

Factors Affecting Default Risk of Commercial Banks: Evidence from Ethiopian Banking Industry

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Abstract

The primary aim of banking industry is collecting funds from the community and extending credit to encourage business development and support a growing economy. While default risk is one of the main risks of banks and affects the development of the financial system. This study was conducted to investigate the factors that affect default risk of Ethiopian Commercial banks. To achieve this research objective quantitative research design was used and data was collected mainly through secondary sources. The study applied a balanced fixed effect panel data of eight Ethiopian commercial banks for six years (2005- 2011). The audited annual reports (Balance sheet and income statements) of Ethiopian commercial bank were obtained from National Bank of Ethiopia (NBE). Both macroeconomic and bank specific default risk factors were investigated using fixed effect panel data model. The study reveals that leverage, operating inefficiency and loan growth have a positive statistically significant relationship with default risk. Whereas loan to deposit ratio has a significant negative relationship with default risk. In terms of ownership, government owned banks are more risky than private banks. Accordingly, leverage, operating inefficiency, loan growth, ownership and loan to deposit ratio are significant determinants of default risk of Ethiopian commercial banks in the study period. Generally, in this study bank specific variables have more significant effect than macroeconomic variables. So, the result of the study is of value to policy making, practice and further research.

Keywords: Default Risk, Commercial Banking Industry, Macroeconomic and Bank Specific Variable and Ethiopia

1.1. Background of the Study

The main business of banking is collecting funds from the community and extending credit to encourage business development and support a growing economy, strengthen the community banks relationship and there by earn profit. Policies, industry specific standards and guidelines together risk concentration limits are designed under supervision of risk management committee (Basel committee, 2001). However, it is extremely important for the banks to appraise projects critically to ensure the flow of credit into these projects with real returns. That is to curb run through credit in to risky projects, effective credit management through identifying, monitoring and controlling loan risk is an essential component of strong banking operation. Credit management becomes effective when it is aimed at reducing the risk of late payment and bad debt, granting credit and ways of collecting accounts receivables. Cognizant of this fact, commercial bank been following rigorous default risk management.

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: default 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 default risk of Ethiopian banks. Therefore, identifying the factors that affect default risk of Ethiopian banks is open for empirical analysis.

Ali, Akhtar and Sadaqat (2011) cited default risk was extensively documented and familiar as the most significant and essential in nature surrounded by loads of financial risk in front of banks. Literatures provided evidences that suggest an existence of a relationship between default risk and macroeconomic variables. The macroeconomic variables suggested by the literatures are: annual growth in GDP, the annual inflation rate, real interest rate, broad money supply (M2), market risk (β) and GDP per capita and etc. Fofack, (2005) identified inflation, real interest rate, growth rate of GDP per capita, net interest margin, return on assets as possible determinant of Non-performing loans. Salas and Saurina, (2002) also identified variables that explain default risks. They found that GDP growth rate, inefficiency; size, net interest margin, and capital ratio and market power significantly affect default risk of a bank. In addition to macroeconomic variables, the exiting literature also provides that bank specific variables like-provisions of loan loss (PLL), loan growth, capital ratio, leverage, gearing ratio, nonperforming loan (NPL), liquid assets, net interest margins, loan concentration, efficiency, size and etc are also determinants of default risks.

Ahmed and Ariff (2007) conducted a multi-country comparative study with bank specific variables from both developed and developing country. They found that two to four factors are alone significantly correlated with default risk of any one banking system. Efficiency, PLL, liquid assets, spread and regulatory capital were significant on their investigation. Regulatory capital is significant for banking system that offers multi-country products. Similarly, management quality is also critical in the case of loan-dominant banks in emerging economies. The empirical evidence also provides leverage as a determinant of default risk and it is high for debt financing institutions (Ali, Akhtar and Sadaqat, 2011). They found gearing ratio-measured by total loan to total capital significantly affect default risk of banks. The existing literature also shows that size of the banks; commonly measured by natural logarithm of total assets; affect default risk of banks (Ali, Akhtar and Sadaqat 2011, Das and Ghosh 2007).

According to annual report by National bank of Ethiopia the major financial institutions operating in Ethiopia are banks, insurance companies and micro-finance institutions. The number of banks operating in the country reached 15 following the establishment of two new banks. In terms of ownership, twelve were private commercial banks, and the remaining three state-owned. During the fiscal year, 45 new branches were opened raising the total branch network in the country to 681 from 636 last year. As a result, bank branch to population ratio improved to 117,474 (Taking total population 80 million) from 126,258 in 2008/09. However, according to Carey (2001) indicates that risk management is more important in financial sector than in other parts of the economy. It's better to look on risk management in Ethiopian banking system require more than the literatures stated because the resource is entirely in hand of commercial banks.

To the best of the researchers' knowledge, no single study has focused on the factors that affect default risk on banking industry in a developing country context such as Ethiopia. Studies in bank default risk are mostly in single country setting and much attention is directed to developed country banks (Ahmed and Ariff, 2007). Effective risk management is crucial for Ethiopian banks. The identification of the factors will make beneficial in constructing effective risk management strategies in banks and to minimize losses and it will have also policy relevance. Hence, this study by trying to address such issue is expected to fill huge gap in the literature and will have relevance to policy making and practice

1.2. Objective of the study

1.2.1. General objective

In general, the objective of the study was to identify the factors that affect default risk in Ethiopian commercial banks.

1.2.2. Specific objectives

- ✓ To examine the relationship between the macroeconomic variable i.e. growth in GDP, inflation and market interest rate and default risk of Ethiopian commercial banks
- ✓ To investigate the factors that influences the loan repayment performance of borrowers financed by commercial Bank.
- ✓ To assess the extent of leverage and owners funds (source of asset financing) effect on reducing default risk
- ✓ To evaluate the impact of banks management quality or their operating efficiency on default risk
- ✓ To examine the effect of loan growth, loan to deposit ratio and bank profitability on default risk of commercial banks
- ✓ To examine the relationship between bank size and banks default risk i.e. to differentiate large and small sized banks default risk vulnerability
- ✓ To assess the impact of ownership on default risk

1.3. Hypothesis of the Study

The study attempted to test the following research hypotheses formulated based on theoretical and empirical review of literature

H1: There is a relationship between macroeconomic variables-growth in GDP, inflation and market interest rate and default risk

H2: There is a relationship between bank specific variables-, leverage, operating inefficiency, loan growth, loan to deposit ratio, capital ratio, and net interest margin and bank size and default risk

1.4. Significance of the study

The subject matter of the study and the resultant lesson drawn from the analyses will value to different interested parties and readers including:-

- ✓ Policy makers in the bank's financial institutions of Ethiopia and the branch managers so as to improve the quality of credit management.
- ✓ A general reader which is interested in getting knowledge with development in the financial sector and

- ✓ particularly of a low income economy.
- ✓ It's used to conduct further research in banking and related areas of finance as a literature.

1.5. Organization of the study

The remaining part of the research report would be organized as follows: First section would discussed the research design and research tools that would be employed, including data gathering methods, sampling, data preparation and analyses. Second section, the research results and discussions would be presented. Finally section, was comprised of conclusions, recommendations and suggestion for further research.

1.6. RESEARCH METHODOLOGY

1.6.1. Research Design

The major objective of this study is to examine the factors that affect default risk of Ethiopian commercial banks. Explanatory (cause and effect) research design is used as the study tries to analyze the factors that affect default risk with a quantitative approach was employed to analyze the collected data with fixed effect panel data regression model similar with previous studies of Quagliariello(2006) and Al-Smadi and Ahmad (2009).A panel data methodology provides important benefits which includes the fact that panel data methodology assumes that individuals, firms, states or countries are heterogeneous. Time series and cross sectional data studies not controlling for this heterogeneity run risk of obtaining biased results.

Furthermore, panel data gives more informative data, more variability, less collinearity among variables, more degree of freedom and more efficiency (Gujrati, 2004, 637). The panel used in this study was balanced panel type because data were used for all observations. Panel data model enables to catch variation across time and individuals at the same time. In addition to this the fixed effect model enables to measure the relationship after controlling individual specific factors

1.6.2. Type of Data, Data Collection and Source of Data

For accomplishing the stated objective of the study, secondary data would be used as it is easily accessible, relatively inexpensive, and quickly obtained (Malhotra, 1996). The data; audited annual report of the sampled banks, were collected from the National Bank of Ethiopia. In this regard, banks are responsible to submit audited annual report including Balance sheet and Income statement to the national bank of Ethiopia and the national bank has also started publishing banks macroeconomic data.

1.6.3. Target population and sampling technique

According to National bank of Ethiopia (2010/11) annual report the number of banks operating in the country during the fiscal year reached 17 following the establishment of two new banks. In terms of ownership, fourteen were private commercial banks and the remaining three. The target population of this study comprised of all commercial banks in Ethiopia operational by the year 2011. The sample banks are selected based on the criteria of data availability from 2005-2011. As results, out of the 17 commercial banks, 8 (47%) banks formed the sample of this study ,the sampled commercial banks were CBE, CBB, DB, AIB, BOA, WB, UB and NIB). Such sampling plan is judged as the purposive sampling. These sampled banks may not represent the whole Ethiopian banking industry; it will be the best approximation of the relationship determinants factors on default risk with the given data.

1.7. Empirical Model Specification

The study employs a panel data analysis that combines observations on cross- section of units over time. Panel data methodology provides an important benefit because the methodology assumes that individuals, firms, states or countries are heterogeneous. Time series and cross sectional data studies not controlling for this heterogeneity run risk of obtaining biased results. Furthermore, panel data gives more informative data, more variability, less collinearity among variables, more degree of freedom and more efficiency (Gujarati, 2004). The research model used for this study was similar with that of Al-Smadi and Ahmad (2009) and Quagliariello (2006). A fixed effect panel data model was used for hypothesis testing. The fixed effect (least square dummy variable) model enables to control unobserved heterogeneity and to get the true effect of the explanatory variables. The research has the following general model

$$Y_{it} = \alpha_i + \sum X_{it} + e_{it} \dots \dots \dots (1)$$

$$e_{it} = u_i + \lambda t + V_{it}$$

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

$X_{k,i,t}$ =the independent variables , α_i =intercept for bank i , $e_{i,t}$ = the error term and S-summation

So on it's expanded from using the study variables this research model has the following form:

$$DR_{i,t} = \alpha_0 + \beta_1 GDP + \beta_2 CPI + \beta_3 MIRN + \beta_4 LEV + \beta_5 OPINF + \beta_6 LGR + \beta_7 LD + \beta_8 CPR + \beta_9 NIM + \beta_{10} LNTA + u_i + e_{i,t} \dots \dots \dots (2)$$

$DR_{i,t}$ = Default Risk of bank i at time t ; $GDP = \frac{RGDP_t - RGDP_{t-1}}{RGDP_{t-1}}$, Real GDP Growth Rate at time t minus Real GDP Growth rate at time t-1 divided by Real GDP Growth Rate at time t-1 for measuring annual

GDP growth ; $CPI = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}$, Inflation Rate at time t minus Inflation Rate at time t-1 divided by; Inflation Rate at time t-1 for measuring annual inflation rate ;MIRN =Nominal Bank Lending Rate ;LEV = Leverage. The ratio of total liability to total asset ;OPINF = Operating Inefficiency $LGR = \frac{Loani_t - Loani_{t-1}}{Loani_{t-1}}$ for measuring annual Loan growth rate ;LD = Loan to Deposit Ratio ;CPR = Capital Ratio, total capital to total asset ;NIM = Net Interest Margin, measure profitability ;LNTA = Natural Logarithm of Total Assets, bank size a_0 = is the constant term for bank i ; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ and β_{10} are parameters estimated/coefficient of the independent variables ; $\epsilon_{i,t}$ = the unobserved heterogeneity & $\epsilon_{i,t}$ = the error term i = bank & t = time

1.8. Estimation Method of Panel Data

Estimation of panel data models using pooled Ordinary Least Squares (OLS) yields inconsistent estimators and heteroskedasticity errors. Furthermore, if the parameters to be estimated differ across firms and/or over time, then a pooled regression is not appropriate because the heterogeneity in the parameter estimates is not effectively dealt with (Chang and Lee, 1977). From a theoretical perspective, Hsiao (1986) demonstrates that “ignoring such parameter heterogeneity among cross-sectional or time-series units could lead to inconsistent or meaningless estimates of interesting parameters”. To resolve this problem, it is therefore appropriate to use panel data models.

In the case of this study, as panel data was adopted in this study, appropriate regression model is selected from fixed effect, random effect regression and pooled ordinary least squares. The general accepted way of choosing between fixed and random effects is running a Hausman test. Statistically, fixed effects are always a reasonable thing to do with panel data (they always give consistent results) but they may not be the most efficient model to run. Random effects will give better P-values as they are a more efficient estimator, so random effects regression should be adopted if it is statistically justifiable to do so.

The least square dummy variable estimator also called with-in a group estimator was used for measuring estimators of this study (β_s). This method enables to control the unobserved heterogeneity by incorporating dummy variables into the model and to see the true effect of the explanatory variables after controlling the bank individual effect. Data were analyzed using descriptive statistics, Pearson correlation analysis and multiple regression analysis. Descriptive statistics was used for measuring the mean and standard deviation of all the variables. Mean value (average value) give us the idea about the central tendency of the values of the variables included in this study ,whereas values for standard deviation measure, how far each variables are from each mean or dispersal of the data in the sample. Pearson correlation analysis was used in order to measure the correlation between the dependent and the independent variables. Besides to this the Pearson correlation was used for the purpose of multicollinearity problem identification between the independent variables as mentioned above. Version 12 of STATA software was used for analyzing and testing the data because the software is more easy to use and it enables to analyze detail econometric analysis including panel data.

1.9. RESULTS AND DISCUSSIONS

1.9.1. Descriptive Statistics

Table 1 bellow presents the descriptive statistics and the distribution of the study variables considered in this research such as default risk, Gross Domestic Product, Inflation (Consumer Price Index), Market Interest Rate, Leverage, Operating Inefficiency, Loans Growth Loans to Deposit Ratio Capital Ratio, Net Interest Margin & Bank’s Size and it provides descriptive about statistical mean, maximum value, minimum value and standard deviation of each variables.

Table 1 descriptive statistics of the variables

Variables	Obs	Mean	Std. Dev	Min	Max
Bank Default risk	56	0.071	0.0563	0.023	0.289
Gross domestic product	56	-0.953	2.315	0.026	-6.571
inflation	56	0.163	0.45	0.186	0.03
Market interest rate	56	0.118	0.001	0.105	0.125
leverage	56	0.891	0.032	0.805	0.957
Operating inefficiency	56	0.033	0.012	0.003	0.06
Loan growth	56	0.658	2.94	-0.12	2.21
Loan to deposit ratio	56	0.758	0.198	0.296	1.211
Capital ratio	56	0.110	0.034	0,04	0.19
Net interest margins	56	0.030	0.008	0.010	0.049
Bank size	56	21.93	1.11	19.96	24.80

Source: Author’s own computations based on annual report data.

As stated in the above table, table 1, from the total of 56observation, on average the default risk (measured by PLL to total loan) of the sampled bank was approximately 7 percent across the years of study. It was higher

than its international limit which is 2 percent (Al-Smadi and Ahmad, 2009). Holding low quality loan might increase the provision. In addition to this, managers may increase loan loss provisions to signal favorable cash flow prospects (Eng and Naber, 2007). But, a prudential provisioning policy enables banks to hold a minimum PLL (Ahmad and Ariff 2007). So, here it might be due to either holding less qualified loans or less prudential provisioning policy might enhance default risk of the sampled banks. The default risk of the sampled bank also varied across bank at 5.63 (its standard deviation) for the period. This shows that different banks have significantly varied levels of default risk. The minimum and maximum default risk recorded was 2.29 and 28.97 percent respectively in the study period.

Commercial banks, including DBE, disbursed Birr 28.9 billion to the various economic sectors. Due to the tight monetary policy measures taken by the National Bank of Ethiopia the year 2007, 2008, 2009 and 2010, the fiscal year witnessed a moderate increase (13.5 percent) in fresh loan disbursements largely due to higher loan collection that can be relied without affecting the outstanding limits. As it is known banks grant loan for a long period so the previously granted loan might have an impact on current period provision.

GDP measured annual economic growth change in its real form. The mean GDP for the 7 year period was -0.95 percent. It shows that the economy of the country was increased (because annual GDP growth rate for the whole sampled period was positive) with a decreasing rate of 0.95 percent each year. The standard deviation for the change in GDP was 2.32. In 2009/10, real GDP growth was 10.4 percent slightly higher than 10 percent last fiscal year. This robust economic growth was in glaring contrast to 6 percent estimate for Sub-Saharan Africa. The growth was also continuous with 11.3 percent annual average growth during 2003/04-2009/10 it indicates that the existence of a significant difference in each year change in economic growth. The maximum GDP in the seven years period was -6.57 percent.

Annual mean of general inflation at the close of the fiscal year 2010/11 was 18.1 percent, 16.3 percentage point higher than the preceding year level. This was predominantly due to the hike in the prices of food items that contributes the lion's share of 14.1 percentage point of the total annual change in headline inflation while non-food items made up the remaining 1.2 percentage point and fats, milk & cheese, bread and prepared food among others and its standard deviation was 45 percent. The mean CPI indicates that on average inflation was increased by 16.3 percent in each year. Whereas, the standard deviation indicates that the existence of difference in inflation rate change each year. The minimum and maximum change in inflation rate for the tested period was 18.6 and 0.3 percent recorded in year 2010 and 2011 respectively. Both indicate that the change in inflation rate was declined. A little movement in inflation rate in 2010 relative to the rest of the test period and the maximum change in inflation rate were recorded in 2011.

The mean nominal bank lending rate was 11.8 percent and its standard deviation was 0.1 percent. The mean nominal lending rate indicates that on average the sampled bank charged 11.8 percent interest rate in their lending for the test period. But, the standard deviation shows banks deviation from the mean lending rate. Among the study variables lending rate has minimum standard deviation and its minimum and maximum values were 10.5 and 12.5 percent respectively. Government control might enable to have a minimum variation.

Regarding to the bank specific variables, mean value of leverage; measured by total liability to total asset ratio, was 0.89 for the test period. That means, on average the sampled bank financed their asset using 89 percent of debt for the test period. It indicates that Ethiopian commercial banks were highly debt dependent. The standard deviation for leverage was 0.03. It indicates that existence of less variation between banks on debt financing. Debt financing ranges from 81 to 96 percent among sampled banks in the test period

The sampled bank mean operating expense was 0.03 and its standard deviation was 0.13 for the study period. Operating expense to total asset was used for measuring banks inefficiency. So, the mean value indicate that on average the sampled bank operating expense is 3 percent of their total asset. The minimum and maximum operating expense ratios were 0.003 and 0.07 in year 2009 and 2008 respectively. As stated above that banks have less credit risk (lower PLL ratio) in 2009. The lower provisioning in year 2009 might also contribute for recording less operating Expense in the same year. The mean loan growth for the sampled bank was 65.87 percent from year 2005 to 2011 for each year. It indicates that on average each bank increased its loan with a rate of 65.87 percent each year for the test period. But, each year change in loan growth between banks has a highest variation; its standard deviation was 294. This finding is consistent with Pfister et.al, (2008) finding, states that Ethiopian banks doubled their loan within three years from 2005 to 2009, especially the loan growth in private banks is high. So, that might be the cause for the wide variation among sampled banks-the early established government banks relatively with the recently established private banks. The minimum loan growth was a decrease of total loans by 12.29 percent and the maximum loan growth was an increase of total loan by 221 percent on year 2005.

On average the sampled bank has 0.76 loans to deposit ratio each year for the 7 year period and its standard deviation was 0.2. The mean loan to deposit ratio indicates that on average the sampled banks loan was 76% of deposit each year for the test period. Minimum loan to deposit ratio of 0.30 was recorded in year 2007. In contrast, maximum loan to deposit ratio of 1.21 was recorded in year 2006. Eleven percent of the sampled bank asset was financed through owners' capital for the test period. The sampled bank capital financing was varied between banks

at a standard deviation of 0.04 for the study period. The minimum and maximum capital to total asset ratio of 0.04 and 0.2 were recorded by the sampled bank in year 2006 respectively. It shows on a given year one bank financed its asset using 4 percent of capital whereas another bank used 20 percent of capital for its asset financing. Therefore, there was also a significant difference on the minimum and maximum value.

The mean NIM ratio for the sampled banks was 0.03 each year for the period from 2003 to 2009. It was incorporated in the model for measuring profitability of the sampled bank in the ratio to total asset. The mean NIM indicates that on average the sampled bank earn net interest margin of 3 percent. NIM standard deviation was 0.01. It shows that the existence of less profitability variation between banks on the study period. The minimum NIM ratio of 0.01 in year 2005 and maximum net margin ratio of 0.05 was recorded in year 2009.

On average the sampled banks has total assets of 3.34 billion birr in each year of the test period and the standard deviation of sampled banks asset was 3.03 billion in the study period. It shows that the existence of a significant difference between banks total assets. To avoid the effect of such variation on banks default risk the variable was measured in its natural logarithm form. Among the sampled banks the minimum total asset was 4.71 million birr and the maximum total asset was 58.95 billion birr in year 2005 and 2011 respectively

1.9.2. Correlation Analysis

In addition to descriptive statistics, a correlation analysis for the study variables was also conducted to address the direction of the relationship between the study variables. The study employed Pearson correlation matrix to measure the correlation between the dependent variable default risk and the explanatory variables

Table 2: Results of the correlation test between the default risk of the Ethiopian banking industry and each of its hypothesized variables

Variables	DR	GDP	CPI	MIRN	LEV	OPINF	LGR	LD	CPR	NIM	LNTA
DR	1										
GDP	0.118**	1									
CIP	-0.02	0.31***	1								
MIRN	-0.16	0.33	-0.25**	1							
LEV	0.06	0.058	-0.24**	0.19	1						
OPINF	0.62	-0.21	-0.034	-0.046	0.017	1					
LGR	0.0046	0.036	0.09	0.16	-0.03	0.34*	1				
LD	0.31***	-0.055	0.23	-0.18	-0.10	0.64	0.055	1			
CPR	0.59	-0.23	0.19	-0.13	-0.02	0.008	0.005	0.003	1		
NIRM	0.49**	-0.49*	0.40***	-0.2	-0.08	-0.02	0.002	0.034	0.12	1	
LNTA	0.41**	-0.46**	0.48***	0.69***	0.1	-0.019	0.42***	0.008	0.078	0.0032	1

Source: Author's Own Computations based on annual report

* Correlation was significant at 1 percent level of significance, **Correlation was significant at 5 percent level of significance, ***Correlation was significant at 10 percent level of significance, CR measures credit risk, GDP-measures change in real GDP growth, CPI indicates change in consumer price index(inflation), MIRN-banks interest rate(nominal lending rate), LEV-Leverage, OPINF-measure operating inefficiency, LGR-change in loan growth, LD indicates loan to deposit ratio, CPR-Capital ratio, NIM-net interest margin, LNTA-natural logarithm of total assets for measuring bank size

As indicated in the above table 2 shows default risk has a statistically significant correlation with operating inefficiency, loan to deposit ratio, capital ratio, and net interest margin and bank size. Generally, credit risk was significantly correlated with bank specific variable than macroeconomic variables according to this study finding, Default risk has a statically significant correlation with capital ratio, net interest margin and bank size at 1 percent level of significance. This indicates that relative to other variables credit risk was highly correlated with capital ratio, net interest margin and bank size. In addition to this default risk has statically significant correlation with operating inefficiency and loan to deposit ratio at 5percent level of significance. Among the study variables the macroeconomic variables were statistically insignificant with the dependent variable according to the correlation analysis result of this study. In contrast, bank specific variables have statistically significant correlation coefficient with credit risk except for leverage and loan growth rate. The three most highly correlated bank specific variables were capital ratio, net interest margin and bank size with 0.59, 0.49 and 0.41 correlation coefficients respectively

1.9.3. Regression Analysis

A better way for identifying factors that affect default risk is hypothesis testing (regression analysis) than descriptive statistics and correlation analysis. In this section the empirical result of the study were discussed. In order to determine the factors that affect credit risk of commercial banks a panel of eight banks and seven year of data a time period from 2005 to 2011 was used. This study was used the fixed effect model. Hypotheses were tested using 1%, 5% and 10% level of significance-a two-tailed test. But, before going in to the analysis econometric treatments were made for keeping panel data and multiple regression assumptions and to get unbiased estimators. Regression result (dependent variable default risk)

Table 3 Regression result (dependent variable default risk)

Variables	coefficient	RobustStd.error	t-value	p-value
Gross domestic product	-0.0048	0.00561	-0.87	0.412
inflation	0.0049	0.0048	1.03	0.33
Market interest rate	4.290	3.504	-1.22	0.261
leverage	0.0005	0.001	0.87	0.007
Operating inefficiency	1.476	0.647	3.79*	0.037
Loan growth	0.001	0.0006	2.56**	0.089
Loan to deposit ratio	-0.193	0.110	-2.04***	0.081
Capital ratio	-0.150	0.175	-0.86	0.419
Net interest margins	1.625	1.255	1.29	0.236
Bank size	.0407	.0406	1.00	0.349
CONSTANT	-0.288	0.472	-0.61	0.56

Number of obs 56
 F(10, 38) 11.09* (Prob> F = 0.0000)
 R-squared 0.7904
 Adj R- Squared 0.6966
 Root MSE .0299

Source: Author's own computations based on annual report data

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

As shown in above Table 3, R-square of the model is 79.04 percent. It shows that all the independent variables of the study explained 79.04 percent of the change in default risk of commercial banks from the period 2005 to 2011 in Ethiopia. The rest 20.96 percent of variation in credit risk was not explained by the independent variables of the study and these going in to error term. The F-statistics also shows that the model was good enough fitted and statistically significant at 1 percent (Prob>F= 0.00000)

The first null hypothesis of this study was hypothesized that there is no statistically significant relationship between GDP growth and default risk. The empirical finding of the study shows the existence of a negative relationship between change in GDP growth and default risk of Ethiopian commercial banks for the tested period. However, it is insignificant. As a result the null hypothesis was accepted and the alternative hypothesis was rejected. This finding was similar with that of Das and Ghosh (2007), Quadrilarilo (2006) and Hess, Grimes and Holmes (2009). This study sampled somewhat a long period and for the whole sampled period the country has not consistent GDP growth. Annually the economy of the country was increased at a decreasing rate in the sampled period as discussed in the descriptive part. Although, it is common in the literature that the effect of GDP growth is evaluated in its lag form in order to see its effect in future time, it was not done here because of complexity of lag variables model. So, it might have a statistically significant effect if it was evaluated in its lag form especially for the late sampled five year the country has a good economic growth. Generally, the effect of change in GDP growth on banks default risk may not be seen quickly. The researcher proposed investigation of factors that affect default risk with incorporating lag variables for future studies.

The second null hypothesis hypothesized that there is no a statistically significant relationship between inflation and default risk. Obviously, the empirical finding of the study found that a positive statistically insignificant relationship between inflation and default risk for Ethiopian commercial banks. Accordingly, default risk of Ethiopian commercial bank was increased due to an increased inflation during the study period. However, which is statistically insignificant. As a result, the null hypothesis was not rejected. In this regard, Fofack (2005) found a positive relationship between inflation and credit risk for Sub-Saharan Africa countries. When inflation was increased Ethiopian commercial banks default risk was also increased but inflation has not such a significant effect on the test period. The following point can be suggested. On the test period a highest inflation was incurred in 2009 on ward. Related to this, trading businesses were expected to be less influenced sector by the inflation and they were the prominent borrower of banks on the test period. Most of the time Ethiopian banks provide loan to trading business than long term projects (Pfister et.al, 2008). So, it might be the reason that the less affected trading sector may help the banks to reduce their loan default as a result of inflation.

The empirical finding of this study also shows the existence of a negative relationship between default risk and market interest rate but which is statistically insignificant. So, the third null hypothesis was accepted. The third null hypothesis states that there is no a statistically significant relationship between market interest rate (nominal bank lending rate) and default risk of Ethiopian commercial banks. This finding is similar with that of Al-Smadi and Ahmad, (2009) but it is not similar with that of Das and Ghosh, (2007) and Jimenez and Saurina, (2006). The empirical result for market interest rate was not as the researcher expected. The logic is that when market interest rate increased borrower may unable to fulfill their obligation due to the highest interest charged as a result bank loan default will increase. But, the empirical finding of this study found that an existence of inverse relationship

between market interest rate (measured by nominal lending rate) and default risk for Ethiopian commercial banks for the test period.

First, it might be due to the way of the variable measurement. The variable was measured using nominal bank lending rate rather than in its real term. Real nominal lending rate means inflation adjusted nominal lending rate which was highly correlated with the variable inflation. In addition to this, the researcher expected that Ethiopian borrowers are more sensitive for nominal lending rate than in its real rate by believing they are less knowledgeable. Secondly, this research was done using secondary data only. So, with the absence of a primary data source; for example an interview with borrowers or bank managers' attitude regarding market interest rate, this finding was not concluded. But, still there are empirical justifications for inverse relationship between interest rate and default risk. Low interest rates stimulate economic activities and productivity that affect positively firms' earnings (Al-Smadi and Ahmad, 2009). During these conditions of the economic growth, banks might relax their credit assessment and monitoring processes. This might cause some adverse selection problems which consequently lead to increase the default risk.

The fourth hypothesis was developed regarding to a relationship between leverage and default risk. The empirical finding of the study shows an existence of a positive statistically significant relationship between leverage and default risk; significant at 1 percent level of significance. As a result the null hypothesis that states that there is no a statistically significant relationship between leverage and default risk, was rejected and the alternative hypothesis was accepted. Accordingly, Ethiopian commercial banks default risk increased by 0.06 percent when they increased their leverage by 1 percent for the period 2005 to 2011. This finding is similar with that of Ahmed, Akhtar and Usman (2011) and Fisher, Gueyie and Ortiz (2002).

1.10. Conclusions and Recommendations

Banks are the main source of finance in Ethiopia because there is no financial market or no other institutions more than banks to raise capital. Raising funds through borrowing was not an important source of resource mobilization. According to annual report, total outstanding borrowing at the end of 2011 was only Birr 9.6 billion. Of the total borrowing, domestic sources accounted for 89.5 percent, while foreign sources took the remaining balance. On the other hand, loan collection by the banking system stood at Birr 30.6 billion up by 21.9 percent over last year. More than half of the loan collection (60.8 percent) was by the private banks. Studies on bank default risk are also rare in Ethiopia. However, to protect these banks from risk is very vital for the whole economy of the country. The purpose of this study was to investigate the factors that affect default risk of Ethiopian commercial banks empirically over the period 2005-2011 using fixed effect panel data methodology; as a result it has a total of 56 observations.

As the result indicated that the three macroeconomic variable of the study has no significant effect on default risk of Ethiopian commercial banks for the period from 2005 to 2011. The empirical result of the study shows a negative but statically insignificant relationship between GDP growth and default risk of Ethiopian commercial banks for the test period. Inflation has a positive but statistically insignificant relationship with default risk for the test period. It implies that inflation did not put a statically significant effect on Ethiopian commercial banks default risk for the test period. Market interest rate has a negative and statistically insignificant relationship with default risk. The result for market interest rate was not common in the literature and as the researcher expectation. The variable was measured using nominal lending rate with the logic that Ethiopian borrowers are more sensitive for nominal lending rate than real rate of lending. The real rate of interest was not used at the same time with inflation rate due to its high multicollinearity. The variable measurement might cause the unexpected type of relationship with the empirical results. The bank specific variables affected default risk of Ethiopian commercial banks more significantly than the macroeconomic variables for the tested period. Leverage has a positive and statistically significant; statically significant at 1 percent, relationship with default risk. For the test period the banks were highly dependent on debt for their asset financing and that might cause a statistically significant effect on their default risk.

Both the regression and correlation analysis of this study shown that bank specific variables have more significant effect than macroeconomic variables, therefore, bank managers and policy makers should focus more on bank specific factors. Of course, it needs further investigation. Further, default risk factors can be investigated with incorporating lag variables, enable to see default risk factors effect through time. Using lag variables need advanced econometric models that may provide more efficient results. In addition, the researcher suggest to conduct such types of study on other financial sectors like micro finance institution, insurance companies to get more insight on factors affecting default risk

1.11. References

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