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How do financial systems influence the determinants of credit growth? New evidence from the Southeast Asian banking sector

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ABSTRACT

This paper investigates the determinants of bank credit growth in Southeast Asia using panel data from 185 banks across ten countries between 2000 and 2022. Employing fixed-effects models with two-way clustering and robustness checks via GMM, Prais-Winsten, and Newey–West estimators, our study finds that credit risk, bank size, cost-to-income ratio, and inflation significantly constrain credit growth, while the loan-to-deposit ratio, profitability, income diversification, liquidity, and macroeconomic conditions such as money supply and GDP growth promote credit growth. Notably, the COVID-19 pandemic had a substantial negative impact on credit expansion, in contrast to the global financial crisis, which saw a resilient credit supply in the region. Furthermore, in bank-based systems, credit growth is more sensitive to internal bank conditions, especially non-performing loans and profitability—reflecting heavy reliance on traditional intermediation. Conversely, in market-based systems, variables like money supply growth and operational efficiency play a greater role, and the effect of bank-level profitability on credit is reversed. The asymmetric responses to inflation and crisis shocks across systems further underscore the importance of institutional context. These findings provide a more detailed understanding of credit dynamics in ASEAN and offer valuable insights for designing differentiated regulatory and monetary policies.

Contribution/ Originality: This study offers original insights into credit growth in Southeast Asia by examining the role of financial system structures and macroeconomic shocks, particularly the COVID-19 pandemic. Utilizing a comprehensive dataset from 2000 to 2022, it highlights how bank-based and market-based systems respond differently to various determinants, providing policy-relevant findings.

1. INTRODUCTION

The banking sector serves as the backbone of economic development by providing a vital conduit through which financial resources are mobilized and allocated across the economy. In emerging and developing economies, particularly within the ASEAN region, banks are the principal providers of credit to businesses and households. Their role in ensuring financial intermediation, implementing monetary policy, and enhancing financial stability is well established (Casu, Girardone, & Monyneux, 2006; Cetorelli & Goldberg, 2012). Yet, this critical sector is also a potential source of macroeconomic vulnerability, as demonstrated by the global financial crisis of 2007–2009, which underscored the importance of prudent credit expansion and effective risk management (Adrian & Shin, 2010; Ho, Huang, Lin, & Yen, 2016).

Credit growth, which refers to the increase in the total amount of bank lending, plays a crucial role as an indicator of both the banking sector's health and the overall economy. It is typically linked to key economic factors such as investment, consumption, and GDP growth (Bernanke & Blinder, 1988; Spatafora & Luca, 2012). However, when credit growth becomes excessive or poorly managed, it can lead to financial instability, contribute to asset bubbles, and potentially provoke banking crises (Gourinchas & Obstfeld, 2012; Keeton, 1999; Lane & McQuade, 2014). In the ASEAN region, where economic integration is increasing through initiatives such as the ASEAN Financial Integration Framework (AFIF) and the ASEAN Banking Integration Framework (ABIF), it is essential to better understand what drives credit growth.

Since the early 2000s, many ASEAN countries have seen a rapid rise in credit growth, often outpacing GDP growth. For instance, data from the World Bank (2022) shows that by 2020, countries like Thailand, Vietnam, Malaysia, and Singapore had credit to the private sector surpassing 100% of GDP. While this growth signals a more robust financial sector and greater financial inclusion, it also raises concerns about the quality of credit and potential systemic risks. Studies by Foos, Norden, and Weber (2010) and Thiagarajan, Ayyappan, and Ramachandran (2011) highlight that rapid credit expansion is often linked to higher credit risk and increased loan defaults, particularly in environments with weak regulatory oversight. Furthermore, the COVID-19 pandemic created a global economic shock that affected ASEAN economies. It disrupted supply chains, reduced production, and severely impacted both household consumption and business investment, leading to a decrease in bank lending due to both demand and supply constraints (Colak & Öztekin, 2021). For example, in Vietnam, credit growth slowed from 12.14% in 2019 to 10.14% in 2020, reflecting a combination of reduced borrower capacity and more cautious lending by banks (Banking Academy of Vietnam, 2020). At the same time, non-performing loans surged due to deteriorating business cash flows and rising unemployment, threatening the solvency of banks and the stability of the financial system (Le, Nguyen, Vu, Do, & Tran, 2022). These developments necessitate a more nuanced exploration of the determinants of credit growth in ASEAN banks, particularly in the post-pandemic context. In addition, despite a growing body of literature exploring the determinants of credit growth, most existing studies treat the banking sector as a homogeneous entity, overlooking the structural diversity in national financial systems (Chaibi & Ftiti, 2015). This simplification limits the analytical depth, particularly in regions like ASEAN, where financial systems differ substantially across countries. While some economies operate predominantly under bank-based systems, where banks are the primary source of capital, others rely more heavily on market-based systems with well-developed equity and bond markets. These financial system structural differences can fundamentally alter the channels through which macroeconomic conditions and bank-specific factors affect credit expansion.

This paper contributes to the literature in several ways. First, it enhances the empirical understanding of credit growth by employing a comprehensive panel dataset of 185 banks from ten Southeast Asian countries spanning the period 2000–2022, thereby capturing crisis-related shocks. Second, it investigates the effects of determinants on the credit growth of banks in Southeast Asia within the context of different financial systems, including bank-based and market-based systems, which facilitates a more comprehensive assessment of how financial systems moderate the relationship between bank-specific and macroeconomic factors and credit growth. Finally, by incorporating the differential impacts of the Global Financial Crisis and the COVID-19 pandemic, the study offers new insights into the resilience and adaptability of Southeast Asian banking systems under varying external shocks. Additionally, the study highlights the significant role that financial system structures play in shaping the responsiveness of credit growth to macroeconomic and internal bank factors, providing deeper insights into how these systems adapt to crisis conditions. The findings also contribute to the development of differentiated regulatory and monetary policy recommendations tailored to the specific characteristics of bank-based versus market-based systems. Collectively, these contributions provide a more detailed and policy-relevant understanding of credit growth dynamics in one of the world's most economically vibrant regions. Our findings are robust across various model specifications and tests.

The rest of this paper is structured as follows: Section 2 reviews the relevant literature. Section 3 presents research methodology and data sources. Section 4 discusses empirical findings, while Section 5 concludes our study.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Non-Performing Loans (NPL)

An increasing body of literature suggests that non-performing loans (NPLs) exert a negative influence on bank credit growth. According to Peek and Rosengren (1995), when banks accumulate high levels of bad debt, their capital adequacy deteriorates, leading to reduced lending capacity a phenomenon known as the "credit crunch." Tölö and Virén (2021) validated this inverse relationship in a cross-country European context, highlighting that elevated NPL ratios increase capital costs, lower net interest margins, and reduce investor confidence, thus constraining credit supply. Similar evidence from Italy (Accornero, Alessandri, Carpinelli, & Sorrentino, 2017) and Mongolia (Chun & Ardaaragchaa, 2024) supports the notion that higher NPLs intensify provisioning requirements, heighten funding costs, and ultimately curb banks' ability to extend new loans.

On the contrary, during short-run economic adjustments or post-crisis recovery periods, the immediate impact of NPLs on lending may be muted. Ashikuzzaman (2022) found that, in the Bangladeshi context, the influence of NPLs on credit growth was statistically insignificant in the short term. This delay in impact is attributable to the time lag between loan default recognition and accounting treatment, as well as to managerial concerns about maintaining reputational stability in competitive banking environments. Therefore, despite long-term deterioration, short-term resilience in credit supply may mask the adverse effects of rising NPLs.

Hypothesis 1 (H_1): Non-performing loans have a negative impact on credit growth in the ASEAN banking sector.

2.2. Bank Size (Size)

Numerous studies advocate that larger banks tend to achieve higher credit growth due to better diversification and risk-sharing mechanisms. Strahan and Weston (1998) showed that large banks are more capable of diversifying credit across industries and geographies, leading to more efficient risk management and increased lending capacity. Bashir (2003) and Constant and Ngomsi (2012) corroborated this positive relationship, arguing that large banks benefit from economies of scale, better technological infrastructure, and stronger capital bases all of which facilitate credit expansion. Cole, Goldberg, and White (2004) further emphasized that large enterprises often prefer large banks due to their lending capacity, contributing to overall credit growth.

Nonetheless, some scholars highlight the negative consequences of bank size on credit distribution, particularly for smaller borrowers. Ibrahim (2016) found that small banks, owing to their proximity to local clients and better soft-information acquisition, may lend more actively during economic fluctuations. Larger banks, in contrast, often favor non-intermediation businesses or risk-averse strategies, thus decelerating loan growth. The complexity of large institutions may also result in bureaucratic inertia and stricter lending criteria.

In the ASEAN context, larger banks have demonstrated more stable and sustained credit expansion due to better access to wholesale funding, broader geographic diversification, and enhanced technological capabilities. These banks can better absorb macroeconomic shocks and exploit cross-border opportunities under frameworks like ABIF. Thus, the hypothesis that bank size contributes positively to credit growth is particularly relevant in ASEAN's increasingly integrated financial landscape.

Hypothesis 2 (H_2): Bank size has a positive effect on credit growth.

2.3. Loan-to-Deposit Ratio (LDR)

The loan-to-deposit ratio (LDR) is often used as an indicator of how efficiently a bank utilizes its liquidity and allocates its deposits for lending purposes. When the LDR is higher, it typically signals a more aggressive lending strategy, where banks are effectively converting deposits into loans that generate income. Nugraha, Yahya, Nariswari,

and Salsabila (2021) highlight a strong positive relationship between a high LDR and credit growth, suggesting that banks are able to turn deposited funds into loans, thereby driving economic activity and building stronger relationships with borrowers.

However, while a higher LDR may be beneficial in terms of expanding credit, it can also present liquidity challenges if taken to extreme levels. Chun and Ardaaragchaa (2024) argue that a more moderate LDR can actually support sustainable credit growth by maintaining sufficient liquidity buffers, which enhance the stability of bank funding. This enables banks to remain flexible during market disruptions and be less vulnerable to unexpected withdrawals. On the other hand, when the LDR surpasses certain thresholds, banks may face regulatory scrutiny or encounter limitations in accessing funding, which could constrain their ability to extend new loans.

In the ASEAN region, where banking systems are heavily reliant on customer deposits, the loan-to-deposit ratio (LDR) plays a significant role in determining credit expansion. In countries like Thailand and Vietnam, a higher LDR often signals a proactive approach by banks in deploying loans to productive sectors such as manufacturing and real estate. Although an excessively high LDR can raise prudential concerns, within an optimal range, it supports efficient credit delivery, especially in economies where banking is more deposit-driven. This supports the hypothesis for the region:

Hypothesis 3 (H_3): The loan-to-deposit ratio (LDR) has a positive effect on credit growth.

2.4. Equity to Total Assets Ratio (Capital)

A high equity-to-assets ratio is often interpreted as an indicator of a bank's strong internal capitalization and financial stability, which in turn enhances its capacity to extend credit. Bernanke, Lown, and Friedman (1991) explain that banks with a higher proportion of equity relative to total assets are better equipped to absorb losses, comply with regulatory requirements, and maintain investor confidence, especially during periods of economic stress. This equity buffer allows banks to continue lending even when access to external capital becomes limited. Gambacorta and Mistrulli (2004) further affirm this perspective, noting that well-capitalized banks have a greater ability to meet regulatory capital thresholds and are more resilient to sudden liquidity shocks, which supports higher levels of credit expansion. Thus, banks with substantial equity not only benefit from increased financial safety but are also better positioned to take advantage of lending opportunities.

However, an increasing equity-to-assets ratio could also suggest an excess of capital, which may reflect a more cautious or risk-averse approach. Bridges et al. (2014) point out that when banks are pressured by regulatory or market forces to maintain high levels of equity, they may respond by contracting their balance sheets, often by limiting the supply of credit. An overly high equity ratio might be seen as a sign of conservatism, especially in uncertain market conditions where the focus shifts towards preserving capital rather than expanding lending. In such situations, even banks with solid financial standing may hesitate to engage in aggressive lending, which could slow down credit growth. Additionally, in environments with volatile economic conditions, banks may be reluctant to extend credit due to the lower risk-adjusted returns on loans.

Furthermore, the effect of the equity-to-assets ratio on credit growth is context-dependent. Bridges et al. (2014) observed that the short-term effects of increased equity requirements tend to be contractionary, but credit supply can rebound over time as banks regain balance sheet strength and market confidence. In periods of synchronized capital buildup across the banking system, adverse signaling effects are muted, potentially facilitating a faster recovery in lending activity. Hence, while the long-term effect of equity accumulation is generally positive, short-term adjustments may involve transitional reductions in credit growth.

Many ASEAN countries, including Malaysia and the Philippines, have strengthened their banking systems' capital base through regulatory reforms following the Asian and global financial crises. Additionally, in emerging markets where external financing is volatile, internally funded equity supports lending continuity, lending credence to this hypothesis.

Hypothesis 4 (H_4): The equity-to-total assets ratio has a positive effect on credit growth.

2.5. Bank Profitability (ROA)

Profitability, often measured by return on assets (ROA), is widely considered a driver of bank credit expansion. Igan and Pinheiro (2011) argued that profitable banks generate higher internal funds, which can be redeployed into lending activities. High ROA also reflects efficient management, reduced risk aversion, and stronger competitive positioning, all of which contribute to expanded credit supply. In support, Osei-Tutu and Weill (2022) showed that more efficient banks tend to offer lower lending rates and have better credit screening, which enhances both credit supply and access.

Conversely, Al-Khouri and Arouri (2016) documented a negative association between profitability and credit growth in Gulf Cooperation Council (GCC) countries. In these markets, banks often rely on non-interest incomes such as fees and financial investments rather than traditional lending. As such, rising profitability may stem from non-lending activities, leading banks to reduce risk exposure through loans. This substitution effect results in a reduction in credit expansion as banks prioritize more profitable but less risky sources of revenue.

In ASEAN contexts, Nguyen and Le (2022) highlighted a bidirectional relationship between profitability and credit growth. Efficient banks may lend more, and growing credit portfolios may simultaneously enhance profitability. The existence of such mutual reinforcement suggests that the relationship is dynamic and conditional on internal strategy and market environment.

Hypothesis 5 (H_5): Bank profitability positively affects credit growth.

2.6. Cost-to-Income Ratio (CIR)

The cost-to-income ratio (CIR) serves as a proxy for operational efficiency. Ivanović (2016) found that banks with lower CIRs tend to exhibit higher credit growth. Efficient banks can operate at lower costs, allowing for reduced lending rates and increased financial intermediation. These banks also have stronger cost management, which enables them to offer competitive credit packages and absorb risks associated with loan expansion. As such, CIR is inversely related to banks' ability to issue credit.

However, elevated CIRs may reflect inefficiencies in operations, suggesting reduced capability for resource reallocation and risk management. A high CIR may indicate that a bank is diverting considerable resources to non-productive activities, which constrains its ability to extend new loans. From a prudential standpoint, regulators may view high CIRs as red flags, leading to tighter oversight and capital constraints, which can further reduce credit supply.

While most empirical findings support an inverse relationship between CIR and credit growth, contextual factors such as scale of operations, technology investment, and local banking structure can obscure direct causality. In some cases, temporary cost increases due to strategic investments may coexist with rising credit, suggesting that the CIR's predictive power may be stronger in the long run.

Hypothesis 6 (H_6): The cost-to-income ratio negatively affects credit growth.

2.7. Income Diversification (IDIV)

Diversified income streams enable banks to reduce reliance on traditional interest income, thereby facilitating more flexible credit policies. Abedifar, Molyneux, and Tarazi (2018) found that non-interest income derived from activities such as insurance, asset management, and brokerage improves risk absorption and enhances information acquisition. Banks with higher diversification can offer loans at more competitive rates and develop stronger client relationships, which in turn support credit expansion.

In the context of the "charter value" hypothesis (Marcus, 1984), income diversification increases bank franchise value and decreases the likelihood of excessive risk-taking. Abedifar et al. (2018) argue that diversified banks are more

prudent and better capitalized, leading to better-quality credit growth. This view is echoed by Lin, Chung, Hsieh, and Wu (2012), who highlights that banks with multiple income channels can afford to offer credit at lower margins without compromising profitability.

Hypothesis 7 (H_7): Income diversification positively influences credit growth.

2.8. Bank Liquidity (Liquidity)

Bank liquidity, commonly measured by liquid assets relative to total assets, plays a pivotal role in determining a bank's ability to support credit growth. Cornett, McNutt, Strahan, and Tehranian (2011) demonstrate that during periods of financial stress, such as the 2007–2009 crisis, banks with higher liquidity were more capable of meeting credit commitments and sustaining loan growth. Liquidity cushions enable banks to respond flexibly to sudden withdrawal demands while simultaneously continuing to supply credit to the private sector. Similarly, Kim and Sohn (2017) provide evidence that liquidity-rich banks, especially large institutions, are more confident in expanding lending due to stronger buffers against potential funding shocks.

However, the risk-absorption perspective also highlights a trade-off: holding excessive liquid assets may reduce the incentives for lending. Berger and Bouwman (2009) argue that maintaining large liquidity reserves can result in "credit hoarding," especially in low-interest environments. During the post-2008 crisis, some European banks prioritized holding government securities and safe, liquid assets over private sector lending. This conservative allocation reduced the scale of risky loan portfolios, leading to stagnation in credit growth. As noted by Naceur, Marton, and Roulet (2018), stringent liquidity requirements under Basel III may unintentionally constrain loan expansion by tying up funds in non-productive assets.

Nonetheless, the relationship between liquidity and credit growth remains ambiguous in some contexts. Lei and Song (2013) contend that higher liquidity may enhance banks' ability to underwrite riskier loans due to greater loss-absorption capacity. In contrast, Naceur et al. (2018) demonstrate that the credit impact of liquidity buffers depends on market structure and regulatory regimes. In developing markets, liquidity may enhance lending confidence, whereas in more regulated systems, it may act as a constraint. Therefore, the influence of liquidity on credit growth may vary across bank size, country, and economic cycle.

Hypothesis 8 (H_8): Bank liquidity has a mixed effect on credit growth, with positive impacts under stability and negative effects under excessive prudence or regulatory rigidity.

2.9. Growth in Broad Money Supply (M2Growth)

An increase in the broad money supply (M2) is often associated with expanded credit availability in the banking sector. Akani and Onyema (2017) posit that when central banks implement accommodative monetary policies and expand the monetary base, commercial banks experience higher liquidity and greater capacity to lend. Dharmadasa (2021) reinforces this finding by arguing that increased M2 enhances deposit growth, which banks can transform into credit for businesses and households. Accordingly, money supply growth indirectly fuels investment and consumption by lowering borrowing constraints.

Nonetheless, rapid and uncontrolled M2 growth may induce inflationary pressures that undermine real credit expansion. Assefa (2014), using long-run data from Ethiopia, showed that aggressive monetary expansion can lead to high inflation, eroding the real value of bank assets and deposits. Inflation discourages savings, thereby reducing banks' core funding base. As a result, loanable funds shrink, and banks may become more conservative in credit allocation. The inflationary consequences of M2 growth can also prompt central banks to adopt restrictive policies, thereby neutralizing initial credit growth effects.

Monetary expansion via M2 growth in ASEAN economies has historically coincided with increased credit delivery provided inflation remains stable. Central banks in the region have used monetary tools effectively to

stimulate liquidity, which commercial banks then deploy into the real economy. This transmission mechanism affirms the validity of the hypothesis in the ASEAN monetary landscape.

Hypothesis 9 (H_9): Broad money supply growth has a positive effect on credit growth.

2.10. Economic Growth (GDP)

Economic growth is widely regarded as a key driver of credit expansion. Calza, Gartner, and Sousa (2003) established a strong positive relationship between real GDP growth and loan demand in the Eurozone, noting that higher income and investment prospects reduce default risk and increase creditworthiness. Terrones and Mendoza (2004) further posit that economic upturns encourage financial deepening, which in turn stimulates banks to extend more loans in response to rising demand for capital. In the ASEAN context, this is particularly relevant given the region's investment-driven growth model, where bank lending is crucial for financing business expansion.

However, during high-growth periods, banks may engage in excessive lending without proper credit assessment. This credit exuberance may be unsustainable and lead to a credit bubble, followed by abrupt contractions when economic activity slows. In such cases, the procyclical nature of credit exacerbates downturns, as banks simultaneously face declining collateral values and higher non-performing loans. This dynamic suggests that although GDP growth supports lending, it may also mask emerging financial vulnerabilities, especially when credit expands faster than economic fundamentals warrant.

Despite potential risks, empirical studies from both developed and developing countries confirm that the relationship between GDP and credit is generally positive and robust. Shingjergji and Hyseni (2015) and Ivanović (2016) show that improving macroeconomic conditions reflected by rising GDP boost bank confidence, reduce default risks, and heighten credit demand. Thus, in the medium to long term, real economic growth consistently underpins credit expansion.

Hypothesis 10 (H_{10}): Economic growth has a positive and significant effect on bank credit growth.

2.11. Inflation (Inflation)

High inflation is often cited as detrimental to credit growth. Huybens and Smith (1999) argue that elevated inflation reduces real returns on financial assets, creating disincentives for both lenders and borrowers. Inflation exacerbates information asymmetry in credit markets, increases loan default risks, and reduces the predictability of cash flows, thereby diminishing banks' willingness to lend. Similarly, Boyd, Levine, and Smith (2001) identified a non-linear relationship where credit markets become dysfunctional when inflation exceeds a critical threshold. These adverse effects are particularly pronounced in economies with volatile monetary regimes. However, mild inflation may signal strong economic activity and rising demand, potentially encouraging lending in the short term. In such contexts, nominal incomes increase, making borrowers appear more creditworthy. Banks may expand credit temporarily to capitalize on rising prices and margin opportunities. Yet, this window is narrow, as prolonged inflation ultimately erodes purchasing power and increases lending costs, leading to a reversal in credit expansion.

Backé and Zumer (2005) and Tinoco-Zermeño, Venegas-Martínez, and Torres-Preciado (2014) confirm that macroeconomic stability anchored by low inflation is a precondition for sustainable credit growth. When inflation is stable, interest rate volatility is reduced, borrower confidence improves, and banks can plan lending strategies more effectively. Therefore, while inflation in small doses may not immediately harm credit, persistent inflation undermines the structural integrity of credit markets.

Hypothesis 11 (H_{11}): Inflation has a negative impact on credit growth.

2.12. Crisis (FC/COVID)

Financial crises significantly disrupt the flow of credit in banking systems. Claessens and Van Horen (2015) showed that during the global financial crisis, banks retracted from foreign markets and reduced lending to mitigate

capital losses and comply with regulatory capital requirements. Similarly, Ivashina and Scharfstein (2010) demonstrated that the 2008 crisis led to a sharp contraction in credit, especially for new loans. These reductions were driven by heightened risk aversion, deteriorating borrower quality, and reduced deposit inflows.

Meanwhile, the COVID-19 pandemic triggered a unique form of credit contraction. Colak and Öztekin (2021) provide cross-country evidence showing that uncertainty, income shocks, and weakened bank balance sheets jointly contributed to declining credit supply. In economies with underdeveloped capital markets, banks were the sole providers of liquidity, making credit crunches more severe. Moreover, COVID-19 disproportionately impacted smaller banks and those with less government support, intensifying the asymmetry in credit access and supply.

Nevertheless, some studies argue that crises may temporarily boost credit under specific conditions. Banu (2013) posited that, in the aftermath of a crisis, banks may increase lending to stimulate recovery and restore asset valuations, especially under supportive fiscal and monetary environments. However, such effects are highly sensitive to risk perception and regulatory relief. Therefore, while temporary expansions may occur, the dominant trend remains contractionary during and immediately after crises.

Hypothesis 12 (H_{12}): Crises (including financial crises and the COVID-19 pandemic crisis) negatively affect bank credit growth.

3. DATA AND METHODOLOGY

3.1. Data

The paper utilizes an unbalanced panel dataset comprising 185 banks from 10 Southeast Asian countries (excluding Timor-Leste due to data limitations) spanning from 2000 to 2022, with a total of 2,518 observations. Data were sourced from the S&P Capital IQ Pro database.

Table 1. Variable's description.

Variables	Definition	Measurement
Dependent variable		
LG	Credit growth (%)	$\left(\frac{\text{Total loans year t}}{\text{Total loans year t} - 1} - 1\right) \times 100$
Independent variables		
Bank characteristics		
Size	Bank size	Natural logarithm of total assets (million USD)
LDR	Loan to deposit ratio (%)	$\frac{\text{Total loans}}{\text{Total deposits}} \times 100$
Capital	Total equity to total assets (%)	$\frac{\text{Total equity}}{\text{Total assets}} \times 100$
ROA	Bank profitability (%)	$\frac{\text{Net income}}{\text{Total assets}} \times 100$
IDIV	Income diversification	$1 - \left(\frac{\text{NII}}{\text{NOP}}\right)^2 - \left(\frac{\text{NON}}{\text{NOP}}\right)^2$ In which: NII: Net interest income NON: Non-interest income NOP: Operating income
Liquidity	Bank liquidity (%)	$\frac{\text{Cash and cash equivalents}}{\text{Total assets}} \times 100$
Macroeconomics variables		
M2Growth	M2 Growth rate (%)	$\left(\frac{\text{Total M2 year t}}{\text{Total M2 year t} - 1} - 1\right) \times 100$
GDP	Economic growth rate (%)	World Bank database
Inflation	Inflation rate (%)	IMF database
FC	Financial crisis	Dummy variable representing the period of the global financial crisis; taking value 1 for the period 2007-2009, 0 for otherwise
COVID	COVID-19 pandemic crisis	Dummy variable representing the period of the COVID-19 crisis; taking value 1 for the period 2020-2022, 0 for otherwise

Macroeconomic variables such as M2 money supply growth, GDP growth, and inflation were obtained from reputable sources including the World Bank and the International Monetary Fund (IMF). The analysis was conducted using Stata 16 software to examine the determinants of credit growth within the Southeast Asian banking sector. Outliers at the 1% and 99% levels were removed to mitigate their influence on the results. The chosen period (2000–2022) captures the dynamics of credit growth over a significant timeframe, encompassing normal economic cycles and periods of crisis. This includes the aftermath of the Asian financial crisis, the global financial crisis of 2007–2009, and the COVID-19 pandemic, all of which have significantly impacted banking systems in the region. Incorporating these periods allows for an assessment of how various determinants of credit growth respond to different economic shocks. Table 1 summarizes all the variables.

3.2. Model Specification

To quantitatively analyze the determinants of credit growth among Southeast Asian banks, this paper proposes the following equation.

$$LG_{i,t} = \beta_0 + \beta_1 Bankcharacteristics_{i,t} + \beta_2 Macroeconomics_{i,t} + \delta_i + \varepsilon_{it}$$

$LG_{i,t}$: Credit growth of bank i at time t,

δ_i: Country fixed effects to control for time-invariant institutional and regulatory differences across ASEAN countries.

$\epsilon_{i,t}$: Error term.

β_0 : Intercept, and β_1 & β_2: each beta coefficient represents the estimated marginal effect of an explanatory variable on bank credit growth (LG), holding other factors constant.

Following Tran and Nguyen (2023) and Nguyen, Pham, Phan, Alam, and Tran (2024) we employ a multiple fixed effects regression model with country fixed effects and applying two-way clustering at the bank and year levels to mitigate potential biases arising from heteroskedasticity and autocorrelation, which commonly present in panel data. The inclusion of country fixed effects (δ_i) is essential to control for unobserved, time-invariant characteristics that are specific to each country such as institutional settings, regulatory frameworks, financial development, monetary policies, and legal systems, which may systematically influence bank-level credit growth. We do not control for time fixed effects in the model because macroeconomic shocks such as the global financial crisis (FC) and the COVID-19 pandemic (COVID) are the same for all banks in a given year, then including time fixed-effects mechanically absorb all the explanatory power of macroeconomics factors (Gulen & Ion, 2016).

Regarding robustness tests, following Manh Pham, Tran, Phan, and Nguyen (2025) this paper employs the following methods: (i) the Generalized Method of Moments (GMM) to address potential endogeneity; (ii) Prais–Winsten regression to correct for autocorrelation; and (iii) the Newey–West estimator to obtain consistent standard errors in the presence of both autocorrelation and heteroskedasticity.

Table 2. Descriptive statistics.

Variables	Observation	Mean	Std. Dev	Min.	Max.
LG	2,518	15.99	67.47	-70.92	2919.88
NPL	2,518	3.58	4.53	0.01	56.05
LDR	2,518	89.85	70.53	2.04	2932.87
Capital	2,518	12.21	6.50	-27.49	87.59
ROA	2,518	0.95	3.24	-148.07	8.90
CIR	2,518	55.45	21.62	-7.65	378.80
IDIV	2,518	0.31	0.19	-4.18	0.50
Liquidity	2,518	17.97	10.48	0.85	82.44
M2Growth	2,518	10.73	6.31	-2.05	39.41
GDP	2,518	4.58	3.12	-12.02	14.52
Inflation	2,518	3.51	3.04	-1.26	24.10
FC	2,518	0.07	0.26	0	1
COVID	2,518	0.22	0.41	0	1

4. EMPIRICAL RESULTS

4.1. Baseline Results

Table 2 presents the descriptive statistics of the dataset used in this paper. Credit growth (LG) among ASEAN banks during the period 2000–2022 ranges from –70.92% to 2919.88%, with a mean value of 15.99% and a standard deviation of 67.47. These figures indicate a substantial disparity in credit growth rates across banks in the ASEAN region. The highest annual credit growth was recorded by MBSB Bank Berhad (Malaysia) in 2018, while the lowest credit growth was observed for Citibank Berhad (Malaysia) in 2022.

Table 3 presents the results of the correlation matrix between independent variables. The results indicate that the correlation coefficients of the independent variables are all below 80%. Therefore, the independent variables exhibit low correlation coefficients (no multicollinearity) and are suitable for regression analysis (Hair, Black, Babin, Anderson, & Tatham, 2006; Judge, Griffiths, Hill, & Lee, 1985).

Table 3. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) NPL	**1.00**												
(2) SIZE	-0.05	**1.00**											
(3) LDR	-0.07	-0.09	**1.00**										
(4) Capital	-0.17	-0.43	0.15	**1.00**									
(5) ROA	-0.23	0.07	0.05	0.16	**1.00**								
(6) CIR	0.13	-0.39	-0.06	0.10	-0.23	**1.00**							
(7) IDIV	0.05	0.31	-0.11	-0.15	0.04	-0.11	**1.00**						
(8) Liquidity	-0.01	-0.32	-0.16	0.16	0.03	0.03	0.04	**1.00**					
(9) M2Growth	-0.08	-0.34	0.00	0.09	0.03	0.07	-0.05	0.33	**1.00**				
(10) GDP	-0.11	-0.13	0.01	-0.01	0.03	0.01	-0.04	0.12	0.23	**1.00**			
(11) Inflation	-0.02	-0.21	-0.02	-0.01	-0.01	0.04	-0.08	0.14	0.32	0.28	**1.00**		
(12) FC	0.08	0.05	-0.05	-0.13	-0.05	-0.04	0.10	0.00	0.09	-0.08	0.23	**1.00**	
(13) COVID	-0.01	0.08	0.01	0.10	-0.02	0.00	-0.03	-0.09	-0.13	-0.45	-0.13	-0.15	**1.00**

Table 4. Empirical results.

Variables	Baseline (1)	GMM (2)	Prais-Winsten (3)	Newey-West (4)
NPL	-0.6639***	-1.5788***	-0.8090***	-0.7119***
	(0.120)	(0.202)	(0.142)	(0.117)
SIZE	-1.6563***	-4.6218***	-1.7135***	-1.4667***
	(0.405)	(0.836)	(0.466)	(0.380)
LDR	0.0581***	0.2405***	0.0873***	0.0605***
	(0.021)	(0.058)	(0.027)	(0.021)
Capital	-0.0941	0.3385	-0.1807	-0.1397
	(0.145)	(0.228)	(0.169)	(0.139)
ROA	1.5076*	0.9463	1.1955	1.2614*
	(0.783)	(0.674)	(0.777)	(0.744)
CIR	-0.0216	-0.2560***	-0.0202	-0.0314
	(0.044)	(0.068)	(0.049)	(0.040)
IDIV	1.6061	17.8179***	7.8957	1.5858
	(4.313)	(6.799)	(4.936)	(4.096)
Liquidity	0.1062	0.2804***	0.0595	0.0842
	(0.068)	(0.108)	(0.075)	(0.061)
M2Growth	0.5455***	0.8907***	0.4711***	0.6352***
	(0.107)	(0.115)	(0.096)	(0.091)
GDP	0.6052***	0.6095***	0.6510***	0.5971***
	(0.167)	(0.119)	(0.148)	(0.149)
Inflation	-0.4821***	0.2010	-0.4854***	-0.3812**
	(0.163)	(0.182)	(0.155)	(0.160)
FC	7.1791***	13.8382***	4.6117**	6.7177***
	(1.792)	(1.985)	(1.968)	(1.778)
COVID	-4.4245***	-2.4305***	-4.3997***	-4.3363***
	(1.129)	(0.934)	(1.213)	(1.054)
L.LG		0.0064		
		(0.016)		
Constant	17.2553***	23.2909*	16.7273**	16.0578**
	(6.668)	(12.504)	(8.180)	(6.491)

Note: **Table 4** presents the regression results evaluating the factors influencing credit growth among Southeast Asian banks. The dataset has been winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. Robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 presents the empirical results on the impact of determinants on the loan growth of ASEAN banks. The findings in Table 4 indicate that credit risk (NPL), bank size (Size), and the cost-to-income ratio (CIR) exert a negative influence on loan growth (LG) among Southeast Asian banks. These relationships are statistically significant across various econometric specifications, reinforcing the robustness of the results. In particular, credit risk measured by the non-performing loan (NPL) ratio shows a consistently significant negative effect on loan growth at the 1% level across all model specifications. This suggests that an increase in credit risk significantly hinders banks' ability to extend loans. From a theoretical standpoint, higher levels of non-performing loans (NPLs) require banks to allocate more resources to loan loss provisions, which in turn reduces the capital available for new lending activities. Additionally, the presence of elevated credit risk creates uncertainty in cash flow forecasts, making it more challenging for banks to predict and manage their lending operations effectively. This finding aligns with previous research by Accornero et al. (2017), Ashikuzzaman (2022), and Chun and Ardaaragchaa (2024), who demonstrated that deteriorating asset quality can erode banks' operational efficiency, undermine market confidence, and lead to more conservative lending behaviors. Moreover, heightened credit risk can lead to increased regulatory scrutiny and concerns from investors, which in turn limit access to funding and reduce banks' willingness to take on additional risks, ultimately slowing credit growth in the region. Regarding bank size, our results indicate a statistically significant negative relationship with credit growth, suggesting that larger banks may face structural and managerial challenges that impede their ability to expand loan portfolios. As banks grow in size, they often experience increased complexity in internal governance, risk management, and operational coordination, which can result in diseconomies

of scale. Furthermore, large banks tend to diversify into non-lending activities, such as securities investments or foreign exchange trading, which may reduce the proportion of assets allocated to traditional lending. This strategic shift may decrease the availability of credit to the private sector, especially to small and medium enterprises (SMEs), which play a crucial role in driving credit growth in emerging economies. Additionally, larger institutions are often subject to more stringent regulatory capital requirements and higher levels of supervisory scrutiny, which can limit their ability to engage in aggressive lending practices. As banks grow in size, their total loan volumes typically increase as well, but this often leads to slower credit growth rates compared to smaller banks. Although large banks tend to maintain higher absolute loan balances than smaller banks, their relative pace of loan growth is generally slower. These findings are consistent with Ibrahim (2016), who discussed the trade-offs between expanding scale and maintaining efficient credit intermediation. Furthermore, the cost-to-income ratio (CIR), a key measure of operational efficiency, is found to negatively affect credit growth, particularly significant in the GMM model at the 1% level. A high CIR indicates rising operational costs relative to income, which points to inefficiencies in the bank's use of resources. Banks with higher CIRs may face pressure on their profit margins and have less capacity to generate retained earnings, ultimately limiting their ability to expand credit. High operational costs also erode competitiveness, discourage customer engagement, and reduce market share, all of which contribute to lower lending activity. As Ivanović (2016) highlighted, persistent inefficiency can undermine investor and depositor confidence, further affecting funding stability and constraining credit supply. Overall, the negative relationship between CIR and loan growth emphasizes the importance of cost management and operational efficiency as essential factors for sustaining credit expansion.

In contrast, the findings of this study reveal that the loan-to-deposit ratio (LDR), bank profitability (ROA), income diversification (IDIV), and bank liquidity (Liquidity) have a positive impact on loan growth in Southeast Asian banks. First, the loan-to-deposit ratio (LDR) shows a strong and statistically significant positive correlation with loan growth across all models. A higher LDR suggests that a larger proportion of deposits are being actively converted into loans, indicating that banks are aggressively pursuing lending opportunities and are confident in the stability of the credit market. This observation aligns with Nugraha et al. (2021) who argue that a higher LDR reflects proactive financial intermediation, as banks aim to optimize their use of deposits to generate interest income. From an operational perspective, banks with higher LDRs typically adopt expansionary lending strategies, which can stimulate economic activity, especially in emerging markets. Additionally, a high LDR may indicate that the bank expects strong demand for credit and perceives lower risks of defaults, prompting it to allocate more resources to lending. In dynamic economies like those in Southeast Asia, such behavior is often fueled by robust investment cycles and consumption-driven growth. Increased lending then creates a positive feedback loop: borrowers use loans for productive purposes, boosting incomes and generating more deposits, which in turn enables banks to sustain their credit expansion. Overall, a high LDR signifies efficient resource allocation and a strategic emphasis on lending growth, playing a key role in the overall increase in loan volumes within the banking sector. Second, bank profitability, as measured by return on assets (ROA), also positively impacts loan growth, though the statistical significance varies across models. A higher ROA indicates that the bank is more efficient in utilizing its assets to generate earnings, which strengthens its internal capital base. This increase in internally generated funds reduces the need for external financing and allows banks to grow their loan portfolios with greater financial independence. Profitable banks can also more easily build capital buffers, meet regulatory requirements, and absorb potential credit losses without compromising their lending capacity. Additionally, strong profitability improves a bank's reputation and creditworthiness, which makes it easier to attract new funding and maintain depositor confidence, both critical factors for sustaining lending operations. Studies such as Igan and Pinheiro (2011), Al-Khouri and Arouri (2016), and Osei-Tutu and Weill (2022) have emphasized that high-performing banks are better positioned to absorb risk, implement robust credit evaluation mechanisms, and expand lending prudently. Additionally, banks with higher return on assets (ROA) often pursue more aggressive yet carefully calculated lending strategies due to their enhanced capacity to

manage risk. As such, profitability serves not only as a gauge of financial health but also as a key driver of credit intermediation and sustainable loan growth. Third, income diversification (IDIV) contributes positively to loan growth by enhancing a bank's financial stability and revenue resilience. When banks generate income from a broader range of non-interest activities such as fee-based services, asset management, or financial advisory they are better protected from fluctuations in lending income. This diversification enables banks to maintain stable cash flows, particularly during economic slowdowns or when credit demand weakens. Previous studies by Abedifar et al. (2018) and Lin et al. (2012) suggest that banks with diversified income sources tend to perform better and are better positioned to support lending. Additionally, diversification reduces risks associated with over-reliance on interest income and fosters deeper customer relationships. Banks offering a variety of services are more likely to collect valuable customer information, which leads to more informed risk assessments. This informational advantage improves credit allocation and lowers default risks, encouraging more confident lending. Moreover, income diversification helps banks maintain investor confidence and ensures greater regulatory compliance by reducing earnings volatility. Strategically, banks with stable income streams are more inclined to take calculated lending risks and expand their loan portfolios, even during periods of economic uncertainty. In Southeast Asia, where banks are increasingly diversifying their offerings due to growing competition, income diversification is a crucial factor in promoting and sustaining loan growth. Finally, bank liquidity, defined as the availability of liquid assets to meet short-term obligations also has a positive impact on loan growth. Banks with higher liquidity levels are in a stronger position to extend credit without compromising their ability to meet withdrawal demands or other immediate liabilities. This flexibility becomes particularly important during financial crises or periods of market instability, when access to external funding may be limited. The findings are consistent with the research of Cornett et al. (2011) and Kim and Sohn (2017), who highlight that sufficient liquidity buffers enhance a bank's ability to lend and reduce its exposure to funding shocks. Additionally, liquidity serves as a signal of financial strength, boosting depositor trust and investor confidence, which can attract more capital and expand the bank's lending capacity. Banks with strong liquidity positions can also respond more quickly to changes in credit demand, thus supporting counter-cyclical lending and contributing to macroeconomic stability. In emerging markets like Southeast Asia, where capital flows and market sentiment are often volatile, maintaining high liquidity allows banks to sustain lending during downturns and capitalize on lending opportunities during periods of recovery. Furthermore, robust liquidity enables banks to absorb potential losses from credit defaults without significantly affecting their financial health. By supporting risk-tolerant behavior, strong liquidity plays a pivotal role in fostering the continued expansion of credit, which is crucial for financial development and economic growth.

For macroeconomic variables, the results presented in Table 4 indicate that both the M2 growth rate (M2Growth) and the economic growth rate (GDP) have a positive effect on loan growth within Southeast Asia's banking sector. In contrast, the inflation rate (Inflation) is found to have a negative impact on credit expansion in the region's banks. Specifically, the positive relationship between M2 growth and loan expansion suggests that an increase in liquidity in the banking system often the result of monetary easing policies such as interest rate cuts or reductions in reserve requirements strengthens banks' lending capacity (Akani & Onyema, 2017; Dharmadasa, 2021). As borrowing costs decrease, the demand for credit increases, enabling banks to meet this demand more effectively. Furthermore, an increased money supply typically boosts consumer confidence and spending, which in turn stimulates further loan growth. Similarly, GDP growth has a strong positive impact on credit expansion, as higher economic activity drives greater demand for financing from both businesses and households (Calza et al., 2003; Terrones & Mendoza, 2004). In a growing economy, firms seek capital for expansion, while individuals have higher income and borrowing capacity, all of which support increased loan volumes. Improved economic outlook also lowers credit risk, encouraging banks to lend more actively (Ivanović, 2016; Shingjergji & Hyseni, 2015). In contrast, inflation has a robust and negative effect on loan growth. Rising inflation typically leads to tighter monetary policy, higher interest rates, and increased borrowing costs, which collectively suppress credit demand (Boyd et al., 2001;

Huybens & Smith, 1999). Inflation also introduces macroeconomic uncertainty, discouraging both investment and consumption. Moreover, high inflation can weaken repayment ability, elevate credit risk, and increase non-performing loans, prompting banks to tighten lending standards (Tinoco-Zermeño et al., 2014). These combined effects constrain banks' willingness and ability to expand credit.

For the variables related to the crises, the research results from Table 4 indicate that during the global financial crisis in 2008, Southeast Asian banks maintained positive credit growth, while the COVID-19 pandemic crisis reduced credit growth in the ASEAN banking sector. This divergence can be explained by the structural and contextual differences between the two crises. During the 2008 global financial crisis, although the global economy experienced widespread disruptions, Southeast Asian banks demonstrated notable resilience, largely due to their conservative financial structures and limited exposure to complex financial instruments such as asset-backed securities or subprime-related derivatives (Green, 2010; Rasiah, Cheong, & Doner, 2014). The crisis had a profound impact on developed economies, particularly in Europe and the United States, whereas its effect on the banking systems in Southeast Asia was generally considered to be more moderate (Cheong, Rasiah, & Thillainathan, 2024; Green, 2010; Rasiah et al., 2014). This relative insulation can be attributed to the region's financial architecture, where banks predominantly engaged in domestic lending activities and had minimal involvement in high-risk financial innovations. Additionally, the 2007–2010 period coincided with rapid economic expansion in Southeast Asia, marked by robust demand for credit to support infrastructure investment, production, and consumption. The inflow of foreign direct investment especially from China and Japan further bolstered credit activity across the region (Cheong et al., 2024). In contrast, the COVID-19 pandemic caused a more severe and widespread economic contraction. Lockdowns and mobility restrictions disrupted business operations and reduced consumer and business confidence, leading to a sharp decline in credit demand. Heightened credit risk and rising non-performing loans also prompted banks to tighten lending standards. Despite aggressive monetary easing, the psychological impact and prolonged uncertainty of the pandemic outweighed stimulus measures, resulting in a significant contraction in credit growth.

4.2. Financial System Structures and Bank Credit Growth

Building upon the research framework proposed by Chaibi and Ftiti (2015), which suggests that macroeconomic conditions and bank-specific characteristics influence bank credit activities in ways that vary across different financial system structures, this paper classifies countries and investigates the determinants of bank credit growth within the Southeast Asian sample based on their financial system structure. Drawing on classification criteria established by leading international institutions such as the World Bank, the International Monetary Fund (IMF), the World Trade Organization (WTO) as well as national government reports and academic literature, Table 5 categorizes the financial systems of Southeast Asian countries into two main types: bank-based and market-based financial system, as detailed below:

Table 5. Classification of financial system structure of Southeast Asian countries.

No	Country	Financial system	Source
1	Brunei	Bank-based	International Monetary Fund (IMF) (2023)
2	Cambodia	Bank-based	Association of Banks in Cambodia (ABC) (2023)
3	Indonesia	Bank-based	World Trade Organization (WTO) (2012)
4	Laos	Bank-based	World Bank (2020)
5	Malaysia	Market-based	Demirgüç-Kunt and Levine (2001)
6	Myanmar	Bank-based	World Bank (2022)
7	Phillipines	Bank-based	National Economic and Development Authority (NEDA) (2013)
8	Singapore	Market-based	Demirgüç-Kunt and Levine (2001)
9	Thailand	Bank-based	Bank of Thailand (2017) and Watanagase (2006)
10	Vietnam	Bank-based	Tran, Pham, and& Tran (2021)

Table 6. Determinants of credit growth in ASEAN banking sector by financial systems.

Regressors	Multiple fixed-effects with two-way cluster estimations		Newey-West estimators	
	Bank-based	Market-based	Bank-based	Market-based
NPL	-0.7574***	-0.1486	-0.8539***	-0.1492
	(0.136)	(0.289)	(0.131)	(0.287)
SIZE	-1.3779***	-1.7699**	-1.2056***	-1.2408*
	(0.464)	(0.782)	(0.457)	(0.739)
LDR	0.0640***	-0.0364	0.0755***	-0.0378
	(0.025)	(0.050)	(0.023)	(0.048)
Capital	0.0563	-0.7275**	-0.0250	-0.6624**
	(0.161)	(0.303)	(0.155)	(0.302)
ROA	1.7150**	-6.0754**	1.3025*	-6.5444**
	(0.786)	(2.756)	(0.759)	(2.677)
CIR	0.0278	-0.2609***	-0.0026	-0.2600***
	(0.048)	(0.089)	(0.045)	(0.089)
IDIV	1.4305	8.2991	-1.1975	10.2089
	(4.917)	(9.687)	(4.673)	(8.936)
Liquidity	0.0421	0.1386	0.0487	0.1470
	(0.083)	(0.118)	(0.069)	(0.117)
M2Growth	0.4399***	1.1547***	0.5206***	1.1495***
	(0.116)	(0.234)	(0.101)	(0.236)
GDP	0.6281***	0.4827*	0.7290***	0.5140*
	(0.196)	(0.291)	(0.169)	(0.285)
Inflation	-0.3967**	-0.4616	-0.3954**	-0.5293
	(0.176)	(0.551)	(0.168)	(0.514)
FC	7.5146***	1.6441	7.6590***	1.7483
	(2.139)	(3.223)	(2.132)	(3.222)
COVID	-5.0446***	-3.7546*	-4.6079***	-3.9565*
	(1.368)	(2.018)	(1.231)	(2.048)
Constant	12.0601	43.2663***	12.3020	37.2532***
	(7.997)	(12.568)	(7.907)	(11.891)

Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 presents the results of the analysis of the determinants of credit growth in Southeast Asian banks, based on the structure of the financial system. We employ multiple fixed-effects estimations with two-way clustering, in combination with Newey-West standard errors, to examine the robustness of the empirical results. The main findings indicate that the estimated coefficients across both methods are consistent and reliable.

Firstly, non-performing loans (NPLs) emerge as a critical factor negatively influencing credit growth, particularly in countries with a bank-based financial system. The results show a statistically significant inverse relationship between NPLs and credit growth at the 1% level for these economies, reflecting the central role of banks in financial intermediation. An increase in NPLs heightens credit risk, forces banks to allocate greater provisions, and reduces their lending capacity. Furthermore, elevated NPLs erode investor and depositor confidence, potentially tightening liquidity in the banking sector. In economies such as Vietnam and Thailand, where capital markets remain underdeveloped and firms depend heavily on bank credit this contraction in lending has a direct and immediate impact on production expansion and overall credit growth. By contrast, in countries with market-based systems such as Singapore, the relationship between NPLs and credit growth is statistically insignificant. In these cases, the availability of alternative funding channels, including equity and bond markets, diminishes the dependency on bank lending and insulates credit flows from the adverse effects of rising credit risk.

Secondly, the study shows that bank profitability, measured by return on assets (ROA), has asymmetric effects on credit growth depending on the structure of the financial system. In bank-based systems, a higher ROA is linked to improved profitability and better resource allocation, which encourages banks to expand credit in pursuit of higher returns. These banks benefit from increased investor confidence, stronger capital reserves, and an enhanced capacity to absorb risks, all of which support greater lending. On the other hand, in market-based systems, higher ROA tends to reduce credit growth. This seemingly paradoxical result reflects a shift in strategy by banks, which may prioritize non-lending activities such as securities investment or providing financial services that offer higher returns and lower

credit risk. In such systems, businesses can access capital through well-established financial markets, which lessens the pressure on banks to increase lending even when their operational performance improves.

Thirdly, the analysis reveals that money supply growth (M2 growth) has a more significant positive effect on credit growth in countries with market-based systems. As M2 increases, banks experience a boost in liquidity and lower funding costs, which incentivizes them to increase lending, particularly to sectors with favorable risk-return profiles. This effect is often strengthened by accommodative monetary policies, such as interest rate cuts, which further stimulate credit demand. In contrast, while M2 growth also positively influences credit expansion in bank-based systems, the effect is relatively weaker. In these economies, the credit supply is more closely tied to the capital needs of the real economy rather than to the availability of monetary liquidity alone. Furthermore, rapid M2 growth in bank-based systems may raise concerns about inflation and lead to stricter regulatory oversight, which could dampen the stimulatory effect of liquidity on credit growth. Furthermore, this paper highlights inflation as another factor that exhibits asymmetric effects across different financial systems. In bank-based systems, inflation significantly suppresses credit growth, likely due to the resulting increases in policy interest rates and borrowing costs. Higher inflation also amplifies credit risk by eroding real incomes, which weakens the repayment capacity of borrowers, particularly small and medium-sized enterprises that are heavily reliant on bank financing. As a result, banks in these systems tend to adopt more conservative lending practices and allocate larger loan loss provisions, thus limiting credit expansion. On the other hand, in market-based economies, the relationship between inflation and credit growth is statistically insignificant. The flexibility and maturity of capital markets in these systems reduce their dependence on bank credit, allowing firms to diversify their funding sources. This reduces the impact of inflationary pressures on the banking sector. Turning to macro-financial shocks, the effects of the Global Financial Crisis (2007–2009) further illustrate the resilience of bank-based systems. Despite the global financial turmoil, banks in these economies were able to sustain credit growth, supported by government interventions and strong domestic linkages with firms and households. The limited reliance on volatile international capital flows also provided a buffer against external liquidity shocks. In contrast, credit growth in market-based systems was more severely affected, as disruptions in financial markets dampened investor confidence and restricted corporate access to capital. As capital markets contracted, the flow of funds to businesses slowed, which indirectly constrained bank lending. However, the COVID-19 pandemic had a more pronounced negative effect on credit growth in bank-based systems compared to market-based systems.

5. CONCLUSIONS

This paper investigates the determinants of bank credit growth in Southeast Asia by analyzing a unique panel dataset of 185 banks from ten countries over the period 2000–2022. Employing robust econometric techniques including two-way clustered fixed effects, GMM, and Newey–West estimators the research identifies both bank-specific and macroeconomic factors shaping credit growth while accounting for differences in financial system structures (bank-based and market-based). Our findings reveal that credit risk, bank size, and the cost-to-income ratio exert statistically significant negative impacts on credit growth. Conversely, factors such as loan-to-deposit ratios, profitability (ROA), income diversification, and liquidity are positively associated with credit growth. These results suggest that efficient and diversified banks are more capable of sustaining credit expansion, particularly during periods of economic recovery. At the macro level, increases in broad money supply (M2 growth) and real GDP significantly enhance credit growth, while inflation dampens lending activity. Notably, the COVID-19 pandemic had a substantial negative impact on credit expansion, in contrast to the Global Financial Crisis, which saw resilient credit supply in the region. The empirical results also show that the impact of key determinants on credit growth varies significantly depending on the structure of the financial system. In bank-based economies, credit expansion is highly influenced by internal bank characteristics. Specifically, credit risk (NPL) strongly hampers lending by increasing provisioning requirements, while profitability (ROA) fosters credit growth by improving internal funding. In contrast, these effects are either less pronounced or reversed in market-based systems, where banks depend less on

traditional lending and more on fee-based or investment income. Similarly, the effect of money supply growth (M2) is more pronounced in market-based systems, reflecting their greater sensitivity to liquidity injections. In bank-based systems, however, credit growth is more closely tied to real-sector financing needs, and liquidity alone does not have as strong an effect. Inflation further suppresses lending in bank-based systems by eroding borrowers' capacity and increasing risk, but it has a limited impact in market-based economies, where alternative funding sources reduce its influence. Lastly, macro-financial shocks highlight structural resilience differences between the two systems. While bank-based systems managed to maintain relatively steady credit flows during the global financial crisis, they faced sharper declines in credit growth during the COVID-19 pandemic due to heightened uncertainty and increased credit risk. In contrast, market-based systems demonstrated more resilience during the pandemic, benefiting from broader access to non-bank financing channels. These findings emphasize the need for policies that are tailored to the specific structure of each financial system. Overall, this study provides new insights into the credit dynamics within Southeast Asia's banking sectors and offers valuable implications for policymakers aiming to strengthen financial resilience and credit intermediation amidst ongoing global and regional challenges.

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