRR	-	-	-	-	-	1	0.282
BS	-	-	-	-	-	-	1

Table 4. Correlation analysis between ROE and other explanatory.

Correlation analysis between NIM and other independent variables

Net profit margin measures the profit a company earns from its investment activities as a percentage of its total fixed assets. Banks and other financial institutions typically use this ratio to analyze investment

in the table below show that there is a positive correlation between ROA and explanatory variables such as Lending Assets Ratio (TLA), Liquid Assets Ratio (LAT), and Gross Domestic Product (GDP). These represent liquidity risk and indicate a bank's ability to absorb shocks [18]. In principle, the higher the ratio, the more liquid the bank is, the better the liquidity, and the more positively correlated the loan-to-asset ratio with the commercial bank's financial performance, although it is not statistically significant. However, the ratio of Liquid Assets to Total Assets (LATA) and Gross Domestic Product (GDP) are closely related to the financial performance of Ethiopian commercial banks. It states that a percentage of the bank's total assets are tied up in the form of loans. The higher ratio of loan to asset also specifies capacity of the bank to meet its demand because this ratio measures the extent of total asset are tied up in the illiquid asset and gross domestic product is defined as the sum of all goods and services produced in a Take your time without double counting products used in other products. Gross domestic product is one of the key economic indicators used by economic decision makers and governments when planning and developing strategies to improve the financial performance of banks. Also, Financing GDP Measure (FGR), Cash Reserve Ratio® (Cash Reserve Ratio® (CRR), Bank Size (SIZE)) is negatively correlated with ROA financial key performance indicators. This result is confirmed by a study by Tseganesh (Table 3).

affected by these explained variables [19]. Loan to assets Ratio® (TLA), Gross Domestic Product (GDP), and Funding Guarantee (FGR) are positively correlated with financial performance of commercial banks, although not statistically significant, as a ratio of liquid assets to total assets. (LATA) means LATA when correlated with these banks. As, the commercial bank's financial performance also improves at the same time. The three left-hand factors, Cash Reserve Ratio (CRR), Liquid Assets to Total Assets ratio (LATA), and Bank Size (SIZE), are negatively correlated with ROE financial performance indicators (Table 4).

decisions and track the profitability of their lending operations. It is how much the bank earns on the assets it invests in. Correlation analysis can be applied to find out the relationship between NIM and other explanatory variables. Lending to assets ratio (TLA), liquid assets to total assets ratio

(LAT), and Gross Domestic Product (GDP) are positively related to NIM. This means that an increase in this variable tends to increase the margin rate, but the loan-to-equity ratio is not important. Financing Gap Measure (FGR), cash Reserve Ratio[®] (Cap), and Bank Size (SIZE) are negatively

related to the NIM financial performance indicators for commercial banks [20]. These explain the increased income from commercial banking operations when influenced by these explained variables. This finding is the same as that of Nigist (Table 5).

	NIM	NIM	TLA	LATA	GDP	FGR	CRR	BS
NIM	1		0.04	0.29	0.27	-0.15	-0.21	-0.08
TLA	-		1	0.21	0.14	0.13	-0.01	0.36
LATA	-		-	1	0.29	0.08	-0.37	0.25
GDP	-		-	-	1	0.16	-0.06	0.22
FGR	-		-	-	-	1	0.18	0.26
CRR	-		-	-	-	-	1	0.28
BS	-		-	-	-	-	-	1

Table 5. Correlation analysis between NIM and other explanatory.

The correlation matrix in Table 5 predicts possible relationships between variables in the study, and all correlation coefficient variables above 0.8 were corrected for multicollinearity issues. Mashoto argued that a correlation coefficient of 0.75 could be the correlation coefficient of the explanatory variables. Therefore, no explanatory variable has a correlation coefficient greater than 0.75 in this study. So there are no multicollinearity issues.

Test the assumptions of Classical Linear Regression Models (CLRM)

Normality test (Bera-jarque test): Jarque-bera uses the property of a normally distributed random variable whose entire distribution is defined by its first two moments (mean and variation). If the residuals are normally distributed, the histogram will be bell-shaped, the Bera-Jarque statistic will be non-significant or above the significance level, the null hypothesis will not be rejected, and the p-value for the normality test will be less than is also larger. 0.05 or 5 percent of significance level. If the p-value is less than the significance level, reject the null hypothesis, accept the alternative hypothesis, and the residuals are not normally distributed. As stated by Kebebe, the normal distribution is unskewed and has a kurtosis coefficient of 3. Skewness measures the degree to which a distribution is not symmetrical about its mean, and kurtosis measures the width of the spread tails.

Jarque-Bera probability statistics (p-values) for ROA, ROE, and NIM are not significant even at 10%. The ROA normality test has a kurtosis coefficient (2.4) less than 3 or a Jarque-Bera statistic at the 5% significance level (P-value=0.27 and greater than 0.05) and skewness. It shows that it is not 0.1. The normality test ROE means that the kurtosis coefficient (2.9) is 3 or less and the Jarque-Bera statistic at the 5% significance level (>0.05 with P-value=0.73) and skew=0.15 is not significant. The normality test NIM means that the kurtosis coefficient (2.4) is 3 or less than the Jacques-Bera statistic at the 5% significance level (P-value=0.37 greater than 0.05) and skewness=0.08 is not significant in Figure or in all cases (H0=Accepted, H1=Rejected because p-value is greater than 0.05 in both cases), hence the conclusion that the data are normally distributed (Appendix A).

Heteroscedasticity test (Var(ut)=σ²): Under this unit, we tested the

residual to determine whether it was heteroscedastic or homoscedastic, and to accept or reject the null hypothesis. The null hypothesis was accepted only if the observed R-squared p-value exceeded the 5% or 0.05 significance level. Unless the null hypothesis is rejected and the alternative hypothesis is accepted. In classical linear regression models, one of the basic assumptions is the homoscedasticity assumption, which states that the probability distribution of the perturbation term remains the same for all observations. That is, the variance of each U_i is the same for all values of the explanatory variables. However, when the error terms do not have the same variance, this condition of non-constant variance or heteroskedasticity is called heteroscedasticity. Therefore, the Breusch-Pagan test was used in this study to detect the problem of heteroscedasticity. This test indicates that if the p-value is significant with a confidence interval of 95, the data have a problem of heteroscedasticity, but if the value is not significant (greater than 0.05), the data have a heteroscedasticity problem. As shown in Table 6, there was no problem of heteroscedasticity in this study, so the p-value is 9.1% or (0.091), indicating an insignificant value. According to this study, the significance value is either not significant or the p-value is over 5%, which corresponds to 0.064. So the decision is to accept H0 and reject H_A (Appendix B).

The impact of liquidity risk on financial performance (ROA, ROE and NIM)

In this part of the study, we described regression measures of banks' financial performance to understand the relationship between independent variables and a bank's ability to hold desirable assets in the short term. Regression analysis is performed to analyze financial performance indicators (ROA, ROE and NIM) and these metrics such as Funding Gap Measure (FGR), Cash to Total Assets Ratio (LATA), and Lending to Assets Ratio (TLA). We identified relationships with independent variables Cash Reserve Ratio (CRR), Bank size (SIZE) and Gross Domestic Product (GDP).

A regression analysis was performed to analyze the relationship between commercial bank financial performance factors and other independent variables. The regression model was applied as follows (Table 6).

Variable	ROA			ROE			NIM		
	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	0.081	0.005	0	8.477	0.583	0	5.863	0.639	0
TLA	0.189	0.075	0.01	0.363	0.078	0.00	-0.229	0.08	0.17

LATA	0.491	0.076	0.00	-0.13	0.021	0.00	-0.087	0.02	0.00
GDP	0.169	0.022	0.00	0.209	0.104	0.04	0.224	0.11	0.05
FGR	6	0.006	0.228	0.014	0.015	0.37	-0.002	0.01	0.894
CRR	0.082	0.051	0.133	0.044	0.057	0.439	-0.036	0.06	0.569
BS	0.01	0.011	0.336	0.009	0.009	0.338	0.008	0.01	0.451
Adjusted R-squared		-	0.6	-	-	0.63	-	-	0.51
F statistics		-	0.000	-	-	0.000	-	-	0.000

Table 6. Regression results for effect of financial performance of commercial banks measured.

According to Table 6 fixed effect regression results, adjusted R² has the value of 60%, 63% and 51% which revealed that the explanatory power of the model was good. The value (*i.e.* 51.63%) could be interpreted as; the variations of financial performance in Ethiopian commercial banks minimum 51% were explained by, Financing gap measure (FGR), Liquid Asset over Total Asset ratio (LATA), Loan to Assets Ratio (TLA), Cash Reserve Ratio (CRR), Bank Size (SIZE) and Gross Domestic Product (GDP) whereas the rest 49% variation of financial performance in Ethiopian commercial banks was explained by neither external nor internal variables used in this study rather it goes to the error term. In general, the above Table 6 indicated that out of the total six explanatory variables of the study three of them were statistically significant (*i.e.* Liquid Asset over Total Asset ratio (LATA), Gross Domestic Product (GDP) and Loan to Assets Ratio (TLA), were significant at 5% level. The rest three variable Financing Gap Measure (FGR), Cash Reserve Ratio (CRR), and Bank Size (SIZE) had no statistically significant effect on financial performance of Ethiopian commercial banks for the period between 2010-2021. Gross domestic product was the only macroeconomic variable that significantly affected financial performance of commercial banks in Ethiopia, but the rest two variables were go to bank specific variables; and industry this indicated that most statistically significant variables that affected financial performance of Ethiopian commercial banks were from bank specific factors. The model fits well at the 5% significance level.

The study measured the loan-to-asset ratio using the ratio of total loans and assets to total assets of Ethiopian commercial banks. The sign coefficient for the loan-to-equity ratio was positive and statistically significant at the 1% significance level with p-values of 0.000 and coefficient values of 0.18 and 0.36 for ROA and ROE, respectively. The coefficient values show that an increase of 1 Birr in total assets increases the financial performance of Ethiopian commercial banks by 0.18 Birr in assets and 0.36 Birr in bank capital. This shows that Ethiopian commercial banks are using their assets to generate income and the loans they provide to their customers are growing at the same pace as their capital. Ultimately, this ends in profit. This result is consistent with Hunanto and Chirique hour concluding that the value of banks' loan-to-value ratios is increasing, and that the amount of loans paid out in general is also increasing. As the amount of loans paid out to the community increases, the bank's profits increase.

Especially in the ROA model, the liquidity ratio is positively and statistically significant and negatively correlated with the profitability indicator ROE and NIM. The negative correlation between liquidity and bank profitability indicates that the more liquid a bank is, the less profitable it is. The results here should be interpreted with caution. Of course, the bank must have sufficient liquidity to meet the demand of depositors to withdraw money at any time. This low ratio indicates that banks struggle to make timely payments. A low ratio means banks will increase their funding costs, ultimately impacting their profitability. On the other hand, if a bank is overly liquid, it means the bank is in a liquidity trap, keeping productive assets idle. This ultimately put the bank's profitability at risk. If this ratio is too high, the bank will keep excess cash dormant and lose interest income. This result is consistent with Abayomi, who found that the liquidity coverage ratio had a significant impact on the profitability of depository banks. This is also consistent with the Basel III framework, which requires banks to hold sufficient high-quality liquid assets/resources to support their liquidity needs

for one month under the correct stress scenario. Therefore, an increase in ILCR means an increase in liquid assets and a decrease in illiquid assets, improving bank profitability. However, this result contradicts Muriithi and Waweru, who found that the liquidity ratio had no effect on the financial performance of commercial banks, while holding everything else constant.

The funding gap, used as an indicator of liquidity risk in this study, is measured as the ratio of the funding gap (the difference between total loans and total deposits) to total assets. Regression results showed that funding gaps of 0.22, 0.26, 0.4, P-values greater than 0.05 had statistically insignificant effects on bank performance of Ethiopian commercial banks (ROA, ROE and NIM) measured in, the coefficients are 6.008, 0.001 and -0.002 respectively. Thus, the funding gap hypothesis states that the funding gap ratio is negatively, but not significantly, associated with his NIM. This does not mean that banks will perform poorly. This average difference between the results of loans made by commercial banks and commercial bank deposits collected from customers is not significant. Consistent with the results of Tabari and Zaghoudi.

The cash reserve ratio in this study is measured as the percentage of cash held in the National Bank of Ethiopia compared to the total cash and cash equivalents held by Ethiopian commercial banks. The sign of the cash reserve ratio coefficient was positive for ROA and ROE, and negative for NIM, but was not statistically significant with p-values greater than 0.05. The coefficient values show that a deposit/withdrawal of 1 Birr from the reserve account of the national bank of Ethiopia does not lead to an increase or decrease in the financial performance of Ethiopian commercial banks. The results suggest that Ethiopian commercial banks have retained an average of 21.01% of their cash with the national bank of Ethiopia.

This was far from the 5% standard set by the National Bank of Ethiopia under guideline no. SBB/55/2013. The results also suggest that the profitability of Ethiopian commercial banks is declining as they continue to increase their cash reserves along with Ethiopia's national bank. Ethiopian commercial banks bear a high opportunity cost. This result is consistent with Wanjiku and Assumptah and Abid and Lodhi, who find a negative relationship between cash reserves and profitability and changes in CRR have an opposite effect on bank profitability.

Furthermore, they conclude that cash reserves may reduce the lending capacity of commercial banks, and that cash reserves may deprive banks of many market opportunities. Another study conducted by Bassey suggests that the cash reserve ratio of commercial banks has a large impact on the profitability of shareholder returns, but only a weak impact on the profitability of asset returns. These results suggest that liquidity management is not optimizing the use of assets, despite the huge profits that commercial banks in Nigeria announce each year.

Bank size in financial performance

Bank size, the natural logarithm of total assets, has a positive impact on the profitability of Ethiopian commercial banks without being statistically significant, as shown in the Table 6. A positive coefficient indicates that large commercial banks tend to generate higher profits than smaller commercial banks and vice versa, but is not statistically significant. It does not support previous work. This positive relationship between bank size and commercial bank profitability suggests that large banks may benefit

from economies of scale, or that even a 1% or 1 Birr increase in size may performance (ROA, ROE and NIM). Therefore, the effect of size is not linear; it can be both negative and positive. This result was consistent with that of Chen.

Gross Domestic Product (GDP) is a key economic indicator of the overall health of an economy. GDP measures the monetary value of final goods and services purchased by final consumers and produced in a country over a specified period of time. Counts all electricity generated within a country's borders. For research purposes, GDP is measured by the rate of change in Gross Domestic Product over a period of one year.

The coefficient sign for GDP was positive and statistically significant, the p-values for ROA, ROE and NIM, which measure the financial performance of commercial banks in Ethiopia, were 0.000, 0.04 and 0.05, respectively, with coefficient values of 0.1, 0.2 and 0.22. The coefficient values indicate that 1% GDP growth increases financial performance of Ethiopian commercial banks by 0.1, 0.2 and 0.22 respectively. This result is consistent with Milhem and Abadeh who suggested that the impact of GDP on his ROA of Islamic Bank of Jordan was statistically significant (2005-2015).

Conclusion

Fixed-effects regression results in adjusted R^2 of 60%, 63%, and 51%, indicating good explanatory power of the model. The values (i.e., 51% and 63%) can be interpreted as follows. Financial performance volatility of Ethiopian commercial banks of at least 51% is determined by the Funding Gap Measure (FGR), Liquidity to Total Assets Ratio (LATA), Lending to Assets Ratio (TLA), Cash Reserve Ratio (CRR), explained.

The study measured the loan-to-asset ratio using the ratio of total loans and assets to total assets of Ethiopian commercial banks. The sign coefficient for the loan to equity ratio was positive and statistically significant at the 1% significance level with p-values of 0.000 and coefficient values of 0.18 and 0.36 for ROA and ROE, respectively. The coefficient values show that an increase of 1 Birr in total assets increases the financial performance of Ethiopian commercial banks by 0.18 Birr in assets and 0.36 Birr in bank capital. This shows that Ethiopian commercial banks are using their assets to generate income and the loans they provide to their customers are growing at the same pace as their capital. Especially in the ROA model, the liquidity ratio is positively and statistically significant and negatively correlated with the profitability indicator ROE and NIM. The negative correlation between liquidity and bank profitability indicates that the more liquid a bank is, the less profitable it is. The results here should be interpreted with caution. Of course, the bank must have sufficient liquidity to meet the demand of depositors to withdraw money at any time. This low ratio indicates that banks struggle to make timely payments. A low ratio means banks will increase their funding costs, ultimately impacting their profitability.

On the opposite hand, if the financial institution is excessively liquid, it method that the financial institution is in liquidity trap and is retaining its efficient belongings idle. This in the end positioned the financial institution's profitability at threat due to the fact an exceedingly better ratio of this will suggest the financial institution has stored extra liquid belongings inactive and subsequently dropping hobby income. Financing hole used as a degree of liquidity threat on this take a look at which became measured *via* way of means of financing hole (the distinction of general mortgage and general deposit) over general asset the regression end result confirmed that financing hole 0.22, 0.26, 0.4 P-fee more than P-fee 0.05 has a statistically insignificant effect on financial institution overall performance of business banks in Ethiopia degree *via* way of means of (ROA, ROE and NIM) have coefficient 6.008, 0.001 and -0.002 respectively. Thus, the speculation of financing hole said that the ratio has financing whole insignificantly and negatively relation with NIM. This no reasons to growth lower the overall performance of banks. This suggest distinction among mortgage dispensed

via way of means of business banks end result became and business financial institution's deposits accrued from client is insignificance. Cash reserve ratio on this take a look at measured *via* way of means of percent of coins reserved held at country wide financial institution of Ethiopia to general coins and close to coins gadgets of Ethiopian business banks have. The coefficient signal of coins reserve ratio had fine on ROA, ROE and bad on NIM however statistically insignificant with p-fee with p-fee of more than 0.05. The coefficient values suggest that if 1 Birr deposit/withdrawal from reserve account held at country wide financial institution of Ethiopia bring about no rise/decline in economic overall performance of Ethiopian business banks. This end result counseled that Ethiopian business banks reserve on common 21.01% their coins at country wide financial institution of Ethiopia. This became a ways from fashionable which became 5% set *via* way of means of country wide financial institution of Ethiopia beneath directives wide variety SBB/55/2013. This end result additionally counseled that as Ethiopian business financial institution held a good deal increasingly more coins reserve at country wide financial institution of Ethiopia their profitability come to be lower due to the fact Ethiopian business banks endure excessive possibility cost. Bank size, herbal log of general belongings, is determined to have statistically insignificant and fine effect on Ethiopian business banks profitability as depicted with inside the above ROA, ROE and NIM are insignificant (p-1/3, 6.0.338 and 0.451) coefficient 0.001, 0.009 and 0.008 ranges respectively.

A positive coefficient indicates that large commercial banks tend to generate higher profits than smaller commercial banks, and vice versa, but is not statistically significant, indicating that Gross Domestic Product (GDP) is a key economic indicator that indicates the overall health of the economy. GDP measures the monetary value of final goods and services purchased by final consumers and produced in a country over a specified period of time. Counts all electricity generated within a country's borders. For research purposes, GDP is measured by his one-year rate of change in gross domestic product. The coefficient sign for GDP was positive and statistically significant, the p-values for ROA, ROE and NIM, which measure the financial performance of commercial banks in Ethiopia, were 0.000, 0.04 and 0.05, respectively, with coefficient values of 0.1, 0.2 and 0.22. The coefficient values show that 1% GDP growth increases financial performance of Ethiopian commercial banks by 0.1, 0.2 and 0.22 respectively.

Recommendation

Researchers communicate recommendations to help CBE implement sound liquidity risk management systems that are robust and resilient. CBEs must be able to incorporate the costs, benefits, and risks of liquidity into their product pricing, performance measurement, and new product approval processes. This will enable banks to track and address emerging sources of liquidity risk, requiring banks to actively manage collateral assets and distinguish between collateral and non-collateral assets. This helps us make better decisions in our liquidity risk management process by adding pressure and risk to burdened assets and deviating from activities that focus on less burdened assets. Banks should regularly publish more information about their liquidity risk management frameworks and the health of their liquidity positions so that market participants can make informed decisions. Commercial banks may need to revisit their credit scoring methods to ensure only worthy borrowers lend money to reduce bad debts. Lending should provide borrowers with some form of financial education, guidance, and advice on how to allocate borrowed funds. Commercial banks are required to hold sufficient capital in accordance with bank operating rules. In order to improve the operational efficiency of banks, it is necessary to improve the capacity development of bankers. For the national bank of Ethiopia at the regulatory or supervisory level, the findings of this study will help policy makers understand the impact of policies on the market environment of commercial banks and their role as financial intermediaries.

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