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Research Article

MACROECONOMIC AND STRUCTURAL DETERMINANTS OF NON-PERFORMING LOANS IN ASEAN+4

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ABSTRACT

Background: Non-performing loans (NPLs) are a critical indicator of banking sector fragility, reflecting deteriorating credit quality and posing systemic risks to financial stability. Despite extensive research in European and advanced economy contexts, empirical evidence on NPL determinants across the ASEAN+4 region remains limited, notwithstanding the region's deep economic interdependencies and recurring exposure to major global shocks.
Purpose: This study identifies and empirically analyses the macroeconomic and structural-institutional factors influencing NPL dynamics across ASEAN+4 economies over the period 2013 to 2023.
Design/Methodology/Approach: Static panel data analysis is employed across 10 economies, namely Indonesia, Malaysia, Thailand, Vietnam, the Philippines, Cambodia, China, Japan, South Korea, and India. Seven explanatory variables are examined: GDP growth, inflation, lending interest rate, unemployment rate, exchange rate, the Civil Justice Index from the World Justice Project, and a COVID-19 dummy variable. Model selection among Pooled Least Squares, Fixed Effect Model, and Random Effect Model was conducted via the Chow, Hausman, and Lagrange Multiplier tests, with the Random Effect Model selected as optimal. Data were sourced from CEIC Data, the World Bank World Development Indicators, and the World Justice Project, and processed using EViews 9.
Findings/Result: Unemployment rate and lending interest rate exert positive and statistically significant effects on NPL ratios at the 1% significance level, with coefficients of 0.524 and 0.288 respectively, confirming that deteriorating labour market conditions and higher borrowing costs erode borrowers' debt-servicing capacity. Inflation exhibits a negative and significant effect at the 5% level (coefficient: 0.159), consistent with the debt-deflation channel whereby moderate inflation reduces the real burden of outstanding obligations. GDP growth, exchange rate, the Civil Justice Index, and the COVID-19 dummy do not demonstrate statistically significant effects within this specification. The model is statistically significant overall (F-statistic p-value: 0.0005; R-squared: 0.220).
Conclusion: Labour market conditions and lending interest rates are the primary macroeconomic drivers of NPL accumulation across ASEAN+4 economies. Policymakers should prioritise employment-supportive measures and prudent interest rate management as pre-emptive credit risk containment tools. The non-significance of civil justice and pandemic variables suggests their effects may be mediated by country-level heterogeneity or require longer horizons to materialise.
Originality/Value: This study contributes to the literature in three ways: it provides rare panel econometric evidence on NPL determinants for the underrepresented ASEAN+4 region; it jointly models macroeconomic and structural-institutional variables within a unified framework; and it explicitly incorporates the COVID-19 shock, advancing understanding of pandemic-era credit risk dynamics in emerging economies.

ARTICLE INFO

Keywords:
non-performing loans, macroeconomic determinants, civil justice, panel data, ASEAN+4

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INTRODUCTION

Non-performing loans (NPLs), broadly defined as credit exposures in which borrowers have failed to meet repayment obligations for a period typically exceeding 90 days, represent one of the most critical indicators of banking sector fragility and macroeconomic vulnerability (Filip, 2014). Elevated NPL ratios constrain credit intermediation, erode bank profitability and capital adequacy, and at systemic levels may trigger broader financial crises (Berge and Boye, 2007; Ghosh, 2015). The recurring nature of global financial shocks, from the Asian financial crisis of 1997 and the Global Financial Crisis (GFC) of 2008 to the COVID-19 pandemic of 2020, has repeatedly exposed the sensitivity of banking systems to macroeconomic disruptions and their consequences for credit quality (Nkusu, 2011; Klein, 2013).

Globally, NPL ratios fluctuated from 6.68% in 2010 to a peak of 7.93% in 2017, before declining through 2023, with a transient resurgence in 2020 reflecting pandemic-induced economic dislocations (World Bank, 2025). These dynamics underscore a fundamental empirical regularity: NPL trajectories are deeply embedded in the macroeconomic and institutional environments in which banks operate (Figure 1). Macroeconomic conditions exert a direct and measurable impact on the credit portfolio quality of the banking sector (Mileris, 2013), a relationship clearly illustrated by concurrent trends in GDP growth, inflation, and lending interest rates over the 2010–2024 period. GDP, as the principal measure of macroeconomic output, captures the market value of all final goods and services produced within an economy over a given period (Karjavovich, 2022), while inflation and lending interest rates constitute essential signalling variables within the monetary policy frameworks of central banks (Amaefula, 2016). As depicted in Figure 2, GDP growth exhibited pronounced cyclical variation over this horizon: the aftershocks of the global financial crisis suppressed growth during 2010–2012, a partial recovery followed before moderating amid escalating international trade tensions, and the COVID-19 pandemic precipitated a dramatic contraction in 2020 succeeded by a vigorous rebound in 2021, though growth has since converged toward more subdued levels amid compounding global headwinds. Inflation and lending interest rates followed broadly parallel trajectories, both accelerating during the pandemic period before retreating, with inflation declining from 2022 and lending rates from 2023 respectively. Taken together with the NPL trends shown in Figure 1, these patterns confirm that credit risk accumulation in the banking sector is inextricably linked to the macroeconomic cycles embedded within the global financial system.

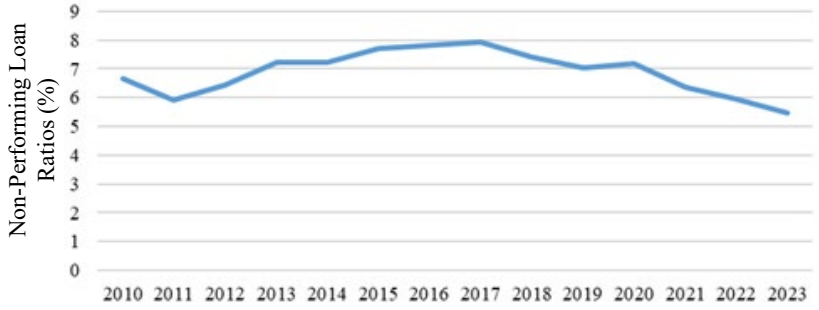

Figure 1. Evolution of Global Non-Performing Loan Ratios, 2010–2023

Figure 2. Evolution of Inflation, Lending Interest Rate, and GDP Growth, 2010–2024

The determinants of NPLs have been examined extensively in the literature, with particular emphasis on macroeconomic drivers. GDP growth is among the most consistently documented factors, with decelerating economic activity reducing borrower income and debt-servicing capacity, thereby elevating credit risk (Nkusu, 2011; Bofondi and Ropele, 2011; Klein, 2013). Inflationary pressures compound this effect by eroding real purchasing power and raising corporate operating costs (Espinoza and Prasad, 2010; Louzis et al. 2012; Makri et al. 2014). Rising lending rates mechanically increase debt-service burdens, amplifying default risk among both household and corporate borrowers (Keeton and Morris, 1987; Berge and Boye, 2007; Beck et al. 2015), while elevated unemployment further weakens households' capacity to honour financial obligations (Nkusu, 2011; Louzis et al. 2012). Beyond macroeconomic cyclical forces, a growing body of evidence highlights the role of structural and institutional factors. Berger and DeYoung (1997), through Granger-causality analysis on U.S. commercial banks, demonstrate that managerial inefficiency is a significant leading indicator of future NPL deterioration, the so-called "bad management" hypothesis, subsequently confirmed in the Greek banking context by Louzis et al. (2012) and in Spanish banks by Salas and Saurina (2002). At the institutional level, La Porta et al. (1997, 1998) establish that the quality of formal legal institutions and creditor rights protection are fundamental determinants of financial sector effectiveness, while Kritikou et al. (2021) specifically demonstrate that judicial inefficiency in contract enforcement is positively correlated with subsequent NPL ratios across EU member states. Djankov et al. (2007) and Calomiris et al. (2017) further confirm that robust collateral and creditor rights frameworks incentivise prudent lending behaviour and support portfolio quality.

Not with standing the breadth of this literature, three critical gaps remain unaddressed, each of which underscores the urgency of the present study. First, the overwhelming majority of empirical evidence is concentrated in European economies, particularly Eurozone and CESEE countries (Louzis et al. 2012; Klein, 2013; Makri et al. 2014), or in advanced economy case studies (Bofondi and Ropele, 2011; Ghosh, 2015; Aver, 2008), with the Asia-Pacific region remaining systematically underrepresented in the panel econometric literature. Second, while macroeconomic and institutional determinants have each been studied, their joint modelling within a unified empirical framework remains largely absent: macroeconomic studies rarely incorporate institutional dimensions (Beck et al. 2015; Nkusu, 2011), while institutional studies tend to operate in isolation from macroeconomic controls (Kritikou et al. 2021; La Porta et al. 1997). This separation is theoretically untenable, given that macroeconomic shock transmission to NPL ratios is itself conditioned by prevailing institutional quality. Third, and most critically, the ASEAN+4 region, comprising the ten ASEAN member states alongside China, Japan, South Korea, and India, constitutes an empirically compelling yet conspicuously neglected setting. The region combines extraordinary institutional and economic heterogeneity, ranging from high-income economies with sophisticated financial systems to lower-middle-income economies at earlier stages of financial development, and from common law to civil law legal traditions. Its member economies are simultaneously bound by deep economic interdependencies, such that financial instability in one state carries material contagion risk for the broader regional architecture. Critically, the region has been repeatedly exposed to major systemic shocks, namely the 1997 Asian crisis, the 2008 GFC, and the 2020 COVID-19 pandemic, each of which produced sharp NPL surges with severe consequences for regional financial stability. Despite this exposure, and despite the region's growing systemic importance to the global economy, rigorous panel econometric evidence on the joint macroeconomic and structural-institutional determinants of NPLs across ASEAN+4 remains absent from the literature. This gap is not merely academic: without a clear understanding of what drives NPL accumulation in this region, policymakers and macroprudential regulators lack the evidence base necessary to design targeted, pre-emptive interventions before the next major shock materialises.

Against this background, the present study pursues two objectives: (1) to identify the macroeconomic and structural-institutional factors that systematically influence NPL dynamics across ASEAN+4 economies; and (2) to empirically estimate the magnitude and direction of these effects using panel data methods. The findings aim to advance the empirical literature on credit risk in emerging and developing market contexts, while providing actionable guidance for regulators and policymakers operating in one of the world's most economically dynamic and systemically significant regions.

METHODS

This study employs NPL as the dependent variable. The independent variables encompass both macroeconomic and structural dimensions. The macroeconomic variables include GDP growth, inflation rate, lending interest rate, unemployment rate, and exchange rate. The structural variable is measured by the Rule of Law indicator: "Civil Justice is Effectively Enforced," which captures the operational effectiveness of the civil judiciary in providing legal certainty to creditors. Additionally, the model incorporates a COVID-19 dummy variable to capture the extraordinary pandemic-induced economic disruptions affecting NPLs during 2020–2023. Table 1 presents full variable definitions and data sources.

The data were processed using EViews 9. The panel dataset covers annual observations from 2013 to 2023 for ten countries: six ASEAN member states (Indonesia, Malaysia, Thailand, Vietnam, the Philippines, and Cambodia) and four strategic partner economies (China, Japan, South Korea, and India). Singapore, Laos, Myanmar, and Brunei Darussalam were excluded due to data incompleteness. The methodological approach integrates descriptive analysis, static panel data estimation, and a systematic literature review.

The descriptive analysis characterises the NPL distribution and underlying variable dynamics across ASEAN+4 countries over the eleven-year observation period, reporting key summary statistics including the mean, standard deviation, minimum, and maximum values for each variable. This preliminary analysis serves to assess data consistency and suitability prior to regression estimation, while providing contextual understanding of the macroeconomic and structural dynamics specific to each country during the sample period.

The static panel data analysis employs three estimation approaches: Pooled Least Squares (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). The optimal model is selected using the Chow Test, Hausman Test, and Lagrange Multiplier Test. The model specification, adapted from Lubis and Mulyana (2021), is as follows:

$$NPL_{it} = \beta 0 + \beta 1 GDPg_{it} + \beta 2 UNEM_{it} + \beta 3 INF_{it} + \beta 4 LIR_{it} + \beta 5 ER_{it} + \beta 6 CJI_{it} + \beta 7 COVID_{it} + \mu_{ij} + \varepsilon_t$$

where: NPL_{it} (Non-Performing Loan ratio for country i at time t); $GDPg_{it}$ (GDP Growth rate for country i at time t); INF_{it} (Inflation rate for country i at time t); $UNEM_{it}$ (Unemployment rate for country i at time t); LIR_{it} (Lending Interest Rate for country i at time t); ER_{it} (Exchange Rate (against USD) for country i at time t); CJI_{it} (Civil Justice Index for country i at time t); $COVID_{it}$ (COVID-19 dummy variable for country i at time t (1 for 2020–2023; 0 otherwise)); $\beta 0$–$\beta 7$ (Regression slope coefficients); μ_{ij} (Cross-sectional error term); ε_t (Time-series error term).

Table 1. Variable definitions and data sources

Variable	Unit	Data Source	Literature Source
Non-Performing Loans (NPL)	Percent	CEIC Data	Shala et al. (2022)
GDP Growth (GDPg)	Percent	World Bank (WDI)	Shala et al. (2022)
Inflation (INF)	Percent	World Bank (WDI)	Shala et al. (2022)
Lending Interest Rate (LIR)	Percent	World Bank (WDI)	Beck et al. (2013)
Unemployment Rate (UNEM)	Percent	CEIC Data	Shala et al. (2022)
Exchange Rate (ER)	USD	World Bank (WDI)	Beck et al. (2013)
Civil Justice Index (CJI)	Index	WJP Rule of Law	—
COVID-19 Dummy	Binary (0/1)	—	Plikas et al. (2024)

RESULTS

Overview of Non-Performing Loans in ASEAN+4

The trajectory of Non-Performing Loans across the ASEAN+4 region exhibits considerable complexity over the past decade, reflecting the interplay of evolving global and domestic macroeconomic conditions. ASEAN member states Indonesia, Malaysia, Thailand, Cambodia, the Philippines, and Vietnam alongside the four strategic partner economies of China, Japan, South Korea, and India, are heavily reliant on bank-based financial intermediation. Consequently, movements in NPL ratios serve as critical indicators of financial system stability in these economies.

Elevated NPL ratios constrain bank profitability, increase capital adequacy pressures, and restrict credit supply (Messai and Jouini, 2013). In an economically integrated region such as ASEAN+4, a deterioration in NPLs in one country can suppress investor confidence and cross-border investment flows. This negative feedback loop ultimately impedes regional economic growth a dynamic documented in the European Union context by Berti et al. (2017), who showed that member states with high NPL ratios experienced investment and credit growth significantly below regional averages, thereby retarding aggregate economic recovery.

Figure 3 illustrates the pronounced cross-country variation in NPL ratios within ASEAN+4, driven substantially by differences in economic development levels. Developing economies, including Indonesia, India, and Vietnam, consistently register higher NPL ratios than advanced counterparts such as Japan and South Korea. India experienced the most dramatic NPL escalation during 2014–2017, with the ratio rising from 4.27% to a regional peak of 11.18% before gradually declining thereafter. Cambodia and Vietnam displayed rising NPL trends by end-2023, with Cambodia reaching 5.39% and Vietnam approximately 4.5%. The Philippines experienced a steady increase from 2019, culminating in a peak of 3.97% in 2021.

By contrast, China, South Korea, and Japan maintained relatively low and stable NPL ratios in the 1–2% range throughout the entire 2013–2023 period. Malaysia, Thailand, and Indonesia exhibited more moderate fluctuations within the 2–4% range, recording modest pandemic-related upticks in 2020 that subsequently reversed. These divergent patterns suggest that country-specific credit restructuring policies and the institutional strength of individual banking systems generate materially different degrees of NPL volatility.

Macroeconomic and Structural Landscape of ASEAN+4

Macroeconomics provides the analytical framework for understanding and interpreting aggregate economic activity and its implications for welfare and growth (Goodwin et al. 2018). Key macroeconomic variables including economic growth, inflation, unemployment, monetary and fiscal policies, and the trade balance exhibit considerable cross-country variation within ASEAN+4 (Indonesia, Thailand, Malaysia, the Philippines, Vietnam, Cambodia, China, Japan, South Korea, and India), where structural differences, development stages, and government policy orientations generate distinct macroeconomic dynamics in each jurisdiction.

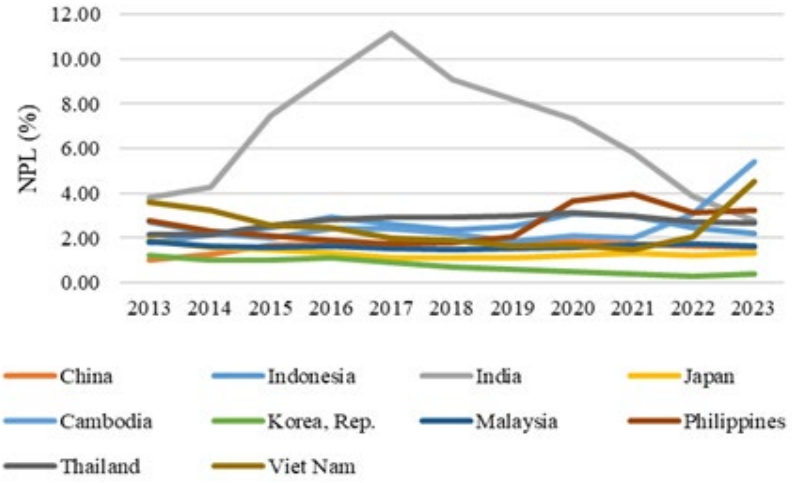

Figure 3. Evolution of Non-Performing Loan Ratios across ASEAN+4, 2013–2023

Figure 4 illustrates the heterogeneity in GDP growth trajectories. In the pre-pandemic era, China and India consistently recorded high growth rates averaging above 6%, while Japan and Thailand expanded at a considerably slower pace. In 2020, the pandemic severely disrupted economic activity across virtually all regional economies, with the Philippines (−9.52%) and Thailand (−6.0%) experiencing the deepest contractions. A vigorous recovery followed in 2021–2022, particularly pronounced in China (8.45%) and India (9.69%).

Inflation dynamics also diverge significantly between advanced and developing economies (Figure 5). India experienced elevated inflation of 10.02% in 2013, while Japan encountered deflation in 2016 (−0.13%) and 2020 (−0.02%). Inflationary pressures surged across the region in 2022, driven by post-pandemic global supply chain disruptions and commodity price shocks arising from geopolitical conflict. These patterns suggest that while inflation is a fundamentally global phenomenon, its manifestations are unequal across countries: developing economies tend to exhibit greater vulnerability to external price shocks than advanced economies, though the pandemic and geopolitical upheaval demonstrated that even advanced economies are not immune when supply disruptions are sufficiently severe.

Elevated unemployment signals an economy's inability to absorb labour supply, with attendant consequences for poverty and social stability. Unemployment rates across ASEAN+4 reflect diverse labour market structures and resilience capacities (Figure 6). Cambodia and Thailand consistently recorded the lowest unemployment rates, remaining below 1.5% throughout the sample period, owing to labour-intensive employment programmes and buoyant pre-pandemic tourism sectors. In India, the unemployment rate peaked at 7.86% in 2020, a consequence of persistent mismatches between the pace of formal job creation and labour force growth, as well as structural skills gaps. Malaysia experienced a rise in unemployment to 4.64% in 2021, reflecting its dependence on export-oriented manufacturing and the collapse of inbound tourism during the pandemic.

Cross-country variation in lending interest rates within ASEAN+4 reflects fundamental differences in economic conditions, development levels, and monetary policy strategies (Figure 7). Japan's ultra-low interest rate regime maintained below 1% throughout 2013–2023 represents a cornerstone of the Abenomics framework and the Bank of Japan's decades-long effort to overcome deflationary pressures. At the opposite extreme, developing economies such as Cambodia and Indonesia recorded the highest lending rates in the sample, peaking at 12.3% in 2014 and 12.6% in 2016, respectively. These elevated rates reflect inflationary pressures, risk premiums required to attract foreign capital, and exchange rate stabilisation objectives. During the pandemic, many regional central banks implemented aggressive rate cuts to stimulate recovery, though the effectiveness of these measures varied markedly: in Japan and South Korea, pre-existing liquidity trap dynamics limited transmission. Post-pandemic, central banks across the region faced a classic growth-inflation trade-off, with commodity-driven price pressures and the risks associated with prolonged low rates including asset price bubbles necessitating policy normalisation.

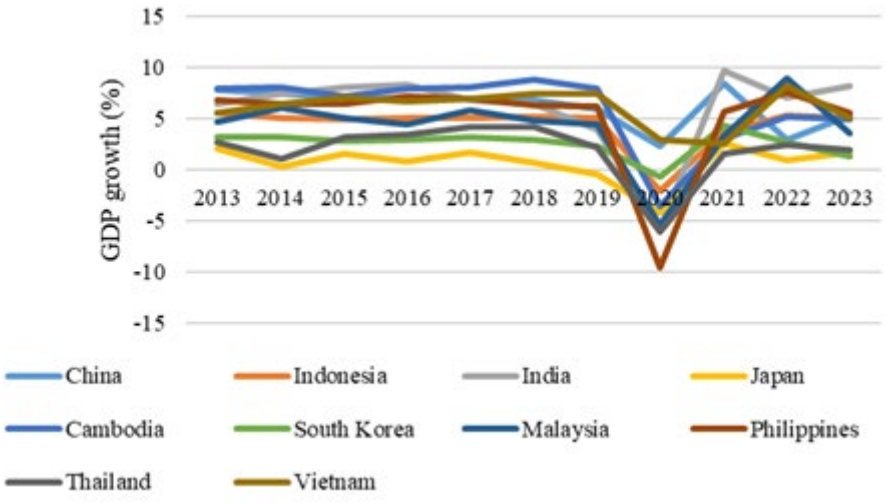

Figure 4. GDP Growth Rates across ASEAN+4, 2013–2023

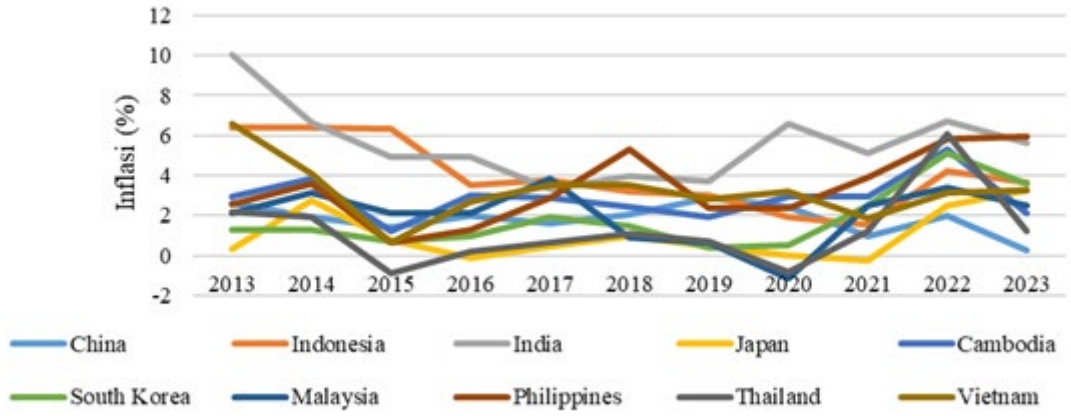

Figure 5. Inflation Rates across ASEAN+4, 2013–2023

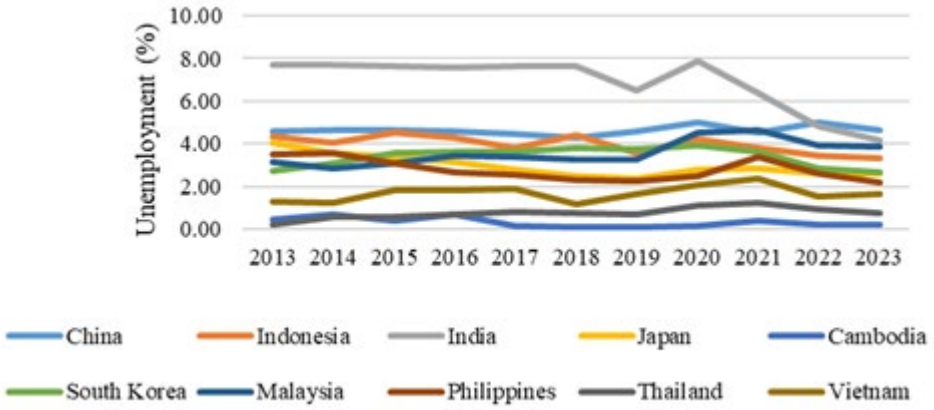

Figure 6. Unemployment Rates across ASEAN+4, 2013–2023

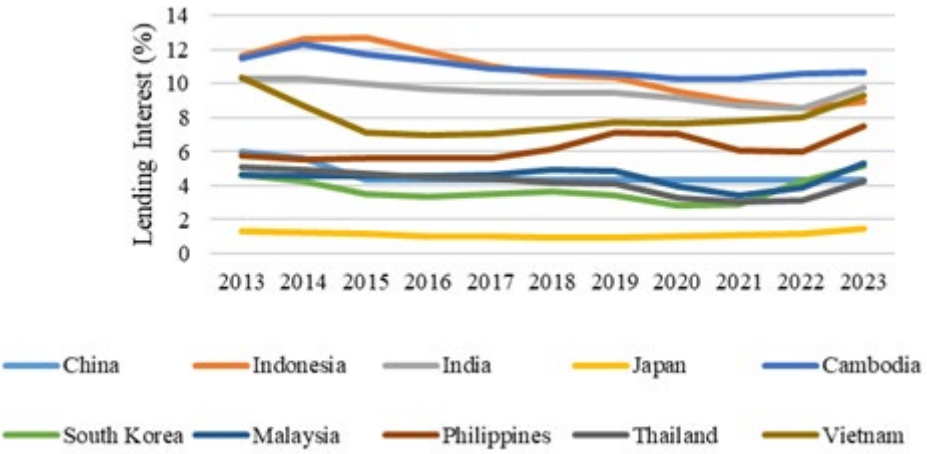

Figure 7. Lending Interest Rates across ASEAN+4, 2013–2023

Exchange rate dynamics across ASEAN+4 reflect a complex and heterogeneous pattern of currency pressures (Figure 8). The Indonesian rupiah and Indian rupee experienced significant depreciation over the sample period: the rupiah weakened from IDR 10,461/USD in 2013 to IDR 15,237/USD in 2023, while the Indian rupee depreciated from INR 58.60/USD to INR 82.60/USD over the same interval. These depreciations are attributable to multiple structural vulnerabilities: persistent current account deficits, heavy commodity import dependence, volatile capital flows, and interest rate differentials relative to advanced economies. In stark contrast, the Japanese yen appreciated from JPY 97.60/USD to JPY 140.49/USD, a paradox reflecting its safe-haven currency status during periods of global stress, Japan's substantial current account surpluses, the Bank of Japan's ultra-accommodative monetary policy, and sustained yen demand as a carry trade

funding currency. Regional exchange rate dynamics are further shaped by post-pandemic global supply chain restructuring, aggressive US monetary policy tightening, shifts in investor preferences toward and away from emerging market assets, and deepening intra-regional trade linkages.

The civil justice index reveals substantial institutional heterogeneity across ASEAN+4 (Figure 9). Japan and South Korea stand as regional frontrunners in judicial effectiveness, achieving peak scores of 0.87 (Japan, 2016) and 0.89 (South Korea, 2015), respectively. These outcomes reflect four key institutional pillars: fully independent and professionalised judiciaries, transparent and predictable legal procedures, accessible court costs, and expeditious case resolution. At the other end of the spectrum, Cambodia and Thailand recorded the lowest civil justice scores, with minima of 0.05 (Cambodia, 2016) and 0.12 (Thailand, 2014), reflecting distinct but serious institutional deficiencies. In Cambodia's case, judicial capture by political elites, pervasive corruption in the legal apparatus, and minimal procedural transparency account for the sharp decline in scores. Thailand's performance reflects the post-2014 coup militarisation of the judiciary and a structural legal dualism that has undermined civil justice delivery.

Across both macroeconomic and structural dimensions, the ASEAN+4 region presents a spectrum of institutional and economic conditions. Countries such as Indonesia, the Philippines, and Cambodia continue to confront persistent structural challenges, including high dependence on informal economic activity, elevated exchange rate volatility, and deficiencies in civil justice enforcement.

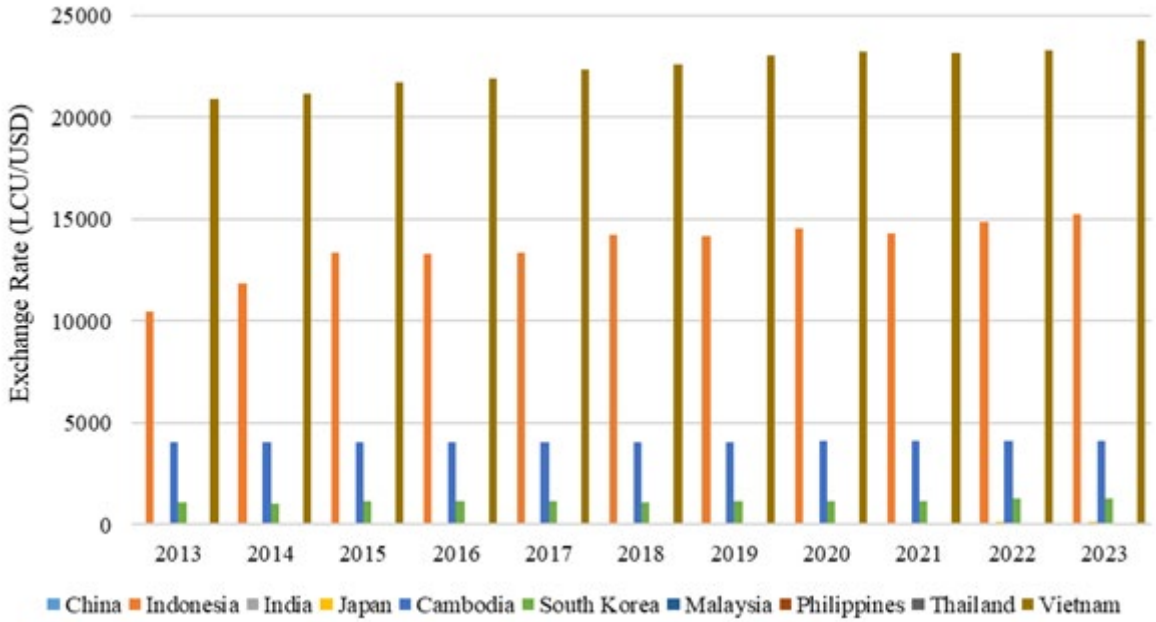

Figure 8. Exchange Rate Dynamics across ASEAN+4, 2013–2023

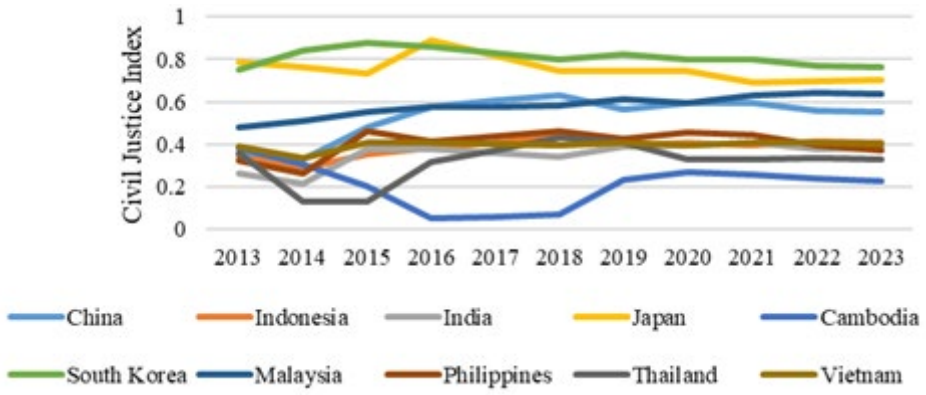

Figure 9. Civil Justice Index across ASEAN+4, 2013–2023

Descriptive Statistics

Aggregate descriptive statistics are presented in Table 2. The dependent variable, NPL, has a mean of 2.48%, a standard deviation of 1.82, and a range from 0.30% (minimum) to 11.18% (maximum), indicating substantial cross-country variability within the ASEAN+4 region.

Panel Data Estimation and Model Selection

Static panel data regression was conducted using PLS, FEM, and REM approaches to examine the relationships among macroeconomic conditions, structural factors, and NPLs. Model selection employed the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test in sequence.

The Hausman Test yielded a p-value of 0.0704, which exceeds the conventional 5% significance threshold. This result indicates insufficient evidence to reject the null hypothesis of REM efficiency relative to FEM. To further validate the superiority of REM over PLS, the Lagrange Multiplier Test was applied. The LM Test returned a p-value of 0.0000 well below the 5% significance level confirming that the Random Effect Model is the appropriate estimator for this analysis, as it effectively captures unobserved country-level heterogeneity that cannot be accounted for by a pooled OLS specification.

Interpretation of Estimation Results

Table 3 presents the Random Effect Model (REM) estimates. Inflation exhibits a statistically significant negative relationship with NPLs at the 5% significance level, with a coefficient of −0.158. This result implies that a one percentage point increase in inflation reduces the NPL ratio by approximately 0.158 percentage points, ceteris paribus. This finding aligns with Shala et al. (2022), who documented a negative inflation-NPL relationship. Louzis et al. (2012) provide the theoretical rationale: moderate inflation erodes the real value of outstanding debt obligations, effectively lightening the repayment burden on borrowers and thereby reducing default risk. Nonetheless, the inflation-NPL relationship may be state-dependent, varying with the prevailing macroeconomic stability conditions of individual countries.

Table 2. Descriptive statistics of NPL and independent variables

Variable	Mean	Maximum	Minimum	Std. Dev.
NPL	2.48	11.18	0.30	1.82
GDPg	4.27	9.68	−9.51	3.44
INF	2.69	10.01	−1.13	1.97
UNEM	3.10	7.85	0.11	1.90
LIR	6.34	12.66	0.95	3.23
ER	4,158.97	23,787.32	3.15	7,366.82
CJI	0.47	0.89	0.05	0.19
COVID	0.28	1.00	0.00	0.45

Table 3. Macroeconomic and Structural Determinants of NPLs in ASEAN+4, 2013–2023

Variable	Coefficient	Probability
GDPg	−0.016961	0.6388
INF	−0.158921**	0.0251
UNEM	0.524110***	0.0001
LIR	0.287575***	0.0096
ER	−1.30E–05	0.7882
CJI	0.409263	0.7473
COVID	0.053420	0.8295
R-squared	0.220024	
Prob (F-statistic)	0.000514	

Note: *), **), ***) denote statistical significance at the 10%, 5%, and 1% levels, respectively. Dependent variable: Non-Performing Loans (NPL).

The unemployment rate exerts a statistically significant positive effect on NPLs at the 1% significance level, with a coefficient of 0.524. This estimate implies that a one percentage point increase in the unemployment rate is associated with a 0.524 percentage point increase in the NPL ratio, ceteris paribus. This finding confirms the intuitive mechanism whereby rising unemployment reduces household income and debt-servicing capacity, elevating the probability of loan default. Nkusu (2011) identified the unemployment rate as one of the primary macroeconomic determinants of NPL dynamics across diverse country samples.

The lending interest rate also exhibits a statistically significant positive effect on NPLs at the 1% significance level, with a coefficient of 0.287. This result indicates that a one percentage point increase in the lending interest rate raises the NPL ratio by approximately 0.287 percentage points, ceteris paribus. Higher interest rates increase debt service obligations, progressively eroding borrowers' capacity to make timely repayments. Klein (2013) demonstrated that interest rate increases tend to deteriorate bank loan portfolio quality, particularly in economies with underdeveloped banking systems or where a large share of loans carry variable interest rate terms.

The remaining variables, GDP growth, exchange rate, civil justice index, and the COVID-19 dummy, do not exhibit statistically significant effects on NPLs within this model specification. While the COVID-19 dummy and civil justice index display positive coefficient signs consistent with theoretical expectations, their lack of statistical significance may reflect the model's limited power given the sample size, or the possibility that these effects operate through intermediate channels (e.g., GDP growth or unemployment) already captured by other regressors.

CONCLUSION AND RECOMMENDATIONS

Conclusions

Based on the empirical results obtained from the Random Effect Model (REM) estimation, three of the seven independent variables demonstrate statistically significant effects on Non-Performing Loans (NPLs) in the ASEAN+4 region during 2013–2023. The unemployment rate exerts a significant positive effect, indicating that increases in labour market slack directly amplify NPL ratios by diminishing household debt-servicing capacity. Inflation displays a significant negative effect, suggesting that moderate price increases reduce the real debt burden on borrowers, thereby dampening default risk. The lending interest rate likewise produces a significant positive effect, confirming that higher credit costs erode borrower repayment capacity and escalate non-performing loan incidence. By contrast, GDP growth, the exchange rate, the Civil Justice Index, and the COVID-19 dummy variable do not yield statistically significant effects on NPLs in the present model.

Recommendations

Policymakers should prioritise labour market interventions that expand formal employment opportunities, particularly in developing ASEAN+4 economies where unemployment risk is most acute. Complementary monetary and macroprudential policies aimed at maintaining price stability and moderating lending interest rates would further support borrower solvency and constrain NPL accumulation; (ii) Future research should extend the country sample and incorporate additional explanatory variables including bank-specific factors (capital adequacy, return on assets) and additional institutional quality indicators to enhance the explanatory power and generalisability of NPL determinant models for the ASEAN+4 region.

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