Determinants of Non-Performing Loans: A Case Study of the Development Bank of Ethiopia

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Abstract

Non-performing loans pose a significant threat to the financial sustainability of development banks, hindering their ability to support economic growth. This study investigates the determinants of non-performing loans at the Development Bank of Ethiopia using a quantitative method, collecting data from loan officers and bank records. Employing explanatory and descriptive research designs, the data was analyzed using descriptive statistics, correlation analysis, and multiple linear regression. The research identified poor credit assessment, inadequate collateral strength, high interest rates, large credit size, and insufficient credit monitoring as significant bank-specific factors contributing to NPLs. Loan diversion and weak borrower credit culture were not found to be statistically significant. These findings highlight the need for Development Bank of Ethiopia to strengthen its credit appraisal processes, collateral evaluation, monitoring practices, and interest rate policies to mitigate NPL risks and enhance financial stability. The model explained 67.6% of the variation in non-performing loans. Future studies should look into how macroeconomic factors affect non-performing loans at Development Bank of Ethiopia.

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Introduction

Non-performing loans (NPLs) pose a significant threat to the stability and profitability of financial institutions, representing a portfolio of loans where borrowers have failed to meet their scheduled debt obligations and are unlikely to repay the full amount, impacting a bank's capital adequacy and overall financial health (Bofondi & Carpinelli, 2018). African perspectives on non-performing loans (NPLs) emphasize their detrimental impact on economic growth and financial stability across the continent, highlighting the need for robust regulatory frameworks and effective risk management practices to mitigate their prevalence and associated consequences for development (Kasekende, 2017).

The banking sector is crucial to both financial stability and economic expansion in developing countries like Ethiopia. Banks support economic growth and industrialization by simplifying capital allocation, mobilizing deposits, and providing loans to productive sectors. However, the quality of banks' loan portfolios has a significant impact on their financial health (Temesgen, 2026). The profitability, liquidity, and solvency of banks are seriously threatened by non-performing loans (NPLs), which are loans for which borrowers have not made repayments for a predetermined amount of time. Excessive NPL rates have the potential to cause systemic financial crises by limiting credit availability to the actual economy and ultimately impeding the growth of the national economy.

The primary participants in the Ethiopian banking business are the Development Bank of Ethiopia (DBE) and other specialized development banks, as well as the state-owned Commercial Bank of Ethiopia (Menza et al., 2017). In accordance with national development objectives, the DBE was established with the strategic goal of offering medium- to long-term funding for key industries like agriculture, industry, and infrastructure. Development banks often assume more risk by financing initiatives in high-priority or emerging industries that have longer gestation periods, unlike commercial banks (Fanta, & Abera, 2024).

Internationally, NPL determinants are studied under two broad categories: Macroeconomic Factors: GDP growth, inflation, unemployment, and interest rates. Studies by Louzis et al. (2012) in Greece and Klein (2013) in Central and Eastern Europe highlight the inverse relationship between economic growth and NPLs. Bank-Specific Factors: Credit growth, profitability, efficiency, and governance. Salas & Saurina (2002) in Spain found that rapid loan growth often precedes increases in NPLs. Berger & DeYoung (1997) linked poor management quality to higher NPLs.

Institutional and operational weaknesses are highlighted by studies conducted throughout Africa: According to Onyango & Olando (2020), high interest rate spreads and low liquidity are the main causes of NPLs in Kenya. Abimbola (2020) discovered that bad credit management and economic volatility are major contributing factors in Nigeria. Viswanadham (2015) emphasized poor loan oversight and insufficient risk evaluation in Tanzania. In Ethiopia, research has increased, but it is still focused on for-profit banks: Poor credit assessment, inadequate monitoring, and fund diversion were identified as main causes in Negera (2012). High lending rates and operational inefficiencies were brought to light by Umer (2015). Previous research suggests several factors influence NPLs. Tehulu & Olana (2014) found that bank size and ownership structure are significant. In a study specific to DBE, Arega et al. (2016) highlighted issues such as inadequate monitoring, aggressive lending practices, and borrower inexperience. Furthermore, Million et al. (2019) confirmed the joint influence of macroeconomic and bank-specific factors on NPLs.

Despite its pivotal role, DBE has been grappling with alarmingly high levels of NPLs. Reports indicate that the bank's NPL ratio has frequently exceeded 40%, far above the 15% regulatory ceiling set by the National Bank of Ethiopia (NBE) for development banks (Asfaw et al., 2016; Lemma-Lalisho, 2022). This situation not only undermines DBE's financial sustainability but also limits its capacity to fulfill its developmental mandate. The persistence of high NPLs raises critical questions about the underlying determinants whether they stem from internal governance weaknesses, borrower behavior, external economic shocks, or a combination thereof. The rise in non-performing loans (NPLs) at DBE is a complicated problem that has effects on national development, business management, and financial stability (Mesfin, 2020; BEYENE, 2023). Although the level of NPAs in banking is unavoidable, the magnitude witnessed at DBE suggests deeper systemic and operational deficiencies. The existing literature on the causes of NPLs in Ethiopia has mostly focused on commercial banks, with little empirical emphasis on development banks.

Furthermore, prior research has produced conflicting findings regarding the relative significance of bank-specific factors versus borrower-specific characteristics, which is frequently brought about by variations in the situational environent, sample size, and methodology (Abebe & Ali, 2025). The problem is made worse by DBE's one-of-a-kind operating model, which includes supporting large, long-term projects in inherently risky industries like agriculture and agro-processing. The bank's credit risk management system may not be able to adequately handle the challenges that many of these initiatives encounter, such as price volatility, supply chain disruptions, and management shortcomings (Scott etal., 2024). Additionally, anecdotal evidence suggests that borrowers participate in activities that could result in loan defaults, such as insufficient credit assessments, inadequate loan monitoring, collateral issues, and fund diversion.

The purpose of this study is to identify and analyze the key bank-specific and borrower-specific factors that influence non-performing loans (NPLs) at the Development Bank of Ethiopia (DBE). The findings will provide evidence-based insights to improve credit risk management practices, inform policy decisions, and promote the long-term financial sustainability of DBE.

Hypotheses

1.There is a significant negative relationship between credit assessment quality and non-performing loans.
2. There is a significant positive relationship between credit size and non-performing loans.
3. There is a significant negative relationship between the intensity of loan monitoring and non-performing loans.
4. There is a significant positive relationship between interest rates and non-performing loans.
5. There is a significant positive relationship between loan fund diversion and non-performing loans.
6. There is a significant positive relationship between collateral weakness and non-performing loans.
7. There is a significant positive relationship between a weak credit culture and non-performing loans.

Theoretical Foundations

Information Asymmetry Theories

Information Asymmetry Theories explain how unequal access to information between parties in a transaction can lead to market failures, primarily through adverse selection (pre-transaction hidden information) and moral hazard (post-transaction hidden actions). The necessity of mechanisms to address these problems is emphasized in these theories. Recent supporting evidence includes studies on online lending platforms, such as Berg et al. (2020), which shows how fintech companies utilize alternative data to reduce information asymmetry and enhance credit scoring, perhaps alleviating adverse selection issues and increasing credit access for previously marginalized consumers. This demonstrates how market efficiency and results can be improved by innovations that aim to close information gaps.

Agency Theory

A common theory in political science, economics, finance, and management, the agency theory framework clarifies and corrects the relationship between principals and their agents. The main idea is that in a number of situations, one party (the principle) assigns another party (the agent) to act on the principal's behalf. Conflicts between the principal's and the agent's interests, however, could lead to problems. This draws attention to the conflicts of interest that exist between bank management (agents) and shareholders (principals). In order to achieve performance goals, managers may focus on short-term loan expansion at the expense of long-term asset quality, which raises the risk of non-performing loans (Jensen & Mecking,1976).

Credit Risk Theories

The credit rationing model created by Stiglitz and Weiss (1981) should be taken into consideration by the DBE while formulating interest rate regulations. According to this model, raising interest rates past a specific threshold might have unintended repercussions, such as attracting riskier borrowers who may be prepared to pay higher rates because of their higher risk profiles. This may result in a rise in default rates and a decline in the quality of the whole loan portfolio. As a result, it's crucial to maintain a careful balance between increasing profitability and minimizing the risks associated with charging higher interest rates in order to entice borrowers with higher risk profiles. Include the Stiglitz and Weiss (1981) credit rationing model, which asserts that raising interest rates over a specific level may induce riskier borrowers, hence raising default rates.

Agency Theory explains how conflicts of interest between bank managers (agents) and shareholders (principals) can lead to short-term loan expansion at the expense of long-term asset quality, increasing NPL risk. The Stiglitz and Weiss model provides a framework for understanding how interest rate policies can inadvertently attract riskier borrowers, further contributing to NPLs. By analyzing bank-specific factors (credit assessment, monitoring, interest rates) and borrower-specific factors (credit culture, loan diversion), my research investigates how these theoretical concepts manifest in practice and contribute to the NPL problem. Essentially, the theories provide a lens through which to understand the motivations and behaviors of both lenders and borrowers that ultimately impact loan performance.

Conceptual Framework

These variables were identified through a review of existing literature on factors influencing loan performance and financial distress in banking. "Credit Assessment," "Credit Size," "Monitoring," "Interest Rate," and "Collateral" represent bank-specific factors, reflecting internal lending policies and risk management practices. "Diversion" and "Credit Culture" are borrower-specific, capturing the behavior and characteristics of loan recipients. These variables are linked to the study variable, Non-Performing Loans (NPLs), within a conceptual framework that posits that deficiencies in bank practices and adverse borrower attributes increase the likelihood of loan defaults, ultimately contributing to a higher volume of NPLs. This framework provides a structured way to examine the relationships between these predictors and NPLs, guiding the empirical analysis and interpretation of results.

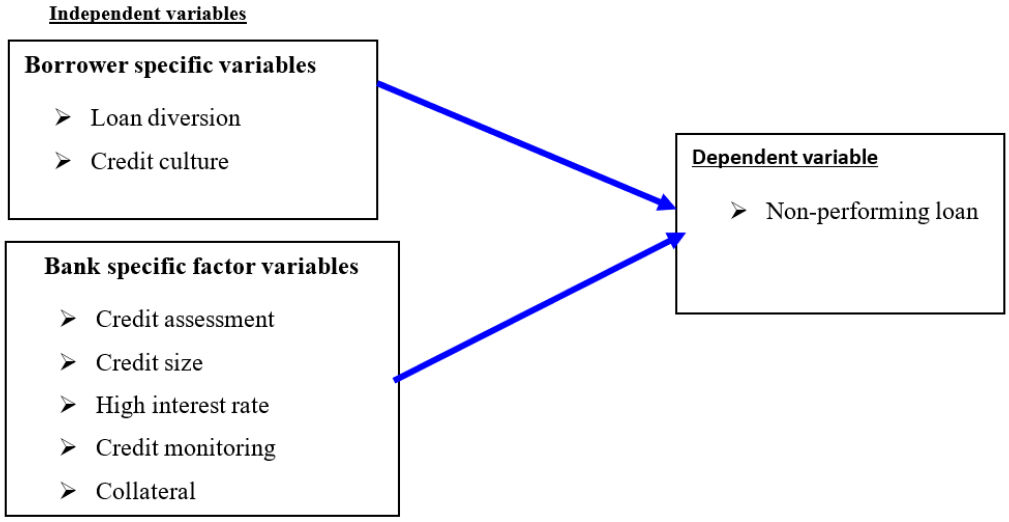

Figure 1: Conceptual framework of the study
Source: Adopted from Arega et al. (2016), Negalign (2019)

Methods

This study employed an explanatory and descriptive research designs to investigate the determinants of non-performing loans (NPLs) at the Development Bank of Ethiopia (DBE). Explanatory research, as highlighted by Kothari (2004), is particularly valuable for elucidating cause-and-effect relationships, making it well-suited for this study's objective. A descriptive variable provides information that characterizes or summarizes a particular aspect of a subject, population, or phenomenon. The target population consisted of all 120 loan officers at DBE's head office. Given the relatively small size of this population, a census approach was adopted, resulting in 114 valid responses, representing a 95% response rate. Data collection involved both primary and secondary sources, with primary data obtained directly from loan officers and secondary data gathered from sources such as bank records. It's important to note that the study relied entirely on cross-sectional data.

Data analysis encompassed a quantitative techniques. Quantitative data was analyzed using SPSS Version 25 to generate descriptive statistics, and conduct multiple linear regression

analysis. The validity of the quantitative results was rigorously evaluated through diagnostic tests to check for potential issues of multicollinearity, autocorrelation, normality, and heteroscedasticity. The study developed a model to examine the relationships between six predictor variables and NPLs at DBE.

Based on that, $Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \epsilon_i$

Where Y is the dependent variable and the independent variables are those that explain the response ranges from X1 to X7

Variables definitions and measurements

Table 1

Variables definitions and measurements

Predictor Variable	Definition / What it Measures	Expected Relationship	Reasoning / Theoretical Mechanism
Assessment	Quality of the lender's credit risk evaluation process (e.g., borrower credit score, cash flow analysis, repayment history check).	**Negative (−) Better assessment → Lower NPLs**	Rigorous screening identifies less risky borrowers and weeds out unviable applications, inherently reducing the probability of default.
Credit Size	The amount of loan principal extended to a borrower (absolute value or relative to borrower's income/collateral).	**Positive (+) Larger credit size → Higher NPLs**	Larger loans increase the ongoing debt service burden on cash flow. They can also induce moral hazard if borrowers or lenders assume systemic protection ('too big to fail').
Monitoring	Frequency and intensity of post-disbursal lender oversight (e.g., site visits, financial covenant checks, repayment tracking).	**Negative (−) Stronger monitoring → Lower NPLs**	Early detection of operational or financial distress allows for timely corrective actions (such as restructuring or reminders) before formal default occurs.
Interest Rate	Annual percentage rate (APR) charged on the loan principal (fixed or floating).	**Positive (+) Higher interest rate → Higher NPLs**	Higher debt servicing costs directly strain borrower cash flows, raising default risk. It also risks adverse selection, where high-risk borrowers accept high interest rates.
Diversion	Extent to which loan funds are used for purposes other than agreed (e.g., personal spending instead of business investment).	**Positive (+) More diversion → Higher NPLs**	Misused funds fail to generate the productive asset or expected income stream meant to service the debt, drastically undermining repayment capacity.
Collateral	Value, liquidity, and legal enforceability of assets pledged by the borrower relative to the loan amount.	**Negative (−) More/higher collateral → Lower NPLs**	Collateral creates a powerful economic and psychological incentive for timely repayment to avoid asset loss, while directly lowering the lender's loss given default (LGD).

Predictor Variable	Definition / What it Measures	Expected Relationship	Reasoning / Theoretical Mechanism
Credit Culture	Shared institutional norms, ethical boundaries, and borrower-lender discipline regarding lending practices and repayment priority.	**Negative (−) Stronger culture → Lower NPLs**	A robust credit culture reinforces strict underwriting standards, discourages strategic defaults (where borrowers can pay but choose not to), and builds long-term compliance.

Validity and Reliability

The content and construct validity of the study were examined to guarantee the standard of the research design. The research adviser checked the content validity after examining the suitability of the measuring scales and the research questions. The questionnaire included questions on the factors to quantify NPL based on the chosen independent variable. The survey will employ a five-point scoring system. One of the most widely used and recognized dependability measures is Cronbach's alpha. It shows how closely related the questions on a questionnaire are to one another Fubara and Mguni, 2005. Cronbach's coefficient alpha values typically fall between 0 and 1, with higher values indicating greater internal consistency. To attain internal reliability, different authors accept different results for this test. George and Mallery (2003) offer the following general guidelines for evaluating reliability coefficients: 9 = Excellent,.8 = Good,.7 = Acceptable,.6 = Doubtful,.5 = Poor, and.5 = Unacceptable.

Table 2. Reliability test

Reliability Statistics

No	Variable Name	Cronbach's Alpha Value	Cronbach's Alpha based on standardized items.	No of items	(α) reliability ranges
1	Credit size	0.996	0.996	6	Excellent
2	Poor credit assessment	0.637	0.573	6	Acceptable
3	Poor credit monitoring	0.918	0.919	6	Excellent
4	Interest rate	0.952	0.953	4	Excellent
5	Poor collateral	0.950	0.950	5	Excellent
6	Credit diversion	0.940	0.941	5	Excellent
	Borrowers credit culture			6	
	Overall	0.888	0.95	38	Excellent

Source: Own computation using SPSS of the survey, 2024

Result and Discussion

Descriptive statistics for Bank specific factors

Table 3 presents data on various bank-specific factors and their perceived impact on non-performing loans (NPLs), as measured by mean scores and standard deviations. Several items related to Credit Size and Risk Appetite indicate potential areas of concern. While the bank acknowledges having a large number of borrowers (Mean=3.05) and a considerable risk appetite (Mean=2.96), the relatively high means associated with "aggressive lending" (Mean=3.16) and "high default rate" (Mean=2.86) suggest a possible correlation between these factors and NPLs. The lower mean for "rapid credit growth" (Mean=2.46) might indicate that respondents perceive it as less of a direct contributor to NPLs compared to the other factors in this category.

The information on Credit Assessment and Monitoring paints a confusing picture. Respondents generally concur that the bank has subpar credit analysis (Mean=3.20) and vigorously enforces the Know Your Customer (KYC) policy (Mean=3.34), but they are less in agreement with assertions about clear loan underwriting (Mean=2.73), evaluating the borrower's ability to repay (Mean=2.53), and taking into account the 5Cs of credit risk assessment (Mean=2.54). Interestingly, the bank also stated that it primarily relies on loan follow-up to protect against identity theft (mean=3.92), has a higher budget for monitoring (mean=3.60), has strict monitoring procedures (mean=3.30), has aggressive credit monitoring (mean=3.86), and has a strong capacity for loan supervision (mean=3.82). The discrepancy between perceived evaluation flaws and monitoring strengths merits more research.

Finally, factors related to Interest Rates and Collateral reveal further insights. Respondents tend to agree that there is a high lending interest rate as compared to other banks (Mean=3.24). The bank also provides loans to customers with strong collateral (Mean=3.24), makes continuous follow up on the collateral (Mean=3.20), has a good collateral estimation method (Mean=3.22) and uses similar collateral methods for all business types (Mean=3.25). These findings suggest that while the bank may be perceived as having high interest rates, it also emphasizes collateral security, potentially mitigating some of the risks associated with lending. However, the use of similar collateral methods for all business types might be a point of concern, as it may not adequately account for the specific risks associated with different industries.

Table 3

Bank Specific factors Affecting Non-performing loan

Credit Size	Mean	Std. Dev.
The bank hasa large number of borrowers	3.05	1.003
There is Aggressive lending in the bank	3.16	.974
The bank experienced a high default rate	2.86	1.072
In the bank, there is rapid credit growth	2.46	1.138
The Bank hasa great risk appetite	2.96	.872
Poor Credit Assessment		
The bank has poor credit analysis	3.20	.961
In the bank Know Your Customer (KYC) policy is strongly applicable	3.34	.988
The bank loan underwriting is clear and strong	2.73	1.091
The bank assesses the overall ability of borrowers for repayment	2.53	1.074

The bank considers the five 5cs during credit risk assessment	2.54	1.023
Poor Credit Monitoring		
The bank has strict monitoring procedures	3.30	1.350
The bank sets a higher budget for loan monitoring and follow-ups	3.60	.725
The bank follows aggressive credit monitoring to notify changes to the credit activity of customers	3.86	.608
The bank has a good loan supervision capacity	3.82	.673
The bank primarily uses loan follow-up to guard against identity corruption	3.92	.518
Interest rate		
There is high lending interest rate	2.69	1.040
The bank there is a high lending interest rate as compared to other banks	3.24	1.007
The bank lending interest rate increases over time	2.74	1.056
The bank charges different interest rates based on credit amount.	2.85	1.033
Poor Collateral		
The bank provides loans to customers with strong collateral	3.24	.989
The bank makes continuous follow up on the collateral	3.20	.952
The bank has a good collateral estimation method	3.22	.910
The bank uses similar collateral methods for all business types.	3.25	.839

Source: Own computation using SPSS of the survey, 2024

Descriptive statistics for Borrower specific factors

The data in Table 4 emphasizes the important contribution of Loan Diversion to NPLs. In general, respondents concur that borrowers at the bank divert credit to other companies (Mean=3.12), especially as a result of financing opportunities (Mean=3.52 and 3.68) and the expectation of windfall earnings in other sectors (Mean=3.92). Additionally, they recognize that borrowers have a poor comprehension of loan terms and conditions (Mean=3.16), which points to a possible problem with borrower education and the transparency of loan contracts. According to these results, the bank struggles with borrowers misusing loan proceeds for unintended purposes. A mean score between 3.40 and 3.79 is regarded as a high mean value, according to Zaidaton and Bagheri (2009).

Regarding Borrower's Credit Culture, the data presents a less clear-cut picture. Respondents express less agreement with statements suggesting a positive borrower orientation/culture (Mean=2.83), cultural improvement over time (Mean=2.98), or positive societal cultural development among borrowers (Mean=2.96). However, they do agree that borrowers don't understand credit terms well (Mean=3.08), reinforcing the earlier point about the need for improved borrower education. Overall, the data suggests that a weak credit culture among borrowers, characterized by a lack of understanding and a propensity for loan diversion, contributes significantly to the bank's NPL problem.

Table 4

Borrower-specific factors affecting non-performing loan

Loan diversion	**Mean**	**Std. Deviation**
The bank borrowers divert their credit to other business	3.12	.822
In the bank, there is ignorance of lending terms and conditions	3.16	.888
The bank borrower because of financing divert their credit to other business	3.52	.914
The bank borrower because of financing divert their credit to other business	3.68	.865
The bank borrowers divert their credit because of anticipated windfall profits in other business areas	3.92	.518
Borrower's credit culture		
In the bank, there is good borrower orientation/culture	2.83	1.080
The culture of the borrowers in the bank increased over time	2.98	1.064
The bank borrowers have good Society's cultural development	2.96	1.124
Borrowers don't understand credit terms well	3.08	.988

Source: Own computation using SPSS of the survey, 2024

Summary of descriptive statistics for the variables

Table 5, summarizes the descriptive statistics for the variables used in a regression model, with sample sizes (N) ranging from 113 to 114. The variables include "Assessment," "Credit size," "Monitoring," "Interest rate," "Diversion," "Collateral," "Credit culture," and the dependent variable, "NPL" (Non-Performing Loans). The means for most variables fall within a relatively narrow range, generally between 2.8 and 3.7 on a scale that appears to range from approximately 1 to 5 (or higher in the case of NPL). This suggests a moderate level of agreement or perception regarding these factors among the respondents.

The variability of replies may be understood by looking at the standard deviations. The lowest standard deviation for "Monitoring" is .46715, which suggests that respondents are most in agreement about how to measure it. "Credit culture" and "Interest rate" have the highest standard deviations (.75495 and .82228, respectively), indicating a wider range of perspectives or experiences surrounding these topics.

"NPL" stands out for having a comparatively big standard deviation (.82228) and a wider range (1.00 to 7.50) when compared to other independent variables, which indicates the diversity in non-performing loan levels throughout the sample. These descriptive statistics serve as the basis for comprehending the distribution and range of the variables utilized in the regression model, which will be used to investigate the links between these variables and NPLs.

Table 5
Descriptive statistics of variables used in the regression model

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Poorcredit Assessment	113	1.20	4.60	2.8690	.72544
Credit size	114	1.40	4.60	2.8982	.71060
Monitoring	114	2.20	5.00	3.6982	.46715
Interest rate	114	1.00	5.00	2.8794	.82228
Diversion	114	1.00	4.20	3.1158	.62790
Collateral	114	1.25	5.00	3.2281	.71994
Credit culture	114	1.25	5.00	2.9627	.75495
NPL	114	1.00	7.50	3.1564	.82228

Regression Analysis

Multiple linear regression analysis is an extension of two-variable regression analysis that allows to study of the effects of two or more independent variables on a single dependent variable simultaneously. This allows the researcher to test which independent variable has the most significant effect on the dependent variable. Therefore, to understand the relationship between several independent variables and a dependent variable, the study used a regression model summary and the researcher checked the regression coefficients for each independent variable. Therefore, multiple regression analysis is used for the factors affecting bad debt.

Diagnostic Tests

Before conducting regression analysis, the study performed the test of regression assumptions. The linearity of the parameter is assumed since the model uses linear ordinary least squares (OLS). The goal of the model is to predict the strength and direction of the relationship between the dependent and independent variables. Therefore, to maintain the validity and reliability of the regression results of the research in the classical linear regression model, it is preferable to satisfy the basic assumptions of the classical linear regression model. As mentioned by Brooks (2008), when these assumptions are met, it is considered that all available information is used in the model. However, if these assumptions are violated, there will be data that is excluded from the model. Consequently, before applying the model to test the significance of the slopes and analyze the regression results, tests for heteroskedasticity, autocorrelation, multicollinearity, normality, and linearity are conducted to identify any misspecification of the data to ensure the quality of the research.

Homoscedasticity Test

In the classical linear regression model, one of the fundamental assumptions is the assumption of equal variances, which states that the probability distribution of the error term remains constant for all observations. This means that the variance of each error term is the same for all values of the independent variable. However, if the error terms do not have equal variances, this violation of the assumption of constant variance is known as heteroscedasticity (Bedru and Seid, 2005). Homoscedasticity of the residuals can be observed in the scatter plots of the residuals, where the variance of the residuals around the predicted values of the dependent

variable should be consistent for all predicted values. This is evident when the residuals are randomly scattered around the reference line, as shown in the figure below. To ensure the quality of the research, any misspecification of the data should be identified and addressed.

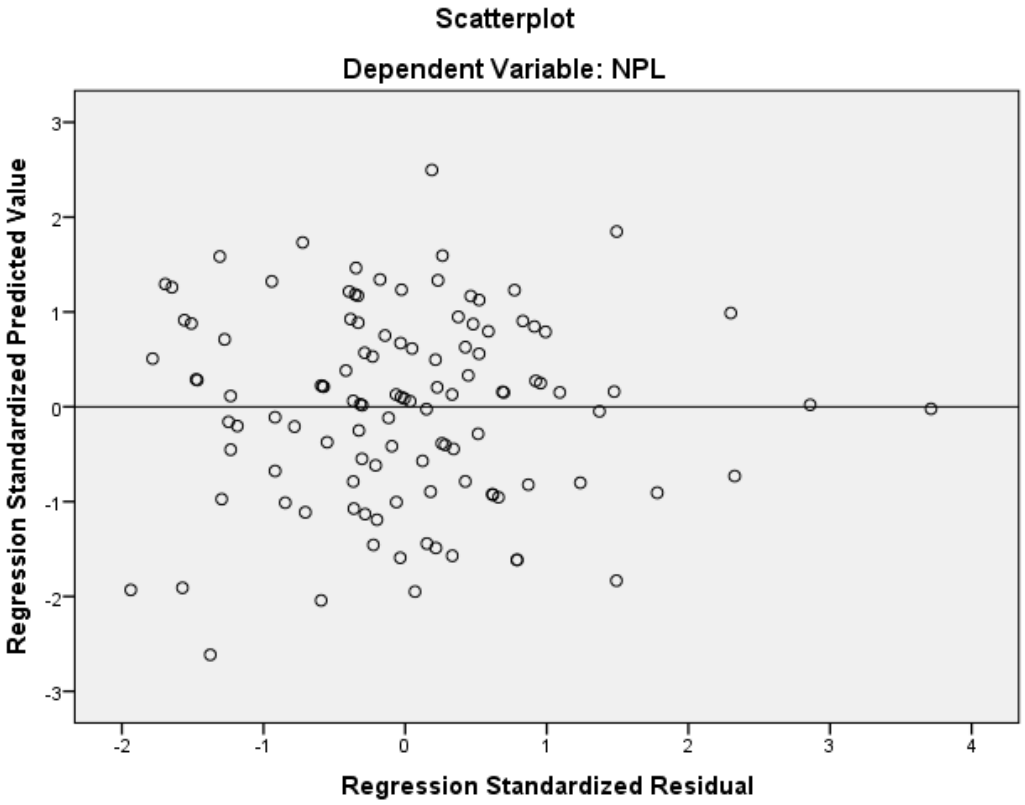

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Figure 2: Homoscedasticity Test

Multicollinearity Test

Multicollinearity is a test that assesses whether the independent variables are highly correlated. It occurs when two or more predictors in the model are strongly correlated, leading to unreliable and unstable estimates of regression coefficients, thus resulting in unusual findings when examining the contribution of individual independent variables to the dependent variable. The consequences of Multicollinearity are increased standard error of estimates of the Betas, indicating reduced reliability and often perplexing and misleading results. As shown in Table 6 the test for Multicollinearity was conducted to determine whether one or more of the variables of interest is highly correlated with one or more of the other independent variables. Tolerance is the measure of how much of the variability of an independent variable is not explained by another independent variable. Hence, if the value is below 0.1 or VIF: the reciprocal of the tolerance value is above 10, it suggests the possibility of multicollinearity. As the multiple regression result in table 4.9 demonstrates, all tolerance values are above 0.1 and VIF is below 10, indicating that there is no possibility of multicollinearity among the variables.

Table 6

Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Assessment	.479	2.086
	Credit size	.435	2.300
	Monitoring	.961	1.041
	Interest rate	.515	1.942
	Diversion	.520	1.924
	Collateral	.455	2.200
	Credit culture	.917	1.090

Source: Own computation and survey, 2024

Normality Test

Statistical methods like regression and t-tests rely on the assumption that data follows a normal distribution. This normality assumption is crucial for drawing accurate conclusions. Therefore, a normality check is conducted to evaluate if the variables conform to a normal probability distribution and if the residuals in regression models have zero mean and constant variance. Assessing normality, often through histograms, Q-Q plots, or normal probability plots, helps ensure the validity of the statistical analysis.

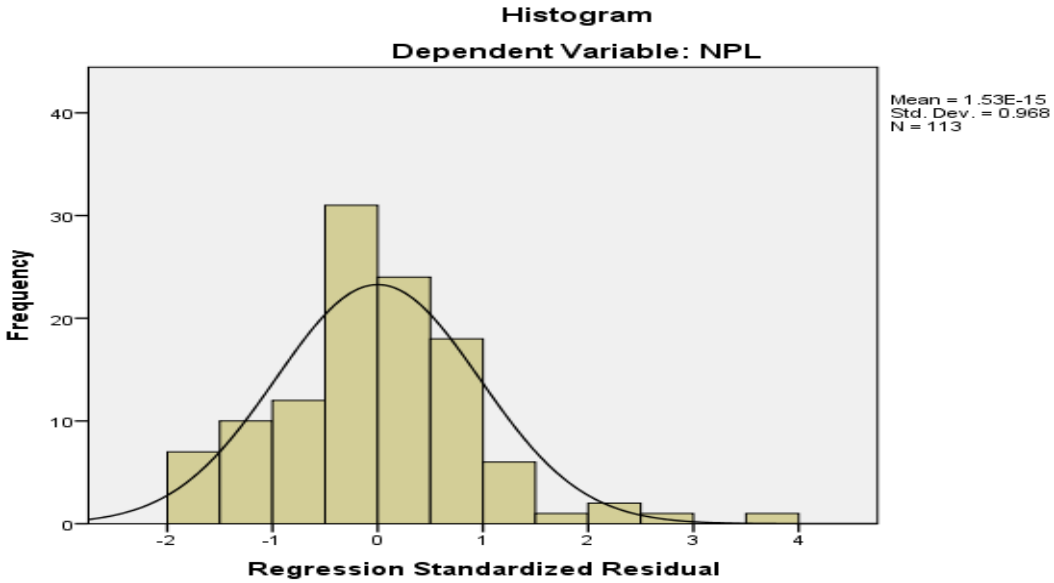

Figure 3: Normality Test

Model Summary

The regression analysis in Table 7 examined the impact of bank-specific and borrower factors on bad debt (NPLs). The model, using multiple linear regression, found a strong positive correlation (R = 0.822) between the independent variables (poor credit rating, weak collateral, high interest rates, credit size, loan diversion, poor monitoring, and borrower credit culture) and NPLs. The R-squared value of 0.676 indicates that 67.6% of the variation in bad debt is explained by these factors, leaving 32.4% attributable to other, unexamined variables. This suggests that while the included factors are significant predictors of bad debt, other influences also play a substantial role.

Table 7

Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.822[a]	.676	.655	.42062

a. Predictors: (Constant), Credit culture, Monitoring, Interest rate, Credit size, Diversion, Assessment, Collateral

Source: Own computation, survey 2024

ANOVA test

Analysis of variance in this study was used to determine if the model fits the data. The test F-value for the data in Table 8 below is 31.325. The p-value associated with the F value 0.000 is less than the alpha value of 0.05. In addition, the ANOVA table indicates that there is a significant effect of the independent variables on the dependent variable and the applied model is significantly suitable for predicting the dependent variable.

Table 8

ANOVA table

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.794	7	5.542	31.325	.000[b]
	Residual	18.577	105	.177		
	Total	57.371	112			

a. Dependent Variable: NPL

b. Predictors: (Constant), Creditculture, Monitoring, Interestrate, Creditsize, Diversion, Assessment, Collateral

Source: Own computation, survey 2024

Table 9 presents the results of a multiple regression analysis examining the relationship between the seven independent variables with Non-Performing Loans (NPL), the dependent variable. The model includes " Poor credit Assessment Assessment," "Credit size," "Monitoring," "Interest rate," "Diversion," "Collateral," and "Credit culture" as predictors. The overall significance and explanatory power of the model are not presented in this table,

but the individual coefficients provide insights into the contribution of each variable.

The results indicate that several bank-specific factors have a statistically significant impact on NPLs. "Assessment" (p = .043), "Credit size" (p = .036), "Monitoring" (p = .008), "Interest rate" (p = .006), and "Collateral" (p = .000) all exhibit statistically significant coefficients ($p < 0.05$), suggesting that these factors are significantly associated with NPL levels. The positive coefficients for these variables indicate a positive relationship, meaning that as these factors increase, NPLs also tend to increase.

The standardized coefficients (Beta) allow for a comparison of the relative importance of the significant predictors. "Collateral" has the largest standardized coefficient (Beta = .302), indicating that it has the strongest relative impact on NPLs compared to the other significant variables in the model. "Interest rate" (Beta = .215) and "Credit size" (Beta = .179) also have relatively strong effects.

Conversely, "Diversion" (p = .230) and "Credit culture" (p = .324) do not have statistically significant coefficients ($p > 0.05$). This suggests that, in this model, these factors are not significantly associated with NPLs. It's important to note that the lack of significance does not necessarily mean these factors are unimportant, but rather that their effect on NPLs is not statistically detectable in this particular model, given the other variables included.

Table 9

Regression output

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.735	.390		-1.884	.062
	Poorcredit Assessment	.162	.079	.164	2.050	.043
	Credit size	.181	.085	.179	2.122	.036
	Monitoring	.235	.087	.153	2.701	.008
	Interest rate	.186	.067	.215	2.779	.006
	Collateral	.300	.082	.302	3.669	.000
	Diversion	.106	.088	.093	1.207	.230
	Creditculture	.054	.055	.057	.991	.324

a. Dependent Variable: NPL

Discussion

Hypothesis 1: Poor credit Assessment - The analysis reveals a statistically significant ($p < 0.05$) positive relationship between poor credit assessment scores and NPLs, contradicting the expectation that better assessment practices would lead to lower default rates. This unexpected finding suggests that higher assessment scores are associated with higher NPLs. Further investigation is crucial to determine if the assessment process accurately identifies risk or if there are systemic issues leading to the approval of riskier borrowers despite high assessment scores. This could also indicate a need to re-evaluate the criteria used in the assessment process itself. The positive coefficient for poor credit assessment is consistent with the widely accepted understanding that the main causes of NPLs are insufficient evaluation of a borrower's ability to repay and asset valuation (Brown, (2022); Smith, 2020; Arega, 2018; Wondimagegnehu, 2012; Dessalegn et.al, 2019).

Hypothesis 2: Credit Size - As anticipated, the analysis confirms a statistically significant ($p < 0.05$) positive relationship between credit size and NPLs. Larger loans are associated with a higher likelihood of becoming non-performing. This aligns with established lending principles, as larger loan amounts inherently carry a greater risk exposure for both the borrower and the lender. Prudent risk management practices, including rigorous creditworthiness evaluations and appropriate collateral requirements, are essential for mitigating the risks associated with larger loans. The positive correlation between the size of credit and nonperforming loans also supports the idea that excessive lending and inadequate credit approval procedures can result in a greater number of bad loans (Salas and Saurina, 2002), even if this conclusion goes against some earlier studies (Keeton, 1999; Boudriga, Boulila, & Jellouli, 2009; Negalign, 2019).

Hypothesis 3: Monitoring - The data in the study indicates a statistically significant ($p < 0.01$) positive relationship between loan monitoring and NPLs, which is counterintuitive. The expectation was that more intensive monitoring would lead to earlier detection of potential issues and proactive intervention, thereby reducing NPLs. However, the results suggest that increased monitoring is associated with higher NPLs. This could indicate that increased monitoring is a reactive measure applied to loans already exhibiting signs of distress, rather than a proactive strategy to prevent defaults.

Hypothesis 4: Interest Rate - Expected Positive Relationship Consistent with expectations, the analysis demonstrates a statistically significant ($p < 0.01$) positive relationship between interest rates and NPLs. Higher interest rates are associated with a greater likelihood of loans becoming non-performing. This is a well-established principle in lending, as higher interest rates increase the

borrower's repayment burden and can make it more difficult for them to meet their obligations, especially in challenging economic conditions. The conclusion of this study is consistent with the conclusions of Agresti et al, (2013), Wondimagegnehu (2012), Arega (2018), and Dessalegn et.al. (2019).

Hypothesis 5: Collateral - The analysis reveals a statistically significant ($p < 0.001$) positive relationship between collateral value and NPLs, contradicting the expectation that greater collateralization would reduce default risk. This surprising finding suggests that higher collateral value is associated with higher NPLs. This could be due to lenders being more willing to approve riskier loans when substantial collateral is offered, or potentially due to inflated or inaccurate collateral valuations. A thorough review of collateral valuation practices is warranted. The finding aligns with the understanding that loans lacking sufficient collateral protection are inherently more vulnerable to default, as the bank has limited recourse in the event of borrower distress (Wondimagegnehu, 2012; Arega, 2018; Smith, 2020; Mamuye, 2021).

Conclusions

Based on the research questions and specific objectives to assess bank-specific and borrower-specific factors influencing NPLs in the Development Bank of Ethiopia (DBE), to determine the effect of bank-specific factors on NPLs, and to analyze which factors have the most significant impact the following conclusions are drawn. This research confirms a positive relationship and impact between NPLs and poor credit assessment, poor collateral strength, high interest rates, credit size, loan diversion, and poor credit monitoring.

Testing for multicollinearity, autocorrelation, normality, and heteroscedasticity supported the regression model's validity. The model is globally significant, as seen by the statistically significant R and R2 values in the ANOVA test results. According to the multiple linear regression analysis, five of the seven independent variables poor credit assessment, poor collateral strength, high interest rates, credit size, and poor credit monitoring have a statistically significant and positive effect on NPLs. In this model, however, the effects of credit culture and loan diversion are minimal.

Therefore, this study concludes that poor credit assessment, poor collateral strength, high interest rates, credit size, and inadequate credit monitoring are key drivers of NPLs in the DBE. Addressing these factors is crucial for improving loan portfolio performance and mitigating financial risk within the institution.

Recommendations

Based on the research findings, several policy recommendations are crucial for mitigating Non-Performing Loans (NPLs) within the Development

Bank of Ethiopia (DBE). To enhance credit monitoring effectiveness, it is imperative to adequately resource branch credit offices with the necessary staff, vehicles, and logistics. This will empower lenders to proactively assess borrower financial health, ensure collateral adequacy, enforce loan terms, and identify and address potential problem loans before they escalate. Furthermore, DBE must strengthen collateral security by ensuring that all loans are adequately secured with appropriate collateral and robust legal documentation. This minimizes potential losses from problem loans and reduces the adverse impact of bad debt provisions on the bank's overall financial performance."

In addition to enhanced monitoring and collateral practices, DBE should implement a robust and comprehensive credit process encompassing rigorous customer selection, thorough credit analysis, transparent sanctioning procedures, proactive monitoring and follow-up, and well-defined recovery strategies for distressed loans. Senior management must prioritize the management of both bank-specific and borrower-specific factors impacting NPLs in priority sectors, developing and implementing prudent credit policies and procedures to mitigate the adverse effects of these loans. Strengthening Know Your Customer (KYC) compliance is also crucial for thoroughly assessing borrower integrity and creditworthiness. Regular and uninterrupted project follow-ups are essential to identify potential defaulters and implement timely corrective actions based on follow-up reports, complemented by reinforced collateral evaluation procedures to ensure loan financing is fully secured by adequate collateral. Finally, DBE must shift away from aggressive and unsustainable lending practices that contribute to a high NPL ratio, emphasizing responsible and sustainable loan growth to ensure long-term financial stability.

Implications of the study

Implications for Internal Bank Management and Policy

The study's most critical implication is that the Development Bank of Ethiopia (DBE) possesses significant internal leverage to reduce Non-Performing Loans (NPLs), as the primary drivers poor credit assessment, weak collateral, high interest rates, excessive credit size, and inadequate monitoring are all bank-controllable factors. This shifts responsibility away from borrower behavior and toward operational reform.

Consequently, DBE must immediately prioritize strengthening collateral valuation and legal documentation, resourcing branch credit offices for proactive monitoring, and revising aggressive lending practices that favor large loan amounts and high interest rates. Failure to address these statistically significant factors will perpetuate high NPLs regardless of economic conditions. Furthermore, since borrower-specific variables like loan diversion and credit

culture were statistically insignificant in the regression model, DBE should focus its limited resources on improving internal controls (KYC, supervision, phased disbursements) rather than attempting to reform borrower habits, which yields less predictable results.

Implications for Financial Stability, Regulation, and Future Research

The findings imply that minimum requirements for collateral valuation, the frequency of credit monitoring, and borrower assessment procedures should be enforced by regulators such as the National Bank of Ethiopia for the broader Ethiopian banking industry, particularly for development banks that are vulnerable to political or directive lending. By reducing NPLs through better internal controls, DBE can boost its profitability, free up money for long-term lending to creditworthy borrowers, and reduce its need on government recapitalization.

Therefore, future research should examine how these external factors interact with bank-specific features and look into whether credit culture and loan diversion have an indirect effect on non-performing loans (NPLs) through mediators like cash flow or project success. Such research could lead to a more sophisticated understanding of risk in Ethiopia's unique economic climate.

Limitation of the study

Despite the robust findings, this study has several limitations that should be acknowledged.

First, only bank-specific and borrower-specific variables were included in the regression model, leaving out potentially significant macroeconomic elements like inflation, foreign exchange shortages, interest rate volatility, and unstable international markets all of which interviewees mentioned as having an impact on loan performance. Second, the statistical insignificance of borrower credit culture and loan diversion does not necessarily indicate that these factors are unimportant; rather, it implies that their influence may be indirect or mediated by other variables that are not included in the model, making it difficult to draw firm conclusions about them. Third, the results may not be as applicable to commercial banks or other financial institutions operating under various regulatory regimes, risk appetites, or ownership structures because the study was limited to the Development Bank of Ethiopia (DBE).

Lastly, the regression analysis's cross-sectional design records correlations at a particular moment in time, making it impossible to draw conclusions about causality or comprehend how these variables change across economic cycles. These shortcomings would be addressed by future studies that

include comparable institutional designs, macroeconomic controls, and longitudinal data.

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