

EXAMINING NON-PERFORMING LOANS IN ETHIOPIA: EFFECTS OF BANK-SPECIFIC FACTORS AND GOVERNMENT POLICIES

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Abstract

Introduction/Main Objectives: This paper examines the factors affecting non-performing loans (NPLs) in Ethiopian commercial banks. It explores both bank-specific and macroeconomic factors over 15 years (2008–2022), providing insights into their implications for credit risk management. The topic is crucial due to the significant impact of NPLs on financial stability and economic growth. **Background Problems:** The study addresses the critical problem of rising NPL levels in Ethiopian banks, posing challenges to profitability and economic stability. The primary research question is: *What factors significantly influence NPLs in Ethiopian commercial banks?* **Novelty:** This research is novel as it incorporates both bank-specific and macroeconomic variables within the Ethiopian banking context, where limited empirical studies exist. It bridges the gap by employing robust analytical methods to assess previously underexplored relationships. **Research Methods:** An explanatory research design was used, employing the Generalized Method of Moments (GMM) panel regression to analyze data from nine Ethiopian banks (one public and eight private) over 15 years. This methodological approach ensures reliable and unbiased results for addressing endogeneity concerns. **Findings/Results:** The findings reveal that return on assets and loan-to-deposit ratio have a significant negative effect on NPLs, signifying that higher profitability and efficient loan management reduce credit risk. Additionally, government expenditure and broad money supply also lower NPLs, indicating the positive role of fiscal and monetary policies. Conversely, a higher effective tax rate significantly increases NPLs. **Conclusion:** The study concludes that profitability, efficient loan management, and supportive fiscal and monetary policies are critical in reducing NPLs. It recommends enhanced borrower monitoring and emphasizes the importance of expansionary policies by the National Bank of Ethiopia and the government to minimize credit risks. The key takeaway is the vital role of integrated financial and policy strategies in mitigating NPLs.

Keywords: Bank-Specific Factors, Generalized Method of Moments, Government Policy Factors, Non-performing Loans.

JEL Code: G21, E52, E62, C33

1. INTRODUCTION

The banking industry is essential to an economy's growth. The stages for the development of the economy are determined by the development function that the banking sector undertakes. Thus, an economy's potential to grow depends on the stability of the financial sector. For many different businesses and organizations, including those

in the public and private sectors as well as those involved in agriculture and other related fields, banks facilitate the movement of funds from surplus to deficit units through the granting of advances and loans. However, as a result of non-performing assets, banks are becoming more cautious about loans (Sontakke & Tiwari, 2013).

Every economy's ability to remain stable is contingent upon the health and safety of its financial institutions. Financial organizations, in particular banks, act as middlemen between surplus and deficit participants in the economy, which promotes economic development and growth. Banks act as financial middlemen, distributing depositors' savings to borrowers as a productive source of loans (Isaac, 2014).

According to the International Monetary Fund (IMF, 2021), Any loan in which the interest and principle payments are 90 days or more past due, or in which the interest payment has been capitalized, refinanced, or postponed by arrangement, or in which the fees are less than 90 days past due, is considered a non-performing loan (NPL). However, there are further valid reasons to question whether complete payment would be received.

Any business's main goal is to turn a profit. For this reason, any asset produced while a firm is operating ought to bring in money for the enterprise. Given that lending is the main activity of commercial banks and that loans are usually their main asset and source of income, it is crucial for banks to thoroughly examine loan management as it relates to the banking sector (Daniel & Wandera, 2013).

The reasons behind loan default vary among nations and are complex in both developed and developing worlds. There are theoretically a lot of reasons why loans fail to perform. Low economic growth, high real interest rates, inflation, lax lending terms, credit orientation, high credit growth and risk appetite, and inadequate supervision are a few of these (Dhar & Bakshi, 2015).

Non-performing loans (NPLs) affect the liquidity and profitability of the bank, both of which are essential qualities that determine the overall efficiency of the bank. Income is reduced when NPL provisions rise. Once more, a mismatch in maturities between an asset and liability creates liquidity risk for banks, lowering both total credit rating and believability (Badar & Yasmin, 2013). Given the severe implications of NPLs on a bank's sustainability, it is crucial to investigate the underlying factors that contribute to their occurrence thoroughly. With this regard, several studies were conducted worldwide to determine the determinant factors of non-performing loans. Some of them (Calice, 2012), (Saba et al., 2012) (Khemraj & Pasha, 2009) and (F. Ahmad & Bashir, 2013) acknowledged that large-scale non-performing loans (NPLs) have often been associated with banks and financial disasters. .

The risk exposure of banks is increased when lending funds to borrowers who are prepared to pay higher rates in order to gain vast amounts of profit, which can be considered negligence because managers prioritize short-term profits over future loan defaults (Ahmad & Bashir, 2013). According to Calice (2012), asset quality has declined in Tunisia's banking sector. Combining declining asset quality with increasing pressure on banks' capital positions may limit the banking sector's ability to mediate credit, slowing

economic growth.

Saba et al. (2012) studied the determinants of NPLs in the U.S. Banking sector. The study concludes that the rate of non-performing loans (NPLs) in the U.S. banking industry is mainly determined by macroeconomic factors, especially interest rates and real GDP per capita. Higher interest rates may induce more cautious lending, which lowers default risks, according to the inverse relationship between interest rates and non-performing loans (NPLs). Real GDP per capita shows how economic growth improves borrowers' ability to repay loans and has a strong correlation with non-performing loans (NPLs). Besides, Khemraj & Pasha (2009) applied a fixed effect model to a panel dataset in an effort to determine the causes of non-performing loans (NPLs) in Guyana's banking sector. The results of their empirical study corroborate the notion that the amount of non-performing loans is significantly affected by macro-factors, such as an increase in real GDP and the real effective exchange rate.

Emerging Asia's non-performing loans (NPLs) are greatly increasing due to macroeconomic factors like unemployment and real interest rates. On the other hand, NPLs are negatively impacted by the inflation rate and the ratio of total external debt to GDP. Furthermore, effective leadership, strong regulations, and the fight against corruption all contribute to a nation's ability to lessen the adverse effects of macroeconomic cycles on bank non-performing loans (NPLs). Effective governance helps reduce the risks of high unemployment, external debt, and interest rates (Arham et al., 2020).

Regardless of the underlying causes for loan defaults, whether due to poor management or an economic crisis—the problem of non-performing loans (NPLs) must not be allowed to grow. These NPLs impose strain on the lender, the borrower, and the whole economy, all of which are harmed. NPLs have a negative influence on banks' balance sheets, which contributes to the sector's decline in profitability (Ghosh, 2017). Countries in Africa concurred that there should be more exposure to loan loss liability, which can reduce the risks resulting from bad loans. However, there is a consistent increase in NPLs in some African nations (Olawajun, 2020).

As seen by the financial crises these loans caused in East Asian nations, the United States, and Sub-Saharan Africa, non-performing loans pose a threat to the economies of every nation. (Adebola et al., 2011). The issue of non-performing loans has affected lending institutions as well as the economy; Ethiopia is no exception. All Ethiopian banks must maintain a non-performing loan ratio below five percent as per the country's financial regulation framework (NBE, 2008).

Despite ongoing efforts to reduce non-performing loans, many Ethiopian lending institutions continue to face a rising number of NPLs. For instance, as of June 30, 2021, several banks reported significant NPL ratios, including Zemen Bank at 9.1%, Cooperative Bank of Oromia at 6.4%, Bank of Abyssinia at 6.3%, and Awash International Bank at 6.9%. Additionally, the Commercial Bank of Ethiopia recorded an NPL ratio of 8.2%, while Lion International Bank, Nib International Bank, United Bank, Wegagen Bank,

and Dashen Bank reported 6.8%, 7.2%, 5.7%, 7.5%, and 5.4%, respectively (Bank's annual report 2021/2022).

Countries with stronger governance, as indicated by metrics such as the rule of law, tend to have lower bank risk levels. This is due to more effective contract enforcement and decreased borrower defaults, creating a more stable environment for financial institutions. Additionally, stringent capital requirements and risk-based regulations further help to reduce risk for individual banks (Ashraf et al., 2017).

According to Oynaka (2019), the commercial banking sector also suffered from severe financial fragility manifested by a high proportion of NPLs and found that Bank size and performance, credit size, poor credit assessment, poor credit terms, lack of aggressive credit collection system, inadequate nature of collateral were identified as factors affecting occurrence of non-performing loans.

Essentially, the issue of non-performing loans is left unresolved. In that case, it can compound into a financial crisis, where the loans exceed bank capital in a relatively large number of banks. Moreover, to maintain non-performing loans, it is necessary to understand its causes. Based on this, this study attempts to extend the existing body of literature in developing economies by exploring the effect of bank-specific factors and government policies on non-performing loans of commercial banks in Ethiopia.

This study makes a significant contribution to existing knowledge in several ways. First, the study examines the monetary and fiscal policy-related factors influencing non-performing loans at selected commercial banks in Ethiopia. Second, the study also analyzes the effect of bank-specific factors on non-performing loans in Ethiopia. Third, the study is based on a new dataset and methodological specifications. The findings of the study will not only be helpful for the regulators of each economy examined but also will help the top management of banks to set up proper loan structures, review internal banking operations, and alert the borrowers to what individual policies to adopt.

The rest of the study is organized as follows: Section 2 deals with the theoretical framework and provides an empirical review. Following that, Section 3 explains the research methodology. Section 4 presents descriptive statistics and empirical analysis. Section 5 makes the final conclusions and suggestions.

2. LITERATURE REVIEW

2.1. Theoretical framework

In the past decades, there have been significant advances in theoretical understanding on the role of credit markets. These advances have evolved from a paradigm that emphasizes imperfect information and enforcement problems (Hoff & Stiglitz, 1990). They pointed out that borrowers and lenders may have differential access to information concerning a project's risk and may form different risk appraisals. So, what is clearly evident in the credit market is the presence of asymmetric information, where the borrower has detailed knowledge of the expected return and risk of their specific project,

while the lender is only aware of the expected return and risk associated with the average project in the economy.

Lending institutions, such as banks, commonly face four major challenges in their credit activities. First, they must determine the risk level of potential borrowers, a problem known as adverse selection. Second, they need to ensure that borrowers will use the loan appropriately, enabling them to repay it, which addresses the moral hazard issue. Third, in cases where borrowers declare their inability to repay, lenders must assess how the project actually performed. Finally, banks must devise methods to enforce repayment if borrowers are reluctant to fulfill their obligations. These challenges arise due to imperfect information and weak enforcement mechanisms, leading to inefficiencies in the credit market and increased loan defaults (Ghatak & Guinnane, 1999).

This study is grounded in information asymmetry theory, which highlights the essential information that both lenders and business owners should be aware of regarding potential risks and returns associated with investments for which resources are allocated. Information asymmetry refers to the extent to which bank managers have more knowledge about a firm than investors as a whole. Bankers are often limited in understanding entrepreneurs' businesses, which is why this study was conducted (Ebenezer & Omar, 2016).

2.2. Empirical studies

Ahmad & Bashir (2013) examined ten bank-specific variables to analyze non-performing loans (NPLs). It finds that a higher loan-to-deposit ratio, return on assets, and credit growth significantly increase NPLs, indicating that excessive lending and risky lending practices drive defaults. The solvency ratio, inefficiency, and market power were found to be insignificant, suggesting they do not directly impact NPLs. Similarly, return on equity, total liabilities to income, and deposit rate showed no meaningful influence on NPL levels. However, the reserve ratio had a positive effect, indicating that banks with a higher reserve anticipate future NPL growth.

The study conducted by Nkusu (2011), Adebola et al. (2011), and Berge & Boye (2007) found a positive correlation between lending rate and NPLs. An increase in interest rate weakens the loan payment capacity of the borrower; therefore, non-performing loans and bad loans are positively correlated with the interest rates (Nkusu, 2011). Farhan et al. (2012) argued that banks with aggressive lending policies charging high interest rates from the borrowers incur greater non-performing loans. The findings reveal that interest rate, energy crisis, unemployment, inflation, and exchange rate have a significant positive relationship with NPLs, meaning that an increase in these factors leads to a rise in loan defaults. Conversely, GDP growth has a significant negative relationship with NPLs, indicating that stronger economic growth improves borrowers' ability to repay loans, thus reducing NPLs.

Ebenezer & Omar (2016) investigates the effect of credit risk on the profitability of commercial banks in Nigeria. Using data from eight Systemically Important Banks (SIBs) for the period 2011 to 2014, the study employs a panel data analysis to explore the

relationship between credit risk indicators (non-performing loans, total debt to assets, and debt to equity ratios) and profitability, measured by return on equity (ROE). The results reveal that non-performing loans negatively and significantly impact profitability, indicating poor credit management policies. However, the debt-to-asset ratio shows a negative but insignificant relationship with profitability, while the debt-to-equity ratio has a positive but insignificant effect. The study concludes that effective credit risk management is crucial for improving the profitability of Nigerian banks, recommending a refocus on managing financial risks to ensure sustainable growth.

The study by Ghosh (2017) examines the impact of non-performing loans (NPLs) on U.S. product and labour markets using time-series data from 1984 to 2016. The methodology involves both single-equation Ordinary Least Squares (OLS) regressions and Vector Autoregressions (VARs), allowing the study to assess both immediate and persistent effects of NPLs on economic activity. The findings show that an increase in total NPLs reduces U.S. GDP growth, with the construction sector being the most affected. Similarly, NPLs significantly decrease employment growth in financial activities and construction sectors. The conclusions emphasize that high NPLs constrain banks' ability to lend, which in turn hampers economic growth, particularly in sensitive sectors like construction. The study calls for regulatory authorities to monitor NPLs vigilantly to mitigate potential real-sector losses.

Tarchouna et al. (2022) examine the impact of corporate governance on non-performing loans (NPLs) across different bank sizes in U.S. commercial banks from 2000 to 2013. Using dynamic panel GMM estimation, the study analyzes 184 banks divided into small, medium, and large categories based on asset size. The research finds that small banks, which rely heavily on personal connections, tend to have weaker corporate governance, leading to higher NPLs. Medium-sized banks exhibit stronger governance, improving loan quality. In contrast, despite having strong liquidity, large banks engage in excessive lending due to neutralized governance, resulting in higher NPLs. The study concludes that the effectiveness of corporate governance in reducing NPLs is significantly influenced by bank size. This nuanced approach provides new insights into how bank size moderates the relationship between governance and loan performance.

The study by Arham et al. (2020) examines the influence of macroeconomic cyclical indicators and country governance on non-performing loans (NPLs) in Emerging Asian countries. Using a panel regression methodology, the researchers analyzed data from ten countries between 2007 and 2017. The baseline findings indicate that unemployment and real interest rates positively and significantly impact NPLs, while inflation and total external debt-to-GDP have adverse effects. The study introduces an interaction analysis with country governance variables (corruption control, government effectiveness, and regulatory quality), demonstrating that solid governance mitigates the adverse effects of macroeconomic cycles on NPLs. The results emphasize that governance is crucial in reducing credit risk in these economies. Overall, the research contributes valuable insights for policymakers and banking sector managers to improve NPL management in Emerging Asia.

The findings and conclusions of Adegboye et al. (2020) explore the relationship between corporate governance structures, bank externalities, and the sensitivity of non-performing loans (NPLs) in Nigeria. The study, which covers data from 2009 to 2017, reveals that sound corporate governance mechanisms significantly reduce the level of NPLs in Nigerian banks. The authors used a corporate governance index developed using Principal Component Analysis to assess how governance influences loan performance. Their results indicate that banks with stronger governance frameworks are better equipped to manage credit risk and maintain financial stability. Additionally, stringent regulatory policies imposed by banking regulators have been shown to further reduce NPLs by curbing excessive risk-taking behaviors. The study recommends that Nigerian banks continue enhancing their corporate governance practices to ensure the long-term sustainability of loan quality and overall banking performance.

The study by Ferreira (2022) investigates the determinants of non-performing loans (NPLs) across 80 countries from 1999 to 2019 using panel data analysis. The findings reveal that high profitability, stable market conditions, and economic growth are associated with lower NPL ratios, indicating healthier banking sectors. Conversely, higher NPL ratios are linked to increased bank costs, market concentration, and stricter bank regulations. The study also finds that bank regulation has effectively reduced NPLs, particularly in non-high-income and non-OECD countries, after the 2008 financial crisis. The research concludes that promoting economic growth is crucial for minimizing NPLs and mitigating financial risks.

The study by Louis et al. (2012) utilizes dynamic panel data methods to investigate the macroeconomic and bank-specific determinants of non-performing loans (NPLs) in the Greek banking sector, focusing on different loan categories: mortgage, business, and consumer loans. The methodology integrates macroeconomic variables such as GDP growth, unemployment, and interest rates alongside bank-specific factors like management efficiency and capital adequacy. The findings indicate that macroeconomic conditions, especially GDP growth and unemployment rates, significantly influence NPLs across all loan types, with business loans being the most responsive. Mortgage loans, however, show the least sensitivity to macroeconomic fluctuations.

Lee et al. (2022) examine the determinants of non-performing loans (NPLs) in Taiwanese banks, focusing on the interplay between corporate governance and macroeconomic factors. The researchers employed a panel smooth transition regression (PSTR) model to analyze data from 32 Taiwanese-listed firms between 2008 and 2015. The study finds that corporate governance variables, such as share collateralization by directors (SCD) and related party transactions (RPT), have a significant positive relationship with NPLs, particularly under low GDP conditions. The analysis also reveals a negative relationship between macroeconomic growth indicators (GDP and manufacturing production index) and NPLs. The study concludes that banks should not only focus on firms' financial performance but also give substantial attention to corporate governance practices, especially during periods of economic downturn, to mitigate credit risks effectively.

Manz (2019) utilizes a concept-centric systematic review to analyze the determinants of non-performing loans (NPLs). The methodology applies open coding to categorize findings into three main factors: macroeconomic, bank-specific, and loan-specific. By reviewing global studies spanning 1987 to 2017, the approach ensures a broad consideration of varying economic and institutional contexts. The results highlight the significant influence of external factors such as inflation, governance structures, and regional loan policies on NPLs.

Furthermore, this study intended to consider monetary and fiscal-related factors to assess fiscal and monetary policy's impact on non-performing loans (combined effect on non-performing loans). Likewise, due to the rapid expansion of banking institutions in Ethiopia, it is better to conduct this investigation to ensure their continuous operation because non-performing loans lead to huge losses on bank profit in particular and the country's economy in general. This study, therefore, seeks to fill this gap by establishing the link between nonperforming loans and its determinants (bank-specific and macroeconomic factors) in the case of commercial banks in Ethiopia.

3. METHOD, DATA AND ANALYSIS

The study employed an explanatory research design because the study is concerned in determining the cause-and-effect relationship between variables by using the quantitative method, as it is the best approach to obtain information about causal relationships, allowing to assess the correlation (relationship) between one variable and another with structured record reviews financial information collected from secondary data such as National Bank of Ethiopia publication, annual reports of the banks, Ministry of Finance and Economic Development and other relevant sources. This method is appropriate to meet the research objective that uses panel data.

3.1. Sampling and Data Collection

For this study, the target population constitutes all commercial banks registered by the National Bank of Ethiopia (NBE) and under operation in the country. Currently, the country has one state-owned bank and twenty-six private commercial banks operating throughout the country. As Kothari (2004) emphasized, a well-designed sample should be feasible, considering the time and financial resources available for the research. Accordingly, from the total number of commercial banks in Ethiopia within the study area, those that have been in operation for at least fifteen years and have audited financial statements were selected for this study using a non-probability (judgmental) sampling technique. The banks considered in this study were the Commercial Bank of Ethiopia, Awash Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia, and Lion International Bank.

The study used secondary sources of data. The data sources for the study were taken from the National Bank of Ethiopia (NBE), the Ministry of Finance and Economic Development (MOFED), and the annual audited financial statements such as the balance sheet and income statement of selected commercial banks.

This study used descriptive statistics and inferential statistics based on panel data. A descriptive analysis describes patterns of behavior or relevant aspects of phenomena and detailed information about each variable. Therefore, each variable's mean, minimum, maximum, and standard deviations were used. Then, the collected data was processed and analyzed through STATA version 17 software packages. Thus, regression results would be presented with the appropriate test statistics in a tabular form.

3.2. Model Specification

The nature of the data used in this study enables the researcher to use the panel regression model. The general formula used for this model is:

$$NPLsit = \beta_0 + \beta_{ixit} + \mu_{it} \dots \dots \dots 3.1$$

In this model, $NPLsit$ represents the non-performing loans of bank i at time t . The term β_0 denotes the intercept for the independent variables X_{it} , which are the various factors influencing non-performing loans. Additionally, μ_{it} captures other unobserved variables that may affect non-performing loans. The time dimension, t , spans from 1 to 15 years, enabling the model to analyze trends and variations in non-performing loans over this extended period.

Based on the above general formula, the following model is used to test the hypothesis, which shows the dependence of non-performing loans on different independent variables this are:

$$NPLsit = \beta_0 + \beta_1 ROA_{it} + \beta_2 LTD_{it} + \beta_3 M2GDP_{it} + \beta_4 ETR_{it} + \beta_5 GE_{it} + \mu_{it} \dots \dots \dots 3.2$$

The model examines the factors influencing non-performing loans ($NPLsit$) for bank i over time period t . Key variables include the return on assets (ROA_{it}) and loan-to-deposit ratio (LTD_{it}) for bank i during the same period, which reflect the bank's financial health and lending capacity.

Additionally, the model incorporates the ratio of broad money to GDP ($M2GDP_{it}$) and the effective tax rate (ETR_{it}) in year t , highlighting broader economic influences. Government expenditure (GE_{it}) during this time period is also considered a potential macroeconomic driver. The intercept (β_0) accounts for baseline effects, while μ_{it} captures other unobserved factors that may impact non-performing loans.

The empirical models outlined above were estimated using the following econometric techniques. To identify the best model for this study, it is essential to compare the outcomes produced by each technique. These techniques include the Fixed Effect Model, Random Effect Model, and the Generalized Method of Moments (GMM).

The GMM is particularly valuable for analyzing dynamic effects, such as when a lagged dependent variable is used as an explanatory variable. The study employed the Hausman test to decide between the fixed and random effect models.

The problems of heteroscedasticity (usually associated with cross-sectional data) and autocorrelation (usually time series data) are sometimes observed even in panel datasets. The Breusch and Pagan Lagrangian multiplier test for heteroscedasticity in random effects regression and the Wooldridge test or the Lagrange-Multiplier test for autocorrelation model are employed to test for heteroscedasticity and autocorrelation, respectively. A test for the severity of multicollinearity is carried out using the Variance Inflation Factor (VIF) technique. Since estimates generated by the random or fixed effects models become inefficient and inconsistent when endogeneity is present, this study employs the Generalized Method of Moments (GMM) to estimate the specified models. GMM addresses these issues more effectively, ensuring more reliable and robust results than random or fixed effects estimations.

3.3. Description of variables

To achieve the study's objective, panel data from 2008 to 2022 were gathered from the annual reports of the National Bank of Ethiopia (NBE) and the Ministry of Finance and Economic Development (MOFED). The study adopts non-performing loans as the dependent variable. Independent variables for this study are bank-specific characteristics and government policy-related factors that could influence the trends of non-performing loans.

3.3.1. Non-performing Loans

This study used only one dependent variable, which is non-performing loans. According to the International Monetary Fund (IMF, 2009), a non-performing loan (NPL) is any loan in which payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payment have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days overdue. NPL is a loan that delays for the payment of principal and interest for more than 90 days. It is measured or indicated by the amount of NPLs to gross loans.

3.3.2. Bank specific variables

This study uses the bank-specific control variables from prior literature on non-performing loans to establish the relationship between the bank-specific factors, government policy, and non-performing loans. The control variables include the return on asset ratio and loan-to-deposit ratio. This study controls for return on assets to assess a firm's managerial efficiency in converting its assets and equity into profits. It also accounts for the banks' risk preferences using the loan-to-deposit ratio.

Return on Asset (ROA): The return on assets ratio, often called the return on total assets, is a profitability ratio that measures the net income produced by total assets during a period by comparing net income to the average total assets. Therefore, the return on assets ratio measures how effectively the bank can earn a return on its investment in assets. In this regard, many scholars found a negative association between a bank's financial performance and the bank's NPLs (Louzis et al., 2012; Nikolaidou & Vogiazas, 2014). Thus, this ratio is expected to have a negative relationship with NPLs in this study.

Loan to deposit (LTD): a ratio used to determine the number of loans that a bank has utilized to the number of current deposits on hand at that same time. Referring to the research findings of Louzis et al. (2012) that show loan to deposit ratio positively affects NPL and supporting the claim that an increase in deposits as compared to the loans shows that banks are more concerned with the quality of loans rather than the quantity and lend only to the quality borrowers Thus, it represents a bank's preference for credit. In this study, this ratio is expected to have a positive relation with NPLs.

3.3.3. Government-Policy Variables

Effective tax rate: the rate which would be paid by a taxpayer on his tax if it was charged at a constant rate rather than progressive. i.e., the effective tax rate is the average rate at which the bank is taxed on the earned income. According to Khan et al. (2018), A positive relationship was analyzed between the Tax rate and the NPL ratio. The higher the tax rate is, the lesser the ability of the borrower to repay the loans. This study expects positive relationships between tax rates and NPLs.

Broad money supply (M2): Money supply is a part of monetary policy that aims to encourage economic growth by targeting the amount of money circulating in the market. The greater the amount of money in circulation (M2), the higher the public purchasing power, which can increase the level of public consumption and, in the long run, encourage high CPI levels, ultimately affecting the business world. Empirically, Nikolaidou & Vogiazas (2014) found an antagonistic relationship between money supply and NPLs. This study expects an inverse relationship between broad money supply and NPLs. The variable can be measured by the ratio of broad money supply to GDP.

Government expenditure (G.E.) is part of the fiscal policy that aims to promote economic growth and depends on the amount of government revenue. If the government has set a policy to buy goods and services, the government's costs to implement the policy reflect the government's expenditure. If the government has more expenditure, the people of a region would have a greater income. Touny & Shehab (2015) viewed the inverse relationship between government spending and NPLs. This study expects a negative coefficient of the government expenditure. The ratio of total government expenditure to GDP can measure the variable.

Table 1: Summary of Potential factors that influence the level of NPLs, corresponding measures, and hypothetic effects on non-performing loans.

Factors	Symbol	Measurement	Expected sign
Non-performing loans	NPLs	NPLs to gross loan	
Return on asset	ROA	Net profit to total asset	Negative
Liquidity ratio	LTD	Total loan to deposit	Positive
Effective tax rate	ETR	Tax to net income before tax	Positive
Broad money	M2	Broad money (M2) over GDP	Negative
Government expenditure	G.E.	Government expenditure as% of GDP	Positive

Source: Table by authors

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

The summary of descriptive statistics intended to give general descriptions of the data (both dependent and independent variables) is presented in Table 2.

The total number of observations for each variable is 135 (i.e., data for nine banks from 2008 to 2022).

Accordingly, each variable's mean, median, standard deviation, minimum, and maximum values were used to show the overall trend of the data over the period under consideration.

Table 2: Summary of descriptive statistics for dependent and independent variable

	N	Mean	Std. Deviation	Minimum	Maximum
NPL	135	.0524171	.1070029	0	.1475
ROA	135	.0272538	.0120425	-.0188	.0623
LTD	135	.6038855	.1228915	.3	.667
GovExp	135	.179	.0314665	.1	.36
M2	135	.3025983	.0568137	.14	.44
Tax rate	135	.282543	.022756333	.21	.33

Source: Table by authors

As seen from Table 2, the NPLs ratio, which represents the percentage of loans that are in default or close to default, has a mean value of 5.24% among Ethiopian commercial banks, with a minimum of 0% and a maximum of 14.75%.

This suggests that, on average, 5.24% of the total loans disbursed by these banks are non-performing, indicating moderate credit risk. According to the Ethiopian context, the banking sectors are required to maintain a ratio of NPLs at least below 5% (NBE, 2008).

The analysis reveals key insights into Ethiopian commercial banks. Non-performing loans (NPLs) exceed the acceptable threshold, ranging from 0% (indicating strong credit management) to 14.75% (reflecting significant credit risk), with a high standard deviation of 10.7% showing disparities in loan recovery performance. Return on Assets (ROA) ranges from -1.88% to 6.2%, with an average of 2.72%, indicating modest profitability, though some firms face inefficiencies or losses.

The Loan-to-Deposit (LTD) ratio ranges from 30% to 76.7%, with a mean of 60.38%, reflecting a moderate lending strategy balancing liquidity and credit generation. Government expenditure as a percentage of GDP ranges from 10% to 36%, averaging 17.9%, highlighting a balanced fiscal role influenced by policy priorities and economic conditions.

Broad money supply varies between 14% and 44% of GDP, with a mean of 30.2%, showing its significant role in economic activity while responding to monetary policies.

The effective tax rate ranges from 21% to 33%, with an average of 28.2%, reflecting a flexible fiscal approach balancing revenue generation and economic needs.

4.2. Correlation Analysis

The correlation coefficient is a measure of the strength and direction of a linear relationship between two variables. The correlation coefficient can take on values between minus one and plus one.

A coefficient of 1 indicates a perfectly positive association, where an increase in one variable causes an equal and opposite increase in the other. Alternatively, if the value is -1, it indicates a perfectly negative relationship where the value of one variable increases while the value of the other lowers. The absence of a linear relationship between the variables is indicated by a coefficient of zero (Brooks, 2008).

Table 3: Pearson's correlation of variables

	NPL	ROA	LTD	GovExp	M2	Tax rate
NPL	1					
ROA	-0.2197	1				
LTD	-0.1553	0.0162	1			
GovExp	-0.1785	0.0186	-0.0476	1		
M2	-0.0918	0.0746	0.003	-0.2206	1	
Tax rate	0.2564	0.1503	-0.1297	-0.0383	0.2363	1

Source: Table by authors

The correlation matrix provides insights into the relationships among various indicators. The Non-Performing Loans (NPLs) ratio is negatively correlated with Return on Assets (ROA) at -0.2197, suggesting that higher non-performing loans are associated with lower profitability. Similarly, NPL has a negative correlation with the Loan-to-Deposit (LTD) ratio (-0.1553), indicating that lending ratios have an adverse impact on non-performing loans.

The correlation between NPL and Government Expenditure (GovExp) is also negative (-0.1785), showing the adverse effect of government spending on loan performance. The relationship between NPL and the broad money supply (M2) is negative (-0.0918), and there is a moderate positive correlation with the Tax Rate (0.2564), suggesting that higher taxes may lead to increased non-performing loans.

The correlation analysis results presented in the table clearly show no multicollinearity issues among the explanatory variables, as none of the values exceed the 0.8 threshold. Gujarati (2004) observes that if the correlation is 0.8 or higher, there is a serious issue with multicollinearity.

4.3. Choosing Random Effect Vs Fixed Effect Model

The study's suitability for a fixed-or random-effects model was determined using the Hausman test. Both the null and alternative hypotheses propose different models; the former states that fixed effects is superior and the latter states that random effects is more suitable. If the p-value is larger than 0.05, the result is not statistically significant, and the

random effects model is appropriate; otherwise, another model is used. On the other hand, the fixed effects model would be supported by a p-value lower than 0.05.

This study yielded a p-value of 0.9713, which is significantly higher than the significance level of 0.05. It follows that the random effects model is appropriate for the investigation and that the result is negligible, therefore accepting the null hypothesis.

4.4. Test for Classical Linear Regression Model Assumptions

As noted by Brooks (2008), when the key assumptions hold true, it ensures that the model incorporates all relevant data. However, violations of these assumptions suggest that some information might be excluded from the model.

Therefore, prior to assessing the significance of the slopes and interpreting the regression results, it is crucial to conduct tests for stationarity, normality, multicollinearity, autocorrelation, and heteroskedasticity. These tests help detect any potential data issues and ensure the model's fitness and the overall quality of the research.

The test of stationary shows that the variables considered in this study are stationary at levels—NPL, ROA, LTD, GovExp, M2, and Tax rate. The result of the Levin-Lin-Chu unit-root test for the variables test statistics shows that this study rejects the null hypothesis of the variable's non-stationary or presence of panel unit root.

Normality Test: The Jarque-Bera test indicated no evidence of non-normality (p-value = 0.1812), supported by skewness (0.1565) and kurtosis (0.2461) within the acceptable range (−1.0 to +1.0). Residuals were therefore normally distributed.

Multicollinearity Test: Correlation analysis and Variance Inflation Factors (VIF) confirmed no multicollinearity issues among independent variables. The average VIF was 1.06, well below the threshold of 10. Heteroskedasticity and Autocorrelation Tests: The Breusch-Pagan test showed no heteroskedasticity (p-value = 0.4384), and the Wooldridge test confirmed no autocorrelation (p-value = 0.1288). The GMM model was employed to address endogeneity and ensure efficient, consistent results while accounting for unobserved heteroskedasticity.

4.5. Result of Regression Analysis

This section summarizes the regression results of the fixed effect, random effect, and generalized method of moments (GMM) models used to investigate the factors of non-performing loans (NPLs) at commercial banks in Ethiopia. As a result, the regression result was obtained, and the coefficients of the variables were estimated using Stata-17 software.

As previously indicated in the model selection section, the random effect regression model was chosen. GMM is an appropriate model for this investigation because it addresses endogeneity difficulties while also producing consistent results.

Table 4: Results of Fixed effect, random effect, and GMM regression model

Variable	Fixed Effect	Random Effect	GMM
NPL-1			0.2034287** (0.0848505)
ROA	-0.3795438*** (0.1380378)	-0.3767537*** (0.1356951)	-0.3529162** (0.1559425)
LTD	-0.0390577** (0.0154375)	-0.0363883** (0.0147275)	-0.0404765** (0.0165282)
GovExp	-0.3574469*** (0.1301493)	-0.3622193*** (0.1286612)	-0.4278326*** (0.150881)
M2	-0.1015197*** (0.0326516)	-0.0986108*** (0.0322316)	-0.0723271** (0.033378)
Tax rate	0.3283027*** (0.0883171)	0.3109647*** (0.0860506)	0.2491784*** (0.0933214)
Constant	0.0708409* (0.0369668)	0.0739476** (0.0366534)	0.0883394** (0.0399904)
R-Squared = 0.2315 Prob (F-Statistic) = 0.0000		R-Squared = 0.2313 Prob (F-Statistic) = 0.0000	Wald chi2(9) = 40.74 Prob> chi2 = 0.0000

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The Fixed Effects, Random Effects, and Generalized Method of Moments (GMM) models are presented in the table above, along with their respective results and significance levels. In this study, the GMM estimation technique is used since it produces efficient and consistent findings. The beta coefficient, which can be positive or negative, measures the effect of each variable on the dependent variable. The p-value denotes the precision or significance level of each variable. The Wald chi-squared test reveals that the coefficients of the explanatory variables are significantly different from zero, indicating that the study's explanatory variables drive changes in commercial banks' non-performing loans.

The Generalized Method of Moments (GMM) results provide a detailed understanding of how various factors impact the Non-Performing Loans (NPLs) rate. Starting with NPL-1 (lagged NPLs), the coefficient of 0.2034 ($p < 0.05$) indicates that a 1% increase in NPLs from the previous period results in a 0.2034% increase in current NPLs, reflecting the persistence of non-performing loans over time.

This suggests that once loans become non-performing, they are likely to continue affecting future NPL levels. For ROA (Return on Assets), the negative coefficient of -0.3529 ($p < 0.05$) suggests that a 1% increase in profitability leads to a 0.3529% decrease in the NPLs rate, highlighting the inverse relationship between a firm's profitability and its likelihood of holding non-performing loans. Moving to the loan-to-deposit ratio (LTD), the significant negative coefficient of -0.0404 ($p < 0.05$) means that a 1% increase in the loan-to-deposit ratio reduces the NPLs rate by 0.0404%, indicating that better alignment between loans and deposits can improve loan performance and reduce defaults.

Government expenditure (GovExp) also has a substantial negative effect, with a coefficient of -0.4278 ($p < 0.01$), implying that a 1% increase in government spending decreases the NPL rate by 0.4278%. This suggests that higher government investment

improves economic conditions, reducing the likelihood of loan defaults. For M2 (money supply), the negative coefficient of -0.0723 ($p < 0.05$) implies that a 1% rise in money supply results in a 0.0723% decrease in NPLs, possibly due to improved liquidity and credit conditions. Finally, the tax rate shows a positive coefficient of 0.2491 ($p < 0.01$), indicating that a 1% increase in the tax rate raises the NPLs rate by 0.2491%, reflecting that higher taxes may increase financial stress, leading to more loan defaults. Overall, the model is statistically significant, with a Wald χ^2 of 40.74 ($p < 0.000$), confirming the robustness of these findings in explaining NPLs behavior.

4.6. Discussion of Results

Building on prior studies and the findings of this research, this section presents a detailed discussion of the results obtained through the GMM model, focusing on their implications for the level of Non-Performing Loans (NPLs) in Ethiopian commercial banks. By referring to existing literature, each explanatory variable is analyzed in terms of its influence on NPLs, offering a comparative view against both empirical and theoretical frameworks.

Return on Asset (ROA) and NPLs

The estimated coefficient for the bank's Return on Assets (ROA) indicates a negative relationship with non-performing loans (NPLs). The ROA coefficient was -0.3529162, highlighting its negative effect on NPL levels. This suggests that for every 1% increase in bank profitability, measured by ROA, there is a corresponding 0.3529162% decrease in NPL levels, assuming all other factors remain constant.

The results align with previous predictions and theories, which suggest that more profitable banks tend to engage in fewer risky activities, as they are under less pressure to increase income, thereby reducing the level of (NPLs) (Barth et al., 2004; Berger & DeYoung, 1997). In this context, it can be concluded that as the financial performance (profitability) of Ethiopian banks improves, their likelihood of engaging in risky activities diminishes, which, in turn, reduces the probability of loans becoming non-performing. Therefore, the results show that the financial performance of the bank influences the level of non-performing loans in Ethiopian commercial banks. This result agreed with the prior research of (Boudriga et al., 2009; Godlewski, 2011; Louzis et al., 2012).

Loan to deposit (LTD) and NPLs

This finding shows a negative link between LTD and NPLs, which is inconsistent with the hypothetical effect developed by this study. The magnitude of the coefficient estimate LTD was -0.0390577. This result shows a negative impact of LTD on the levels of NPLs. This implies that for a percentage change in loan-to-deposit ratio, keeping the other thing constant resulted in 0.0390577 percent changes in the level of NPLs in the opposite direction. Some studies show a negative relationship between LTD and NPLs, especially when higher LTD ratios reflect better loan portfolio management rather than reckless lending. For instance, research by Drehmann et al. (2012) on banking systems in emerging markets found that banks with moderate increases in LTD ratios tend to experience lower levels of NPLs due to better allocation of credit resources and more

stringent credit assessment procedures. These banks effectively utilized their deposit base for productive lending, resulting in lower defaults.

The study by (Adegboye et al., 2020) indicates that an increase in LTD leads to a reduction in NPLs. This is attributed to the more conservative and stringent lending policies enforced by the Central Bank of Nigeria, which limit the portion of deposits banks can allocate to loans. As a result, Nigerian banks tend to take fewer risks, thus reducing the likelihood of defaults and the accumulation of NPLs. Thus, this study on Ethiopian commercial banks reveals that a higher LTD ratio reflects more responsible lending practices, reducing loan defaults. This results in a negative relationship between the LTD ratio and NPLs, as banks focus on low-risk, profitable sectors, reducing the likelihood of loan defaults.

Government Expenditure (Gov Exp) and NPLs

The hypothetical effect that the study developed is not consistent with the regression result of the GMM model in Table 4 above. The study postulated a positive correlation between Gov Exp and bank non-performing loans (NPLs). The coefficient of Gov Exp, in contrast to the hypothesis, was -0.3574469. Based on this data, it can be concluded that Gov Exp has a statistically significant negative impact on NPL levels. This suggests that a 0.3574469 percent change in the level of NPLs was the result of a percentage change in Gov Exp held constant with respect to the other variable.

The result of this study confirms the arguments of (Touny & Shehab, 2015). This suggests that government spending has a negative impact on the amount of non-performing loans (NPLs). Table 4 illustrates the correlation between a low level of NPLs ratio and an increase in government spending. According to this relationship, an increase in government spending corresponds to a rise in employee pay and benefits, which helps to lower the employees' debt load.

Broad Money Supply (M2) and NPLs

The coefficient for M2 is -0.1015197, as Table 4 demonstrates. This indicates that, while all other variables remain unchanged, a change in M2 will have the opposite effect on Ethiopian commercial banks' non-performing loans (NPLs), changing by 0.1015197 percent. According to this finding, an expansionary monetary policy will lower interest rates, which in turn reduces the cost of borrowing. Additionally, a rise in the money supply will encourage spending and investment, which will raise income and improve debtors' capacity to repay their loans. This finding conforms with the results of (Ahmad & Ariff, 2008; Nikolaidou & Vogiazas, 2014).

Effective Tax Rate (ETR) and NPLs

This study hypothetical effect is supported by the regression result of the GMM model in Table 4 above. The study proposed a positive correlation between bank NPLs and ETR. The coefficient of ETR in contrast to the hypothesis, was 0.3283027. This finding demonstrates that ETR has a positive and statistically significant effect on NPL levels.

It suggests that, for every percentage change in ETR, the level of NPLs changed by 0.3283027 percent in the same direction while the other variable remained constant. The result of this study confirms the arguments of (Albertazzi & Gambacorta, 2006; Khan et al., 2018). This suggests that at some point, Ethiopia's high income tax rates contributed to the country's higher non-performing loan (NPL) levels in commercial banks.

This suggests that when a bank transfers its tax burden to borrowers by raising fees and other commissions and loan prices, the borrowers pay the banks' tax burden as compensation and also owe the government tax. This is supported by the positive and statistically significant influence of the effective tax rate on commercial bank non-performing loans (NPLs). As a result, debtors who bear this double burden are unable to make their payments.

5. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusion

The main objective of this study was to examine the effect of bank-specific factors and government policies on non-performing loans (NPLs) in Ethiopian commercial banks, using panel data analysis spanning from 2008 to 2022. A study was conducted using the GMM model on the data. According to the results, several factors considerably affected the amount of nonperforming loans, including return on asset, loan-to-deposit ratio, government expenditure, broad money supply, and effective tax rate.

The results further demonstrated that bank profitability, measured by return on assets (ROA), has a significant negative impact on NPL levels. This implies that as Ethiopian commercial banks effectively manage their assets, they are less likely to engage in high-risk activities, which helps mitigate the occurrence of non-performing loans. Profitable banks are generally in a stronger financial position and, as a result, have less pressure to pursue risky ventures to generate income. Consequently, higher profitability contributes to a more stable loan portfolio, reducing credit risk and minimizing NPLs.

Additionally, the negative relationship between the loan-to-deposit ratio (LTD) and NPLs highlights the importance of maintaining an optimal balance between lending and deposit levels. A higher LTD ratio, when managed prudently, indicates that banks are effectively utilizing their deposits to extend loans without overextending credit. This responsible lending approach reduces the likelihood of defaults, as banks are better positioned to assess borrowers' creditworthiness and ensure that loans are granted to those with the capacity to repay.

These findings highlight the critical role of sound asset management and responsible lending practices in maintaining the health of the banking sector and reducing the risk of non-performing loans in Ethiopian commercial banks.

Moreover, the study's regression results indicate that government expenditure has a negative effect on the NPL levels of Ethiopian commercial banks. Increased government spending often reflects higher employee compensation and greater social benefit

disbursements, which help reduce the debt burden on employees and, consequently, lower NPLs. Similarly, the broad money supply also exerts a negative influence on NPL levels, suggesting that an expansionary monetary policy stimulates investment, thereby decreasing the proportion of non-performing loans. Lastly, the effective tax rate was found to have a positive impact on NPL levels. Higher taxes place additional financial strain on borrowers, increasing the likelihood of defaults among commercial banks in Ethiopia.

5.2. Suggestions

Based on the findings and conclusions of the regression analysis, the following Suggestions are proposed. To reduce the risk of loan losses, bank management and loan officers must first prioritize maintaining the quality of bank assets, particularly loan performance. To effectively reduce the likelihood of NPLs, bank managers should focus on making sound asset management decisions. Proper asset management will not only enhance the financial performance of Ethiopian banks but also help limit their involvement in high-risk activities, ultimately leading to a lower incidence of NPLs.

Additionally, strengthening loan portfolio management is crucial, as prudent lending practices, supported by thorough credit assessments and a focus on low-risk sectors, help reduce default risks. Banks should adopt stricter credit evaluation measures and comply with regulatory guidelines to ensure responsible lending. Government spending increases are linked to a decrease in non-performing loans. The government's increased spending on social benefits helps to reduce the employees' debt load. A government expansionary fiscal strategy would help lower non-performing loans. In a roundabout way, this will help banks out since loan defaults will be less likely.

As banks transfer their tax burdens to borrowers, it weakens borrowers' capacity to repay their loans, potentially driving up the level of NPLs. Therefore, to reduce NPLs, bank management should consider avoiding or mitigating the practice of shifting tax burdens. Instead, they can explore financial strategies such as reinvesting in the company by repurchasing shares rather than issuing cash dividends or maximizing deductions like interest expenses. The government and policymakers should consider revising the tax structure to reduce the tax burden on individuals and businesses, especially during economic downturns. This could help alleviate financial strain on debtors and prevent loan defaults.

This study recommends that the National Bank of Ethiopia adopt an expansionary monetary policy to stimulate investment and consumption, subsequently increasing income and enhancing debtors' ability to meet their loan obligations. Maintaining a balance in monetary expansion is essential to avoid inflationary pressures. Lastly, Ethiopian banks should collaborate closely with regulatory bodies to ensure compliance with prudential standards and guidelines, fostering a resilient and stable banking system capable of effectively managing credit risks.

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