The Impact of Credit Risk Management on Financial Performance of Commercial Banks in Ethiopia

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Abstract

Commercial banks are profit seeking organizations operating as intermediaries between borrowers and lenders and play predominant role in credit growth and granting credit facilities. Commercial Banking sector is related to conditions and uncertainty; they are exposed to several types of risks. Among these risks, credit risk makes a severe threat to the financial performance of the banks. This study carried out an investigation in to the impact of credit risk management on financial performance of commercial banks in Ethiopia from 2001 to 2017. The secondary data collected from the bank's annual reports was analyzed by using panel regression analysis (random effect model). In the model Return on Asset (ROA) was used as the financial performance indicator while capital adequacy ratio (CAR), loan loss provision ratio (LLPR), and loan and advance to total deposit ratio (LDR) as credit risk indicators while macroeconomic variables were real gross domestic product growth rate (GDP) and inflation rate (INFL). The result of the analysis indicates that CAR, GDP and INFL have positive and statistically significant effect on return on asset (ROA). LLPR found negative statistically significant effect on ROA, while LDR found negative but statistically insignificant effect on ROA. The study concluded that credit risk still remains a major concern for the commercial banks in Ethiopia because credit risk is an important predictor of bank financial performance. The findings help the policy makers in setting better performance strategies and enable managers of the banks to allocate asset more efficiently.

Key words: Commercial banks, credit risk management, credit risk indicators, gross domestic product, inflation, financial performance, panel data regression model.

Introduction

Commercial banks are profit seeking organizations operating as intermediaries between borrowers and lenders interesting temporarily available resources from business and individual customer as well as granting loans for those in need of financial support. Banks deal with money belonging to individuals and other organizations assuming a number of risks by performing their activities. Risk is the possibility that a loss will occur and for any bank it is a part of every decision. In fact, the essence of business decision making is comparing the gains and potential risks involved (Bessis, 2002).

Banking industry is very important for the allocation of financial resources due to its intermediation functions of transferring funds from those who have surplus to deficit one (Eken et al., 2012; Ongore, 2013). In performing and sustaining these functions, good financial performance must be created from which financial risks may not be avoided. The financial sectors play an important role in the growth of the economy and development in any country. In the past decade, it has seen dramatic changes in managing risk in banking industry. In recent years, financial institutions have increased the focus on the importance of risk management (Christine & Beverly, 2001).

Commercial banks are currently operating in a highly volatile environment and they are facing risks such as credit risks, interest rate risk, liquidity risks, and foreign exchange risks. Among others, if these risks are managed it may encourage a bank to stay and reap success in the market. The most daily operations that are performed in banks are risky by nature. For this reason, banks should implement efficient risk management and this is urgently required (Carey A., 2001).

Basel Committee of Banking Supervision (BCBS, 2000) defined credit risk is the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). Credit occurrences usually include events such as bankruptcy, failure to pay a due obligation, repudiation/moratorium or credit rating change and restructure. Basel Committee on Banking Supervision- BCBS (1999) described credit risk as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms.

Credit risk is most critical for the survival of the banks as it is directly linked to the major as well as the primary activity of banks i.e., lending funds to the borrowers as money or other instruments.

Credit risk management is the human activity which integrates risk assessment, recognition of risk, developing strategies to manage it, and mitigation of risk using managerial resources. Credit risk management is very important to commercial banks as it is an integral part of the loan process. Credit risk management should be at the centre of commercial banks operations in order to maintain financial sustainability and reaching more clients. Despite these facts, over the past years there has been increased number of significant bank problems in both, matured as well as emerging economies (Brown bridge and Harvey, 1998; Basel, 2004).

A credit facility is supposed to be performed if payment of both principal and interest are up to date in accordance with agreed repayment terms. The non-performing loans (NPL) represent credits which the banks recognize as possible loss of funds due to loan default. They are further classified into pass, special mention, substandard, doubtful and loss. Bank credit in loss category avoids bank from achieving their set targets, Kolapo, et al (2012).

Capital adequacy ratio (CAR) is regulatory capital requirement which is measured shareholder's fund divided by total assets (Syed M., 2017).

Loan loss provision (LLP) is an allowance earmarked as an expense for loan amount which has not been collected by the banker and not paid by the customer. The purpose of creating this provision is to cover the likely losses on account of defaults. Loan loss provision ratio (LLPR) is measured as loan loss provision to total loans and advances (Ms. Champa R., 2018)

Loan and advance to deposit (LD) is a useful instrument to determine bank liquidity, and by extension, it influences the profitability of the banks. The commercial bank profit is based on the interest charged against the deposits; it means the profit is generated through the positive difference between interest of loans and interest on deposits supported a study by Joni T. & Towpek (2006).

Financial performance is company's ability to generate new resources, from day-to-day operation over a given period of time and it is gauged by net income and cash from operation (Das & Ghosh, 2007).Lack of proper credit risk management causes poor commercial bank's financial performance or bankruptcy. Likewise, effective credit risk management causes high financial performance in commercial banks. The success of commercial banks institutions largely depend on the effectiveness of their credit management systems because these institutions generate most of their income from interest earned on loans extended to small and medium entrepreneurs.

This trend hinders the achievement of the goals for which commercial banks they were intended which is to provide credit to the rural unbanked population and bridge the financing gap in the mainstream of financial sector (Migiri, 2002).

The banking system in Ethiopia has witnessed a significant expansion following banking reform program which was undertaken in 1994. The reform program encouraged private banks to enter and expand their operations in the industry. According to National Bank of Ethiopia (NBE) annual report 2016/17, Ethiopian financial sector has been resilient and continued to work under safe and sound environment. Commercial banks have continued to expand their financial intermediation and remained highly profitable. 956 new branches were opened in 2016/17. The total branch network of commercial banks increased from 3,301 in 2015/16 to 4,257 in 2016/17 which resulted in improved access to finance.

National bank of Ethiopia (NBE) as a one and only regulator and supervisor of all financial institution activities in the country has a mandate to issue and provide guidance to all financial institutions as to the risk management system. To this end, it has revised the 2003 bank's risk management guidelines in 2010 to incorporate latest developments in the area. The guideline presents the risk management system of the banking risks. In Ethiopia, commercial banks play an important role in mobilizing financial resources for investment by extending credit to various businesses and investors. Lending stand for the heart of the banking industry and loans and advances are the dominant assets as they generate the largest share of operating income. However, Loans expose the banks to the greatest level of credit risk (Chin W., 2015).

Hence, examining the impact of credit risk management on financial performance of commercial banks in Ethiopia is vital to check the situation in the industry as Ethiopia is the country that do not allow any foreign owned banks to work in the industry and there is a very strong and direct involvement of government control in the day to day activities of the commercial banks in Ethiopia.

Based on the statements highlighted above, the result of this study is to find out an answer for the following research questions:

1. What is effect of capital adequacy on financial performance of commercial banks in Ethiopia?
2. What is the effect of loan loss provision on financial performance of commercial banks in Ethiopia?
3. What is the effect of loan and advance to deposit on financial performance of commercial banks in Ethiopia?
4. What is the relationship between gross domestic product (GDP) and financial performance of commercial banks in Ethiopia?
5. What is the relationship between inflation and financial performance of commercial banks in Ethiopia?

Objectives of the study

The main objective of the study is to examine the impact of credit risk management on financial performance of commercial banks in Ethiopia.

The specific objectives of the study are:

1. To determine the extent which capital adequacy affects the financial performance of commercial banks in Ethiopia.
2. To determine the extent to which loan loss provision affects the financial performance of commercial banks in Ethiopia.
3. To determine the extent which loan and advance to deposit affect the financial performance of commercial banks in Ethiopia.
4. To determine the relationship between gross domestic product (GDP) and financial performance of commercial banks in Ethiopia.
5. To determine the relationship between inflation and financial performance of commercial banks in Ethiopia.
6. To make recommendations on the basis of the finding of the study

Hypotheses of the study

In line with the specific objectives of the study, the following testable null hypotheses were adopted following the previous researchers who studied a research on similar topic like Alalade S., et al (2015) and Ogboi Ch., (2013).

H_{01}: Capital adequacy has no statistically significant effect on financial performance of commercial banks in Ethiopia

H_{02}: Loan loss provision has no statistically significance effect on financial performance of commercial banks in Ethiopia

H_{03}: loan and advance to deposit has no statistically significance effect on financial performance of commercial banks in Ethiopia.

H_{04}: There is no statistically significance relationship between growth domestic and financial performance of commercial banks in Ethiopia.

H_{05}: There is no statistically significance relationship between Inflation and financial performance of commercial banks in Ethiopia.

Literature review

According to **Fauziah Hanim Tafri, et al** (2009) analysed the impact of financial risks on financial performance of Malaysian commercial banks using panel data analysis for the period of 1996-2005 by employing regression analysis of Generalized Least Squares (GLS) of fixed effects and random effects models.The researchers found that loan loss provision (LLP) has a negative significant impact on return on asset (ROA). Liquidity risk was found positive but insignificant impact on return on asset (ROA). Growth domestic product (GDP) was found to have insignificant effect on return on asset (ROA). Capital has positive statistically significant effect on return on asset (ROA). The researchers found that inflation rate has no statistically significant effect on return on asset (ROA).

According to **Ara Hosna, et al** (2009) conducted the credit risk management and profitability of commercial banks in Sweden using panel data for the period of 2000 to 2008 by adopting regression analysis model. The researchers found that non-performing loans ratio (NPLR) had statistically significant negative effect on financial performance while capital adequacy ratio (CAR) had statistically significant positive effect on financial performance of commercial banks in Sweden.

According to **Al-khouri** (2011) assessing the risk and financial performance of 43 commercial banks operating in 6 of the Gulf Cooperation Council countries using panel data for the period of 1998 to 2008 by employing Ordinary Least Square (OLS) regression analysis. The researcher found that credit risk, capital risk and liquidity risk have significant impact on financial performance when the financial performance measured by Return on Asset (ROA). However, liquidity risk is the only risk that affects the financial performance of gulf cooperation council countries (GCC) banking sector when measured by return on equity.

According to **Girma M.** (2011) studied credit risk management and its impact on financial performance of Ethiopian commercial banks using panel data for the period of 2000 to 2010 by employing regression model. The researcher found that non-performing loans ratio (NPLR) had statistically significant negative impact on financial performance while loan loss provision ratio (LLPR) had statistically insignificant negative impact on financial performance of commercial banks in Ethiopia.

According to **Kolapo T., et al** (2012), investigated the credit risk and commercial bank's financial performance in Nigeria using panel data for the period of 2000 to 2010 by employing panel data regression model. The researchers found that non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR) had statistically significant negative impact on financial performance while loan to deposit ratio (LDR) has statistically significant positive impact on financial performance of Nigerian commercial banks.

According to **Ogilo F.** (2012) analyzed the impact of credit risk management on financial performance of commercial banks in Kenya using panel data analysis for the period of 2006 to 2010 by employing multiple regression model and Pearson correlation analysis. The researcher found that capital adequacy and asset quality have a negative impact while liquidity have positive impact on the financial performance of commercial in banks.

According to **Charles O. and Okaro K.** (2013) examined the impact of credit risk management and capital adequacy on the financial performance of commercial banks in Nigeria using panel data analysis for the period of 2004 to 2009 by employing Ordinary Least Square (OLS) and Fixed Effect Model. The researchers found that non-performing loans ratio (NPLR) have negative insignificant impact on financial performance. Loan loss provisions ratio (LLPR) and loan to deposit ratio (LDR) found that they have positive statistically insignificant impact on financial performance, while capital adequacy ratio (CAR) have a positive statistically significant impact on financial performance of commercial banks in Nigeria.

According to **Indiael K. and Dickson P.** (2013), investigated credit risk and financial performance of commercial banks in Tanzania using panel data analysis for the period of 2005 to 2011 by employing Regression model. The researchers found that non-performing loans (NPL) and loan loss provision (LLP) have statistically negative impact on financial performance (ROA) of commercial banks in Tanzania.

According to **Vincent O. and Gemechu B.** (2013) conducted the determinants of financial performance of commercial banks in Kenya using panel data analysis for the period of 2001 to 2010 by employing linear multiple regression modeland generalized least square (GLS). The researchers found that capital adequacy ratio (CAR) had significant positive effect on financial performance and for non-performing loans ratio (NPLR) and inflation (INFL) have significant negative effect on financial performance while gross domestic product (GDP) and liquidity ratio has no significant effect on financial performance of commercial banks in Kenya.

According to **Fan Li and Yijun Zou** (2014)examinedthe impact of credit risk management on profitability of commercial banks in Europe using panel data for the period of 2007 to 2012 by employing multivariate regression analysis. The researchers found that non-performing loans ratio (NPLR) had statistically significant negative impact on financial performance while capital adequacy ratio (CAR) had statistically insignificant impact on financial performance of commercial banks in Europe.

Arif A., et al (2015) analysed relevance of financial risk with financial performance of Indian banking sector using panel data analysis for the period of 2008/09 to 2012/13 by using linear multiple regression model. The researchers found that non-performing loans ratio (NPLR) has negative statistically significant impact on financial performance where as capital adequacy ratio (CAR) has positive significant impact the financial performance. Liquidity risk has insignificant positive impact the financial performance of Indian Commercial Banks.

According to **Alalade S., et al** (2015) analyzed the credit risk management and financial performance of selected commercial banks in Nigeria using panel data analysis from the period of 2006 to 2010 by adopting Multiple Regression Model. The researchers found that loan loss provision (LLP) has positive but not statistically significant effect on financial performance while non-performing loans (NPL) has negative but not statistically significant effect on financial performance.

According to **Million G., et al** (2015) examined the impact of credit risk on profitability performance of commercial banks in Ethiopia panel data for the period of 2003 to 2014 by using descriptive statistics and panel data regression model. The researchers found that non-performing loans ratio (NPLR) had statistically significant negative impact on financial performance while loan loss provision ratio (LLPR) has statistically significant positive impact on financial performance. Capital adequacy ratio (CAR) and loan to deposit ratio (LDR) does not reveal statistically significant impact on financial performance of commercial banks in Ethiopia.

According to **Samuel A.** (2015) examined the determinants of financial performance of commercial banks in Ethiopia using panel data for the period of 2002 to 2013 by employing using multiple linear regressions (fixed effect model). The researcher found that capital adequacy ratio (CAR) and gross domestic product (GDP) had statistically significant positive effect on financial performance measured by return on asset (ROA). Loan and advance to total deposit (LDR) found statistically significant negative effect on financial performance while inflation (INFL) found statistically insignificant effect on financial performance of commercial banks.

According to **Misker B.** (2015) examined the impact of credit risk on financial performance of commercial banks in Ethiopia using panel data for the period of 2003 to 2013 by adopting multiple regression analysis. The researcher found that non-performing loans ratio (NPLR) and capital adequacy ratio (CAR) had statistically significant negative impact on financial performance while loan to deposit ratio (LDR) had statistically significant positive impact on financial performance of commercial banks in Ethiopia. Gross domestic product (GDP) was found statistically insignificant positive impact on financial performance while inflation (INFL) was found statistically insignificant negative impact on financial performance of commercial banks in Ethiopia.

According to **Ambrose N. (2017**) determined the effect of credit risk management on the financial performance of commercial banks in Tanzania using panel data for the period of 2005 to 2015 by adopting Panel data regression analysis. The researcher found that non-performing loans ratio (NPLR) had statistically significant negative effect on financial performance. Capital adequacy ratio (CAR) had statistically significant positive effect on financial performance while loan to deposit ratio (LDR) had statistically insignificant negative effect on financial performance of commercial banks in Tanzania.

According to **Ms. Champa R. and Dr. M. R. Patil** (2018) examined the credit risk and commercial public and private banks' financial performance in India using panel data analysis for the period of 2000/01 to 2015/16 by employing Ordinary Least Square regression analysis. The researchers found that non-performing loans ratio (NPLR) have statistically significant negative influence on financial performance while capital adequacy ratio (CAR), loan loss provision ratio (LLPR) and loan to deposit ratio (LDR) have statistically significant positive influence on financial performance.

According to **Anthony W. and Shanise M.** (2018) conducted the impact of risk factors on the financial performance of the commercial banking sector in Barbados using panel data for the period of 2000 to 2015 by employing multiple regression model. The researchers found that non-performing loans ratio (NPLR) and loan to deposit ratio (LDR) had statistically significant negative impact on financial performance. Capital adequacy ratio (CAR) and inflation (INFL) had statistically significant positive impact on financial performance of commercial banks in Barbados. Gross domestic product growth rate (GDP) was found statistically insignificant positive impact on financial performance of commercial banks in Barbados.

Moreover, based on the above researchers' findings, the results are inconsistent for different studies conducted. In addition, despite various studies being undertaken to investigate the impact of credit risk management on financial performance of commercial banks, the results revealed mixed findings and different researchers used different methodology or approach in measuring the impact of credit risk management financial performance of commercial banks. This study attempts to fill up the gap of impact of credit risk management on financial performance of commercial banks studies by focusing in particularly the commercial banks in Ethiopia.

Research methodology

The study adopted a quantitative research design to achieve its objectives. Panel data regression (Random effect model) analysis was used to investigate the extent to which credit risk management affects the financial performance of commercial banks in Ethiopia for the period of 2001 to 2017. Combining time series and cross sectional observations, panel data give more informative data, more variability, less colinearity among variables, more degrees of freedom and more efficiency. It also enriches empirical analysis in such a way that may not be possible if either only time series data or cross sectional data is used (Charles O. and Okaro K., 2013).The target population of this study is all commercial banks registered by National Bank of Ethiopia and have a data of 17 years 2001 to 2017.

However, commercial bank(s) which were not in operation for the entire 17 years period or not operational in the market were dropped due to incompleteness of the records. This research used secondary data which was collected from the audited annual financial reports of commercial banks, ministry of finance and economic development and National Bank of Ethiopia for the period of 2001 to 2017. The data analysis method used was panel data regression model (Random effect model). Besides, the regression output was obtained by using statistical software package called STATA Version 12.

Table 1: Variable description

S/N	Variables	Measurement	Type of variable
1	ROA (Return on asset)	Net income/Total asset	Dependent variable
2	LLPR (Loan loss provision ratio)	Loan loss provision /Total loans and advances	Independent variable
3	CAR (Capital adequacy ratio)	Total capital/Total asset	Independent variable
4	LDR (Loan deposit ratio)	Total loan and advance /Total deposit	Independent variable
5	GDP (Gross domestic Product)	Growth rate of real gross domestic product	Independent variable
6	INF (Inflation)	annual inflation rate	Independent variable

Model specification

This study adopted a panel data regression model previously studied by Jane G., et al (2016) in their study of effect of credit risk on financial performance of commercial banks in Kenya.This research adopted regression analysis to find out the relationship between credit risk management and financial performance in the commercial banks. The researcher used 17 years period (2001-2017).

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it+} \beta_5 X_{5it} + \varepsilon_{it}$$

Where: Y is the dependent variable; β_0 is constant term; β is the coefficient of independent (explanatory) variables; X_{it} is the vector of independent variables; and ε_{it} is the error term.

Thus the panel regression model equation becomes:

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LLPR_{it} + \beta_3 LDR_{it} + \beta_4 GDP_{it} + \beta_5 INFL + \varepsilon_{it.}$$ Where,

ROA_{it} = Return on assets of bank i at time t

CAR_{it} = Capital adequacy ratio of bank i at time t

$LLPR_{it}$ = Loan loss provision ratio of bank i at time t

LDR_{it} = Loan deposit ratio of bank i at time t

GDP_{it} = Real gross domestic product growth rate at time t

$INFL_{it}$ = Annual inflation rate at time t

It is the regression function which determines the relation of X (CAR, LLPR, LDR, GDP and INFL) to Y (ROA). β_0 is the constant term and β is the coefficient of the function, it is the value for the regression equation to predict the variances in dependent variable from the independent variables.

This means that if β coefficient is negative, the predictor or independent variable affects dependent variable negatively: one unit increase in independent variable will decrease the dependent variable by the coefficient amount. In the same way, if the β coefficient is positive, the dependent variable increases by the coefficient amount. β_0 is the constant value which dependent variable predicted to have when independent variables equal to zero (if X_{1it}, X_{2it}, X_{3it}, X_{4it}, and X_{5it} = 0, then β_0 = Y). ε is the disturbance or error term.

Regression analysis output contains values which discussed below:

R2 is the proportion of variance in the dependent variable that can be predicted from independent variables. The Probability value (P-value) is used to measure how reliably the independent variables can predict the dependent variable. It is compared to the significance level which is typically 0.05. If the P-value is greater than 0.05, it can be said that the independent variable does not show a statistically significant relationship with the dependent variable.

Result and discussion

Table 2: descriptive statistics analysis

Variable	N	Mean	Std. Dev.	Min	Max
ROA	119	0.0245844	0.0094445	-0.021268	0.040283
CAR	119	0.1202798	0.0441665	0.037433	0.294393
LLPR	119	0.0452387	0.048012	0.007463	0.289723
LDR	119	0.6678856	0.1599578	0.29687	1.0553
GDP	119	0.0925436	0.0373038	-0.02099	0.126442
INFL	119	0.1185602	0.1139418	-0.105722	0.364

Source: STATA12 output from own computation.

The descriptive statistics for the dependent and independent variables are presented below. The dependent variable is financial performance measured by return on asset (ROA) and the independent variables are capital adequacy ratio (CAR), loan loss provision ratio (LLPR), loan and advance to total deposit ratio (LDR), real gross domestic product growth rate (GDP) and Inflation (INFL). To provide a clear picture of financial performance and credit risk indicators considered under the study the descriptive statics, namely; mean, standard deviation, minimum and maximum values computed for the sample observation of 7 commercial banks for 17 years period (2001 to 2017) as shown in Table2. To measure the financial performance of commercial banks, return on asset (ROA) were used in this study having minimum value of -2.127% and maximum value of 4.028% with a mean value of 2.458% and standard deviation of 0.944% and. The result on table 2 showed that on average the banks under study earned a 2.458% return on asset with 0.944% standard deviation. According to Valentina F., et al (2009) found in their study commercial banks were appearing very profitable in Sub-Saharan Africa (SSA), where Ethiopia is located, having about 2% of average return on asset which significantly higher than bank returns in other parts of the world.

Hence, it can be argued that commercial banks in Ethiopia had been efficient enough to generate a higher rate of return out of their asset. This indicates that there is high profitability of the commercial banks in Ethiopia.

Capital Adequacy Ratio (CAR) has a minimum value of 3.743% and maximum value of 29.439% with a mean value of 12.028% and standard deviation of 4.417%. According to National Bank of Ethiopia the minimum requirement of capital adequacy ratio (CAR) is 8% for Ethiopian banks. Likewise, according to BASEL Committee the minimum requirement of capital adequacy ratio (CAR) in Commercial banks is 8%. The average amount of capital adequacy ratio (CAR) is higher than the minimum capital requirement of the National Bank of Ethiopia and BASEL Committee.

Loan loss provision ratio (LLPR) has a minimum value of 0.746% and maximum value of 28.972 with a mean value of 4.524% and standard deviation of 4.801%. This indicates that on average commercial banks in Ethiopia held 4.524% of their loans as loan loss provision. In Ethiopia, National Bank of Ethiopia requires a reserve for loan loss to be charged on commercial bank's revenue on the bases of the amount of classified loan categories. The required amount of loan loss provision ratio (LLPR) determined by National Bank of Ethiopia is pass 1%, special mention 3%, substandard 20, doubtful 65% and loss 100%. Thus, the mean value of 4.524% falls under substandard.

The loan and advance to total deposit ratio (LDR) is the most commonly used to measure bank's liquidity. The ratio can also show how the bank used the depositor's fund on credit purpose which may cause to default risk. As shown in table 2, loan and advance to total deposit ratio (LDR) has minimum value of 29.687% and maximum value of 105.53 with a mean value 66.790% and standard deviation of 16%. The maximum value also shows that how the commercial banks lend in excess of depositor's fund and employed the depositor's fund in high risk takingactivities. According to Jna W. (2013) there is no (micro- or macro-prudential) international regulation that sets quantitative limits to the loan and advance to total deposit ratio (LDR) mainly, because the relation between loans and deposits depends on the structure of the domestic financial system.

Gross domestic product growth (GDP) is an indicator of the economic health of a country as well as the gauge of a country's standard of living. For this study, gross domestic product (GDP) is measured by the annual real growth rate of gross domestic product. Gross domestic product (GDP) has a minimum value of -2.099% and maximum value of 12.644% with a mean value of 9.254 and standard deviation of 3.730%. This implies that economic growth in Ethiopia during the period of 2001 to 2017 remains reasonable stable.

Inflation (INFL) has a minimum value of -10.572% and maximum value of 36.40% with a mean value of 11.856% and standard deviation of 11.394%. Inflation (INFL) had somewhat a higher standard deviation (11.856) compared to gross domestic product (GDP). This implies that inflation rate in Ethiopia remains somewhat unstable during this study period.

Table 3: Pearson's correlation Matrix

	roa	car	llpr	ldr	gdp	infl
roa	1.0000					
car	0.2462	1.0000				
llpr	-0.4260	-0.3957	1.0000			
ldr	-0.0905	0.4820	-0.2932	1.0000		
gdp	0.5277	-0.0499	-0.1510	-0.2031	1.0000	
infl	0.4375	-0.0287	-0.0884	-0.2217	0.2778	1.0000

Source: STATA12 output from own computation.

As shown table 3; Pearson's correlation matrix, the values are in diagonal, all are 1.0000 which indicates that every single variable is perfectly correlated with itself. Loan loss provision ratio (LLPR) and loan and advance to total deposit ratio (LDR) are inversely correlated with return on asset(ROA) with correlation coefficient values of -0.4260 and -0.0905 respectively which indicates that when these variables; loan loss provision ratio (LLPR) and loan and advance to total deposit ratio (LDR) increases, return on asset(ROA) decreases.

However, capital adequacy ratio (CAR), real annual gross domestic product rate (GDP) and inflation rate (INFL)) are positively correlated with return on asset (ROA). This indicates that as the rate of capital adequacy ratio (CAR), real annual gross domestic product rate (GDP) and inflation (INFL) increases, return on asset (ROA) also increase with a correlation coefficient value of 0.2462, 0.5277 and 0.4375 respectively.

According to Brooks (2008), Multicollinearity will occur when some or all of the independent variables are highly correlated with one another. If the multicollinearity occurs, the regression model is unable to tell which independent variables are influencing the dependent variable. According to (Julie P., 2009), there is a multicollinearity problem in developing regression that includes all the independent and control variables into one liner regression as the correlation is higher than (0.7). Thus, it indicates that there is no multicollinearity problem in this study while there is no any highly correlated independent variable.

Table 4: Multi-collinearity Test

Variable	VIF	1/VIF
ldr	1.46	0.683455
car	1.44	0.695135
llpr	1.28	0.782728
gdp	1.15	0.867645
infl	1.14	0.880224
Mean VIF	1.29	

Source: STATA12 output from own computation

As shown in table 4, Variance inflation factor (VIF) ranges from 1.14 to 1.46 which is less than 10. This shows that there is no multicollinearity feature in this study. Variance inflation factor (VIF) shows multi-collinearity when the value exceeds 10 (Sabari, 2012). Tolerance value (TV) is the reciprocal of Variance inflation factor (1/VIF) which ranges from 0.683455 to 0.880224 which shows absence of Multi-collinearity. Multi-collinearity feature exist when the value of TV is less than 0.2 (Sabari, 2012).

Table 5: Result of panel data regression analysis (Random effect model)

roa	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
car	.0544606	.0189333	2.88	0.004	.017352	.0915691
llpr	-.0653791	.0143046	-4.57	0.000	-.0934155	-.0373426
ldr	-.007149	.004645	-1.54	0.124	-.016253	.001955
gdp	.0981348	.0163248	6.01	0.000	.0661388	.1301308
infl	.0232796	.0053028	4.39	0.000	.0128863	.0336728
_cons	.0139245	.0047	2.96	0.003	.0047126	.0231364

$R^2 = 0.5177$
Prob > chi2 = 0.0000
Source: STATA12 output from own computation.

As declared in research design and methodology part, the study used panel data regression model (random effect model) to estimate the effect of explanatory variables (CAR, LLPR, LDR, GDP and INFL) on financial performance of commercial banks in Ethiopia measured by return on asset (ROA). As shown in Table 5, the R^2 of the model is 51.77% indicating that credit risk indicators (independent variables) in the model explained 51.77% of the variance in financial performance of commercial banks in Ethiopia measured by return on asset (ROA).

Capital adequacy ratio (CAR)

H_{01}: Capital adequacy has no statistically significant effect on return on asset (ROA) of commercial banks in Ethiopia.

Table 5, shows that capital adequacy ratio (CAR) has a statistically significant positive effect on return on asset (ROA) with a coefficient of 0.0545 at level significance of 0.05. This means that one unit increases in CAR, ROA will increase by 0.0545 units, while other explanatory variables are held constant. The statistical significance of CAR is 0.004; this tells that 99.996% of the variance of ROA can be predicted by CAR. This finding is in line with previous empirical studies like (Ambrose N., 2017)

H_{01} hypothesizes that capital adequacy has no statistically significant effect on return on asset (ROA). This hypothesis was tested with the help of panel data regression analysis (random effect model). The P value of CAR is 0.004% at level significance of 0.05. Thus, the null hypothesis is rejected.

Loan loss provision ratio (LLPR)

H_{02}: Loan loss provision has no statistically significant effect on return on asset (ROA) of commercial banks in Ethiopia.

As shown in table 5, loan loss provisionratio (LLPR) has a statistically significant negative effect on return on asset (ROA) with a coefficient of 0.065 at level significance of 0.05. It refers that if LLPR increases one unit, ROA will decrease 0.065 units, when other explanatory variables are held constant. The statistical significance of LLPR is 0.000; this tells that more than 99.999% of the variance of ROA can be predicted by LLPR. This finding is in line with previous empirical studies like (Kolapo T., et al 2012)

H_{02} hypothesizes that loan loss provision has no statistically significant effect on return on asset (ROA). This hypothesis was tested with the help of panel data regression analysis (random effect model). The P value of LLPR is 0.000% at level significance of 0.05. Thus, the null hypothesis is rejected.

Loan and advance to total deposit ratio (LDR)

H_{03}: Loan to deposit has no statistically significant effect on return on asset (ROA) of commercial banks in Ethiopia.

As shown table 5, loan and advance to total deposit ratio (LDR) found to have negative but has no statistically significant effect on ROA. This finding is in line with previous empirical studies like (Million G., et al 2015)

H_{03} hypothesizes that loan and advance to total deposit ratio (LDR) has no statistically significant effect on return on asset (ROA). This hypothesis was tested with the help of panel data regression analysis (random effect model). The P value of LDR is 0.124% at level significance of 0.05. Thus, the null hypothesis is accepted.

Macroeconomic variables

Gross domestic product (GDP)

H_{04}: GDP has no statistically significant effect on return on asset (ROA) of commercial banks in Ethiopia.

As shown in table 5, real gross domestic product growth rate (GDP) has statistically significant positive effect on ROA with a coefficient of 0.098 at level significance of 0.05. This means that one unit increase in GDP may also increase ROA by 0.098 when other explanatory variables are held constant. The statistical significance of GDP is 0.000; this tells that more than 99.999% of the variance of ROA can be predicted by GDP. This finding is in line with previous empirical studies like (Samuel A., 2015)

H_{04} hypothesizes that real gross domestic product growth rate (GDP) has no statistically significant effect on return on asset (ROA). This hypothesis was tested with the help of panel regression data analysis (random effect model). The P value of GDP rate is 0.000% at level significance of 0.05. Thus, the null hypothesis is rejected.

Inflation (INFL)

H_{04}: Inflation rate has no statistically significant effect on return on asset (ROA) of commercial banks in Ethiopia.

Inflation rate (INFL) has statistically significant positive effect on ROA with a coefficient of 0.023 at level significance of 0.05. This means that one unit increase in INFL may also increase ROA by 0.023 when other explanatory variables are held constant.

The statistical significance of INFL rate is 0.000; this tells that more than 99.999% of the variance of ROA can be predicted by INFL. This finding is in line with previous empirical studies like (Anthony W. and Shanise M**.**, 2018)

H_{04} hypothesizes that inflation (INFL) has no statistically significant effect on return on asset (ROA). This hypothesis was tested with the help of panel data regression analysis (random effect model). The P value of inflation rate is 0.000% at level significance of 0.05. Thus, the null hypothesis is rejected.

Conclusion

This main objective of this study was to examine the impact of credit risk on the financial performance of commercial banks in Ethiopia. The panel data of 7 commercial banks over the period of 17 years (2001 to 2017) have been collected from the annual reports of the commercial banks and macroeconomic variables. Panel regression model (random effect model) has been used to assess the impact of credit risk management on financial performance of commercial banks in Ethiopia. The study concluded that capital adequacy, loan loss provision, inflation, gross domestic product had statistically significant effect on financial performance of commercial banks in Ethiopia. However, Loan and advance to total deposit had statistically insignificant effect on financial performance of commercial banks in Ethiopia.

The study concludes that commercial banks in Ethiopia are mainly influenced by credit risk and macro economic factors. The result in this study therefore, suggested that the need for strong credit risk management must be adopted.

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