



Determinates of Credit Risk in Ethiopian Commercial Banks

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Abstract

This study is concerned with identifying the determinants of credit risk in Ethiopian Commercial Banks. We collected secondary data from the audited financial statement of eight senior commercial banks for the period of 14 years. To analyze the data, a fixed effect ordinary list square model was applied. Finally, the study found out macro-economic and micro-economic variables affect the level of credit risk in Ethiopian commercial banking industry.

1. Introduction

Credit risk is one of the most important risks that should be dealt by policy makers to make sure the smooth operation of banks. Most of the financial crisis and economic downturn experienced by developed, developing and under-developed economies were caused by the banking sector instability. Campbell (2011) shows how credit risk circulates in the economy for a long period of time and finally became the cause of financial distress in the global economy. Further, Babar and Zeb (2011) stressed that as Banks are the backbone of most countries economic stability and smooth functioning, they might also be the source of economic crisis.

Accordingly, the global financial and economic crises of 2008 revitalized the need for enhancing credit risk management system and caused a surge of academic works and policy discussions across the developed and developing countries. In this respect, Exogenous and Endogenous factors were identified from a single country perspective: (Manaba , Thengb, & Md-Ru, 2015; Zhang , Cai , & Dickinson , 2016; Abid , Ouertani, & Zouari-Ghorbel, 2014) and from cross countries perspective: (Castro, 2013; Dimitrios, Helen , & Mike, 2016; Nikolaidou & Vogiazas, 2017), in which many of these studies focused their case on developed counties.

Nevertheless, the focus given to developing countries is comparatively low despite the fact that the health of the banking sector determines the overall health of the economy in most developing countries. Moreover, to design a rigor credit risk management system, empirical studies which show the existing management practice and factors responsible for credit risk are important; however, such types of studies are scantily available in the least developing countries like Ethiopia. In cases when there are some available studies, they are not well publicized for policy and managerial consumption. In this regard, this study will serve in filling this gap. The motivation of this study is, therefore, to identify the credit risk factors (micro and macro) contributing to the credit risk of Ethiopia commercial banks.

Furthermore, the current study focuses on pointing out factors affecting credit risks in Ethiopian commercial banking industry. According to a survey conducted by the National Bank of Ethiopia (NBE), which considers both bank specific and external factors, credit risks perceived as one of the dominant risk in the industry (NBE, 2009). Therefore, since the banking industry in Ethiopia is highly relayed on providing traditional service,

accepting deposit and credit provision, the result of the current study will have a paramount importance. Other studies such as (Asfaw & Veni, 2015; Tehulu & Olana, 2014; and, Lelissa, 2014) were conducted in the case of Ethiopia. However all of them were focused on identifying bank specific factors. However, this research tried to fill this gap by considering Inflation Gross domestic product and Unemployment macro level factors.

To that end, following this introduction, the rest of this paper is structured as follows: Section 2 briefly reviews the literature while Section 3 describes the data and the methodology employed followed by the empirical findings in Section 4. Then, section 5 provides the main conclusions and recommendations based on the findings of the study.

2. Literature Review

Various empirical studies have been conducted in different countries from different perspectives regarding determinants of asset quality. Among the literatures which considered both macro and micro economic determinants of problems loan, Chaibia & Ftiti (2015) identified GDP growth, interest rates, unemployment, and exchange as macro-economic determinants for both market based economy (France) and Bank based economy (German), as per their classification. The case of Indian commercial banking industry's determinants of bad loan is assessed by different authors which includes (Thiagarajan, Ayyappan, & Ramachandran, 2013; Dash & Kabra, 2010; and Das & Ghosh 2007). According to Thiagarajan, Ayyappan , & Ramachandran (2013) commercial banks in India are affected by both macro and bank specific factors. Their study showed that lagged non-performing assets and GDP growth are the major contributing factors for the current level of banks problem on loan. Moreover, Dash & Kabra (2010) found some consistent result with (Thiagarajan, Ayyappan , & Ramachandran, 2013). Both researches indicate current GDP has a negative impact on NPL; however, the result of Dash & Kabra (2010) is insignificant. The unique result found by Dash & Kabra (2010) is that real effective exchange rate affects NPL effectively and strongly. Moreover, Dash & Kabra found GDP at the macro level and bank size, operating expense and real loan growth at the bank level significantly influence the loan problem of Indian state owned banks. On the other hand, GDP, inflation and market interest rate at Macro level and lag non-performing loans, loan growth, loan concentration and bank size as bank specific factors have a significant influence on Jordanian Commercial banking industry (Al-Smadi & Ahmad, 2008). In another study by

Zribi & Boujelbène (2011) that focuses its case on Tunisia commercial banks, they found out that NPL is also highly influenced by ownership structure, profitability and macro level (GDP growth, inflation, exchange rate and exchange rate) factors. Thus, according to this study there is strong and significant impact of inflation on the level of bad asset (NPL) in Tunisia commercial banks. Yet, there are a number of studies which found insignificant relationship between inflation and loan problem (Thiagarajan, Ayyappan , & Ramachandran, 2013; Al-Smadi & Ahmad, 2008 and Dash & Kabra, 2010). On the other scenario, US commercial and Saving Banking industry's determinants of credit risk was assessed by (Ghosh, 2017). This study identified bank capitalization, liquidity risks, poor credit quality, greater cost inefficiency and banking industry size are variables which significantly and positively influence NPLs, while bank profitability lowers NPLs. In addition to the effect of micro-economic variables, higher state real GDP, real personal income growth rates, and changes in state housing price index reduce NPL and inflation, state unemployment rates, and US public debt significantly increase NPLs as a macro-economic variable. Ahmad & Ariff (2007), performed comparative study on a multi countries base by grouping developed and developing countries in to two different sections. In their study, countries with developed economy including Australia, France, Japan and the US are included, and the developing economies are represented by India, Korea, Malaysia, Mexico and Thailand. A total of 23,499 banks are included under the research for the period of 1996 to 2002 from a crisis period. The study mainly focused on bank specific variables such as management efficiency, loan-loss provision, loan to- deposit ratio, leverage, regulatory capital, funding costs, liquidity, spread and total assets. Their study revealed that management quality is significant in loan dominated companies and they found the irrelevance of leverage for credit risk which is contrary to the finding of most researchers. A study of Ali & Daly (2010) also strived to answer the question of which macro-economic factors can mostly affect the credit risk of commercial banks in Australia and USA. Using the logit regression model, they identified that both countries, Australia and USA, are affected by the same set of macroeconomic variables; GDP and short term interest rate. The study also confirmed that the US economy is more susceptible for macroeconomic variables shake than that of the Australian.

In the case of Africa, there are evidences which show different macro and micro economic factors that influence credit risk level of commercial banks. For example, by using both pooled (unbalanced) and fixed effect panel models Warue (2013), found per capita income and profitability (ROA) are the major determinants (with a varying level significance for small, medium, large, local and foreign) of Kenyan commercial banks' bad loan practices. In contrast to the above result, Fofack (2005) argues that more attention should be given to macro-economic factors. This study was performed by using pseudo-panel econometric models for a classified sub panel of CAF and NON CAF sub Saharan countries. The finding of Fofack's study indicates the leading causes of credit risk in most sub-Saharan countries are economic growth, real exchange rate appreciation, real interest rate, net interest margins and interbank loans.

Few studies were also conducted from the Ethiopian commercial banks point of view. Among others, Negera (2012) studied the determinant of nonperforming loan in Ethiopian commercial banks. The study used both primary and secondary data source which are obtained from private and public owned Ethiopian commercial banks. In this case, the study found that, poor credit assessment, failed loan monitoring, underdeveloped credit culture, lenient credit terms and conditions, aggressive lending, compromised integrity, weak institutional capacity, unfair competition among banks, willful default by borrowers and their knowledge limitation, fund diversion for unintended purpose, over/under financing by banks ascribe to the causes of loan default in Ethiopia. On the other hand, Tehulu & Olana (2014), examined the bank specific determinants of credit risk in Ethiopian commercial banks. Their research, then, showed that credit growth, bank size, operating inefficiency and ownership have statically significant influence on credit risk. Lelissa (2014) also identified that level of Ethiopian commercial banks' bad loan is well explained by quantity of risk and quality of risk management related (bank specific) variables. This study classified credit risk determinant variables in to two different categories which are quantity risk and quality risk variables. Out of quantity risk variables, loans to total asset and credit concentration have a significant relationship with credit risk and among quality risk variables categories; bank size has a significant influence on Ethiopian commercial banks credit risk.

3. Materials and Methods

3.1 Model Specification and Description of Study Variables

As shown in the previous section, there a number of academic literatures which covered the issue of NPL's determinants in different countries context (Ghosh, 2017; Chaibia & Ftiti, 2015; Jović, 2017; Abid , Ouertani, & Zouari-Ghorbel, 2014 and others). Unlike most research, the present study considers the issue from the single country perspective. Moreover, the study includes systematic variables which are not customary in most research in case of Ethiopia. The following variables are accounted for the model of this research.

3.1.1 Bank Specific Variables

Return on Assets (ROA): Good management has the ability of changing its efficiency to reduce the risk of default. Most empirical evidence identified an inverse relationship between profitability and credit quality. As stated by Ghosh (2017), highly profitable corporate has less intention to involve in riskier businesses activities. To measure ROA we applied Net Income divided by total asset, which is similar with (Dimitrios, Helen , & Mike, 2016).

Capital Adequacy Ratio (CAR): Capital adequacy refers to the amount of equity and other reserves which the bank holds against its risky assets. The purpose of this reserve is to protect the depositor from any unexpected loss. Dubious results have been recorded by different empirical literature regarding the relationship between Credit risk and capital adequacy ratio. On one hand, the managers of banks with low capital seem to involve in a moral hazard incentive to provide loan for customer with poor credit scoring. This moral hazard hypothesis implies a negative relationship between CAR and NPL (Ghosh, 2017). On the other hand, managers of highly capitalized banks might involve in a liberal credit policy with the notion of "Too Big To Fall". This might lead a positive relationship between equity capital and credit quality of the banking industry. We applied a formula which is the same as that of (Prakash & Poudel, 2013; Ghosh, 2017) which is total capital of the banks divided by total assets.

Loan to Deposit Ratio (LTD): To measure banks liquidity this research paper employed Loan to Deposit Ratio. Increasing loans to deposits ratio reveals a risk preference and is expected to lead to higher NPLs. So it is expected a positive relationship between NPL and

LTD ratio. When the banks are more liquid, they can reduce risk of insolvency. This ratio represented by the formula which Dimitrios, Helen , & Mike (2016) which is also applied on the present study.

Loan growth rate (LGR): when banks offer more and more credit, the probability of accepting bad customer will be high. As the supply increase, they reduce their interest rates charged on loans and lower their minimum credit standard. Such a reduction in credit standards increases the chances of loan defaults by borrowers. So it is expected to find a positive relationship between the two variables.

Bank Size: We use the natural logarithm to capture the size of commercial banks in Ethiopia which is similar with Vithessonhi (2016). With the liberal credit policy with the assumption of “TO BIG TO FALL”, big banks might involve in loose credit monitoring activity. On contrary, their experience, management capability and diversification, big banks have the ability to reduce their credit default rate. This shows that the relationship between these two variables depends on the trait of the management of the banking industry.

3.1.2 Macro-Economic Variables

The effect of exogenous variables on the level of credit risk in Ethiopian banking industry have been captured by using Gross Domestic Product growth rate and Inflation. Thiagarajan, Ayyappan & Ramachandran (2013) and Dash & Kabra (2010) found an inverse relationship between GDPGR and NPL. According to their study, the main reason behind this relation is that as the economy grows the ability of the credit customer will be raised, and as a result banks can recover their loan as per the agreed upon contract. On the other hand, most academic as well as empirical literatures found a parallel relationship between inflation and NPL. In a country like Ethiopia with high inflation rate, the ability of customers in servicing their loan will be deteriorated. Hence it is expected a positive impact of inflation on NPL. The other macro variable is Unemployment rate (UR). As it is found by different theoretical literatures, high unemployment rate will paralyze the ability of credit customer in servicing their loan, and vice versa. In this research we expect to have a positive relationship between these variables.

Table 1: Variables that explain NPL behaviour in Ethiopian banking system

	Symbol	Explanation	Expected sign
Microeconomic Variables	CAR	Bank Total Capital	(-)/(+)
	BAS	Natural log of Bank's Assets	(-)/(+)
	LDR	Loan/Deposit	(+)
	LGR	Previous loan less current loan divided by current loan	(+)
	ROA	Profit / Total Assets	(-)
	Lag NPL	NPL at time t-1	(+)
Macroeconomic variables	UR	Unemployment rate	(+)
	GDPGR	Previous GDP less Current GDP divided by Current GDP	(-)
	INF	Inflation rate	(+)

The equation for estimation is as follows:

$$NPL_{it} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 UR_{i,t} + \beta_3 INF_{i,t} + \beta_4 ROA_{i,t} + \beta_5 CAR_{i,t} + \beta_6 LDR_{i,t} + \beta_7 LGR_{i,t} + \beta_8 BAS_{i,t} + \beta_9 NPL_{i,t-1} + \epsilon_{i,t}$$

3.2 Methodology

The objective of this study is to identify factors which have an influence on the Ethiopian commercial banks credit risk level. To achieve this objective, descriptive research design with a quantitative approach is employed. Besides, a panel data study design which combines the attributes of cross sectional (inter-firm) and time series data (inter-period) is used. The advantage of panel data analysis is that more reliable estimates of the parameters in the model can be obtained (Gujarati, 2004). In order to select the sample commercial banks, a non-probability or deliberate sampling technique were applied. This is because of the criterion used to select the banks, which is year of establishment. In using secondary source, the availability and consistency of the data is important; thus, we used banks with 14 years of historical financial data. Accordingly, commercial banks which satisfied the aforementioned creation include Commercial Bank of Ethiopia, Construction and Business Bank, Awash International Bank, Dashen Bank, Wegagen Bank, Nib Bank, Bank of Abyssinia and United Bank. All of these commercial banks have fourteen years financial data which are used as an input for the study.

In order to control the Heteroskedasticity problem the study applied a robust error term. Moreover the 1.85 value of Durbin-Watson test on Table 4 indicates that the model is free

from serial autocorrelation. The other test conducted to assure the reliability of the data is a multicollinearity test. Mela & Kopalle (2002) found out that collinearity can reduce parameter variance estimates and that positive and negative correlation structures have an asymmetric effect on variable omission bias.

Table 3: Correlation coefficients, using the observations

ROA	CAR	BAS	LDR	LGR	GDPR	UR	INFR	
1.0000	- 0.3077	0.2551	-0.1930	-0.2373	-0.2480	0.2012	-0.0952	ROA
	1.0000	- 0.5214	0.2508	0.1497	-0.0707	0.1288	-0.0548	CAR
		1.0000	-0.6982	-0.0186	0.3332	-0.6194	0.3644	BAS
			1.0000	0.0202	-0.1837	0.4750	-0.2636	LDR
				1.0000	0.1811	-0.1951	0.1276	LGR
					1.0000	-0.5645	0.1536	GDPR
						1.0000	-0.6099	UR
							1.0000	INFR

Source: Author Computation via Gretl 2016

Considering the level of severe multicollinearity Brooks (2008), the study classified this problem in to two: perfect multicollinearity when the level of their relationship is 1 or -1, and near multicollinearity when the level of relation is +0.8 percent. Since the result of table does not show a value 0.8 or above, there is no severe multicollinearity problem in the model.

4. Result and Discussion

4.1. Result and Discussion of Descriptive Statistics

In this sub topic the result of the descriptive statistic: mean, standard deviation, minimum and maximum value of the dependent and the independent variables of the model is presented. Because the data are a panel of strongly balanced in type, the study has 104 observations of the dependent and independent variables. As per Table 2 result, as shown below, the average NPLR in Ethiopia commercial banking industry is 5.07% percent with the minimum value of 0 and maximum of 24.1 percent. As the rate indicates, commercial banks in Ethiopia tried to maintain the NPL rate around 5% during the study period, which might be the result of strict follow-up and control applied by the National Bank of Ethiopia.

Table 2: Summaries of Dependent and Independent Variables

Variable	Mean	Median	S.D.	Min	Max
NPL	0.0960	0.0439	0.113	0.00	0.535
ROA	0.0394	0.0280	0.0763	0.00308	0.535
CAR	0.112	0.105	0.0480	0.00991	0.294
BAS	22.0	22.0	1.44	18.8	26.0
LDR	0.741	0.734	0.231	0.215	1.62
LGR	0.212	0.182	0.185	-0.140	0.777
GDPR	0.0885	0.107	0.0425	-0.0216	0.136
UR	0.0615	0.0536	0.0121	0.0514	0.087
INFR	0.130	0.104	0.132	-0.0824	0.444

Source: Author Computation via Gretl 2016

The table also shows that Commercial Banks of Ethiopia earned 2.36 percent of return on asset with 1 percent standard deviation and with minimum amount of 1 percent earning and maximum of 4 percent. This indicates that on average the banking sector in Ethiopia earned 2.36 percent ROA during the study period. According to Flamini, McDonald, & Schumacher (2009), sub-Saharan African countries have higher profit than other parts of the world with an average ROA of around 2 percent. The other independent variable of the model is CAR, which is the variable used by central bank of the country to protect the depositors. Moreover, it is also used as an indicator of the financial institutions healthiness. BASEL committee set a minimum standard of 8% of the financial institutions risk weighted assets. In case of Ethiopian commercial banking sector the average CAR ratio of these banks is 10.05 percent for the last 10 years with a minimum and maximum value of 4.7 and 19.2 respectively. The average amount of CAR is higher than the 8 percent minimum capital requirement of BASEL committee. This may show that in Ethiopia depositors are secured from different types of financial risk. To measure the banks' liquidity, a ratio of loan and advance to total deposit is used and it has a mean of 68.4 percent with a standard deviation of 21.78 percent and maximum and minimum percentage of 121 and 21.5 respectively has been found. This means, out of a one birr deposit, on average, 68 cent was granted as loan and advance to the deficit unit. From the maximum value one can see that in Ethiopian

there was a time that banks provided loan more than what they have been received as a deposit, which shows high risk taking activity. Van den End (2013) mentioned that there is no international limit for the amount of LTD ratio but some countries like China required this ratio not to exceed 75 percent. The other explanatory variable of the model is Bank Asset Size (BAS) which is used to measure the worthiness of Ethiopian commercial banks. As per the result shown in Table 2, Ethiopian Commercial Banks maintained an average 22.5255 (in terms of log) with maximum and minimum value of 20.3287 and 26.0070 respectively.

To capture the impact of macro-economic variable on NPL this study used INFR, UR and GDP. As it is shown in the table the average inflation during the study period is 15.7 percent and a minimum and maximum value of 1.44 and 33.54 percent respectively. On the other hand, the average value of the unemployment rate was 6.1 percent with highest value of 8.71 percent and lowest value of 5.14. When it comes to the GDP, the country's economy grew by 11.02 percent annually with a minimum and maximum percentage of 8.64 and 13.57, respectively. This indicates that during the study period the Ethiopian economy registered a rapid growth rate.

4.2 Regression Result and Discussion

A fixed effect model is used in order to identify factors which affect the credit risk in commercial banks of Ethiopia. In order to do so, Gretl 2016 version has been used. The regression result of the paper indicates both macro and micro variables pose a significant influence on the assets quality of the commercial banks' in Ethiopia. The R-square of the model is 82.9, which means around 83 percent of the variance in the dependent variable are explained by the explanatory variables included in the model.

Table 4: Fixed effect regression result

Fixed-effects, using 104 observations

Included 8 cross-sectional units

Time-series length = 13

Dependent variable: NPL

Robust (HAC) standard errors

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-0.747563	0.557239	-1.342	0.2216	
BAS	0.0263115	0.0195109	1.349	0.2195	
LDR	0.167163	0.0657043	2.544	0.0384	**
UR	3.89424	1.45422	2.678	0.0316	**
INFR	0.00739566	0.0277798	0.2662	0.7977	
GDPR	-0.707822	0.247960	-2.855	0.0245	**
CAR	-0.331034	0.149532	-2.214	0.0624	*
LGR	-0.131279	0.0334681	-3.923	0.0057	***
ROA	0.336733	0.0683760	4.925	0.0017	***
NPL_1	0.192952	0.0889299	2.170	0.0666	*

Author Computation via Gretl 2016

Mean dependent var	0.092068	S.D. dependent var	0.113544
Sum squared resid	0.173081	S.E. of regression	0.044603
LSDV R-squared	0.869657	Within R-squared	0.829509
Log-likelihood	185.1464	Akaike criterion	-336.2928
Schwarz criterion	-291.3381	Hannan-Quinn	-318.0803
rho	-0.048132	Durbin-Watson	1.856939

*Indicates significance at 10% level.

**Indicates significance at 5% level.

***Indicates significance at 1% level.

As per the result, there are variables (micro and macro) which significantly affect the credit risk of Ethiopian banking industry at different level of significance. A rare negative and significant relationship between LGR and NPL were identified. At 1% level of significance,

LGR affects the level of NPL positively. The possible explanation for this result may be that the banks might create a close relationship with the borrowers in order to differentiate bad and good investment (Elsas, 2005). The other variable which affects NPL at 1% level of significance is ROA. The level of NPL is positively affected by the ROA in Ethiopian commercial banking industry. This result is consistent with Zribi & Boujelbène (2011) who pointed out the most profitable banks are the riskiest banks. Other than this, at 5% level of significance LDR affects NPL positively. The regression result postulates that whenever the commercial banks provide more and more credit out of the deposit, liquidity will reduce which in return result a rise on the level of NPL. Lelissa (2014) also found consistent result with this study. The other variable which is significant at 5% is UR. As it was expected this exogenous variable affects the NPL positively and significantly which consistent with (Chaibia & Ftiti, 2015). The other significant variable which poses negative impact on NPL is GDPR. This study found a consistent result with Chaibia & Ftiti, (2015); Thiagarajan, Ayyappan , & Ramachandran (2013); Dash & Kabra (2010); and Ghosh (2017). On the other hand, at 10% of significance level CAR affects the quality of Ethiopian commercial assets inversely. As explained by Ghosh (2017), banks with minimum capitalization base have “moral hazard” incentives to engage in risky lending activity. So the regression result of this study supports the “moral hazard” hypothesis activities by Ethiopian commercial banks. The last variable which is significant at 10% level of confidence is lag_NPL of the banks. This variable has positive impact on the loan quality of commercial banks in Ethiopia. So, this indicates the previous value of NPL will significantly affects the present value of banks NPL. This result is consistent with Dimitrios, Helen , & Mike (2016). Other than the above significant relationship depicted in table 4, there are variables which don't have significant power to explain the credit risk of Ethiopian commercial banks which are Capitalization (BAS) and inflation (INFR).

6. Conclusion

This study was conducted to identify the determinants factor on the level of credit risk of commercial banks of Ethiopia. It was found that LDR and BAS have positive impact. The result of the study further indicated that a negative and significance effect GDPR and LGR on the level of assets quality in Ethiopian baking industry. As intermediation is the main

source of income in Ethiopia commercial banks, most of them provide credit from deposit customer. This activity increases the risk taking behavior of the banks. So, diversifying the source of income might minimize the riskiness of the commercial banks. At the same time, the study unveiled that the fast growing economy of the country had a negative impact on the level of bad loan. Moreover, LGR has negatively affected the level of NPL which might be an indication for the existence of a close relationship between banks and borrowers. This study also calls for more reserach to be undertaken in the area for more conclusive results.. Finally, the findings of this study have macro prudential as well as bank specific policy implication which needs to be accounted in the process of policy making activity of commercial banking industry in Ethiopia.

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Reference

- Abid , L., Ouertani, M., & Zouari-Ghorbel, S. (2014). Macroeconomic and Bank-Specific Determinants of Household's. *Procedia Economics and Finance*, 13(58 – 68).
- Ahmad , N., & Ariff, M. (2007). Multi-Country Study of Bank Credit Risk Determinants, *The International Journal of Banking and Finance*, 5, 135-152.
- Ali, A., & Daly, K. (2010). Macroeconomic determinants of credit risk: Recent evidence from a cross country study. *International Review of Financial Analysis*, 165–171.
- Ali, A., & Daly, K. (2010). Macroeconomic determinants of credit risk: Recent evidence from a cross. *International Review of Financial Analysis*, 165–171.
- Al-Smadi, M., & Ahmad, H. (2008). Factors Affecting Banks' Credit Risk: Evidence from Jordan.
- Asfaw, A., & Veni, P. (2015). Determinants of Credit Risk in Ethiopian Private Commercial Banks, *International Journal of Accounting and Financial Management Research*, 5(3), 2249-6882.
- Aver, B. (2008). An Empirical Analysis of Credit Risk Factors of the Slovenian Banking System. *Managing Global Transitions*, 317.

- Berger, A., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial. *Journal of Banking & Finance*, 849-870.
- Brooks, C. (2008). *Introductory Econometrics for Finance*. (second, Ed.) Edinburgh: Cambridge University Press.
- Campbell, J. (2011). The US financial crisis: lessons for theories of institutional complementarity. *Socio-Economic Review*, 211-234.
- Castro, V. (2013). Macroeconomic determinants of the credit risk in the banking system: The case of the GIPS. *Economic Modelling*, 21(672–683).
- Chaibia, H., & Ftiti, Z. (2015). Credit risk determinants: Evidence from. *Research in International Business*, Vol.133 (1-16).
- Das, A., & Ghosh, S. (2007). Determinants of Credit Risk in Indian Stateowned: An Empirical Investigation. *Economic Issue*, vol.12.
- Dash, M., & Kabra, G. (2010). The Determinants of Non-Performing Assets in Indian Commercial Bank: An Econometric Study. *Eastern Finance and Economics*, 7, 1450-2889.
- Dimitrios, A., Helen, L., & Mike, T. (2016). Determinants of non-performing loans: Evidence from Euro-area countries. *Finance Research Letters*, Vol.18(116–119).
- Elsas, R. (2005). Empirical determinants of relationship lending. *Journal of Financial Intermediation*, 32–57.
- Flamini, V., McDonald, C., & Schumacher, L. (2009). *The Determinants of Commercial Bank Profitability in Sub-Saharan Africa*. International Monetary Fund.
- Fofack, H. (2005). Nonperforming Loans in Sub-Saharan Africa: Causal Analysis and Macroeconomic Implications, World Bank.
- Ghosh, A. (2017). Sector-specific analysis of non-performing loans in the US banking system and their macroeconomic impact. *Journal of Economics and Business*, 29-45.
- Gujarati, D. (2004). *Basic Econometrics* (4th ed.). New York: McGraw-Hill Companies.
- Jović, Ž. (2017). Determinants of Credit Risk – The Case of Serbia, *Economic Annals*, 0013-3264.

- Lelissa, T. (2014). Factors Influencing the Level of Credit Risk in the Ethiopian Commercial Banks: The Credit Risk Matrix Conceptual Framework. *European Journal of Business and Management*, 6, 2222-1905.
- Manaba , N., Thengb, N., & Md-Ru, R. (2015). The Determinants of Credit Risk in Malaysia. *Social and Behavioral Sciences*, 301 – 308.
- Mela, C., & Kopalle, P. (2002). The impac of collinearity on regression analysis: the assymetric effect of posetive and negative correlation. *Applie Economics*, 667-677.
- Melkamu, G. (2012). *Factors Contributing For Non-Performing Loans In Ethiopian Commercial*. Addis Ababa: Jimma Unisversity.
- National Bank of Ethiopia. (2012). licensing and Supervison of Banking Business. *Directives, 6th*. Addis Ababa, Oromia, Ethiopia.
- Negarit Gazeta (2008, Augest 25th). Banking Business proclamation . Addis Ababa, Ethiopia: Federal Negarit Gazeta of The Federal Democratic.
- Negera, W. (2012). *Determinants of Non Performing Loans: The case of Ethiopian Banks* .
- Nikolaidou, E., & Vogiazas, S. (2017). Credit risk determinants in Sub-Saharan banking systems: Evidence fromfive countries and lessons learnt from Central East and South East Europeancountries. *Develop Finace*, 7 (52–63).
- Prakash , R., & Poudel, S. (2013). Macroeconomic Determinants of Credit Risk in Nepalese Banking Industry. *International Business Research Conference* (pp. 978-1-922069-25-2). Toronto, Canada: Ryerson University.
- Tehulu, T., & Olana, D. (2014). Bank- Specific Determinants of Credit Risk: Empirical Evidence from Ethiopian Banks. *Research Journal of Finance and Accounting*, 5, 222-1697.
- Thiagarajan, S., Ayyappan , S., & Ramachandran, A. (2013). Determinants of Credit Risk in the Commercial Banking Sector of Belize. *Research journal of Social Science and Management*, 2251-1571.
- van den End, J. W. (2013). *A macroprudential approach to address liquidity risk with the Loan-to-Deposit ratio*. Amsterdam: De Nederlandsche Bank.

Vithessonthi, C. (2016). Deflation, bank credit growth, and non-performing loans: Evidence from Japan. *International Review of Financial Analysis*, 45 (295–305) .

Warue, B. (2013). The Effects of Bank Specific and Macroeconomic Factors on Nonperforming Loans in Commercial Banks in Kenya: A Comparative Panel Data Analysis. *Advances in Management & Applied Economics*, 3, 1792-7544.

Zhang , D., Cai , J., & Dickinson , D. (2016). Non-performing loans, moral hazard and regulation of the Chinese. *Journal of Banking & Finance*, 48–60.

Zribi, N., & Boujelbène, Y. (2011). The factors influencing bank credit risk: The case of Tunisia. *Journal of Accounting and Taxation*, 3, 70-78.