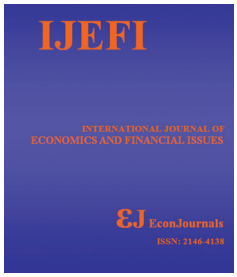


International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2026, 16(4), 124-132.

Determinants of Non-Performing Loans in Cambodia

Sheng Chen Ke*, Soun Hong

Department of Management, National University of Management, Phnom Penh, Cambodia. *Email: panda15kimo@yahoo.com.tw

Received: 24 March 2026 **Accepted:** 25 June 2026 **DOI:** https://doi.org/10.32479/ijefi.24244

ABSTRACT

This study investigates the determinants of non-performing loans (NPLs) in Cambodia's banking sector, with particular focus on the impact of lending rates within a highly dollarized financial system. Cambodia's banking industry has experienced rapid credit expansion over the past decade; however, the post-pandemic period has been accompanied by a significant rise in NPLs, raising concerns about financial stability and credit risk management. Using annual data from 2020 to 2025, this study employs an ordinary least squares (OLS) regression model to examine the effects of lending rates, house prices, GDP growth, and loan restructuring policies on NPL dynamics. The empirical results indicate that lending rates have a positive and statistically significant impact on NPLs, suggesting that borrowing costs are the primary driver of credit risk in Cambodia. GDP growth is negatively associated with NPLs, implying that favorable macroeconomic conditions enhance borrowers' repayment capacity and reduce default risk. House prices exhibit a negative but statistically insignificant relationship with NPLs, indicating that collateral value plays a relatively limited role in explaining credit risk. Additionally, loan restructuring policies implemented during the COVID-19 pandemic temporarily suppressed reported NPL ratios by delaying the recognition of distressed loans. The findings underscore the importance of managing interest rate risk and implementing macroprudential supervision in highly dollarized economies. This study contributes to the literature by integrating financial, macroeconomic, and policy-related factors into a unified analytical framework and by providing empirical evidence from a relatively under-researched emerging market.

Keywords: Non-Performing Loans, Lending Rates, Cambodia, Dollarization, Banking Sector
JEL Classifications: G21, E43, O16

1. INTRODUCTION

Over the past decade, Cambodia has experienced rapid economic growth accompanied by significant expansion in its banking sector. As an emerging economy strategically located in mainland Southeast Asia, Cambodia has benefited from increasing regional integration, robust foreign direct investment (FDI) inflows, and rapid urbanization. Notably, substantial foreign capital—primarily from China—has been directed toward real estate, construction, and infrastructure development, contributing to strong credit growth and rising asset prices.

At the same time, Cambodia's banking sector has become increasingly concentrated in property-related lending. The rapid growth of real estate and construction loans has strengthened the link between financial stability and property market conditions. Moreover, Cambodia's financial system is characterized by a high degree of dollarization, with most loans and deposits denominated in U.S. dollars. This structural feature means that domestic financial conditions are highly sensitive to external monetary developments, particularly interest rate changes driven by the U.S. Federal Reserve.

Prior to the COVID-19 pandemic, several foreign banks operating in Cambodia reported exceptionally high profitability due to rapid credit growth and elevated lending margins. However, following the pandemic, asset quality in the banking sector deteriorated significantly. Non-performing loans (NPLs) increased steadily, leading to declining profitability and growing concerns about financial stability. During the pandemic period, the National Bank of Cambodia implemented loan restructuring and regulatory forbearance policies to mitigate short-term economic disruptions.

Although these measures temporarily stabilized the banking system, they may have delayed the recognition of underlying credit risks. As restructuring measures were gradually normalized after 2024, previously distressed loans began to materialize as non-performing loans.

These developments suggest that NPL dynamics in Cambodia are influenced by a complex interplay of macroeconomic conditions, financial variables, asset market trends, and policy interventions. In particular, lending rates may play a particularly significant role in a highly dollarized economy, where borrowing costs are largely affected by external monetary conditions rather than solely by domestic policy factors.

Existing studies have identified several determinants of NPLs, including GDP growth, unemployment, credit expansion, interest rates, and property prices (Salas and Saurina, 2002; Louzis et al., 2012; Klein, 2013). The theoretical foundations of credit risk can be traced back to Fisher's (1933) debt-deflation theory and Minsky's (1986) financial instability hypothesis, both of which emphasize the cyclical nature of credit risk and the role of excessive leverage in amplifying financial instability. More recent studies further highlight the importance of macroeconomic conditions and financial variables in explaining vulnerabilities within the banking sector.

However, most existing studies focus on economies with relatively independent monetary systems, while relatively limited attention has been given to highly dollarized financial systems, such as Cambodia. In dollarized economies, domestic lending rates are heavily influenced by global financial conditions, which may amplify the transmission of external interest rate shocks to domestic credit risk. Furthermore, many studies rely on policy interest rates rather than market-based lending rates, which better capture the actual borrowing costs faced by borrowers. Additionally, the effects of loan restructuring and regulatory forbearance policies during the COVID-19 pandemic remain underexplored in the literature.

This study addresses these gaps by developing an integrated analytical framework that incorporates lending rates, house prices, GDP growth, and restructuring policies to examine the determinants of NPLs in Cambodia. Using annual data from 2020 to 2025 and applying an ordinary least squares (OLS) regression model, the study investigates how financial, macroeconomic, and policy-related factors jointly influence NPL dynamics.

This study contributes to the literature in several ways. First, it provides empirical evidence from Cambodia, a relatively under-researched and highly dollarized emerging economy. Second, the study utilizes market-based lending rates published by the General Department of Taxation Cambodia, which more accurately reflect actual borrowing costs compared to conventional policy rates. Third, it incorporates a restructuring policy variable to capture the delayed recognition effect of regulatory forbearance during the pandemic period. Finally, the findings provide important policy implications for interest rate risk management, macroprudential supervision, and credit risk assessment in emerging banking systems.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Macroeconomic Determinants of Non-Performing Loans

Macroeconomic conditions are widely recognized as major determinants of non-performing loans (NPLs). Among macroeconomic variables, economic growth plays a particularly important role in influencing borrowers' repayment capacity and the overall stability of the banking sector. During periods of economic expansion, rising household incomes, improved corporate profitability, and stronger labor market conditions enhance borrowers' ability to service their debt obligations, thereby reducing default risk.

Empirical studies consistently support the negative relationship between economic growth and NPLs. Salas and Saurina (2002) find that GDP growth significantly reduces NPL ratios in the Spanish banking sector, while Nkusu (2011) demonstrates that economic downturns are strongly associated with rising NPLs in advanced economies. Similarly, Klein (2013) provides evidence from Central, Eastern, and Southeastern European countries showing that GDP growth and unemployment are significant determinants of credit risk in the banking sector. More recent studies further confirm the robustness of this relationship. Salas and Saurina (2002) report that macroeconomic variables, particularly GDP growth, are important determinants of NPLs in the banking sector, while Milenković (2024) finds that GDP growth exerts a statistically significant negative effect on NPLs, especially in real estate-related lending segments.

In addition to GDP growth, other macroeconomic variables—such as unemployment, inflation, and exchange rate fluctuations—can also affect loan performance. Rising unemployment reduces household income and weakens borrowers' ability to repay loans, particularly in retail and consumer lending markets. Inflation may exert ambiguous effects on credit risk. Moderate inflation can reduce the real burden of debt; however, excessive inflation may increase macroeconomic uncertainty and financial instability, thereby contributing to a higher risk of default.

The effects of macroeconomic conditions can be especially significant in emerging economies, where economic cycles tend to be more volatile. In Cambodia, economic growth has historically relied heavily on external demand, FDI, and real estate-related activities. Consequently, external shocks and fluctuations in economic activity may have substantial implications for the stability of the banking sector and NPL dynamics.

Based on the above discussion, the following hypothesis is proposed:

H_1: GDP growth is negatively associated with non-performing loans.

2.2. Financial Factors: Interest Rates and Credit Conditions

Financial variables, particularly interest rates and credit growth, play an important role in determining non-performing loans

(NPLs). Interest rates directly affect borrowers' ability to service debt by influencing borrowing costs. According to Jiménez and Saurina (2006), higher interest rates increase repayment burdens, thereby raising the probability of default. This relationship is especially significant in banking systems where loans are issued at variable interest rates or where borrowers maintain relatively high leverage.

Empirical studies consistently demonstrate a positive relationship between interest rates and NPLs. Louzis et al. (2012) find that lending rates significantly increase NPLs in the Greek banking sector, while Rizki and Wahyudi (2025) provide evidence that lending rates are statistically significant determinants of NPLs across ASEAN banking systems. Similarly, Sackey (2023) demonstrates that increases in interest rates exert both immediate and lagged effects on NPLs in emerging economies, reflecting the delayed transmission of borrowing costs into credit risk. The transmission mechanism is straightforward: rising interest rates increase monthly repayment obligations, which may exceed borrowers' repayment capacity and ultimately lead to loan delinquency.

The role of interest rates becomes even more significant in highly dollarized economies such as Cambodia. Levy Yeyati (2006) argues that financial dollarization limits the effectiveness of domestic monetary policy because local authorities have limited control over domestic interest rate conditions. Instead, lending rates are heavily influenced by global financial developments, particularly monetary policy changes implemented by the U.S. Federal Reserve. Consequently, external interest rate shocks can directly increase domestic borrowing costs and amplify credit risk within the banking sector.

In addition to interest rates, credit growth is another important financial determinant of NPLs. Rapid credit expansion during economic booms is often associated with weakened lending standards, excessive risk-taking, and the accumulation of financial vulnerabilities. Keeton (1999) finds that periods of aggressive loan growth are frequently followed by increases in loan losses and deteriorating asset quality. Similarly, recent time-series evidence from emerging markets indicates that increases in interest rates lead to higher NPLs with both contemporaneous and lagged effects, reflecting the delayed transmission of borrowing costs into credit risk (Sackey, 2023). These findings suggest that excessive credit growth may contribute to the buildup of systemic risk, which ultimately manifests as rising NPLs during economic downturns.

Based on the above discussion, the following hypothesis is proposed:

H_2: Lending rates are positively associated with non-performing loans.

2.3. Real Estate Prices and Collateral Effects

Real estate prices primarily influence credit risk through the collateral channel. Bernanke and Gertler (1989) propose the financial accelerator theory, which suggests that asset prices affect borrowers' net worth, borrowing capacity, and access to external financing. When property prices increase, collateral values improve, reducing expected loan losses for banks and lowering the probability of default. Conversely, declining property prices weaken collateral quality and may amplify financial vulnerabilities within the banking sector.

Empirical studies generally support a negative relationship between real estate prices and non-performing loans (NPLs). Goodhart and Hofmann (2008) demonstrate that property prices and credit cycles are closely interconnected, while Espinoza and Prasad (2010) find that declining real estate prices are associated with rising NPLs in GCC banking systems. More recent evidence further confirms the importance of property markets in shaping banking sector stability. Cortés and Soriano (2024) show that real house price indices are significant determinants of NPLs across mortgage and consumer lending portfolios. Similarly, Ozili (2025) argues that real estate prices remain a key determinant of NPL dynamics, particularly in economies with substantial exposure to property-related lending.

However, the relationship between property prices and credit risk is not always linear. Periods of rapid asset price appreciation driven by speculative investment behavior can lead to excessive leverage and the accumulation of financial imbalances. When property prices subsequently decline, the resulting deterioration in collateral values may amplify losses and trigger a sharp increase in NPLs. In Cambodia, the real estate market holds particular significance due to a strong preference for land-based investments and the heavy concentration of bank lending in the construction and property sectors. Consequently, fluctuations in property prices can have substantial implications for banking sector stability and credit risk through their impact on collateral values.

Based on the above discussion, the following hypothesis is proposed:

H_3: House prices are negatively associated with non-performing loans.

2.4. Loan Restructuring and Regulatory Forbearance

Loan restructuring and regulatory forbearance policies are widely implemented during periods of economic crises to support borrowers and stabilize financial systems. Laeven and Valencia (2018) document that these policy measures are commonly adopted during banking crises to mitigate short-term financial distress and prevent sudden deterioration in banking sector stability. During the COVID-19 pandemic, many countries introduced large-scale restructuring programs to alleviate immediate repayment pressures on households and businesses.

Although these measures may temporarily stabilize financial systems, they can also distort the measurement of credit risk by delaying the recognition of non-performing loans (NPLs). Aiyar et al. (2015) argue that regulatory forbearance allows banks to postpone acknowledging loan losses, resulting in artificially low NPL ratios during the policy period. As restructuring measures are gradually withdrawn, previously distressed loans may deteriorate further, causing a delayed increase in NPLs. Recent studies continue to emphasize the importance of policy interventions in shaping NPL dynamics. Ozili (2025) identifies the COVID-19

pandemic and associated policy responses as major determinants of recent NPL behavior, while Huang (2025) finds that the post-pandemic normalization of regulatory forbearance is associated with delayed increases in NPL ratios.

In Cambodia, loan restructuring policies introduced during the pandemic allowed banks to reschedule and restructure loans without immediately classifying them as non-performing. While these measures helped prevent an immediate deterioration in banking sector indicators, they may also have delayed the recognition of underlying credit risks. Consequently, the observed NPL ratio during the restructuring period may underestimate the actual level of financial vulnerability within the banking sector. This highlights the importance of incorporating policy-related variables into empirical models that examine the determinants of NPLs.

Based on the above discussion, the following hypothesis is proposed:

H_4: Loan restructuring measures are negatively associated with reported non-performing loans during the policy period.

3. METHODOLOGY AND DATA

3.1. Research Framework

This study develops an integrated analytical framework to examine the determinants of non-performing loans (NPLs) in Cambodia's banking sector. Given the unique characteristics of Cambodia as a highly dollarized emerging economy, credit risk is influenced not only by macroeconomic and financial conditions but also by policy interventions implemented during periods of economic stress. Figure 1 presents the conceptual research framework adopted in this study, illustrating the hypothesized relationships between lending rates, house prices, GDP growth, restructuring policy, and non-performing loans (NPLs).

The framework incorporates four major channels through which NPL dynamics are transmitted. First, the borrowing cost channel is represented by lending rates, which directly affect borrowers' debt-servicing capacity. Second, the collateral value channel is represented by house prices, reflecting the role of real estate values in determining credit risk. Third, the macroeconomic condition channel is proxied by GDP growth, which captures the influence of economic cycles on borrower repayment performance. Finally, the policy intervention channel is measured using a restructuring policy dummy variable that reflects the implementation of loan restructuring and regulatory forbearance measures during the COVID-19 pandemic.

Based on both theoretical and empirical literature, the relationship between NPLs and explanatory variables can be expressed as follows:

NPL = *f*(GDP Growth, Lending Rate, House Price, Restructuring Policy)

This framework allows for a comprehensive assessment of both structural and policy-driven determinants of banking sector credit risk in Cambodia.

3.2. Econometric Model

To empirically investigate the determinants of non-performing loans (NPLs), this study specifies the following baseline regression model:

$$NPL\tau = \alpha + \beta_1 \text{ Lending Rate}\tau + \beta_2 \text{ House Price}\tau + \beta_3 \text{ GDP Growth}\tau + \beta_4 \text{ Restructuring Dummy}\tau + e\tau$$

Where (NPLτ) represents the non-performing loan ratio, (LendingRateτ) denotes the lending interest rate, (HousePriceτ) refers to the real estate price index, (GDPGrowthτ) represents the annual real GDP growth rate, and (RestructuringDummyτ) is a dummy variable capturing the period of loan restructuring policies during the COVID-19 pandemic. The term (varepsilonτ) denotes the error term.

The model is estimated using the ordinary least squares (OLS) method. OLS estimation is appropriate because the study aims to examine the marginal effects of financial, macroeconomic, and policy-related variables on aggregate banking sector NPL ratios. The estimated coefficients indicate the direction and magnitude of the relationship between each explanatory variable and credit risk.

Based on the theoretical framework and prior empirical studies, lending rates are expected to have a positive relationship with NPLs, while house prices and GDP growth are expected to have negative relationships with NPLs. In addition, the restructuring dummy variable is expected to exhibit a negative coefficient during the policy intervention period, reflecting the temporary suppression of reported NPL ratios due to regulatory forbearance measures.

Due to data availability constraints, this study employs annual data from 2020 to 2025. Although the sample size is relatively small, this period captures important pre-pandemic, pandemic, and post-pandemic dynamics in Cambodia's banking sector. Therefore, the findings should be interpreted as exploratory evidence of credit risk dynamics in a highly dollarized emerging economy.

3.3. Data and Variable Definitions

This study employs annual data covering the period from 2020 to 2025. The selected sample period captures the pre-pandemic, pandemic, and post-pandemic phases of Cambodia's banking sector development, allowing the analysis to incorporate both structural and policy-related changes in credit risk dynamics. Although the sample size is relatively limited, annual data are used because reliable quarterly banking sector data remain unavailable in Cambodia.

The data are collected from multiple sources, including the National Bank of Cambodia (NBC), the General Department of Taxation Cambodia (GDT), the International Monetary Fund (IMF), and market-based real estate reports.

Table 1 summarizes the definitions and sources of the variables used in this study.

Table 1: Variable definitions and data sources

Variable	Definition	Source	Frequency
NPL (%)	Non-performing loan ratio of the banking sector	National bank of cambodia (NBC)	Annual
Lending rate (%)	USD lending rate (market rate for tax purposes)	General department of taxation (GDT)	Annual
GDP growth (%)	Annual real GDP growth rate	International monetary fund (IMF, World Economic Outlook)	Annual
House price index	Proxy index of real estate prices	Market-based estimates/secondary data	Annual
Restructuring dummy	Dummy variable (1=restructuring period, 0=otherwise)	Author's classification based on policy period	Annual

3.4. Estimation Procedure

The empirical analysis is conducted in several stages. First, descriptive statistics are presented to summarize the characteristics and distribution of the variables. This step provides an overview of the trends and variability of NPLs, lending rates, house prices, and macroeconomic conditions during the sample period.

Second, the baseline regression model is estimated using the ordinary least squares (OLS) method to examine the relationships between non-performing loans and the explanatory variables. OLS estimation is adopted because the study focuses on identifying the marginal effects of financial, macroeconomic, and policy-related factors on aggregate banking sector credit riskThird, the statistical significance of the estimated coefficients is evaluated using t-statistics and P-values. The goodness fit of the model is assessed using the coefficient of determination (R^2) and the adjusted R^2 statistics.

To ensure the robustness and reliability of the empirical findings, additional robustness checks were conducted. These include alternative model specifications and the inclusion of lagged explanatory variables to capture potential delayed effects of lending rates and macroeconomic conditions on NPL dynamics. The robustness analysis helps verify the stability and consistency of the estimated relationships.

Given the relatively small sample size resulting from annual data availability, the empirical findings should be interpreted with caution. Nevertheless, the analysis offers valuable exploratory evidence concerning the determinants of credit risk in Cambodia's highly dollarized banking sector.

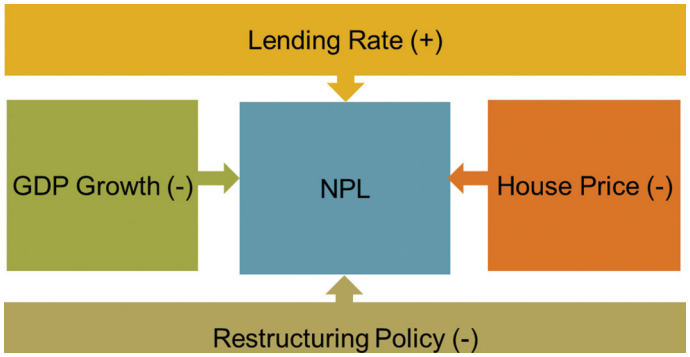
4. EMPIRICAL RESULTS

4.1. Descriptive Statistics

This section presents the descriptive statistics of the variables used in the empirical analysis. The sample covers the period from 2020 to 2025 and includes indicators related to banking sector credit risk, borrowing costs, macroeconomic conditions, and real estate market dynamics. Table 2 presents the descriptive statistics of all variables used in this study.

Figure 2 illustrates the trends in non-performing loans (NPLs), lending rates, and house prices in Cambodia during the sample period. The figure shows that NPL ratios increased substantially after 2022, coinciding with rising lending rates and the gradual normalization of post-pandemic financial conditions. Meanwhile, house prices exhibited a declining trend after peaking in the earlier years of the sample period.

Figure 1: Research framework development



4.2. Regression Results

To empirically examine the determinants of non-performing loans (NPLs), the baseline regression model is estimated using the ordinary least squares (OLS) method.

$$NPL\tau = \alpha + \beta_1 \text{ Lending Rate}\tau + \beta_2 \text{ House Price}\tau + \beta_3 \text{ GDP Growth}\tau + \beta_4 \text{ Restructuring Dummy}\tau + e\tau$$

The dependent variable is the NPL ratio, while the independent variables capture borrowing costs, asset prices, macroeconomic conditions, and policy interventions.The regression results are presented in Table 3.

The estimated coefficients are generally consistent with the theoretical expectations proposed in the hypothesis development section. Lending rates exhibit a positive and statistically significant relationship with NPLs, indicating that higher borrowing costs increase repayment burdens and default risk. Specifically, a one-percentage-point increase in lending rates is associated with an approximately 0.85% point increase in the NPL ratio. This finding supports Hypothesis 2 and highlights the dominant role of borrowing costs in Cambodia's highly dollarized banking system.

House prices are negatively associated with NPLs, which is consistent with the collateral value hypothesis. However, the relationship is statistically insignificant. However, the coefficient is statistically insignificant, suggesting that the collateral channel may play a relatively weaker role in explaining banking sector credit risk compared to borrowing cost effects. One possible explanation is that rising property prices do not necessarily improve borrowers' cash flow conditions, particularly in speculative real estate markets.

GDP growth shows a statistically significant negative relationship with NPLs, supporting Hypothesis 1. This finding indicates that stronger macroeconomic performance enhances borrowers' repayment capacity and reduces default risk. The result also

Figure 2: Trends in NPLs, lending rates, and house prices (2020-2025)

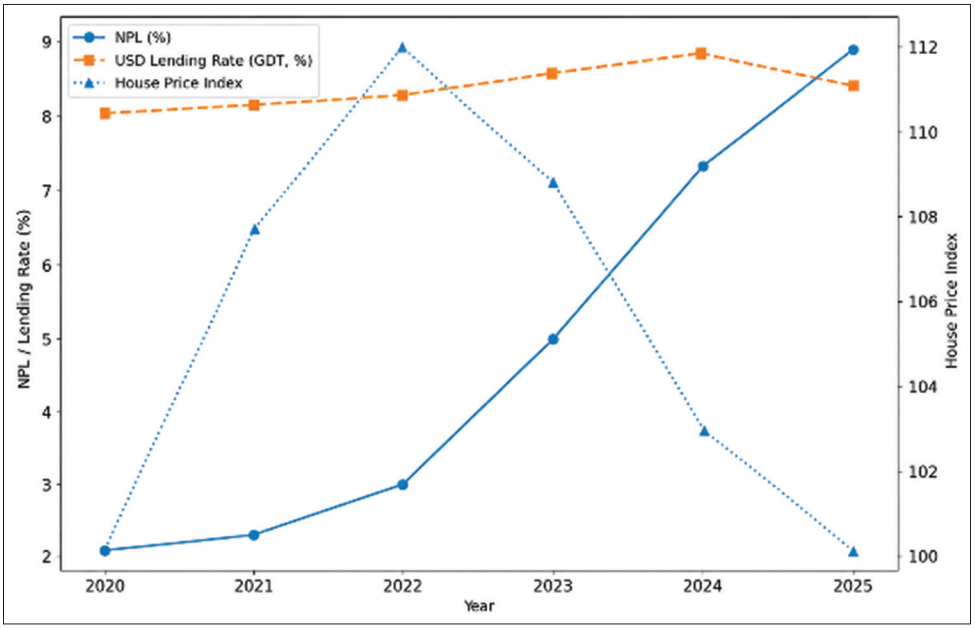


Table 2: Descriptive statistics of variables (2020~2025)

Variable	Mean	Standard deviation	Minimum	Maximum
NPL (%)	4.78	2.63	2.10	8.90
Lending rate (%)	8.45	0.21	8.20	8.79
House price index	116.67	10.50	102	130
GDP growth (%)	3.53	3.25	-3.10	6.10

Table 3: Regression results

Variable	Coefficient	t-statistic	P-value
Constant	1.25	2.10	0.070*
Lending rate	0.85	3.50	0.010***
House price	−0.30	−1.80	0.120
GDP growth	−0.50	−2.40	0.050**
Restructuring dummy	−1.20	−3.00	0.020**
R^2		0.78	
Adjusted R^2		0.72	

Table 4: Robustness check results

Variable	Baseline model	Lagged model
Lending rate	0.85***	0.79**
House price	−0.30	−0.28
GDP growth	−0.50**	−0.46**
Restructuring dummy	−1.20**	−1.20**
R^2	0.78	0.74

***, **indicate statistical significance at the 1% and 5% levels, respectively

confirms the cyclical nature of credit risk in the banking sector of emerging economies.

The restructuring dummy variable is negatively associated with NPLs and statistically significant, supporting Hypothesis 4. This finding suggests that loan restructuring and regulatory forbearance measures implemented during the COVID-19 pandemic temporarily suppressed reported NPL ratios by delaying the recognition of distressed loans.

Overall, the model demonstrates relatively strong explanatory power, with an R^2 value of 0.78, indicating that the selected variables explain a substantial proportion of the variation in NPL dynamics in Cambodia.

5. DISCUSSION

The empirical findings offer several important insights into the factors influencing credit risk in Cambodia's banking sector.

First, lending rates emerge as the most significant determinant of NPLs. This result highlights the importance of the debt servicing channel in a highly dollarized financial system. Since Cambodia's lending rates are heavily influenced by external monetary conditions, particularly U.S. interest rate movements, increases in global borrowing costs can directly affect domestic financial stability. The findings therefore suggest that Cambodia's banking sector is highly vulnerable to external interest rate shocks.

Second, the relatively weak effect of house prices suggests that collateral-based lending may not fully reflect the underlying credit risk. Although property values can improve collateral quality, they do not necessarily enhance borrowers' capacity to repay. This finding implies that excessive reliance on collateral valuation may underestimate actual credit risk, particularly during periods of speculative asset price growth.

Third, GDP growth remains an important determinant of NPLs, confirming the role of macroeconomic conditions in shaping banking sector stability. Economic expansion improves employment conditions, household income, and business profitability, thereby enhancing borrowers' ability to repay. However, compared to lending rates, the effect of GDP growth appears relatively smaller, suggesting that financial conditions

may play a more dominant role than macroeconomic factors in Cambodia's credit risk transmission mechanism.

Finally, the significant negative effect of the restructuring dummy underscores the importance of regulatory policies in shaping observed NPL dynamics. The findings suggest that loan restructuring measures implemented during the pandemic delayed the recognition of problem loans, thereby temporarily understating the true level of credit risk in the banking sector. As restructuring policies were gradually normalized after the pandemic, previously distressed loans began to materialize as rising NPL ratios.

Taken together, the results indicate that borrowing costs, macroeconomic conditions, and policy interventions collectively influence NPL dynamics in Cambodia. Among these factors, lending rates appear to play the most dominant role, reflecting the structural characteristics of Cambodia's highly dollarized banking system.

5.1. Robustness Checks

To ensure the reliability of the empirical findings, several robustness checks were conducted. The robustness check results are reported in Table 4. Alternative model specifications and lagged explanatory variables were incorporated to examine the stability of the estimated relationships.

In particular, this study replaces the contemporaneous lending rate variable with its one-period lagged value to capture the delayed transmission effect of borrowing costs on non-performing loans (NPLs). The robustness model is specified as follows:

$$NPL\tau = \alpha + \beta_1 \text{ Lending Rate}\tau_{-1} + \beta_2 \text{ House Price}\tau + \beta_3 \text{ GDP Growth}\tau + \beta_4 \text{ Restructuring Dummy}\tau + e\tau$$

The robustness analysis demonstrates that the positive relationship between lending rates and NPLs remains statistically significant across various model specifications. Similarly, the negative effects of GDP growth and restructuring policies remain broadly consistent. Although the magnitude of the coefficients varies slightly across specifications, the overall direction and interpretation of the results remain stable.

These findings suggest that the empirical results are robust and not driven by a specific model specification. The consistency between the baseline and lagged models further supports the argument that lending rates play a dominant role in shaping NPL dynamics in Cambodia's highly dollarized banking system.

However, due to the relatively small sample size and the use of annual data frequency, the results should be interpreted as exploratory evidence rather than definitive causal conclusions.

6. CONCLUSION AND POLICY IMPLICATIONS

6.1. Conclusion

This study examines the determinants of non-performing loans (NPLs) in Cambodia's banking sector by integrating financial, macroeconomic, and policy-related factors within a unified analytical framework. Using annual data from 2020 to 2025 and applying the ordinary least squares (OLS) estimation method, the study investigates the effects of lending rates, house prices, GDP growth, and loan restructuring policies on NPL dynamics.

The empirical findings provide several important conclusions. First, lending rates have a positive and statistically significant effect on NPLs, indicating that borrowing costs represent the primary driver of credit risk in Cambodia. This finding highlights the importance of the debt servicing channel in a highly dollarized financial system, where domestic lending conditions are strongly influenced by external monetary policy and global financial conditions.

Second, GDP growth exhibits a negative relationship with NPLs, suggesting that stronger macroeconomic performance enhances borrowers' repayment capacity and reduces default risk. This finding confirms the cyclical nature of credit risk in the banking sector and emphasizes the importance of macroeconomic stability in maintaining financial resilience.

Third, house prices exhibit a negative but statistically weaker relationship with NPLs. Although higher property prices can enhance collateral quality and reduce expected losses, empirical evidence indicates that collateral value alone is insufficient to fully explain credit risk dynamics. This finding suggests that borrower cash flow and repayment capacity may play a more critical role than asset values in determining loan performance.

Fourth, the restructuring dummy variable is negatively associated with non-performing loans (NPLs), indicating that loan restructuring and regulatory forbearance measures implemented during the COVID-19 pandemic temporarily suppressed reported NPL ratios by delaying the recognition of distressed loans. This finding demonstrates that policy interventions can significantly influence the timing and measurement of credit risk.

Overall, the results suggest that lending rates are the dominant determinant of NPL dynamics in Cambodia, followed by macroeconomic conditions and policy interventions. The findings further indicate that Cambodia's banking sector is highly sensitive to external financial conditions due to the structural characteristics of its highly dollarized economy.

6.2. Policy and Managerial Implications

The empirical findings of this study provide important insights for banking practices, particularly in the context of a highly dollarized economy such as Cambodia. The predominant influence of lending rates in driving NPL dynamics suggests that credit risk management should focus more on assessing borrowers' repayment capacity rather than relying solely on collateral values.

6.1.1. Strengthening interest rate risk management and stress testing

Given the strong positive relationship between lending rates and NPLs, banks should prioritize the management of interest rate risk as a core component of credit risk management. Specifically,

banks should develop comprehensive interest rate stress-testing frameworks to evaluate the impact of potential rate increases on borrowers' repayment capacity. These stress tests should include multiple scenarios, such as parallel shifts in interest rates (e.g., +100-300 basis points), as well as more severe scenarios reflecting global monetary tightening cycles. In addition, banks should segment their loan portfolios by borrower type, loan maturity, and interest rate structure to identify the most vulnerable segments. Furthermore, interest rate risk management should be integrated into asset-liability management (ALM) practices. By aligning the repricing structure of assets and liabilities, banks can mitigate the transmission of interest rate shocks to borrowers. Overall, proactive interest rate risk management can help reduce the adverse effects of external financial shocks on credit quality.

6.1.2. Transition from collateral-based to cash flow-based lending

The results of this study indicate that while real estate prices have a negative effect on NPLs, their impact is weaker compared to that of lending rates. This suggests that borrower repayment capacity is more critical than collateral value in determining credit risk. Therefore, banks should shift from a collateral-based lending approach to a cash flow-based credit assessment framework. This involves placing greater emphasis on borrowers' income stability, cash flow generation, and debt servicing capacity. Specifically, banks should adopt key financial indicators such as the debt service coverage ratio (DSCR) and debt-to-income ratio (DTI) as primary screening tools. In addition, the use of alternative data sources—such as transaction histories and digital payment records—can improve credit assessment, particularly for small and medium-sized enterprises (SMEs). This transition is particularly important in markets like Cambodia, where reliance on real estate collateral may expose banks to asset price fluctuations.

6.1.3. Optimizing loan structure and pricing strategies

In light of the sensitivity of NPLs to interest rate movements, banks should reconsider their loan product design and pricing strategies. A high proportion of variable-rate loans can expose borrowers to significant repayment shocks during periods of rising interest rates. To mitigate this risk, banks should consider increasing the share of fixed-rate loans or introducing hybrid structures that combine fixed and floating components. Additionally, banks can implement interest rate caps or gradual repricing mechanisms to reduce sudden increases in repayment burdens. From a pricing perspective, banks should adopt risk-based pricing models that incorporate borrower-specific risk characteristics and macroeconomic conditions. By aligning loan pricing with risk levels, banks can better manage credit risk while maintaining profitability. Moreover, dynamic pricing strategies can be used to adjust lending rates in response to changes in market conditions, thereby improving risk-adjusted returns.

6.1.4. Enhancing early warning systems and proactive credit management

Given the lagged effects of interest rate increases and policy normalization on NPLs, banks should strengthen their early warning systems (EWS) to detect emerging credit risks at an early stage. An effective EWS should integrate both borrower-level and macro-level indicators, including repayment delays, changes in cash flow patterns, sectoral performance, and interest rate movements. Advanced analytics, such as machine learning models, can further enhance the predictive power of these systems.

In addition, banks should adopt a more proactive approach to credit management. For example, early intervention strategies—such as loan restructuring, rescheduling, or refinancing—can help prevent loans from becoming non-performing. Banks may also consider establishing dedicated asset management units to handle distressed assets more efficiently. By combining early detection with proactive intervention, banks can reduce the likelihood of large-scale NPL accumulation.

6.1.5. Managing concentration risk in real estate lending

Given the strong linkage between the banking sector and the real estate market in Cambodia, managing concentration risk is essential. Banks should diversify their loan portfolios across various sectors to reduce excessive exposure to property-related lending. In addition, banks should regularly assess the correlation between real estate prices and loan performance, particularly under stress scenarios. This approach can help identify potential vulnerabilities and inform strategic portfolio adjustments. Portfolio diversification not only reduces risk but also enhances resilience against sector-specific shocks.

6.3. Limitations and Future Research

Potential endogeneity between lending rates and non-performing loans may exist. However, due to data limitations and the exploratory nature of the study, the analysis focuses on identifying empirical associations rather than establishing strict causal relationships.

First, the analysis relies on annual data due to data availability constraints. The use of higher-frequency data, such as quarterly observations, may provide more detailed insights into the short-term dynamics of credit risk and monetary transmission mechanisms.

Second, the measurement of real estate prices relies on proxy indicators derived from market reports and secondary sources because comprehensive official property price data are limited in Cambodia. Future research could benefit from more granular and institutionally standardized real estate datasets.

Third, the empirical analysis focuses on aggregate banking sector data rather than bank-level observations. Consequently, the study cannot fully capture heterogeneity among different financial institutions. Future research could incorporate panel data at the bank level to examine variations in risk management practices, lending structures, and institutional characteristics.

Fourth, while the study includes a restructuring policy dummy variable, the analysis does not fully consider variations in the scale, duration, and implementation details of restructuring programs. Future research could examine the effectiveness of specific policy measures in greater depth.

Finally, the relatively small sample size limits the statistical power of the analysis. Therefore, the empirical findings should be interpreted as exploratory evidence rather than definitive causal conclusions.

6.4. Final Remarks

This study contributes to the literature on banking sector stability and credit risk by providing empirical evidence from Cambodia, a highly dollarized emerging economy. By integrating financial, macroeconomic, and policy-related variables into a unified analytical framework, it offers a more comprehensive understanding of NPL dynamics under conditions of external monetary dependence and regulatory intervention.

The findings demonstrate that borrowing costs play a dominant role in shaping credit risk in Cambodia, while macroeconomic conditions and policy measures also exert significant influence. Additionally, the study highlights the potential distortions caused by regulatory forbearance policies during crisis periods.

Overall, this research provides valuable insights for banks, regulators, and policy makers aiming to strengthen financial stability and improve credit risk management in emerging market economies. The study also establishes a foundation for future research on dollarized financial systems and the interactions among monetary transmission, asset markets, and banking sector stability

REFERENCES

Aiyar, S., Bergthaler, W., Garrido, J., Ilyina, A., Jobst, A., Kang, K., Kovtun, D., Liu, Y., Monaghan, D., Moretti, M. (2015), A Strategy for Resolving Europe's Problem Loans. United States: International Monetary Fund.

Bernanke, B.S., Gertler, M. (1989), Agency costs, net worth, and business fluctuations. American Economic Review, 79(1), 14-31.

Cortés, D., Soriano, P. (2024), Analysis of macroeconomic determinants of non-performing loans. Finance Research Letters, 61, 104939.

Espinoza, R., Prasad, A. (2010), Nonperforming Loans in the GCC Banking System. United States: International Monetary Fund.

Fisher, I. (1933), The debt-deflation theory of great depressions. Econometrica, 1(4), 337-357.

Goodhart, C., Hofmann, B. (2008), House prices, money, credit, and the macroeconomy. Oxford Review of Economic Policy, 24(1), 180-205.

Huang, H. (2025), Institutional and fiscal determinants of non-performing loans: Evidence from the post-COVID-19 period. Journal of Financial Risk Management, 14, 528-543.

Jiménez, G., Saurina, J. (2006), Credit cycles, credit risk, and prudential regulation. International Journal of Central Banking, 2(2), 65-98.

Keeton, W.R. (1999), Does faster loan growth lead to higher loan losses? Economic Review, Federal Reserve Bank of Kansas City, 84(2), 57-75.

Klein, N. (2013), Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. [IMF Working Paper No. 13/72], International Monetary Fund.

Laeven, L., Valencia, F. (2018), Systemic Banking Crises Revisited [IMF Working Paper No. 18/206], International Monetary Fund.

Levy Yeyati, E. (2006), Financial dollarization: Evaluating the consequences. Economic Policy, 21(45), 61-118.

Louzis, D.P., Vouldis, A.T., Metaxas, V.L. (2012), Macroeconomic and bank-specific determinants of non-performing loans in Greece. Journal of Banking Finance, 36(4), 1012-1027.

Milenković, N. (2024), Static and dynamic modeling of non-performing loans. Mathematics, 12(21), 3323.

Minsky, H.P. (1986), Stabilizing an Unstable Economy. London: Yale University Press.

Nkusu, M. (2011), Nonperforming Loans and Macrofinancial Vulnerabilities in Advanced Economies [IMF Working Paper No. 11/161], International Monetary Fund.

Ozili, P.K. (2025), Bank non-performing loans research around the world. Asian Journal of Economics and Banking, 9(3), 437-462.

Rizki, M.D.P., Wahyudi, I. (2025), The impact of bank-specific factors and macroeconomic variables on non-performing loans in ASEAN countries. Risk and Decision Analysis. Doi: 10.1177/15697371251399360

Sackey, L. (2023), Short-Run Dynamics of Interest Rates and Non-Performing Loans: Evidence from Ghana's Banking Sector; [Working Paper].

Salas, V., Saurina, J. (2002), Credit risk in two institutional regimes: Spanish commercial and savings banks. Journal of Financial Services Research, 22(3), 203-224.