Bank- Specific Determinants of Credit Risk: Empirical Evidence from Ethiopian Banks

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Abstract

While credit risk is one of the main risks of banks and affects the development of the financial system, little study is done to examine its determinants. This study examined the bank- specific determinants of credit risk in Ethiopian commercial banks. The quantitative research approach was adopted for the study. A balanced panel data of 10 commercial banks both state-owned and private owned for the period 2007 through 2011 has been analyzed using random effects GLS regression. The regression results revealed that credit growth and bank size have negative and statistically significant impact on credit risk. Whereas, operating inefficiency and ownership have positive and statistically significant impact on credit risk. Finally, the results indicate that profitability, capital adequacy and bank liquidity have negative but statistically insignificant relationship with credit risk.

Key words: Banks, credit risk, Ethiopia

1. INTRODUCTION

The health of financial sector is a cornerstone for the overall economical development of a country. Banks' health reflects to a large extent the health of their borrowers, which in turn reflects the health of the economy as a whole (Arpa et al, 2001). Banking industry in Ethiopia was dominated until very recently by the public owned commercial banks namely Commercial Bank of Ethiopia and Development Bank of Ethiopia. The sector was opened for private investors since the 90s. Since then some 18 private banks have been established and have been a significant engine for the growing economy. Commercial banks in Ethiopia extend credit (loan) to different types of borrower for many different purposes. For most customers, bank credit is the primary source of available debt financing and for banks good loans are the most profitable assets (Mishkin, 2004). Even if credit creation is the main income generating activity, it also involves huge risks to banks.

Having an effective risk management is a crucial for banking business. Without a doubt, in present day's unpredictable and explosive atmosphere all banks are in front of enormous risks like credit risk, liquidity risk, operational risk, market risk, foreign exchange risk and interest rate risk, along with other risks, which may possibly affect the survival and successes of banks (Ali,Akhtar and Sadaqat,2011 and Al-Tamimi and Al-Mazrooei,2007). In this regard, the national bank of Ethiopia conducted a survey on November 2009 aimed to identify status of risk management practice to address weaknesses. Questionnaires were distributed for a sample of 15 Ethiopian banks. The report revealed that credit and operational risks were key bank risks over the last two years and would continue to be so over the next five years. But, the study did not identify the factors that affect credit risk of Ethiopian banks. Therefore, identifying the factors that affect credit risk of Ethiopian banks is open for empirical analysis. As stated by Zribi and Younes (2011), credit risk in emerging economy banks is higher than that in developed economies and that risk is formed by a larger number of bank-specific factors in emerging economies compared to their counterparts in developed economies. Thus, the main objective of this study is to identify bank specific determinants of credit risk in commercial banks of Ethiopia.

2. REVIEW OF RELATED LITERATURE

2.1. *Concept of credit Risk in Banks*

A bank exists not only to accept deposits but also to grant credit facilities, therefore inevitably exposed to credit risk. Credit risk is by far the most significant risk faced by banks and the success of their business depends on accurate measurement and efficient management of this risk to a greater extent than any other risks (Gieseche, 2004). According to Chen and Pan (2012), credit risk is the degree of value fluctuations in debt instruments and derivatives due to changes in the underlying credit quality of borrowers and counterparties. Coyle (2000) defines credit risk as losses from the refusal or inability of credit customers to pay what is owed in full and on time. Credit risk is the exposure faced by banks when a borrower (customer) defaults in honoring debt obligations on due date or at maturity.

Credit risk according to Basel Committee of Banking Supervision BCBS (2001) and Gostineau (1992) is the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). Credit events

usually include events such as bankruptcy, failure to pay a due obligation, or credit rating change and restructure. Basel Committee on Banking Supervision- BCBS (1999) defined credit risk as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Heffernan (1996) observe credit risk as the risk that an asset or a loan becomes irrecoverable in the case of outright default, or the risk of delay in the servicing of the loan. In either case, the present value of the asset declines, thereby undermining the solvency of a bank. Credit risk is critical since the default of a small number of important customers can generate large losses, which can lead to insolvency (Bessis, 2002).

2.2. Prior Empirical Literature

In this section prior empirical literature including definition and measurement of variables as well as relationship of explanatory variables with the dependent variable are presented.

Dependent Variable (credit risk)

According to Basel Committee of Banking Supervision BCBS (2001) credit risk is defined as the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). Empirically credit risk was commonly measured by either using provision for loan loss or Non-performing loan to the gross loan amount.

Explanatory Variables

The empirical evidence relating to the impact of bank size on credit risk appears to be mixed. For instance, some studies report a negative association between credit risk and bank size (Saunders et al. (1990), Chen et al. (1998), Cebenoyan et al. (1999) and Megginson (2005); Salas and Saurina, (2002); Hu et al (2006)). According to these studies, the inverse relationship means that large banks have better risk management strategies that usually translate into more superior loan portfolios vis-à-vis their smaller counterparts. There are also studies which provide evidence of a positive association between NPLs and bank size (Rajan and Dhal, 2003). In this study the size variable is constructed by computing the relative market share of the asset of each commercial bank.

Theoretical arguments suggest a negative relationship between these two variables. Such a relationship is justified by the most natural argument that is diversification by size. Indeed, larger banks are expected to have lower risks because they have the capability of holding more diversifiable portfolios.

Natural logarithm of total assets have been used as a proxy for measuring bank size in most prior research (Ali, Akhatar and sadaqat (2011),Ahmed, Akhtar and Usman (2011), Ahmad and Ariff (2007) and Das and Ghosh (2007)).

The literature on regulatory capital and bank credit risk shows an inverse relationship. For example, Hussain and Hassan (2004), in the context of 11 developing countries have shown a negative relationship between capital ratio and portfolio risk. Nor and Mohamed (2007) have presented a comparative study of all factors contributing to the credit risks of commercial banks in a multi-country setting: Australia, France, Japan and the U.S. represent developed economy banking systems while emerging ones are represented by India, Korea, Malaysia, Mexico and Thailand. They have found that the regulatory capital is an important factor influencing the credit risk of any banking system that offers a range of services. This study also highlights that the credit risk in emerging economy banks is higher than that in developed economies and that risk is formed by a larger number of bank-specific factors in emerging economies compared to their counterparts in developed economies. In the context of emerging countries, Goldlewski (2004) have found that the regulation of capital and risk are negatively related.

Profitability reflects how banks are run given the environment in which banks operate. In fact, profitability should mirror the quality of a bank's management and the shareholders' behavior, the bank's competitive strategies, efficiency and risk management capabilities. Thus, it can be expected to have negative relationship with credit risk.

Credit growth sometimes called loan growth implies credit expansions by banks. Excessive rapid loan growth, as well as sharp declines in bank capital levels are useful pointers to the deterioration in the financial health of banks and can be employed as early warning indicators of future problem loans (Das and Ghosh, 2007). Previous literature shows growth in loan is a cause for credit risk. A strong loan growth translates into significantly higher credit losses with a lag of 2-4 years (Hess, Grims and Holmes, 2009).

Regarding operating efficiency, Ali, Akhtar and Sadaqat (2011) found a negative but insignificant relationship with credit risk of Pakistan commercial banks. Inefficient managers will not cope successfully with the process of granting and monitoring loans that will lower the banks' credit quality and bring about a growth in problem loans (Salas and Saurina, 2002). Inefficient banks hold riskier portfolio (Lis, Pages and Saurina, 2000). As studied by Berger and De Young (1997), poor management in the banking institutions results in bad quality loans, and therefore, escalates the level of non-performing loans. They argue that bad management of the banking firms will result in banks inefficiency and affects the process of granting loans. The banks' management might not thoroughly evaluate their customers' credit application due to their poor evaluation skills. Therefore, banks' inefficiencies might lead to higher non-performing loans.

Another potential factor is ownership. In a recent research from industrialized countries, De Nicolo (2001) and Giuliano et al. (2007) have suggested that state-owned banks typically exhibit higher risk than other types of banks. Micco et al. (2004), analyze financial institutions with different ownership types covering 119 countries.

He concludes that non performing loans tend to be higher for banks with state ownership than for other groups. Hu et al. (2004) use a panel of Taiwanese banks and find a positive correlation between capital share owned by the state and the level of non- performing loans. However, Garcia-Marco and Robles-Fernandez (2007) investigating the relationship between risk taking and ownership structure document that commercial banks (mainly private owned) are more exposed to risk than deposit banks (mainly state owned). More recently Hu et al (2006) analyzed the relationship between non performing loans and ownership structure of commercial banks in Taiwan with a panel dataset covering the period 1996-1999. The study shows that banks with higher government ownership recorded lower non-performing loans. According to Rainer and Paul (2007) on their studies of transition countries(Russia, Ukraine, Hungary and Czech Republic) it is found no indication of excessive risk taking by any specific ownership or size categories of transition banks

3. DATA AND METHODOLOGY

3.1. Research Design, Data and Sampling

The major objective of this study was to investigate the bank specific determinants of credit risk of Ethiopian commercial banks. For this reason causal research design was applied in this study since the objective is to assess cause effect relationship. The sample consists of a panel of ten (10) commercial banks that were registered before 2007 from around 19 banks operating in the country. The period 2007-2011 was chosen just to examine the determinants of credit risk using recent data and recently established banks were not considered to avoid new entrant bias. The sample banks were: Awash International Bank(AIB), Bank of Abyssinia (BOA), Construction and Business Bank (CBB), Commercial Bank of Ethiopia (CBE),Cooperative Bank of Oromia (CBO) , Dashen Bank(DB), Lion International Bank(LIB), Nib International Bank(NIB), united bank(UB) and Wegagen Bank(WB).

3.2. Data Collection Methods

The data to be used in this study was collected from the annual reports of each commercial Bank and from the central bank of Ethiopia (NBE). For accomplishing the stated objective of the study, secondary data was used because mostly primary data are not objectively measureable. In addition to this, secondary data are easily accessible, relatively inexpensive, and quickly obtained (Malhotra, 1996).

3.3. Operational Definition of Variables

Credit risk was used as a dependent variable in this study. Credit risk can be affected by many factors. Here, it should be that the selected variables are more extensively mentioned in the empirical literatures as determinants of credit risk and a consideration was also made of availability of data. Operational definition of the dependent and independent variables and hypotheses is presented in the following table.

Table 3.1 Variables, Operational Definitions and Expected Signs

Variables	Symbols	Operational definition	Expected sign
Credit risk	CR	Provision for Loan Loss/Total loans	
Bank size	BAS	Natural Logarithm of Total Assets	-Ve
Profitability	PRO	Interest Income minus Interest expense/Total Asset	-Ve
Capital adequacy	CAD	Total Capital/Total assets	-Ve
Bank liquidity	BL	Total Loans / Total deposits	+/-
Credit (loan) growth	CGR	Current year Loans minus Previous year Loans/previous year loan	+Ve
Operating Inefficiency	OPINF	Total Operating Expense/Total Assets	+Ve
Ownership	OWN	Dummy variable that takes (1) for government owned banks and zero otherwise.	+ve

3.4. Method of Data Analysis and Econometric model

To test the hypotheses, statistical analyses were carried out using random effects GLS regression. Hausman test was used to select between fixed effect and random effect model. The hausman test shows Prob>chi2 = 0.2824 which is insignificant supporting random effect model than fixed effect **(Insert Table 3.2 here)**. Breusch and pagan lagrangian multiplier test for random effects also shows Prob>chi2=0.0224 supporting random effect rather than pooled OLS regression **(Insert Table 3.3 here)**.

The research has the following general model:

$$Y_{i,t} = \alpha_0 + \sum X_{i,t} + \varepsilon \text{ --------------------Eq.1}$$

$$Y_{i,t} = \text{ the dependent variable for bank i at time t}$$

$X_{i,t}=$ the independent variables for bank i at time t.

$\alpha_0=$ constant

$\varepsilon = \eta_i + \mu_{i,t}$

Eq.1 is extended to include all the explanatory variables as follows:

$$CR_{i,t} = \alpha_0 + \beta_1 BAS_{i,t} + \beta_2 PRO_{i,t} + \beta_3 CAD_{i,t} + \beta_4 BL_{i,t} + \beta_5 CGR_{i,t} + \beta_6 OPINF_{i,t} + \beta_7 OWN_{i,t} + \varepsilon$$

Eq.2

Where β_1, β_2, ---, β_7 are parameters estimated/coefficient of the independent variables and variable symbols are as described in section 3.3 (Table 3.1).

To control for hetroskedasticity and autocorrelation, standard error robust clustered was applied.

4.   EMPIRICAL RESULTS

4.1   Testing Assumptions of Regression Model

Test for Normality Assumption

Shapiro wilk test was used to test normality distribution of error term. Shapiro wilk test for normal distribution shows Prob>z = 0.10404 which is statistically insignificant indicating that the residuals are normally distributed **(Insert Table 4.1 here).**

Test for Multicollinearity Assumption

The variance inflation factor (VIF) shows a value less than 4.59 for each variable. The larger the value of VIF, the more troublesome or collinear the variables and as a rule of thumb a VIF greater than 10 is unacceptable (Gujarati, 2004). Generally, multicollinearity problem is not a concern in this study **(Insert Table 4.2 here).**

Assumptions of homoskedasticity and problems of autocorrelation are controlled using clustered robust standard error.

4.2   Results of Regression Analysis

In this section the data analysis made using random effect GLS regression and discussions are presented **(Insert Table 4.3 here)**

The overall explanatory power of the above model is high with R^2 of 56% and Prob > chi2= 0.0004. This indicates that 56% of the variation in credit risk can be explained by the variation in the explanatory variables.

As expected credit growth has negative and statistically significant impact on credit risk at 5% level of significance. This is consistent with previous research (Al-Smadi and Ahmad, 2009; Altunbas et al, 2007) who found significant and negative relationship between growth on loan and credit risk. The result shows that rapid credit growth today results in lower credit standards that, eventually, bring about higher problem loans in the future to Ethiopian commercial banks which may be due to poor screening.

Operating inefficiency has a positive and statistically significant impact on credit risk at 5% level of significance (i.e. P> Z =0.029). This result is similar with the findings of Salas and Saurian (2002) and Berger and De Young (1997). They argue that bad management of the banking firms will result in banks inefficiency and affects the process of granting loans. The banks' management might not thoroughly evaluate their customers' credit application due to their poor evaluation skills and lack of adequate resources due to inefficiency.

Similarly, ownership has a positive and statistically significant (at 1% level of significance) impact on credit risk. This finding shows that government banks were more risky than private banks. However, the variable bank size has negative and statistically significant impact on credit risk at 10% level of significance. This shows that a high diversification of portfolio assets in large banks can cause a reduction in credit risk of Ethiopian commercial banks and it also shows that larger banks have better diversification opportunity than smaller banks. This result is consistent with the study of Saunders et al. (1990), Chen et al. (1998), Cebenoyan et al. (1999); Megginson (2005); Salas and Saurina, (2002); Hu et al (2006). They suggest that the inverse relationship means that large banks have better risk management strategies that usually translate into more superior loan portfolios vis-à-vis their smaller counterparts. Finally, the findings revealed that profitability, capital adequacy and bank liquidity have a negative and statistically insignificant relationship with credit risk.

5. CONCLUSION

The aim of this paper is to identify bank- specific determinants of credit risk of Ethiopian commercial banks for the period 2007 to 2011. A balanced panel data of ten commercial banks and 50 observations have been used for the analysis. The random effects GLS regression results revealed that credit growth and bank size have negative

and statistically significant impact on credit risk. Whereas, operating inefficiency and ownership have positive and statistically significant impact on credit risk. Finally, the results indicate that profitability, capital adequacy and bank liquidity have a negative but statistically insignificant relationship with credit risk.

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Appendices

Table 3.2

```
. hausman fixed random
```

| | ———— Coefficients ———— | | | |
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
bas	-.0174189	-.012255	-.0051639	.0064391
pro	-.0037799	-.0038102	.0000303	.0010092
cad	-.0537633	-.0444555	-.0093079	.0244595
bl	-.0459673	-.0276526	-.0183148	.0082034
crg	-.0200579	-.0267651	.0067072	.0031104
opin	.7848916	.8159095	-.0310179	.0413018

```
                    b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

            chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        7.44
            Prob>chi2 =      0.2824
            (V_b-V_B is not positive definite)
```

Table 3.3
```
Breusch and Pagan Lagrangian multiplier test for random effects

    cr[bank,t] = Xb + u[bank] + e[bank,t]

    Estimated results:
                        Var      sd = sqrt(Var)
               _____
           cr |    .0013487       .0367251
            e |    .000284        .0168537
            u |    .0004393       .0209588

    Test:   Var(u) = 0
                        chi2(1) =     5.21
                     Prob > chi2 =    0.0224
```

Table 4.1

Normality Test

Normal distribution of the residual using Shapiro wilk test

H0: Variables are normally distributed

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residual	*50*	*0.84934*	*7.086*	*4.176*	*0.10205*

Table 4.2
```
     Variable  │     VIF        1/VIF
    _____│_____
          bas  │     4.59      0.217688
          cad  │     2.94      0.340619
         opin  │     1.96      0.509656
          crg  │     1.89      0.529663
          own  │     1.51      0.661953
           bl  │     1.49      0.670085
          pro  │     1.40      0.712255
    _____│_____
     Mean VIF  │     2.26
```
Test for Multicollinearity

Table 4.3

Random effects GLS regression Results

Variable	Coefficient	Robust Std.Err.	Z-statistics	Prob>|Z|
BAS	-.012255	.0073855	-1.66	0.097***
PRO	-.0038102	.0028111	-1.36	0.175
CAD	-.0444555	.0667302	-0.67	0.505
BL	-.0276526	.020249	-1.37	0.172
CGR	-.0267651	.0113409	-2.36	0.018**
OPIN	.8159095	.3736951	2.18	0.029**
OWN	.0737196	.0195889	3.76	0.000*
CONSTANT	.1645676	.0817649	2.01	0.044**

R-sq - within=0.2760	Wald chi2 (7) =26.29	No. of observation= 50
- Between=0.6374	Prob > chi2= 0.0004	obs per group: min=5
- Overall= 0.5616		aveg=5.0
		Max=5
		No. of groups= 10

Note: * Statistically significant at 1 percent level of significance** statistically significant at 5 percent level of significance*** statistically significant at 10 percent level of significance.

Source: Financial statement of sampled commercial banks and own computation through STATA 11.1 software package.

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