INNOVATIONS

Investigation on Macroeconomic Determinants of Non-Performing Loans: The Case of Ethiopian Commercial Banks

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Abstract

This study was undertaken to examine the macroeconomic determinants of nonperforming loans in the case of Ethiopian commercial banks. The study used both primary and secondary data over the period of 2010 to 2019. Non probability sampling, particularly purposive sampling, was employed and, accordingly, 13 commercial banks were selected out of a total of 17. The necessary data were gathered from audited financial statements of selected banks, 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 used. Concerns about heteroskeda sticity, normality, serial correlation, and multi Collinearity were all assessed on the data. For secondary data, multiple regression analysis was employed, and the Fixed Effect Model (FEM) was used accordingly. The study discovered that the gross domestic product has a negative and substantial impact on non-performing loans, but the real lending rate, household income distribution, money supply, inflation rate, exchange rate, and public debt have a positive and significant impact on NPLs. Furthermore, the results of the interview show that these external factors influence NPLs.

Key Words: 1.Non-performing Loans 2. Macroeconomic factors 3.Commercial banks.

1. Introduction

Commercial banks are legally constituted financial institutions that accept deposits, provide checking account services, make various loans, and provide basic financial products such as certificates of deposit (CDs) and savings accounts to individuals, small businesses, and other organizations in order to achieve their primary goal of profit generation. Through their active participation in various initiatives and businesses in a country, they are facilitators of the country's economic development. They accomplish this by participating in a range of lending activities or by providing loans. They are also important jacks of all trades in boosting and improving society's quality of life.

Without the participation of commercial banks to a sweeping extent, the country's economic success would be unimaginable. They are not only money's purveyors, but also money's manufacturers, courtesy of their credit-creation operations. The basic aim of commercial banks is to offer financial services to the general public and companies in order to foster economic and social stability and long-term prosperity (Bandlamudi, K. et al., 2017).

However, while they are lending their funds, there is likelihood that they are unable to collect a given percentage of their entire loans due to various reasons, resulting in nonperforming loans. A nonperforming loan (NPL) is a loan on which the borrower has defaulted because they have failed to make regular payments for a certain length of time. Since the global financial crisis (GFC) in 2007–2008, the credit quality of loan portfolios has been unstable in most nations throughout the world, and as a result, bank asset quality has worsened dramatically over time(Kjosevski & Petkovski, 2017).The rise in gross non-performing loans poses a serious threat to the banking system and the economy as a whole. Similarly, failing to handle non-performing loans over time has a long-term impact on banks' liquidity and solvency, potentially jeopardizing the financial sector's liquidity situation (Kaaya and Pastory, 2013).As a result, failing to handle gross non-performing loans responsibly usually results in significant loan provisioning, which causes a decline in profits for many banks and eventually reduces the financial sector's capacity to contribute to economic development(Karim et al., 2010).

According to Louzis et al.(2010)understanding the drivers of nonperforming loans is critical for both regulatory bodies and bank management. Any solution implemented by regulatory authorities to reduce the NPL problem, however, must first include a thorough examination of the underlying macroeconomic and bank-specific factors of NPL.

The bankruptcy of the financial sector was revealed to be the source of the current financial crisis, which resulted in a recession in the economy and a worsening of transactions. Banks and financial institutions are the backbone of the economy in today's world, and their importance cannot be overstated. Banks, on the other hand, are encountering difficulties as a result of lax regulatory oversight, a lack of quality management, and moral hazard. As a result, bank financial instability emerges, resulting in lower economic development. The effect of problematic loans and degraded bank earnings has intensified as a result of the economic crisis. Non-performing loans, which are an issue for banks, are defined as loans that are past due for more than a year and have not been repaid (Baselga-Pascual & Orden-Olasagasti, 2015).

Despite this, little is known about the factors that influence NPLs in Ethiopia. It is therefore critical to investigate and comprehend the factors that lead to the prevalence of non-performing loans in Ethiopian commercial banks objectively. The primary goal of this study is to investigate and thoroughly identify macroeconomic factors that contribute to the occurrence of non-performing loans in Ethiopian commercial banks. Accordingly, the main objective of this paper is to address the question, "What are the macroeconomic factors of non-performing loans in Ethiopian commercial banks?"

1. Literature Review

1.1. Overview of Banking in Ethiopia

Ethiopia, like many other developing countries, has nascent banking and financial institutions. Under each governor who controlled the country, the development, structure, ownership, administration, and operations of financial institutions, especially commercial banks, evolved into what they are now. There are now seventeen commercial banks registered with the National Bank of Ethiopia (one public and sixteen private) that are actively engaged in banking activities across the country.

1.2. Non- Performing Loans

Non-performing loans are seen differently in different nations. In other words, there is no universally accepted definition of non-performing loans; nonetheless, there are differences in classification and substance. Banks usually define non-performing loans based on best international practices(Mahesh, 2010).According to the National Bank of Ethiopia (NBE), "non-performing loans" means "loans and advances whose credit quality has deteriorated such that full collection of principals and/or interest in accordance with the contractual repayment terms of the loan or advance is in question".A non-performing loan is a past-due debt that cannot be repaid within the agreed-upon time frame. Non-performing loans are sums of those lenders have been unable to recoup from defaulters. A defaulter may be an individual or institution who is unable to pay a loan. It is made up of subpar, questionable debts, and bad debts/losses. Non-performing loans are used as a proxy for gauging the country's banking sector's credit risk (Festic et al., 2011).Because of idiosyncratic-level and country-level factors, the burden of non-performing loans is inherited. Idiosyncratic-level variables are measured by financial position and a statement of comprehensive income. Many market indicators are used to measure variables at the country level(Waqas & Khan, 2017).

In general, a non-performing loan (NPL) is a bank loan that has been defaulted on or is unlikely to be repaid in full by the borrower. Non-performing loans are a significant concern for the banking industry since they lower bank profitability and are sometimes portrayed as preventing banks from lending more to businesses and consumers, hence slowing economic development.

1.3. Literature Review

Several empirical studies have looked at the influence of a variety of factors on NPLs, including bank-specific factors, banking sector and monetary policy issues, and macroeconomic variables.

Macroeconomic Determinants of NPLs

According to Chaibi & Ftiti(2015), macroeconomic factors are described as those features that inform us about non-controlling failures experienced by banks owing to changes in their composition. In their investigation, they found that the economy, which is based on macroeconomic issues, has a significant influence on the financial environment, where business units engage in monetary operations that are handled by financial institutions.

Waqas & Khan, (2017) undertaken study on determinants non-performing loans in banking sectors across three types of South Asian economies using a sample of 105 unbalanced panel data of financial firms over the period of 2000–2015 and applying the General Method of Moment (GMM).Their study found a significant impact of macroeconomic variables on non-performing loans. According to qualitative research undertaken by Syed (2021) numerous macroeconomic parameters impact the banking system, and hence the NPLs, in different nations and at different times.

Hada et al. (2020) conducted study in Romania focusing on determinants of NPLs. Their study used panel data for the period of 2009 to 2019. The analysis was done using linear regression model and the findings revealed that each independent variable has a considerable influence on the dependent variable NPL. Similarly, they reported that NPLs and the macroeconomic indicators analyzed have high connections. In Tunisia, Abdel et al. (2014), conducteda study to investigate the drivers of non-performing loans using dynamic panel data methodologies. Their study used panel data collected from 16 Tunisian banks from 2003 to 2012. Their findings suggest that NPLs in the Tunisian banking sector are mostly explained by macroeconomic factors (GDP, inflation, interest rates).

Memdani (2017) investigated a study on factors determining prevalence of NPAs across the three different ownership structures (public sector banks, private banks, and foreign banks) of Indian banking sector. The necessary panel data for all banks were collected from the official website of the Reserve Bank of India (RBI) and the country's central bank respectively. Finally, the findings show that macroeconomic factors have a considerable impact on NPLs in public sector banks.

In their study, Zaib et al. (2014) used a panel econometric analysis using a fixed effect model to examine determinants of NPLs. They claim in their study that persistent slowdown in economic development results in a high percentage of nonperforming loans.Kojuet al. (2018) used both static and dynamic panel estimating methodologies to analyze the macroeconomic and bank-specific causes of non-performing loans (NPL) in the Nepalese banking sector. They focused on data collected from30 Nepalese commercial banks for the study period of 2003 to 2015 and their findings reveal that, in addition to bank-related factors, NPLs have a substantial association with macroeconomic variables. According to a study by Syed and Tripathi, (2019) on the influence of macroeconomic determinants on non-performing loans in BRICS nations from 2000 to 2016 macroeconomic factors are important predictors of non-performing loans. Macroeconomic factors are highly related to nonperforming loans, according to a study conducted by Mazreku et al. (2018) using data from the World Bank and the International Monetary Fund for a sample of transition countries between 2006 and 2016.

1.4. Formulation of Hypotheses

In light of the preceding literature and empirical investigations, the following sets of hypotheses were formulated to address the study's main objective.

H1: *Gross domestic product has a negative and significant impact on the NPLs of ECBs.*

H2: *Real lending rate has asignificant and positive impact on the NPLs of ECBs.*

H3: *Household income distribution has a significant and negative effect on the NPLs ECBs.*

H4*: Unemployment rate has a significant and positive on the NPLs of ECBs.*

H5: *Money supply has a significant and positive effect on the NPLs of ECBs.*

H6: *Inflation rate has a significant and positive impact on the NPLs of ECBs*

H7: *Real exchange rate has a significant and positive impact on the NPLs of ECBs.*

H8: *Public Debt has a significant and positive impact on the NPLs of ECBs.*

2. Research Methodology

Primary and secondary data were employed in this study. The study's primary data was collected from unstructured interviews with vice presidents of credit appraisal and portfolio management at each sampled bank, as well as senior credit committee members, while the secondary data was collected systematically from audited financial statements of 13 licensed and registered commercial banks that have been in operation for at least ten years from 2010 to 2019, obtained from the National Bank of Ethiopia (NBE), the Central Statistical Agency (CSA) and the Ministry of Finance and Economic Cooperation (MOFEC) respectively.During the research period, all commercial banks with fewer than ten years of banking experience were excluded from the sample. A sample of 13 banks was chosen from a population of 17 based on financial data availability and other crucial factors such as asset size, loan size, liability positions, capital, earnings, and general banking experience. The readability, appropriateness, adaptability, and representativeness qualities of sampling processes are approved by the greater sample size.

Test result for basic assumptions of Classical Linear Regression Model (CLRM) were undertaken to ensure sample conformity. Accordingly data was tested for heteroskedasticty ($E(ui2) = \sigma i2$) using Breusch-Pagan-Godfrey, for serial correlation or autocorrelation ($cov(ui, uj) = 0$ for $i \neq j$) through Godfrey Serial Correlation, for normality ($ut \sim N(0, \sigma 2)$) by Jarque-Bera test, for Multi collinearity respectively. Consequently, no significant violations were found for all these tests. Furthermore, Ramsay RESET test of model specification test was carried out for this study.

2.1. Variable Specification

The following macroeconomic bound study variables specifications were developed based on the oretical framework and the findings of extensive reviews of empirical research. As a result, the following table presents a measurement of explanatory factors as well as their predicted sign.

Table 1: Definitions of variables and their expected sign

Variable	**Explanation**	**Expected Sign**
Dependent Variable		
Non-Performing Loans	Percentage of NPL to total outstanding loans	
Independent Variable		
Growth Domestic Product	Growth in GDP in percentage	_
Lending Rate	Average real lending rate	+
Household Income	Percentage increase/decrease in household income	_
Unemployment	Increase/ decrease in unemployment rate	+
Money Supply	Percentage of increase M2	+
Inflation Rate	Increase/decrease in inflation rate	+
Exchange Rate	Increase/ decrease in exchange rate in terms of USD	+
Public Debt	Increase/decrease in government borrowing	+

2.2. Empirical Model Formulation

After analyzing available empirical research and theoretical relationships among variables, multiple regression models were formulated in accordance with the study's aims. Furthermore, nonperforming loans (NPL) was used as a dependent variable, with other explanatory factors including gross domestic product, lending rate, household income distribution, unemployment rate, money supply, inflation rate, exchange rate, and government debt.To achieve its primary objective, the study used an economic model based on empirical studies by 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).The suggested general econometric model appears as follows to describe the impact of explanatory variables on dependent one (NPLs).

$$\mathbf{Yit= \beta_o + \beta X_{it}+ \varepsilon_{it} , \ldots\ldots\ldots\ldots 1}$$

Where:

Yit: non-performing loan for bank 'i' in year't'

β0: constant term

β: coefficient of the independent variables of the study,

Xit: is independent variable for bank 'i' in year't' and**εit** stands for the normal error term.

After fitting the specified research variables, the study used the aforementioned general model as follows.

$$NPLs=\beta_0 +\beta_1(GDP)_{it} + \beta_2(RLR)_{it}+ \beta_3(HID)_{it} + \beta_4(UN)_{it}+\beta_5(MS)_{it} +\beta_6(IFR)_{it}+ \beta_7(EXR)_{it} + \beta_8(PD)_{it} + \varepsilon_{it}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where:

NPLs is stands for Non-performing loans, β0 is an intercept, β1, β2, β3..... and β8 represent estimated coefficient for bank i at time't', GDP = Gross Domestic Product at time t,RLR = Real lending Rate at time t,HID = Household Income Distribution at time t,UN = Unemployment Rate at time t,MS = Money Supply at time t,IFR = Inflation Rate at time t,EXR = Exchange Rate at time t, PD = Public debt at time t, and εit represents error terms.

2.3. Model Selection for Regression

There are three types of prospect models: Common Effect Model or Pooled Least Square (PLS), Fixed effect model (FEM), and Random Effect Model (REM), each with its own importance and limitations. According to Gujarati and Porter (2009), the common effect model is based on the assumption that in the regression model, all observations are pooled together. The Fixed Effects Model (FEM), on the other hand, accounts for heterogeneity or uniqueness among cross-section units by assigning each entity its own intercept value, which captures variations across entities. The Random Effects Model (REM), on the other hand, is based on the assumption that unobserved individual heterogeneity is uncorrelated with the independent variables in the model. Based on its appropriateness and the result of Hausman test this study employed the Random Effect Model (REM).

3. Results and Discussions

This section contains the study's findings based on the Random Effect Model (REM). As a result, the regression output is shown in the table below. Furthermore, the study used the p- value to investigate the impact of explanatory variables on non-performing loans.

Table 2: Regression results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
GDP	-0.464390	0.099327	-4.675355	0.0000
RLR	0.543848	0.137547	3.953915	0.0001
HID	0.021557	0.003585	6.013602	0.0000
UN	155.7506	24.98979	6.232568	0.0000
MS	0.379785	0.072963	5.205186	0.0000
IFR	0.036186	0.009469	3.821526	0.0002
EXR	1.337019	0.368528	3.628000	0.0005
PD	0.162193	0.028804	5.630897	0.0000

Note: Growth domestic product(GDP), Real Lending Rate(RLR), Household Income distribution(HID), Unemployment Rate(UN), Money Supply(MS), Inflation Rate (IFR), Exchange Rate (EXR) and Public Debt(PD).

3.1. Regression Results

The real growth domestic product, which is defined as the total monetary or market value of all finished goods and services produced inside a country's border and assessed yearly, has a negative coefficient of -0.46 and is statistically significant at the 1% level. The findings show that real GDP moves in the opposite direction of non-performing loans, which is in line with what this study expected. This indicates that a one percent rise or reduction in GDP, while holding all other factors constant, would result in a 0.46 change in nonperforming loans in the opposite direction.This result is in line with the findings of Zheng et al. (2020), Koju et al. (2019), and Klein (2013), who found that real gross domestic product has a negative impact on the amount of non-performing loans. This could be

because an increase in GDP is linked to economic progress, which enhances borrowers' credit-servicing ability.

With a coefficient estimate of 0.54 and a highly significant p-value that is acceptable at the one percent significant level, the real lending rate has a positive and significant influence on the number of non-performing loans. The study's findings are in line with the findings of Bahruddin& Masih (2019), Khemraj & Pasha (2005), Debarun Chakraborty (2016), and Sunday Nathan (2020). In other words, this result supports the hypothesis that increased lending rates lead to an increase in NPLs.

Household income, which is defined as the total gross income before taxes obtained by all members of a household over the age of a certain age at a given time, has a positive and substantial impact on the emergence of non-performing loans. This determinant has a weaker positive coefficient estimate of 0.02 and is statistically significant at the 1% level. The findings show that household income distribution changes in the same way when it comes to non-performing loans, which contradicts the study's hypothesis and theoretical assumptions.The findings of the study are congruent with that of (Zainol et al., 2018), who found that household income distribution had a favorable influence on NPLs.

Unemployment refers to the percentage of the labor force that is unemployed yet looking for a job. The findings reveal that the unemployment rate is statistically significant at 1% and has a strong positive impact on the emergence of NPLs. In other words, the findings support the hypothesis that higher unemployment leads to more non-performing loans. This might be because of the high unemployment rate, which leads to a higher ratio of non-performing loans due to the economic downturn and poor capacity to repay the loans.This positive effect of unemployment on NPLs means that the longer a person is jobless, the more likely they are to suffer negative consequences and contribute to the community's unemployment multiplier effect, which weakens their ability to meet their financial obligations. The study's findings are in line with those of Chaibi&Ftiti (2015), Roman & Bilan (2015), Klein (2013), Szarowska (2018), and Nargis et al. 2019).

Money supply refers to the total amount of money owned by the public at a specific moment in time in an economy or the total stock of money circulating in an economy. It has a positive coefficient estimate of 0.37 and is statistically significant at the one percent significant level. The findings confirm the hypothesis that a rise in money supply will lead to a rise in non-performing loans. The positive relationship between the money supply and the volume of NPLs could be explained by the fact that increasing the money supply leads to long-term price inflation, which lowers the purchasing power of money and causes economic instability, as well as affects borrowers' credit serving capacity in general.The results of the study are similar to the findings of Rulyasri et al. (2017), Yurdakul (2014), Leka et al. (2019), Adeola & Ikpesu (2017), and Marouf &Guellil (2017), who have documented a positive impact of money supply on NPLs and are inconsistent with the work of Bozdo & Kripa (2015).

The inflation coefficient estimate is statistically significant and positive. It accounts for 0.03 percent, implying that a 1% increase in inflation would result in a 3% increase in non-performing loans in the same direction if all other variables remained constant. This might be because an increase in general prices causes economic instability, affecting borrowers' capacity to meet their financial obligations according to the terms of the contract. The study's findings are consistent with those of Marijana Urak, Sandra Pepur Klime, et al. (2013), Gjini & Koprencka (2018), and Khan et al. (2020), who discovered a

positive and significant impact of inflation on the emergence of NPLs, but contradict those of Kjosevski et al. (2019) and Mazreku et al. (2018), who reported a negative correlation between inflation and NPLs.

The exchange rate, which indicates the value of one country's currency in terms of the currency of another, has a positive coefficient and statistically significant influence on the occurrence of nonperforming loans. As a result, the research findings support the predicted hypothesis. This might be predicated on the argument that the sharpest decrease in the value of one country's currency in terms of another country's currency would result in a deterioration of economic progress, which would then harm society as a whole. The study's results are in line with findings of Beck et al. (2013), Beck et al. (2021), Kusmayadi et al. (2018), Jakubk & Reininger (2014), Kjosevski et al. (2019), Koju et al. (2019), and Kjosevski et al. (2019).

The impact of public debt on non-performing loans has a positive coefficient estimate of 0.16 and is statistically significant. The findings show that public debt rises in the same direction as non-performing loans, which is consistent with the hypothesis's prediction. This might be due to the fact that while public debt is good in the near term for financing various initiatives, it causes economic distortion in the long run. The findings of the study are consistent with the work of Slamolu (2015), Louzis et al. (2010), Ghosh (2015), Makri et al. (2014), Reinhart & Rogoff (2010), and Koju et al. (2018), who have reported the positive impact of public debt on NPLs, and inconsistent with the findings of Kumar & Kishore (2019), who found the impact of public debt insignificant.

Furthermore, the outcomes of an interview with bank executives show that non-performing loan occurrences are strongly associated with macroeconomic factors since they most often occur unexpectedly and are beyond the control of banks.

4. Conclusions

The study's main objective is to investigate the macroeconomic factors that influence non-performing loans in Ethiopian commercial banks. The study used both primary and secondary data to arrive at this conclusion. The NPL ratio is a useful metric for assessing a financial system's and a country's economic stability. As a result, the findings of this paper support the theory that macroeconomic conditions influence the volume of non-performing loans. Accordingly, study discovered that the gross domestic product has a negative and substantial impact on non-performing loans, but the real lending rate, household income distribution, money supply, inflation rate, exchange rate, and public debt have a positive and significant impact on NPLs.The key contribution of this study is that the findings of the overall analysis may be utilized to anticipate non-performing loan trends as well as the rationale behind their occurrences both in the banking industry as a whole as well as at individual banks.

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