

INNOVATIONS

Bank Specific Determinants of Non-Performing Loans: The Case of Selected Ethiopian Commercial Banks

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Abstract

The purpose of this study was to investigate bank specific determinants of nonperforming loans of selected Ethiopian commercial banks. The study used both primary and secondary data over the period of 2010 to 2019. To support the prospect, purposive sampling, was employed and, accordingly, 13 commercial banks were selected out of a total of 17. The necessary data were collected from bank audited financial statements, the National Bank of Ethiopia (NBE), the Central Statistical Agency (CSA), and the Ministry of Finance and Economic Cooperation (MOFEC), in that order. To get primary data, an unstructured interview was held with sampled bank officials. The collected data were tested for heteroskedasticity, normality, serial correlation, and multicollinearity problems. For the analysis of secondary data, multiple regression analysis was used, and the output of Fixed Effect Model was employed accordingly. Eventually, the study found that CAR, ROA and ROE significantly and negatively affect NPLs while loan to deposit ratio, growth in number of branches, bank inefficiency and loan growth rate positively and significantly related with emergence of NPLs. Finally, study reveals positive and insignificant impact of bank size on NPLs.

Key Terms: 1. Non-performing Loans 2. Commercial Banks 3. Bank Specific Factors.

1. Introduction

It is the will of every country to go through a constant growth process. Commercial banks play a critical and necessary role in this respect. Small enterprises can obtain funding from commercial

banks. Their primary contribution to economic growth is as financial intermediaries. They play an important role in facilitating the movement of investment money across the market. The lending process, which aids commercial banks, is the primary vehicle for capital allocation in the economy. Savings are channeled through banks to investments and consumption. The investment demands of savers are matched with the credit needs of investors and consumers. In general, no country's economic progress would be possible without the involvement of commercial banks. However, while they are channeling money, there is a possibility that the borrowed funds will become uncollectible due to various factors relating to borrowers, banks internal activities and external environment voiding the contractual agreement and causing the loan to default.

Various loan monitoring tools have been issued by regulatory bodies to ensure that commercial banks retain excellent quality assets and operate within prudential criteria. Despite these efforts, the quality of assets as assessed by non-performing loans (NPL) has deteriorated in several countries, most commonly in emerging and developed countries. Nonperforming loans are inevitable in the ordinary operations of commercial banks situated in every nation. In general, loan default refers to a borrower's inability to repay a debt. A loan default, or a non performing loan, occurs when a debtor is unable to repay the principal and costs of the loan after it has been declared overdue.

The public as a consumer of banking services, the public as a prospective investor in banks' stock, the banks' management, the financial markets, the banking supervisors and regulators, and other interested entities are all interested in information on the banks' loan quality. The ratio of non-performing loans is one of the most popular metrics used to determine a bank's loan quality. A rise in this percentage might indicate that the financial system is deteriorating. There are a variety of factors that might contribute to the occurrence of nonperforming loans, including internal bank operations as well as circumstances beyond the banks' control. The objective of this study is to analyze and identify variables specific to firms that lead to the occurrence of non-performing loans in Ethiopian commercial banks, based on the above reflected assertions.

2. Literature Review

A lot of studies have examined the effects of different macroeconomic and bank-specific factors on non-performing loans in order to better understand them. Some research looked at their impacts separately, while others investigated them all at the same time. The available literature was addressed below as a foundation for selecting explanatory factors for this investigation. Prior to the financial crisis of the previous decade, the loan portfolio credit quality had been quite constant. Following that, the quality of the banks' lending operations deteriorated dramatically. In both industrialized and emerging economies, the quality of banks' loan portfolios deteriorated, causing difficulty in the banking sector. In many nations, the problem of rising NPL ratios is evident in the banking industry (Radivojevic & Jovovic, 2017). Louzis et al. (2012) examined the factors of non-performing loans in the Greek banking industry, independently for each loan type, using panel data methodologies. They argue that because NPLs are external to the banking industry, the drivers of NPLs should not be limited to macroeconomic issues. As a result, each bank's unique characteristics and policy choices are expected to have an influence on the rate of nonperforming loans. The findings show that, in addition to macroeconomic causes, bank-specific variables such as management quality and performance may explain the Greek banking industry. Between 1999 and

2012, Ekanayake and Azeez (2015) investigated the factors that influenced NPLs in Sri Lanka's banking system, concluding that NPLs had a positive link with bank size and efficiency.

Kumar and Kishore (2019) used panel data and a random effects model to identify bank-specific and macroeconomic factors of non-performing loans in conventional banks in the United Arab Emirates (UAE) from 2008 to 2015. They discovered that non-performing loans from the previous year had a substantial significant correlation with NPL, and the liquidity ratio had a negative association with NPL, but the capital adequacy ratio and return on assets had a insignificant relationship with NPLs. For the period 2000–2008, Makri et al. (2014) analyzed the factors impacting the NPL rate in the Eurozone's banking industry. Their findings show substantial links between NPLs and numerous bank-specific determinants such as capital adequacy ratios, nonperforming loan rates from the previous year, and return on equity (ROE). They discovered a statistically substantial negative impact of the return on equity on NPLs. Andriani and Wiryono (2015) used ten years of commercial bank financial data from 2002 to 2013 to perform an empirical study on the Indonesian banking system. They discovered that microeconomic factors have an impact on the amount of non-performing loans. Furthermore, bank-specific variables such as ownership structure and skimming can contribute to a high percentage of NPLs in the banking industry, according to their report. Koju et al. (2018) used both static and dynamic panel estimating methodologies to analyze the macroeconomic and bank-specific determinants of non-performing loans (NPL) in the Nepalese banking sector. From 2003 to 2015, the study looked at 30 Nepalese commercial banks. According to their findings, NPLs show a substantial positive link with the export-to-import ratio, inefficiency, and asset size.

Over a 5-year period (2010 to 2014), Gambo et al. (2017) investigated the relationship between bank specific and macroeconomic determinants of non-performing loans in Nigerian deposit money institutions. They examined a sample of ten banks and used a non-survey research approach as well as secondary data derived from the bank's annual reports and accounts. Their findings show a positive association between non-performing loans, loan-to-deposit ratios, and bank size. In addition, they discovered a non-significant positive relationship between capital adequacy ratio and nonperforming loans. They also showed a non-significant negative association between the rate of non-performing loans and the return on assets. The study by Jameel (2014) on the determinants of non-performing loans in Pakistan banking sector, which used time series data and a multiple liner regression model, found that loan maturity time period, capital adequacy ratio, and credit deposit ratio are all negatively associated with NPLs. Khan et al. (2020) conducted a study on the determinants of NPLs in China's developing state, and their findings revealed that operating efficiency and profitability indicators have a negative but statistically significant relationship with NPLs, while capital adequacy and income diversification have a negative but statistically insignificant relationship with NPLs. Abid et al. (2014) conducted a study in Tunisia on the issue of households' NPLs using dynamic panel data methods estimated on around 16 Tunisian banks over the period 2003–2012. The results show that NPLs in the Tunisian banking system can be explained by bank-specific determinants in addition to macroeconomic variables. The study of Hosen et al. (2020) on non-performing loans in Bangladesh uses an annual panel dataset covering the years 2014 to 2018. They investigated the impact of selected variables on non-performing loans using a pooled ordinary least square (OLS) technique. Their study found that inefficiency has a substantial positive effect on NPLs, whereas the loan-to-deposit ratio has a negative impact.

2.1. Overview of Non-performing Loan

Non-performing loans are defined differently in different countries. There is no universally accepted definition of "non-performing loans." However, there are differences in classification and content. i.e. different countries have their own criteria of defining and categorizing NPLs. Banks typically classify non-performing loans based on international best practices. Non-performing loans are classified differently in each country (Mahesh, 2010). Non-performing loans are defined by the International Monetary Fund as loans that are not performing. "A loan is non-performing when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons—such as a debtor filing for bankruptcy—to doubt that payments will be made in full." The National Bank of Ethiopia (NBE) defined "non-performing loans" as "loans whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment terms of the loan or advance is in question." In Ethiopian context the NBE requires all financial institution to classify their loan in to five major categories as pass, special mention, substandard, doubtful and loss.

2.2. Hypotheses Formulation

The following hypotheses were formulated for this study in order to achieve the study's main objective by taking into consideration available theories and based on existing and the above-mentioned empirical studies.

H1: *Capital adequacy ratio has a significant and negative impact on NPLs of commercial banks in Ethiopia*

H2: *Loan to deposit ratio has a positive and significant influence on NPLs of commercial banks in Ethiopia.*

H3: *Return on assets has a significant and negative impact on NPLs of commercial banks in Ethiopia.*

H4: *Return on equity has a significant and negative impact on NPLs of commercial banks in Ethiopia.*

H5: *Bank size has a significant and positive impact on NPLs of commercial banks in Ethiopia.*

H6: *Growth in number of branches has a significant and positive impact on NPLs of commercial banks in Ethiopia*

H7: *Bank inefficiency has a significant and positive impact on NPLs of commercial banks in Ethiopia.*

H8: *Loan growth rate has a significant and positive effect on NPLs of commercial banks in Ethiopia.*

3. Research Methodology

This study used both primary and secondary data over a ten-year period from 2010 to 2019. The primary data was obtained from interviews with officials from selected commercial banks, while the secondary data was gathered from audited financial statements of proposed banks, the National Bank of Ethiopia (NBE), the Ministry of Finance and Economic Cooperation (MOFEC), and the Central Statistical Agency (CSA). On the basis of its premises, the study used a non-probability sampling

approach called purposive sampling to pick a sample from the study's population. All licensed and registered commercial banks in the country were included in the study's population. As a result, seventeen commercial banks are in existence. A sample of 13 commercial banks was carefully chosen from a population of 17 based on their years of experience with borrowing and lending activities. Primary data was analyzed using a detailed discussion analysis, and secondary data was analyzed using multiple regression analysis methods. To ensure sample conformance to multiple regression analysis methods, the assumptions of the Classical Linear Regression Model (CLRM) were used. As a consequence, the acquired data was examined for heteroscedasticity, multicollinearity, normality, and linearity, with no major violations observed for any of these tests. Nonperforming loans are the dependent variable, with bank-specific parameters (capital adequacy ratio, loan-to-deposit ratio, return on assets, return on equity, bank size, increase in number of branches, inefficiency, and loan growth rate) being used as explanatory variables for the study. Hair, et al. (2014) rule of thumb approaches was also used to guarantee that the sample was big enough to meet the requirements of efficiency, reliability, flexibility, representativeness, stable coefficients, statistical significance, and generalizability of the results.

3.1. Variable Specification

Based on the results of thorough empirical investigations and theoretical framework. the following bank-specific study variables specifications were generated: Accordingly, the below table shows a measurement of explanatory factors as well as their expected sign respectively.

Table 1: Definitions of variables and their expected sign.

Variable	Notation	Explanation	Expected sign
Dependent Variable			
Nonperforming loans	NPLs	Percentage of NPL to total outstanding loans	
Explanatory Variables			
Capital Adequacy Ratio	CAR	Ratio of the total risk weighted assets total capital fund	-
Loan to Deposit Ratio	LDR	Ratio of total loans to total deposit	+
Return on Assets	ROA	Ratio of net profits to total assets	-
Return on Equity	ROE	Ratio of net income to shareholders' equity	-
Bank Size	BS	The natural logarithm of bank's total assets	+
Growth in Number of Branch	GNB	Percentage increase in number of branches	+
Bank Inefficiency	BI	operating expense to operating Income	+
Loan Growth Rate	LGR	Increase in percentage of loans and advances	+

3.2. Empirical Model Formulation

Multiple regression models were developed in accordance with the study's objectives after examining existing empirical evidences and theoretical applications of the selected study variables. Nonperforming loans (NPLs) were also utilized as a dependent variable, with additional bank-specific determinants (capital adequacy ratio, loan-to-deposit ratio, return on assets, return on equity, bank size, growth in number of branches, inefficiency, and loan growth rate) as explanatory variables. The study employed an economic model based on empirical investigations of Louzis et al. (2012), Messai & Jouini (2013), Bucur & Dragomirescu (2014), Kingu (2017), Kjosevski & Petkovski (2017), Rajha (2017), Mazreku et al. (2018), Kumar & Kishore (2019), Koju et al. (2018), and Kjosevski et al. (2019).

Accordingly, to explain the relationship between dependent and explanatory variables, the following generic econometric model is proposed:

$$Y_{it} = \beta_0 + \beta X_{it} + \varepsilon_{it} \dots\dots\dots 1$$

Where:

Y_{it} : non-performing loan for firm 'i' in year 't'

β_0 : constant term

β : coefficient of the independent variables of the study,

X_{it} : is independent variable for firm 'i' in year 't' and ε_{it} stands for the normal error term.

The study employed the aforementioned general model after fitting the relevant research variables.

3.3. Model Selection for Regression

The data was analyzed using EViews statistical software. The study used three panel estimation techniques to analyse the panel data: the common effect model, also known as the Pooled Regression Model (OLS), the fixed effects model (FEM), and the random effects model (REM). The common effect model is one of the simplest models that ignores the influence of individual subjects and time by assuming that all individual subjects are homogeneous and have the same nature across time (Woodridge, 2010) and (Gujarati and Dawan, 2015). As a result, the constants and coefficients in the common-effect model are consistent across subjects and time periods.

$$Y_t = \beta_0 + \beta X_t + \varepsilon_t \dots\dots\dots (1)$$

By controlling unobserved heterogeneity across time and permitting diversity in behavior among individual banks, the fixed-effect model (FEM) is utilized. The model enables varying constants for individual subjects, but the coefficients are fixed throughout time. In other words, this approach accounts for heterogeneity or individuality among cross-section units by assigning an intercept value to each item that represents the distinctions between them.

$$Y_{it} = \beta_0 + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (2)$$

According to Gujarati and Dawan (2015), the random effect is assessed by allowing individual banks to vary in time. As a result, the random-effect model (REM) has fixed coefficients while the constant in random effect has a random component. This model is based on the premise that unobserved individual variability is unrelated to the model's independent variables.

$$Y_{it} = \beta_0 + \varepsilon + \beta X_{it} + \varepsilon_{it} + \theta_i \dots\dots\dots (3)$$

For this study, panel regression was used to look at the relationship between NPLs and bank-specific independent variables. Because panel regression mixes cross-section and time series, the residuals are expected to correlate with time and individual banks, biasing the ordinary least square. The following is the actual employed model taking into account the proposed variables.

$$NPLs = \beta_0 + \beta_1(CAR)_{it} + \beta_2(LDR)_{it} + \beta_3(ROA)_{it} + \beta_4(ROE)_{it} + \beta_5(BS)_{it} + \beta_6(GNB)_{it} + \beta_7(BI)_{it} + \beta_8(LGR)_{it} + \varepsilon_{it} \dots\dots\dots (4)$$

Where:

NPLs is stands for Non-performing loans, β_0 is an intercept, $\beta_1, \beta_2, \beta_3, \dots, \beta_8$ represent estimated coefficient for bank i at time 't', CAR = Capital Adequacy Ratio of Bank i at time t, LDR = Loan to Deposit Ratio of Bank i at time t, ROA = Return on Assets of Bank i at time t, ROE = Return on Equity of Bank i at time t, BS = Bank Size of Bank i at time t, GNB = Growth in Number of Branches of Bank i at time t, BI = Bank Inefficiency of Bank i at time t, LGR = Loan Growth Rate of Bank i at time t and ε_{it} represents error terms which are consciously or unconsciously added or excluded.

4. Results and Discussions of Findings

The findings of the study are presented in this part, which is based on the three models: Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). Consequently, the regression output is displayed in the table below.

Table2: Regression results

Regressor	Pooled OLS estimation		Fixed Effects Model		Random Effect Model	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
CAR	-0.054	0.04**	-0.115	0.03**	-0.764	0.03**
LDR	0.011	0.03**	0.015	0.03**	0.214	0.03**
ROA	-0.864	0.03**	-1.491	0.00***	-0.332	0.01***
ROE	-0.008	0.04**	-0.008	0.03**	-0.043	0.06*
BS	0.236	0.07*	0.029	0.2307#	0.346	0.07*
GNB	0.087	0.04**	0.021	0.03**	0.056	0.03**
BI	0.029	0.03**	0.003	0.02**	0.532	0.127#

LGR	0.542	0.00***	0.103	0.00***	0.187	0.00***
R-Squared	76.47%		88.96%		81.76%	
Prob(F- Statistics)	0.000		0.000		0.000	

Note: ***, **, * and # indicates significant at 1%, 5%, 10% and insignificant respectively.

The three versions provide a good mix of features. The R-squared of the pooled OLS estimation model is 76.47 percent, the dynamic FE estimation model is 88.96 percent, and the static Random Effect model is 80.76 percent. As shown in the table above, FE estimation attained the highest R-squared value, with the variables used explaining 88.96% of the variance dependent variable. Furthermore, the Hausman test results show that fixed effect models are preferred over random effect models. Due that the following explanation of results are deepened on the value of fixed effect model. The P value is used to evaluate the regression and identify significant factors that influence the dependent variables. The fixed effect model result of R-squared 88.96% indicates that variation in non-performing loans can be explained by variation in bank-specific determinants, with the remaining 11.04 percent explained by other factors not included in the model.

The capital adequacy ratio, which is the ratio of a bank's available capital to its risk-weighted credit exposures, has a negative coefficient estimate of -0.115 and a significant p-value of 0.03, which is significant at the 5% level. This suggests that CAR has a negative impact on non-performing loans, with NPLs decreasing as bank capital rises and vice versa. The above-mentioned hypothesis is supported by the regression findings. This might be because CAR sets requirements for commercial banks by monitoring their capacity to pay liabilities, respond to credit risks, and operational risks, allowing them to absorb possible losses. The findings are similar to those of Makri et al. (2014) and Abid et al. (2014), Kingu, (2017), Jameel (2014), Khan et al. (2020), and Koju et al. (2019), who found a negative influence of CAR on NPLs, but not with that of Swamy (2013).

The loan-to-deposit ratio, which explains how existing deposits are used in lending or reveals the bank's ability to pay back depositor withdrawal effects by having to depend on loans provided as a source of liquidity, has a positive coefficient estimate of 0.015 and a significant p-value of 0.03 that is acceptable at the 5% significance level. The findings show that, the loan to deposit ratio moves in the same direction as non-performing loans, as predicted by this study hypothesis. That is, if all other variables remain constant, a 1% change in the loan-to-deposit ratio results in a 0.15 percent increase in NPLs in the same direction. The study's results in line with work of Gambo et al. (2017) but contradict with the findings of Washeka and Asif (2016), Jameel (2014) and Hosan et al. (2020) who found a negative relationship between loan-to-deposit ratio and NPLs.

ROA, which is used to determine a bank's profitability and is calculated as net income divided by total assets and demonstrates that the bank's financial condition is stable, has a negative coefficient estimate and statistically significant impact on non-performing loans. The study's findings support the hypothesis that was proposed. This might be because banks are actively managing their assets and making use of their economic resources to generate income. Furthermore, the study's findings are consistent with the reports of Godlewski (2005), Makri et al. (2014), Dimitrios et al. (2016), Rachman et al. (2018), and Mensah, (2019), but not in line with the findings of Kumar & Kishore (2019) and Ahmad & Bashir (2013).

Return on equity (ROE), which is used to assess a bank's financial performance and is used to determine profitability and efficiency in generating profits, has a negative coefficient estimate and a statistically significant P-value. The findings show that ROE moves in the opposite direction of non-performing loans, which is consistent with the hypothesis of this study. This might be because more profitable banks indicate better resource management, which leads to a lower number of nonperforming loans (NPLs). This study findings support the findings of Washeka & Asif (2016), Rothman et al. (2018), Sebayang (2020) and Waqas & Khan (2017), who found a negative association between NPLs and bank profitability as determined by ROE.

Bank size, which is measured by the natural logarithm of total assets, yields a positive coefficient estimate but is statistically insignificant. This means that the bigger the bank, the more non-performing loans it has. This might be because Ethiopia's largest commercial bank is the Commercial Bank of Ethiopia (CBE), which is publicly owned and responsible for funding the country's riskier government projects than private banks. The findings of the study are consistent with the results reported by Kingu (2017), Gambo et al. (2017), Louzis et al. (2012), Washeka & Asif (2016), Khemraj & Pasha (2005), Rajha (2017) and Chaibi & Ftiti (2015), who found a significant influence of bank size on NPLs based on the notion that large banks are more prone to NPL problems than small banks. But the sequel of the study is not in line with the findings of Swamy (2012), Salas & Saurina (2002), and Ghosh (2015), who found a negative relationship based on the assumption that large banks are technologically sophisticated, have well-trained manpower, a fully functional infrastructure to carry out their banking activities smoothly, and a skilled administration with the necessary skills needed to successfully manage loan portfolios.

Growth or increase in the number of branches as bank specific determinants of non-performing loans has a positive coefficient estimate of 0.021 and a statistically significant p-value as indicated in the above regression result table. Therefore, the findings support the formulated study hypothesis. The possible explanation is that as commercial banks expand their branches across the country; their likelihood of being vulnerable to the problem of non-performing loans tends to increase. Growth in the number of branches is measured by dividing the change in the current year's number of branches over the preceding year's available number of branches of an individual bank. The findings of the study are consistent with the report of Nishani and Ekanayake (2018).

The inefficiency of a bank may be calculated by dividing total operating expenses by total operating income during a certain time period. It has a statistically significant p-value and a coefficient estimate of 0.003, which supports the formulated study hypothesis. Bank inefficiency is also used by organizations to detect faulty management hypotheses, unethical behavior, and skimming in business failures as well. The findings of this study coincide with those of Ekanayake and Azeez (2015), Benthem (2017), Waqas & Khan (2017), Louzis et al. (2012), Garr (2013), and Koju et al. (2019), but vary with those of Khan et al. (2020), who found that inefficiency had a negative influence on NPLs.

The loan growth rate (LGR) is calculated by dividing the total change in the current year's loans and advances balance by the net change in the previous year's loans and advances balance. It has a positive coefficient estimate and a statistically significant p-value in this investigation. As a result, the study's findings support the research hypothesis. The reason for this direct relationship between NPLs and loan growth is that when banks authorize large amounts of loans in order to increase profits, their criteria for selecting loan applicants may be less stringent, and they may prefer to support riskier

projects. Specifically, the sequels of this study are consistent with the "moral hazards theory," which states that in an effort to attain growth targets, bank managers lower borrower selection and eligibility requirements and offer loans to poorly qualified borrowers who eventually default on their loans, resulting in an increase in nonperforming loans (NPLs). The findings of the study complement those of Washeka & Asif (2016) and Salas & Saurina (2002), but contradict those of Kingu (2017), Nikolaidou (2011), Khemraj, and Pasha (2005), and Zheng et al. (2020), who showed a negative association between loan growth rate and the likelihood of a loan defaulting.

Furthermore, the study of the results of interviews conducted with officials of selected commercial banks reveals that, in the case of Ethiopian commercial banks, bank-specific determinants are the key predictors of non-performing loans.

5. Conclusions

This paper used both primary and secondary data (panel data technique) to analyze the banks' specific drivers of NPLs in the case of selected Ethiopian commercial banks from 2010 to 2019. In general, the analysis discovered that bank-specific determinants are the major causes of the country's level of NPLs. Furthermore, the study's findings are compatible with existing theories and prior studies conducted by numerous scholars. Finally, the study will serve as a guideline and provide direction to subsequent researchers interested in the area, instructing them to include other determinants of NPLs that were not included in this study and to do more thorough research.

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