DETERMINANTS OF CREDIT RISK IN ETHIOPIAN PRIVATE COMMERCIAL BANKS

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ABSTRACT

Optimal portfolio diversifications, establishing a comprehensive credit limit and loan pricing system as well as Credit risk management strategy, policy and procedures without a clear picture of Credit risk drivers is just considered as putting money on fire. Therefore, analyzing the link between the bank specific factors and credit risk indicator is indispensably required using a panel data set over the period of 2006-2012. The three Panel data estimation method, pooled OLS regression, fixed effect and random effect model, were used for extracting good result and F-test ascertained the appropriateness of Pooled OLS regression model. Its result revealed that the credit growth and return on equity had statistically significant negative impact on Credit risk indicator of the large Ethiopian private commercial banks. However, inefficiency, and deposit rate had statistically insignificant positive influence on the Credit risk indicator. It means that inefficient bank as well as those Banks that charge high deposit rate is likely to incur higher problem loan.

KEYWORDS: Loan Pricing System, OLS Regression, Credit Risk, F-Test

INTRODUCTION

There are many economic and financial reasons for justifying this study. First, Credit risk is the king of all risks. Many authors ranked the types of risk in terms of importance for the banks and Credit risk got the first rank ((Atakelt & Veni, 2015) (Hussain & Al-Ajmi, 2012) (Alam & Masukujjaman, 2011)). Therefore, investigating the determinants of Credit risk directly or indirectly means obtaining solution for a major problem of the banks.

Second, financial system of Ethiopia has shown progress since the financial reform of 1994. New and complex financial and economic police, regulatory measure and directive have been evolving gradually. As a result, it is inevitable to face multiple problems related to economic and financial policy measure that directly or indirectly influence the Ethiopian banking business. Within this change, the issue of credit risk management did not receive its due attention in the literature especially in developing country like Ethiopian. Therefore, this study serves as a benchmark for policy makers, bankers and others on aspects of banking environments.

Third, the linkage between financial crisis or banking failure and Credit risk management system has also been justified by many authors. For instance, Failure of practicing effective Credit risk management system was considered as one of the main cause of financial crises in general and banking failure in particularly ((Hussain & Al-Ajmi, 2012), (Al-Tamimi & Al-Mazrooei, 2007), (Van Gestel 2009), Saunders , 2008) , Fight A. (2003), Suresh P. (2010)). Practicing
effective Credit risk management system was a prescription given by several authors to minimizes banking problems and failure ((Hull, 2007), (De Juan, 2004), (Marrison, 2002) (Kolb, 1992)).

Understanding the impact or determinants of credit risk is tantamount with understanding the cause of diseases under which treatment and prevention measures proceed easily. When determinants of credit risk are assessed properly, it is possible to minimize the level of NPL, Credit loss, banking failure and crises.

Assessing the determinants of credit risk is the cornerstone for the effectiveness of risk management system and practice. Optimal portfolio diversifications, establishing a comprehensive credit limit system and loan pricing, as well as Credit risk management strategy, policy and procedures without a clear picture of credit risk drivers considered just like driving a car without having a break and knowing final destination. Therefore, the success and survival of commercial banks is greatly depending on effective Credit risk management system and practice (Atakelt & Veni, 2015).

Macroeconomic environment instability (specially increasing the level of unemployment, interest rate and inflation) with bank specific factors (aggressive lending, liquidity problem, management quality, asset quality and capital adequacy) may influence bank’s performance and lead to insolvency and then finally bring the bank crisis ((Festic M. et al, 2011), (Saunders & Cornett, 2003)). Banks are unable to meet their current financial obligation when borrowers fail to repay their loan amount. As a result, it may face liquidity problems that in turn force the bank to sell its asset less than what it worth in normal business condition and then finally may lead to insolvency.

Bank’s asset quality has been a major concern for a regulatory body. Problems related to Asset quality have a multiplier effect that directly or indirectly flamed by both micro and macro-economic environment. Therefore, proper assessment of banking environment means reducing adverse effect of banking business and solving the credit problem as well as identifying the cause and consequence of whole banking and financial system.

Due to the fact mentioned above, Banks should give more emphasis on determinant of credit risk to survive while doing their credit business. Study on the determinants of Credit risk is indispensably required to balance the contradicted objective of the bank (liquidity, safety and profitability).

The safety, soundness, solvency and profitability of banking system greatly depend on macro and micro economic condition. This study assumes that the level of asset quality depends on the fluctuation of bank specific economic environments. Generally, this study focus on the bank level determinants of Credit risk, such as Credit growth, profitability, bank size, inefficiency, diversification and deposit rate, in large private commercial banks of Ethiopia using panel data model over the period of 2006-2012.

**LITERATURE REVIEW**

There are several studies related to the determinants of credit risk at macroeconomic and micro level of banks. Researcher tried to summarize the main finding of some selected studies mainly on the area of macroeconomic and banks specific determinants of credit risk.

Awojobi & Amel (2011) employed panel data for analysis the determinants of Credit risk efficiency of Nigerian banking industry. Capital adequacy, proxy for Credit risk efficiency, was the independent variable while bank specific determinants: Credit risk (total loan over the asset), insolvency risk (current asset over current liability), Interest sensitivity
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ratio, market risk, management quality, ROA and bank size and macroeconomic determinants: growth and inflation, were used as explanatory variables. Researchers found that Credit risk, insolvency risk, market risk, bank size and economic growth had a positive influence on credit risk efficiency. However, management quality and inflation had a negative impact on credit risk efficiency.

Abdullah, A. et al (2012) conducted research using Johansen’s co-integration test to assess the long-term relationship between Credit risk and bank specific factors. Researchers found that Bank size had a positive and significant relationship with credit risk in domestic banks. Liquid assets and credit risk had negative and significant in foreign banks.

Ganic, M. (2012) conducted research on Bank Specific Determinants of Credit Risk in the Banking Sector of Bosnia and Herzegovina using the panel regression model and found that inefficiency and credit growth had a significant negative influence on credit risk while ROE and deposit rate had significant positive impact on credit risk. However, capital adequacy, liquidity, market power, ROA and reserve ratio had an insignificant impact on credit risk.

The impact of an economic condition on borrower’s credibility or credit quality was widely evidenced in the literature. Several authors found that a favorable economic condition reduce the level of Nonperforming loan. Thiagarajan, S. et al (2011), Das and Ghosh (2007), Zribi N.& Boujelbene Y. (2011), Fainstein G. (2011), Salas and Saurina (2002), Castro V. 2013) found that a significant negative relationship between GDP growth and the level of nonperforming loan.

Prakash & Poudel (2013) conducted research on Macroeconomic Determinants of Credit Risk in Nepalese Banking Industry and found that inflation and foreign exchange rate influence credit risk negatively while GDP growth, growth of Broad Money Supply and Market Interest Rate failed to influence credit risk in the Nepalese banking industry. Many authors also strongly link the loan problem with macroeconomic variables.


It manifested from the above literature that the level of asset quality is influenced by several macro and micro economic factors. Generally, Bank size, deposit rate, inefficiency, diversification, profitability, credit growth and capital adequacy indicators are important bank specific factors that were mostly employed in the study related to Credit risk determinant while GDP, inflation, exchange rate, interest rate, money supply, and unemployment rate are some of widely employed macroeconomic determinants of credit risk.

The main objective of this study is to find out bank specific Credit risk determinants, Credit growth, profitability, bank size, inefficiency, diversification and deposit rate, in large private commercial banks of Ethiopia using panel data model over the period of 2006 to 2012.
RESEARCH QUESTION AND HYPOTHESES

The aim of this study is to verify the hypothesis whether the bank specific factors such as ROE, Credit growth, bank size, deposit rate, diversification and inefficiency have an influence on the level of asset quality (credit risk) in Ethiopian private commercial banks using panel data model over the period of 2006 to 2012.

Main research question is that how the bank specific factors affect credit risk in Ethiopian private commercial banks. Based on this objective and research questions, researcher tried to test whether bank specific factors have significant influence on the credit risk of Ethiopian commercial banks.

H1: There is a significant positive correlation between each Bank specific determinant and Credit risk.

METHODOLOGY

The mean intention of the researcher is to find out the link between bank specific determinants of credit risk and credit risk indicator of the private commercial bank in Ethiopia. Panel data model was used in order to achieve this objective. It is obvious that research should be done mainly based on previous literature. The majority of reviewed previous researches used panel data model to analyze the determinants of credit risk (Awojobi & Amel , 2011) , Ganic, M., (2012), Prakash & Poudel (2013), Zribi & Boujeblene , (2011), Misman, F., (2012) , Das & Ghosh, (2007), Thiagarajan, S. et al., (2011), Jimenez & Saurina, (2006), Misman, F., (2012), Castro V., (2013)).

Totally, 19 commercial banks, where 17 private commercial banks and two public commercial banks, are currently operating in the Ethiopian banking system. Based on the classification of NBE, There were six big private commercial banks out of 17 private commercial banks operating in the country during the study period. Population of the study was the six large private commercial banks.

In order to take balanced secondary data, from six large private commercial banks, the six-year periods of panel data set starting from 2007 to 2012 were taken. Bank of Abyssinia, Wegagan bank, United bank, Awash international bank, Dashin bank and Nib international bank were the six large private commercial banks based on their asset size.

Based on asset size, NBE classified commercial banks in to three : large commercial banks for those commercial banks with total asset greater than Birr 9 billion and medium commercial banks with total asset size between birr 3 billion and birr 9 billion and finally small commercial banks with asset size less than birr 3 billion. Therefore, this study excludes public commercial bank as well as small and medium private commercial banks.

Specification of Model and Variables

A panel data model where both feature of cross sectional and time series panel data set are taken in to consideration in the estimation of the parameters of the study. It deals with multiple observations of the same entities over multiple period of time. The general function of the Model of the study is written as follows:

\[ \text{Credit risk indicator} = f (\text{bank specific determinants of Credit risk}) \]

Symbolically:

\[ Y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \ldots + \beta_k x_{kit} + U_{it} \]
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Where:

i = 1, 2, 3.. ..........................6: six large private commercial banks
t = 1, 2, 3.. ..................................6: six years: 2007-2012

yit’ is stands for credit risk indicator for the bank ‘i’ at time ‘t’ period. Here “i” represent for the ith cross-sectional unit while “t” stand for the tth time period.

• \( \alpha \) and \( \beta \) are vector of the parameters

• \( X_{k,t} \) is the values of the kth independent variables for bank i at a time t:

• \( U_{it} \) is the error term

With the variables of the study:

\[
CR_{it} = \alpha + \beta_1 CG_{it} + \beta_2 ROE_{it} + \beta_3 DR_{it} + \beta_4 INF_{it} + \beta_5 DV_{it} + \beta_6 BS_{it} + U_{it} \]

Where

\( CR \) stands for the Credit risk ratio, \( DR \): Deposit rate, \( CG \): Credit growth rate \( ROE \): Return on equity, \( INE \): Inefficiency, \( DV \): Diversification and \( BS \): Bank size

Variable of the Study

There are multiple factors that affect Credit risk management activities of the banks. For instance, profitability, loan growth, Bank size, deposit and lending rate, branch expansion, efficiency, level of diversification, capital adequacy, level of liquidity and ownership structure were some of the bank specific Credit risk determinants mostly reported in literatures4.

Is no single unique variable that indicate the level of credit risk and being considered as a proxy for the credit risk indicator (dependent variable). Different authors used different asset quality measure as an indicator of credit risk5. it is depend on the the level of disclosuring asset quality data for external users. It is difficult to get data related to NPL from most commercial banks and regulatory body due to its confidentiality. Therefore, the choice of the variable, credit risk indicator greatly depends on the availability of data related to asset quality.

Different financial ratios were used to indicate the level of credit risk (asset quality) in several studies and books as well as banks report. Financial ratio such as the ratio of NPL to total loan, loan to total asset, risk-weighted assets to total assets, loan loss reserve to total loans, loan losses to total loan, loan loss provison to total loans and Provision for loan losses to total assets as well as total loan to total deposit and total loan to equity were mostly used as a proxy for credit risk in several credit risk determinants related literature. Generally, the ratio of nonperforming loan to total loan was considered

5 In most books and studies, ratio of Provision for loan losses over total operating income, Provision for loan losses over total loans, Provision for loan losses over total assets and Non-Performing loans over total loans are an indicator of asset quality (Casu B. et al. 2006, P. 214). Almost all banks are using such parameters as standard to determine their asset quality.
as the Credit Risk indicator in most literatures. 


Credit growth, profitability, Bank size, efficiency, diversification and deposit rate were used as the banks specific Credit risk determinants in this study while the ratio of loan loss provision to total loans and advance was used as a proxy for the credit risk indicator (dependent variable). The variable of the study are clearly described below.

**Deposit Rate**

Deposit rate is measured as the ratio of interest expense to total deposit. It is one of the determinants of nonperforming loan due to its influentiality in pricing loans. Increment of cost of fund enforces the bank to charge high lending rate that in turn influences the repayment capacity of borrowers.

Today in complex banking environment, banks make competition through different ways. Charging attractive interest rate is one among others. Charging high deposit rate has multiple impacts on credit risk. First, offering high deposit rate directly influence the lending rate. Landing rate in turn, especially charging high-risk premium for risky borrowers, have multiple effect on borrower’s loan repayment capacity. Therefore, it has positive impact on loan quality since charging high interest rate means raising borrowing costs, which increase loan burden.

Second, offering high deposit rate encourage depositors or improve the level of deposit mobilization and create an excess loanable fund. The Deposited money should not be kept idle since the deposit is not free of cost. As a result, it enforces the bank to increase its lending volume and thus credit risk. Growth in deposit creates excessive loanable fund that motivated the bank to take credit risk or extend credit to riskier borrowers.


Many authors also reported the bond between deposit rate and non-performing loan. For instance, deposit rate and level of NPL positively correlated ((Ganic, M. (2012), (Ahmad & Bashir, 2013).). Ahmad & Bashir (2003) argued that the effect of deposit rate on Non-performing loan depending upon the level of risk management system being practiced. Coefficient of deposit rate is expected to be positive.

**Annual Credit Growth Rate**

It is obvious that the probability of non-repayment of the loan will increase with the level of credit growth. Theoretically, the increment of any unit of credit is not without bearing the risk. Creation of an additional unit of credit is only possible through taking risks. Therefore, there is default risk whenever the banks take risk to extend credit.
The impact of Credit growth on nonperforming loan was extensively reported in several literatures. The finding of Das & Ghosh, (2007), Jimenez & Saurina (2006), Thiagarajan, S., et al (2011), Ahmad & Bashir (2013) ascertained the positive impact of credit growth on credit risk. However, Ganic, M. (2012) found a negative relationship between credit risk and credit growth.

**Bank Profitability**

Bank profitability is usually measured by return on equity, return on assets and net interest margin. Return on equity is Ratio of Net income to average stockholders' equity. It indicates what the shareholders of the bank earning from their equity investment. Most of the studies were analyzed using ROE as bank’s profitability indicator (Abdullah, A. et al. (2012). Ganic, M. (2012), (Shingjergji, 2013)). MACDoNALD S. and Koch T (2007) note as ROE is vital for performance analysis specially for indicating long-term sustainability and survival of the bank. Therefore, ROE is one of the vital measures of bank performance (profitability indicators) and negative sign will be expected on this ratio.

**Asset Size**

Bank size has become quite fashionable determinant of credit risk recently and measured by log of total asset. There is no clear-cut evidence that shows the exact relationship between bank size and problem loan. The negative impact of bank size on credit risk was reported in some literature. It is justified that big banks have ability to deal with credit risk by formulating sound and effective Credit risk management system, introducing modern risk management instrument and technology as well as a better portfolio diversification opportunity and having Competitive advantage on economies of scale. On the other hand, there is a “big to fail” finding stating that bank size and credit risk positively correlated. In this case, there is a massive mobilization of fund through branch expansion and paying attractive deposit rate. As a result, bank can extend credit, which exposed the bank to credit risk ( (Das & Ghosh, 2007), (Zribi & Boujelbene , 2011), (Abdullah A. et al, 2012) and (Misman, F., 2012)). Thirdly, Awojobi & Amel (2011) found that bank size is irrelevant factor on credit risk. This is due to the common supervision and regulatory measure taken by the apex bank of the country under which all banks either big or small obey such measure in a similar way.

**Inefficiency**

In this study, inefficiency is measured by the ratio of operating expenses to total income. Inefficient banks tend to face high operating expense that flamed by nonperforming loan related costs. Inefficient bank’s Credit risk management system and practice characterized with poor credit analysis and credit monitoring system lead to poor credit quality. Efficient banks have sound and effective Credit strategy, policy and procedure with a strong credit culture that enable to undertake Credit risk management function properly and reduce operating expense while improving operating income. As a result, positive coefficient will be expected on this explanatory variable.

Thiagarajan, S. et al (2011), Ganic, M. (2012), Rashid K. et al (2014), Das and Ghosh (2007) used inefficiency in their study and found that inefficiency was positively related with problem loans. Diversification is also one of the major determinants of credit risk and measured by ratio of non interest income to total income.

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8 Non-interest income includes service charges on deposits, trust fees, advisory fees, servicing fees, net trading profits from trading books, and commissions and fees from off balance sheet items.
PROVISION FOR DOUBTFUL LOAN TO TOTAL LOANS AND ADVANCE

Changes in the level of asset quality directly influence the volume of loan loss provision. It is obvious that when the bank’s loan loss provision is high, it means high risk associated with credit portfolio and expecting high credit loss. In other word, the level of asset quality and loan loss provision moves together positively. Therefore, Loan loss provision clearly shows the level of credit risk since it is determined depends upon the level of asset quality. As a result, the researcher used ratio of loan provision to a total loan as a proxy for credit risk.

RESULT AND DISCUSSION OF THE STUDY

The description of this study started by giving insight about the credit risk indicators of the Ethiopian commercial banks and then assessing assumption of the model and analysis of the study finally.

Specific loan provisions indicates the level of credit quality of the bank since it is an expense that the bank set aside as an allowance against deteriorated loans. It is one of the vital Credit risk management instruments that build the bank’s ability to absorb the credit loss arises from bad loans by allocating capital under Loan loss provision account (Atakelt & Veni, 2015), (Van Greuning H, .2010)). Therefore, it indicates the effectiveness of the Credit risk management system and practice due to the fact that loss loan provision is determined based on the level of risk factors associated with borrowers.

Figure 1 shows the trend of Loan loss provision of Ethiopian commercial banks. High capital was allocated on provision in 2003 and 2012, which means that banks incurred high credit risk during to withstand the adverse credit effect. Bank’s loan loss provision increased from 2000 to 2003, then came down until 2009, and finally showed upward movement contentiously.

Source: National Bank of Ethiopia

Figure 1: Trend of Loan Loss Provision of Commercial Banks

It is necessary to assess the basic assumption of the method before undertaking further analysis. The result of normality test, the p. value of Kolmoprou-Snimay test for each variable is greater than 0.071, ascertain the normality of the distribution of the data for each variable.

Several authors have suggested that Multicollinearity problem exists if the correlation between each pair of independent variable is greater than 0.8 ((Gujarati, N., 2003,P. 341-375) , (Pallant, J. (2007, P.149) , Yfield, A. (2009, P.

In order to make adequate provision for loans, some regulatory bodies classify provision in to two. 1. Bank to allocate certain percent of their capital on performing loans (standard asset). 2. Specific Loan loss provision where bank allocate certain percentage of its capital as a provision based on the classification of nonperforming asset (sub standard asset, doubtful asset and loss asset).
It can be clearly seen from Table 2 that the correlation between each pair of independent variable is less than 0.515. Since the coefficients of all independent variables are less than 0.515, there is no multicollinearity problem in the study. Furthermore, Durbin-Watson test, with value of 0.9, also shows that the residuals are independent.

**Table 2: Correlations Coefficient of Variables**

<table>
<thead>
<tr>
<th>Variables</th>
<th>CG</th>
<th>ROE</th>
<th>INF</th>
<th>BS</th>
<th>DR</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG</td>
<td>1</td>
<td>.066</td>
<td>-.023</td>
<td>-.119</td>
<td>.039</td>
<td>-.515**</td>
</tr>
<tr>
<td>ROE</td>
<td></td>
<td>1</td>
<td>.346</td>
<td>.515**</td>
<td>.014</td>
<td>-.131</td>
</tr>
<tr>
<td>INF</td>
<td></td>
<td></td>
<td>1</td>
<td>.368</td>
<td>-.172</td>
<td>-.419</td>
</tr>
<tr>
<td>BS</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>.236</td>
<td>-.116</td>
</tr>
<tr>
<td>DR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>.501</td>
</tr>
<tr>
<td>CR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Note: * Correlation is significant at the 0.05 level  
** Correlation is significant at the 0.01 level  
Source: Own Computation

The result of correlation coefficient shows that all variables are statistically significant and negatively correlated with the credit risk ratio except deposit rate. Deposit rate has significant positive correlation with credit risk.

**Estimation of Panel Data Regression Model**

Table 2 shows the estimation result of the three models of the retained variable using Stata 10 (diversification was excluded due to multicollinearity problem). Researcher tried to explore good result by employing the three methods of estimation ¹⁰.

The three methods of estimation of linear panel data models (pooled OLS, fixed and random effect model) show that credit growth, bank profitability and bank size had a negative influence on credit risk while inefficiency and deposit rate had a positive influence on credit risk. The two variables, inefficiency and deposit rate, had statistically insignificant influence on credit risk in any method of estimation. In previous literature, credit growth, deposit rate, ROE and inefficiency were positively correlated with credit risk.

**Table 2: Estimation Result of Parameters using Panel Data Model**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression Model</th>
<th>Fixed Effect</th>
<th>Random Effect Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Coef.</td>
<td>P. value</td>
<td>Coef.</td>
</tr>
<tr>
<td>CG</td>
<td>-.165403</td>
<td>0.003</td>
<td>-.1024854</td>
</tr>
<tr>
<td>ROE</td>
<td>-.0020505</td>
<td>0.040</td>
<td>-.0014856</td>
</tr>
<tr>
<td>BS</td>
<td>-.0655315</td>
<td>0.059</td>
<td>-.072284</td>
</tr>
<tr>
<td>INE</td>
<td>.4195253</td>
<td>0.514</td>
<td>.9492798</td>
</tr>
<tr>
<td>DR</td>
<td>.0248789</td>
<td>0.989</td>
<td>.984171</td>
</tr>
<tr>
<td>Cons</td>
<td>.5114174</td>
<td>0.000</td>
<td>.5163931</td>
</tr>
</tbody>
</table>

¹⁰ Generally, there are three method of estimating panel data model such as pooled model, fixed effect and random effect (Asteriou & Hall, 2007, P. 345)
The Pooled OLS Regression OF Credit Risk Ratio Function

Even though the pooled OLS model uses data that composed of both time series and cross-section data, it has some strength and weakness\(^{11}\). One of the basic advantages of the pooled OLS model is that it increases the accuracy of the estimation due to its possibility of increasing sample size. In other side, it assumes that there are no differences among the sample banks or all sample banks are assumed to be homogenous, which is an unrealistic assumption (Asteriou & Hall, 2007, P. 345).

In the pooled OLS method of estimation, credit growth and ROE had statistically significant negative impact on credit risk. However, inefficiency, and deposit rate had statistically insignificant positive influence on the Credit risk ratio. Furthermore, Bank size had positive but statistically insignificant impact on credit risk.

Statistically significant and negative coefficient of return on equity (ROE) shows an inverse relationship between profitability and credit risk ratio. This result is not as expected and also inconsistency with previous research. This is not an exceptional output of this study even other, like Shingjergji, A. (2013), Swamy V.2012) found similar results of inconsistency. It may be due to the reason that profitable banks have the capacity to implement modern Credit risk management system, technology and hiring trained man power/experts as well as having credit information access so that it contributes for minimizing problem loan.

Credit growth had statistically significant negative influence on credit risk. It is inconsistency with the result of Das & Ghosh, (2007), Jimenez & Saurina (2006), Thiagarajan, S., et al (2011), Ahmad & Bashir (2013) who found a positive influence of Credit growth on credit risk. This is due to the reason that the banks may develop the best experience of dealing with borrowers (build the capacity of solving the borrower’s problem by giving consultant and other service to improve their loan repayment), developing strong credit risk culture as well as develop sound Credit risk management system whenever a problem loan arise due to credit growth.

In a similar manner, Bank size and credit risk are also correlated negatively but not statistically significant. It is due to the fact that large banks have ability to deal with credit risk by formulating sound and effective Credit risk management system, introducing modern risk management instruments and adopt new technology as well as a better portfolio diversification opportunity and gaining competitive advantage on economies of scale so that contribute for minimizing problem loan.

Operating inefficiency had insignificant positive influence on credit risk. It implies that increasing the level of inefficiency tends to increase problem loan. There is statistically insignificant positive relationship between deposit rate and credit risk. This means that increasing the deposit rate directly influences landing rate that create repayment Burdon on borrowers and influence loan quality.

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\(^{11}\) It is just running the OLS regressions by pooling all individual observations together in to one data set and imposing a common set of parameters across them. Therefore, it confronts the basic strength and weakness of OLS regression model. Increasing accuracy of the estimation due to increment of sample size is one of the advantage of pooled OLS model, and also Gujarati, N. (2003,P. 307) noted that pooled OLS model may improve the relative precision of the estimated parameters since it include all observation in a regression.
Fixed Effect Method of Estimation

In the fixed effect method of estimation\textsuperscript{12}, ROE and bank size had statistically insignificant negative impact on credit risk while inefficiency and deposit rate had positive impact but statistically insignificant. However, Credit growth had statistically significant negative impact on the credit risk ratio. Finally, credit growth, bank profitability and bank size had statistically significant negative impact on credit risk while inefficiency and deposit rate had positive impact but statistically insignificant.

So here, one of the vital questions to be raised is that, which model is an appropriate method of estimation. In order to choose one, either pooled OLS or fixed effect model, standard F-test can be used\textsuperscript{13}. If the F-statistic value is less than the critical value, accept the null hypothesis and indicate the appropriateness of the pooled OLS model while fixed effect model if null hypothesis is rejected. The F value is obtained through the following formula (Gujarati N. 2003, P.643)

\[ F = (R^2_{ir} - R^2) / (1 - R^2_{ir})/(n - k) \]

The result of F(5,24) value Clearly indicates that the F-value, 0.419 (for 5 numerator df and 24 denominator df), is insignificant and, therefore, the pooled OLS model seems to be appropriate. In addition to this, the fixed effect model may not produce such much better estimation result, then pooled OLS model since the degree of heterogeneity of the sample banks in somewhat reduced (all sample banks are large commercial banks and no difference in ownership structure). Therefore, they are the same in terms of structure and size. However, there is some degree of heterogeneity, in managerial skill, number of branch and branch location as well as credit culture/philosophy etc, among sample banks.

The final test, Hausman test, is conducted to check the appropriateness of the random effect model the pooled OLS method of estimation. If the result of such test is significant, p-value is less than 0.05, pooled OLS model will be appropriate while random effect model will be preferred if the null hypothesis is rejected (Gujarati, N., 2003, P. 650). The result of Hausman test attested the superiority of pooled OLS model.(see the table 5).

CONCLUSIONS

Optimal portfolio diversifications, establishing a comprehensive credit limit system and loan pricing, as well as Credit risk management strategy, policy and procedures without a clear picture of credit risk drivers considered just like driving a car without having a break and knowing final destination. Therefore, analyzing the link between the bank specific factors and credit risk indicator is indispensably required in today complex banking environment.

The main objective of this study is to analyze the Credit risk determinants of large Ethiopian private commercial banks using a panel data set over the period of 2006-2012. Researcher tried to explore good result by employing the three methods of panel data estimation (pooled OLS, fixed and random effect model) and different test, F-statistical and Hausman test , were carried out to chose the best result and finally, pooled OLS regression model found to be appropriate.

Credit growth had significant negative impact on problem loans due to the strong and unified credit risk culture,
developing sound Credit risk management system as well as gaining best experience of dealing with borrowers and building the capacity of solving the repayment problem.

Bank Profitability indicator had statistically significant negative relationship with credit problem. It is inconsistence with previous studies and it may be due to the reason that profitable banks have the capacity to implement modern Credit risk management system, technology and hiring trained man power/experts as well as having credit information access so that it contributes for minimizing problem loan.

In a similar manner, Bank size and credit risk was also correlated negatively but not statistically significant. It is due to the fact that large banks have ability to deal with credit risk by formulating sound and effective Credit risk management system, introducing modern risk management instruments and adopt new technology as well as a better portfolio diversification opportunity and gaining competitive advantage on economies of scale so that contribute for minimizing problem loan. Finding further revealed that inefficient bank as well as those Banks that charge high deposit rate is likely to incur higher problem loan. Finally, it can be concluded that Credit growth and bank profitability had statistically significant negative impact on problem loan while inefficiency and deposit rate had statistically insignificant positive impact on problem loans.

REFERENCES


