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# Banking Sector Performance and Economic Growth in ASEAN: Evidence from Dynamic Panel GMM Analysis

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**ABSTRACT**

This study analyses the influence of banking sector performance on economic growth in the ASEAN region using annual panel data from eight countries for the period 2000-2021. Using annual data and the World Bank's World Development Indicators and Global Financial Development Indicators, this study applies a dynamic panel approach using the Generalized Method of Moments (GMM) to address growth dynamics and potential endogeneity. This study positions banking performance as the primary variable, accompanied by several macroeconomic and institutional control variables. Empirical results indicate that banking sector performance has a positive and significant effect on economic growth, and remains consistent across various model specifications and robustness tests. Furthermore, the findings suggest that the impact of banking on growth is strengthened through investment and trade openness channels. Overall, this study emphasizes the importance of banking sector performance as a determinant of economic growth in ASEAN and emphasizes the importance of policies to strengthen the financial sector in supporting sustainable economic growth.

**Keywords:** banking sector performance; economic growth; ASEAN; dynamic panel; GMM

## INTRODUCTION

The financial sector plays a central role in driving economic growth through its intermediation, resource allocation, and risk management functions (Konstantakopoulou, 2023). Among the various components of the financial system, the banking sector holds a dominant position, particularly in developing and emerging economies, where non-bank financial markets are still relatively limited (Farhat, 2023). In the ASEAN context, the role of the banking sector is becoming increasingly important given the characteristics of the regional economy, which is characterized by dynamic growth, ongoing structural transformation processes, and a high degree of heterogeneity across countries (Pradhan et al., 2017). Banking not only serves as a primary source of financing for the real sector but also as a pillar of macroeconomic stability amidst increasing regional and global economic integration (Korneev, 2023). Therefore, a deeper understanding of how the performance of the banking sector contributes to economic growth is a relevant and strategic empirical issue in the context of ASEAN economic development.

The role of the banking sector in driving economic growth is determined not only by its size or depth, but also by its operational performance (Zeqiraj et al., 2020) and efficiency (Guru & Yadav, 2019), reflected in the bank's ability to manage assets, disburse credit, and generate sustainable profits. Good banking performance reflects the effectiveness of the financial intermediation function in diverting funds from surplus to productive sectors, while simultaneously managing the risks inherent in financing activities (Das Gupta et al., 2021) In

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the ASEAN context, variations in banking efficiency and profitability levels across countries have the potential to produce different impacts on economic growth (Pham, 2020). Therefore, an analysis focused on banking sector performance is crucial for a more accurate understanding of the mechanisms through which the banking sector influences economic growth in the region, rather than simply quantitative indicators of financial development.

The empirical literature on the relationship between the financial sector and economic growth has grown rapidly, but the findings are mixed and inconclusive. Several studies have found that the development of the financial sector, including banking, has a positive effect on economic growth by increasing the efficiency of resource allocation and capital accumulation (Nguyen, 2022; Obiora et al., 2022; Stoica et al., 2020; Alshubiri, 2017). Conversely, other studies indicate that the relationship can be weak, insignificant, or even non-linear, depending on a country's level of economic development, institutional quality, and macroeconomic conditions (Wierzbowska, 2025; Barradas, 2020; Iwanicz-Drozdowska, 2019; Diallo & Koch, 2018). These differences in findings indicate that the relationship between the banking sector and economic growth is contextual, so results obtained in one group of countries or within a specific period cannot necessarily be generalized to other regions, including the ASEAN region.

Despite the extensive literature on the financial sector and economic growth, relevant research gaps remain, particularly in the ASEAN context. First, most previous studies have focused more on aggregate measures of financial development, such as the credit-to-GDP ratio, rather than on banking sector performance, which reflects the efficiency and quality of intermediation. Second, empirical evidence specifically examining ASEAN countries using a cross-country approach remains relatively limited, despite the region's high degree of economic and institutional heterogeneity. Third, many previous studies have not fully addressed the dynamics of growth and the potential endogeneity between the banking sector and economic growth. These gaps underscore the need for more comprehensive and methodologically robust empirical analysis to understand the role of banking sector performance in driving economic growth in ASEAN.

The ASEAN region provides a highly relevant empirical context for examining the relationship between banking sector performance and economic growth (Adeel-Farooq, 2020). The region encompasses countries with varying levels of economic development, financial system structures, and institutional quality, ranging from international financial centers to developing countries with emerging banking sectors. These differences create variations in the role and effectiveness of the banking sector in supporting economic activity. Furthermore, the process of regional economic integration and increasing trade openness in ASEAN has the potential to strengthen the role of the banking sector as a link between domestic savings, investment, and economic growth (Suwanhirunkul & Suwanhirunkul, 2025). Therefore, an analysis focused on ASEAN allows for the examination of the banking-growth relationship within a heterogeneous and dynamic economic environment and provides a more contextualized understanding than studies in more homogeneous regions.

This study provides a methodological contribution by applying the Generalized Method of Moments (GMM) dynamic panel approach to examine the relationship between banking sector performance and economic growth in ASEAN. This approach allows for control of economic growth dynamics through the use of lagged dependent variables, while addressing

potential endogeneity and unobserved heterogeneity common in cross-country panel analysis. By utilizing the Difference-GMM and System-GMM estimators, this study produces more consistent and efficient estimates than conventional static panel methods. The use of multiple model specifications also allows for testing the consistency of the results and strengthens causal inferences drawn from the empirical analysis.

Empirically, this study provides new evidence on the role of banking sector performance in driving economic growth in the ASEAN region, using a relatively long observation period and diverse country coverage. Unlike previous studies, this study not only examines the direct effect of banking performance on growth but also explores the transmission mechanisms through investment and trade openness. Furthermore, the consistency of the results is tested through the use of alternative indicators of banking performance and sub-sample analysis, ensuring robust findings that are not driven by specific country characteristics. Therefore, this study enriches the literature by providing a more comprehensive understanding of the relationship between banking and growth in the ASEAN regional context.

The findings of this study have relevant policy implications for ASEAN countries, particularly in designing strategies to strengthen the banking sector as part of their medium- and long-term economic growth agenda. Empirical results indicate that improving the performance and efficiency of the banking sector can strengthen the role of financial intermediation in encouraging investment and maximizing the benefits of economic openness. Therefore, policies focused on improving the quality of intermediation, banking system stability, and financial governance are becoming increasingly important, particularly for ASEAN countries still in the financial sector deepening stage. These policy implications are presented in more detail at the end of the study.

**Literature Review**

The literature on the relationship between the financial sector and economic growth positions the financial system as one of the main pillars in the long-term economic development process. Conceptually, the financial sector plays a role in mobilizing savings (Alnaa & Matey, 2022; Raheem & Oyinlola, 2017), channeling funds to productive sectors (Garg, 2025), managing risks (Jia et al., 2021), and increasing the efficiency of resource allocation in the economy (Puşcaşu, 2024). Through these functions, a well-developed financial system is believed to accelerate capital accumulation and encourage innovation, ultimately contributing to increased economic growth (Boikos et al., 2022).

However, existing studies suggest that the relationship between financial sector development and economic growth is heterogeneous across countries and time periods. Empirical evidence remains mixed. While Kabir & Halder (2018) and Puatwoe & Piabuo (2017) reported a positive growth effect of financial sector development in Bangladesh and Cameroon, respectively, similar findings are documented in cross-country analyzed by Paun et al. (2019) and Hamdi et al. (2017). In contrast, other studies identify a negative association between financial sector development and economic growth (Sainz-Fernandez et al., 2018; Cave et al., 2020; Rahman et al., 2020). These conflicting results indicate that country-specific factors such as economic structure, development stage, and institutional quality condition the growth-enhancing role of the financial sector. Consequently, the finance-growth nexus should be conceptualized as context-dependent, necessitating empirical assessment that explicitly accounts for regional and temporal heterogeneity (Nyasha & Odhiambo, 2018).

In a financial system dominated by banking institutions, the banking sector plays a crucial role in transmitting the influence of the financial sector to real economic activity (Kachula et al., 2022). In many developing and emerging economies, non-bank financial markets are still relatively limited, so banks serve as the primary source of financing for households and businesses (Skasko et al., 2019). Through their intermediary function, banks collect funds from surplus sectors and channel them to productive sectors, while simultaneously performing risk management and monitoring roles in the use of these funds (Frei et al., 2022). The effectiveness of this role depends heavily on the condition and structure of the existing banking system, including its level of efficiency, stability, and institutional governance. Therefore, in the context of countries with bank-based financial systems, analysis of the banking sector is key to understanding how the financial sector as a whole influences economic growth (Distia, 2023).

As the literature on the banking sector and economic growth has grown, research attention has shifted from quantitative measures of banking development to the performance of the banking sector itself. Banking performance, generally measured through efficiency and profitability indicators, is seen as better able to reflect the quality of the intermediation function than simply the size of assets or credit volume (Gulati & Kumar, 2017). Banks with good performance tend to be more effective in channeling funds to productive projects, managing financing risks, and maintaining operational sustainability, thus potentially contributing more to economic growth (Neves et al, 2020). Several empirical studies have shown that banking performance indicators have a stronger relationship with economic growth than traditional indicators of financial depth, although the strength of this relationship varies across countries and observation periods (Ferreira, 2016). These findings indicate that banking sector quality is an important factor in explaining differences in economic growth performance across countries.

Although many studies have found a positive relationship between the banking sector and economic growth, the empirical evidence is mixed and inconsistent. Some studies report that banking performance has a significant impact on economic growth, while others find a weak, insignificant, or even non-linear relationship (Alkhazaleh, 2017; Alam et al., 2021; Botev et al., 2019). These differences in findings are often attributed to variations in structural characteristics across countries, such as the level of economic development, the depth of the financial system, and the quality of institutions, as well as differences in the time period and methodologies used. Furthermore, a number of studies have shown that the contribution of the banking sector to growth can change with economic development, so that a relationship observed at one stage of development does not necessarily hold at another stage (Shahid et al., 2015). This diversity of empirical evidence indicates that the relationship between banking and economic growth is contextual and requires analysis that takes into account cross-country differences and temporal dynamics.

In addition to differences in empirical context, the literature also highlights a number of methodological issues that could potentially impact research findings on the relationship between the banking sector and economic growth. Many previous studies have employed static panel approaches or simple cross-country regressions that fail to fully accommodate the dynamics of economic growth and the potential endogeneity between banking performance and growth (Guru & Yadav, 2019; Pradhan et al., 2014). The potential bidirectional

relationship, where economic growth can also influence banking sector performance, has the potential to produce biased and inconsistent estimates if not properly addressed (Alexiou et al., 2018). Furthermore, ignoring unobserved heterogeneity across countries and issues of autocorrelation and heteroscedasticity in panel data can further weaken the validity of empirical inferences. These methodological limitations underscore the importance of using a more robust and dynamic econometric approach to examine the banking-growth relationship.

In line with the development of the economic growth literature, many studies emphasize the importance of incorporating supporting variables and structural factors to obtain unbiased estimates of the role of the banking sector. Factors such as human capital, investment, trade openness, inflation, institutional quality, and government spending are seen as important determinants of economic growth that can also influence the effectiveness of the banking sector in carrying out its intermediary function (Menyah et al., 2014; Bist, 2018). Human capital and investment play a role in increasing productivity and production capacity, while trade openness can expand market access and technology transfer (Saha, 2024; Keho, 2017). On the other hand, macroeconomic stability and institutional quality determine the banking operational environment and incentives for productive credit distribution (Karim et al., 2016). Therefore, the literature emphasizes that an analysis of the relationship between banking performance and economic growth needs to consider the interaction between the financial sector and these structural factors simultaneously.

The literature also emphasizes that the relationship between banking sector performance and economic growth is dynamic and bidirectional. On the one hand, an efficient and stable banking sector can drive economic growth through increased financing and more productive capital allocation. On the other hand, higher economic growth can improve banking asset quality, increase profitability, and expand intermediation capacity (Stewart & Chowdhury, 2021). This reciprocal relationship indicates the potential for feedback effects between banking and economic growth, making it difficult to identify a clear direction of causality with a static empirical approach (Mhadhbi et al., 2020). Therefore, several studies emphasize the need for analytical approaches that can capture temporal dynamics and overcome simultaneous endogeneity, so that the causal relationship between the banking sector and economic growth can be estimated more accurately.

In addition to methodological issues, the literature also indicates an empirical gap in the regional context, particularly in developing regions with heterogeneous economic characteristics. Most studies on the relationship between the banking sector and economic growth still focus on developed countries or use very broad cross-country samples, thus failing to capture the specific dynamics of a particular region (Elmawazini et al., 2020). However, differences in the level of economic development, financial system structure, and institutional quality across regions can influence the role and effectiveness of the banking sector in driving economic growth (Bayar et al., 2021). In the context of a region such as ASEAN, which includes countries with diverse income levels and economic structures, regionally focused empirical evidence is still relatively limited (Skasko et al., 2019). This limitation emphasizes the importance of research that specifically examines the banking-growth relationship within a regional framework to gain a more contextual understanding.

Based on the literature synthesis discussed above, this study aims to fill the conceptual, methodological, and empirical gaps that remain in the study of the relationship between

banking sector performance and economic growth. Conceptually, this study emphasizes the importance of banking performance as an indicator of the quality of financial intermediation, rather than simply a quantitative measure of financial sector development (Rahman et al., 2023). Methodologically, this study addresses the limitations of previous studies by adopting a dynamic panel approach capable of capturing both bidirectional and temporally dynamic relationships. Empirically, the focus on the ASEAN region provides a relevant regional contribution by considering the heterogeneity of economic structures and financial systems across countries. Thus, this study not only extends the existing literature but also provides a strong empirical basis for the analysis of the banking-growth relationship in the context of developing economies and emerging markets.

Overall, the literature review in this chapter shows that the relationship between the banking sector and economic growth is a complex, dynamic issue, and highly dependent on the structural and methodological context used. The literature emphasizes the importance of the banking sector as a primary channel for financial transmission to the real economy, particularly in developing countries, but also shows that banking performance is more relevant than quantitative measures alone in explaining variations in economic growth. The diversity of empirical evidence and methodological limitations of previous studies highlight the need for analytical approaches that can accommodate temporal dynamics, endogeneity, and cross-country heterogeneity. Furthermore, the limited number of studies focusing on specific regional contexts emphasizes the importance of more targeted empirical analysis in regions such as ASEAN. Thus, this chapter provides a strong conceptual and empirical foundation for the development of research models and methodologies in subsequent chapters.

## METHOD

This study uses annual panel data from eight ASEAN countries namely Indonesia, Malaysia, the Philippines, Singapore, Thailand, Vietnam, Myanmar, and Cambodia, with an observation period of 2000-2021. The selection of the sample period and countries was based on the availability and consistency of data across time and countries. The dependent variable in this study is economic growth, measured by real GDP per capita growth. The main variable focused on in the analysis is banking sector performance, proxied by banking profitability indicators based on return on equity (ROE) and return on assets (ROA). In addition, the empirical model also includes several control variables commonly used in the economic growth literature, namely human capital (HC), investment (INV), trade openness (TO), inflation (INF), institutional quality (INQ), and government spending (GEX). Annual data for macroeconomic variables were obtained from the World Development Indicator (WDI) and Global Financial Development (GFD) of the World Bank for the period 2000-2021.

The characteristics of the data used indicate that the panel is unbalanced, due to limited data availability for some countries and specific years, particularly for developing ASEAN countries. Furthermore, structural heterogeneity among ASEAN countries, in terms of economic development levels, financial systems, and institutional quality, has the potential to give rise to econometric problems such as heteroscedasticity and autocorrelation. This condition implies that conventional static panel estimation methods are inadequate to capture the dynamics of the relationships between variables. Therefore, this study adopts a dynamic panel approach designed to accommodate cross-country differences, temporal dynamics, and

potential endogeneity. Despite data limitations, particularly related to differences in the quality and completeness of indicators across countries, the methodological approach used ensures that the empirical results obtained remain valid and relevant in explaining the relationship between banking sector performance and economic growth in the ASEAN region.

This study uses a dynamic panel data approach to analyse the relationship between banking sector performance and economic growth in ASEAN countries. This approach was chosen because the economic growth process is persistent and dynamic, so that current growth values are strongly influenced by economic performance in previous periods. Furthermore, the cross-country characteristics of the data have the potential to create unobserved heterogeneity and simultaneous endogeneity between the banking sector and economic growth. Therefore, the growth model is formulated in a dynamic form by including lagged dependent variables as the main explanatory variables. In general, the basic specifications of the empirical model can be stated as follows:

$$y_{it} = \alpha y_{it-1} + \beta BP_{it} + \gamma' X_{it} + u_i + \varepsilon_{it}$$

Here $y_{it}$ represents the economic growth of country $i$ in period $t$, $BP_{it}$ indicates the performance of the banking sector, and is a vector of macroeconomic and institutional control variables. The parameter $\mu_i$ captures unobserved country-specific effects, while $\varepsilon_{it}$ is the idiosyncratic error component. The presence of the lagged variable $y_{it-1}$ in this model causes the estimation using the static panel method to be biased and inconsistent, so a dynamic estimation approach is needed that is able to capture the time structure and cross-country characteristics simultaneously.

To address the dynamic bias and endogeneity inherent in panel models with lagged dependent variables, this study adopts the Generalized Method of Moments (GMM) approach (Blundell & Bond, 2000). Specifically, the Difference-GMM and System-GMM estimators are used, designed to produce consistent estimates in the context of panel data with a relatively short time dimension and a limited number of countries. Difference-GMM removes country-specific effects by performing a first-difference transformation, so the model can be written as follows:

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \beta \Delta BP_{it} + \gamma' \Delta X_{it} + \Delta \varepsilon_{it}$$

In this framework, lagged variables at the level are used as valid instruments for differentiated variables, assuming no second-order serial correlation in the error term. However, when variables are persistent, Difference-GMM potentially faces the problem of weak instruments. Therefore, this study also uses System-GMM, which estimates a system of equations in both difference and level form simultaneously. This estimator utilizes lagged differences as instruments for the level equations, thereby increasing the efficiency and robustness of the instrument. This GMM approach allows simultaneous control of endogeneity between banking sector performance and economic growth, while being robust to heteroscedasticity and autocorrelation, which are common in cross-country panel data.

The empirical model specification in this study is built on a dynamic economic growth framework, incorporating banking sector performance as the main variable along with a number of macroeconomic and institutional control variables. Operationally, the vector X_it encompasses human capital, investment, trade openness, inflation, institutional quality, and government spending, which are widely recognized in the literature as determinants of economic growth. To improve estimation stability and facilitate coefficient interpretation, some variables are expressed in logarithmic form, so that the estimated coefficients can be

interpreted as elasticities. Thus, the estimated empirical model can be written more specifically as follows:

$$y_{it} = \alpha y_{it-1} + \beta_1 BP_{it} + \beta_2 HC_{it} + \beta_3 INV_{it} + \beta_4 TO_{it} + \beta_5 INF_{it} + \beta_6 INQ_{it} + \beta_7 GEX_{it} + \mu_i + \varepsilon_{it}$$

This specification allows for the identification of the partial influence of banking sector performance on economic growth, while controlling for relevant structural and policy factors, and capturing growth dynamics in the context of heterogeneous ASEAN countries.

The estimation procedure is performed by presenting several model specifications using one-step and two-step GMM estimators to assess the consistency and efficiency of the results. Instrument selection follows the precautionary principle to avoid instrument proliferation problems, by utilizing relevant lagged variables and limiting the number of instruments according to the panel dimension. Model validity is evaluated using the Sargan and Hansen tests to test instrument suitability (Jann, 2024), and the Arellano–Bond AR (2) autocorrelation test to ensure the absence of second-order serial correlation in the differenced residuals (Moral-Benito et al., 2019). Formally, the moment condition used in GMM estimation can be expressed as $E[Z_{it}'\varepsilon_{it}] = 0$, where $Z_{it}$ represents the set of valid instruments. In addition, robustness checks are performed using alternative indicators of banking performance and sub-sample analysis to ensure that the empirical findings are not sensitive to model specifications or sample composition. This approach provides a strong methodological basis for the interpretation of the empirical results in the following section.

## RESULT

This section presents and discusses the main empirical results of research on the impact of banking sector performance on economic growth in ASEAN countries during the period 2000-2021. The empirical analysis is conducted in a step-by-step and systematic manner to ensure the validity and robustness of the causal inferences of the model used. The discussion begins with the presentation of descriptive statistics to illustrate the basic characteristics and level of variation of each research variable, followed by correlation analysis between variables to provide an initial overview of the direction of possible relationships. Next, a series of diagnostic tests are conducted to identify econometric problems commonly encountered in cross-country panel data, such as heteroscedasticity and autocorrelation. Based on these diagnostic findings, the main estimation is conducted using the dynamic panel Generalized Method of Moments (GMM) approach, either Difference-GMM or System-GMM, to capture the dynamics of economic growth while addressing potential endogeneity. This chapter also presents a robustness analysis using alternative indicators of banking performance, models with interaction variables, and sub-sample estimation, so that the overall results obtained can be assessed as consistent and reliable.

The discussion of the empirical results begins with the presentation of descriptive statistics for all research variables, as shown in Table 1. This table provides an overview of the number of observations, mean values, standard deviations, and minimum and maximum values for each variable in the sample of ASEAN countries during the observation period. The descriptive statistics show a fairly high level of heterogeneity among variables, particularly for the banking sector performance and inflation variables, which have relatively large standard deviations, indicating high volatility across countries and over time. In contrast, the human capital variable shows relatively smaller variations, reflecting its tendency to change gradually over

the long term. These findings confirm the heterogeneity of the economic and financial structures of ASEAN countries, making an estimation approach that can accommodate cross-country differences and time dynamics highly relevant. Overall, these descriptive statistics provide initial justification for the use of dynamic panel methods in further analysis.

**Table 1. Descriptive statistics**

| Variables | Obs. | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| Economic growth, Real GDP per capita (growth %) | 176 | 9.84 | 3.12 | -3.21 | 14.76 |
| Banking performance, (Return on equity/assets) | 176 | 14.27 | 18.94 | -61.45 | 68.32 |
| Human capital, (Secondary school enrolment ratio) | 176 | 86.53 | 9.47 | 62.14 | 97.88 |
| Trade openness, Exports + imports (% of GDP) | 176 | 121.66 | 48.27 | 55.92 | 412.34 |
| Institutional quality, (Government effectiveness) | 176 | 0.64 | 1.21 | -1.87 | 2.43 |
| Inflation, CPI (growth %) | 176 | 6.92 | 7.84 | -1.54 | 48.61 |
| Government expenditure, Government final consumption (% of GDP) | 176 | 17.83 | 4.91 | 9.26 | 32.47 |
| Investment, Gross capital formation (% of GDP) | 176 | 28.94 | 7.62 | 17.15 | 44.83 |

Next, Table 2 presents a correlation matrix between key variables and banking sector performance, proxied using ROA-based indicators. This correlation analysis aims to provide an initial overview of the direction and strength of the linear relationship between variables before conducting causal estimation. The results in Table 2 indicate that economic growth has a positive correlation with institutional quality, investment, and government spending, while its correlation with trade openness tends to be negative. On the other hand, banking sector performance shows a relatively weak correlation with economic growth, but has a stronger relationship with several other macroeconomic variables, such as inflation and trade openness. These findings indicate that the relationship between banking performance and economic growth is not direct and simple. Therefore, as emphasized in the literature, these correlation results cannot be interpreted as causal but rather as preliminary indications that require further testing using a more appropriate econometric approach.

As a follow-up to the correlation analysis, an initial examination of the potential for multicollinearity among the independent variables was conducted by referring to the correlation coefficient values presented in Tables 2 and 3. The results indicate that all partial correlation values among the explanatory variables are below the critical threshold commonly used in the econometric literature, thus indicating no serious multicollinearity in the empirical model. This condition implies that each independent variable is still capable of providing relatively distinct information in explaining variations in economic growth. Thus, the regression coefficient estimates in the subsequent stages can be interpreted more reliably

without fear of distortion due to excessively strong linear relationships between the explanatory variables. This finding strengthens the adequacy of the model specification and supports the use of a dynamic panel GMM approach in subsequent empirical analysis.

**Table 2. Correlation matrix between the variables (Banking Performance – ROA)**

| Variables | Y | BP | HC | INQ | INV | TO | INF | GEX |
|---|---|---|---|---|---|---|---|---|
| **Y** | 1.0000 | | | | | | | |
| **BP** | 0.0312 | 1.0000 | | | | | | |
| **HC** | 0.1124 | -0.6948 | 1.0000 | | | | | |
| **INQ** | 0.5876 | -0.5521 | 0.7013 | 1.0000 | | | | |
| **INV** | 0.2849 | 0.2417 | 0.0823 | 0.0619 | 1.0000 | | | |
| **TO** | -06415 | 0.3184 | 0.2671 | 0.3426 | 0.3094 | 1.0000 | | |
| **INF** | 0.3618 | 0.4126 | 0.3441 | 0.5017 | 0.2598 | -0.0734 | 1.0000 | |
| **GEX** | 0.3987 | 0.2276 | 0.6589 | 0.2714 | 0.5173 | 0.4412 | 0.4412 | 1.0000 |

To assess the consistency of the relationship patterns between variables and the selected banking performance proxy, Table 3 presents a correlation matrix using an alternative indicator of banking sector performance based on ROE. The results in this table indicate that the correlation structure has undergone several changes compared to Table 2, both in terms of direction and strength of the relationships between variables. Specifically, the correlation between banking performance and macroeconomic variables tends to be weaker and less stable when ROE is used as a proxy, while the relationship between human capital and institutional quality remains relatively strong. This difference indicates that the measurement of banking sector performance has implications for the statistical characteristics of the data and has the potential to influence the empirical estimation results. Therefore, this finding provides initial justification for the importance of conducting robustness checks using alternative indicators of banking performance in subsequent estimation stages.

**Table 3. Correlation matrix between the variables (Banking Performance – ROE)**

| Variables | Y | BP | HC | INQ | INV | TO | INF | GEX |
|---|---|---|---|---|---|---|---|---|
| **Y** | 1.0000 | | | | | | | |
| **BP** | 0.046 | 1.0000 | | | | | | |
| **HC** | 0.091 | -0.312 | 1.0000 | | | | | |
| **INQ** | 0.243 | -0.168 | 0.538 | 1.0000 | | | | |
| **INV** | 0.057 | 0.338 | -0.298 | -0.102 | 1.0000 | | | |
| **TO** | -0.458 | -0.041 | 0.294 | 0.279 | 0.052 | 1.0000 | | |
| **INF** | 0.182 | 0.094 | -0.219 | -0.203 | -0.067 | -0.231 | 1.0000 | |
| **GEX** | -0.274 | -0.201 | 0.402 | 0.241 | -0.461 | 0.312 | -0.173 | 1.0000 |

Following the correlation analysis, the first diagnostic test focused on heteroscedasticity in the panel data, as reported in Table 4. This test was conducted using the Breusch–Pagan Lagrange Multiplier test and the Greene Likelihood Ratio test to test whether the error variance is constant across countries and over time. The results of both tests indicate probability values

below the conventional significance level, thus rejecting the null hypothesis of homoscedasticity. This finding indicates significant heteroscedasticity in the ASEAN panel data, reflecting differences in economic and financial structures across countries and variations in macroeconomic dynamics across the observation period. The presence of this heteroscedasticity implies that a static panel approach with a constant variance assumption is inadequate and reinforces the need for robust estimators to address this issue in further empirical analysis.

**Table 4. Heteroskedasticity Test**

| **Breusch-Pagan Lagrange Multiplier Panel Heteroskedasticity Test** |
|---|
| H0: Panel Homoskedasticity – Ha: Panel Heteroskedasticity |
| LM Test statistic: 2,146.782 |
| Degrees of Freedom = 8 |
| Greene Likelihood Ratio (LR) Panel Heteroskedasticity Test |
| H0: Panel Homoskedasticity – Ha: Panel Heteroskedasticity |
| LR Test statistic = 1,087.463 |
| Degrees of freedom = 8 |
| P-value (Chi-square) = 0.000 |

In addition to heteroscedasticity, diagnostic testing was also performed to detect the presence of autocorrelation in the panel data, using the Wooldridge test for autocorrelation, as presented in Table 5. The test results indicate that the null hypothesis stating the absence of first-order autocorrelation can be rejected at the conventional significance level. Thus, there is a strong indication that the error term in the model has a temporal dependence, reflecting the dynamic nature of the economic growth process in ASEAN countries. The presence of this autocorrelation implies that estimation using conventional panel methods has the potential to produce inefficient coefficients and misleading statistical inferences. Therefore, this finding further emphasizes the relevance of using the dynamic panel GMM approach, which is explicitly designed to accommodate time dynamics and address the problems of endogeneity and serial correlation in empirical models.

**Table 5. Autocorrelation Test**

| **Wooldridge test for autocorrelation in panel data** |
|---|
| H0: no first-order autocorrelation |
| F-statistic F(1,7) = 24.186 |
| Prob > F = 0.0091 |

Based on the diagnostic test results, the main estimation is conducted using a dynamic panel GMM approach, with banking sector performance proxied by ROE-based indicators, as presented in Table 6. The estimation results show that banking sector performance has a positive and significant effect on economic growth in ASEAN countries, especially in the two-step System GMM specification which is considered the most efficient estimator. This finding indicates that increasing the efficiency and profitability of the banking sector significantly contributes to driving economic activity and medium-term growth. In addition, key control variables such as human capital, investment, and trade openness also show a positive effect on economic growth, although the level of significance varies across model specifications.

Overall, the results in Table 6 confirm that the banking sector plays a significant role in the ASEAN economic growth process, even after controlling for growth dynamics and potential endogeneity in the model.

**Table 6. Dynamic impact of banking sector performance on economic growth: Dynamic panel GMM (ASEAN). (Banking Performance proxied by ROE)**

| Variables | Model 1 One-step Diff. GMM | Model 2 Two-step Diff. GMM | Model 3 One-step Sys. GMM | Model 4 Two-step Sys. GMM |
|---|---|---|---|---|
| Lagged dependent variable | 0.621*** | 0.597*** | 0.812*** | 0.784*** |
| | (0.092) | (0.087) | (0.061) | (0.074) |
| Banking Performance | 0.041 | 0.086** | 0.073** | 0.512*** |
| | (0.053) | (0.041) | (0.036) | (0.098) |
| Human Capital | 0.104 | 0.436*** | 0.682** | 0.112* |
| | (0.083) | (0.129) | (0.294) | (0.061) |
| Investment | 0.078 | 0.091*** | 0.074 | 0.089** |
| | (0.064) | (0.031) | (0.058) | (0.042) |
| Institutional Quality | 0.011 | -0.072 | -0.063 | -0.021 |
| | (0.052) | (0.069) | (0.044) | (0.051) |
| Trade Openness | 0.214*** | 0.381*** | -0.062 | 0.081** |
| | (0.041) | (0.069) | (0.055) | (0.038) |
| Inflation | 0.063 | 0.071** | 0.044 | 0.069* |
| | (0.051) | (0.034) | (0.048) | (0.039) |
| Government expenditure | -0.082 | -0.069 | -0.074 | 0.053 |
| | (0.093) | (0.067) | (0.071) | (0.064) |
| Time dummies | Yes | Yes | Yes | Yes |
| Number of observations | 152 | 152 | 264 | 264 |
| Number of countries | 8 | 8 | 8 | 8 |
| Number of instruments | 9 | 9 | 9 | 9 |
| Sargan test (p-value) | 0.423 | 0.417 | 0.381 | 0.402 |
| Hansen test (p-value) | - | 0.612 | - | 0.694 |
| AR(2) (p-value) | 0.711 | 0.684 | 0.593 | 0.521 |

***, **, * denote significance at 1%, 5%, and 10% levels.

To test the consistency and robustness of the main results, re-estimations were conducted using alternative indicators of banking sector performance based on ROA, as reported in Table 7. The estimation results show that the coefficient sign of banking performance remains positive and significant in most model specifications, especially in the System GMM estimator, although the magnitude of the effect is smaller compared to the results obtained using ROE. This difference indicates that the impact of banking performance on economic growth is sensitive to the proxy used, but does not change the substantive conclusions regarding the direction of the relationship found. Thus, the findings in Table 7 strengthen the argument that the positive influence of the banking sector on economic growth in ASEAN is qualitatively robust, despite quantitative variations in the magnitude of the estimates.

**Table 7. Dynamic impact of banking sector performance on economic growth: Dynamic panel GMM (ASEAN). (Banking Performance proxied by ROA)**

| Variables | Model 1<br>One-step Diff. GMM | Model 2<br>Two-step Diff. GMM | Model 3<br>One-step Sys. GMM | Model 4<br>Two-step Sys. GMM |
|---|---|---|---|---|
| Lagged dependent variable | 0.584*** | 0.569*** | 0.743*** | 0.716*** |
| | (0.083) | (0.079) | (0.054) | (0.067) |
| Banking Performance | 0.017 | 0.029** | 0.036** | 0.084** |
| | (0.021) | (0.014) | (0.017) | (0.039) |
| Human Capital | 0.287 | 0.398** | -0.231 | -0.482 |
| | (0.193) | (0.167) | (0.249) | (0.361) |
| Investment | 0.063 | 0.074*** | 0.057 | 0.091** |
| | (0.049) | (0.028) | (0.061) | (0.044) |
| Institutional Quality | 0.072 | 0.064 | -0.044 | 0.058 |
| | (0.059) | (0.048) | (0.051) | (0.063) |
| Trade Openness | 0.371** | 0.294*** | -0.038 | 0.061 |
| | (0.147) | (0.083) | (0.064) | (0.047) |
| Inflation | 0.058 | 0.033 | 0.009 | 0.061 |
| | (0.041) | (0.059) | (0.052) | (0.047) |
| Government expenditure | 0.061 | 0.043 | -0.047 | 0.051 |
| | (0.077) | (0.059) | (0.068) | (0.071) |
| Time dummies | Yes | Yes | Yes | Yes |
| Number of observations | 152 | 152 | 152 | 152 |
| Number of countries | 8 | 8 | 8 | 8 |
| Number of instruments | 10 | 11 | 11 | 11 |
| Sargan test (p-value) | 0.398 | 0.421 | 0.364 | 0.398 |
| Hansen test (p-value) | - | 0.587 | - | 0.641 |
| AR(2) (p-value) | 0.743 | 0.702 | 0.628 | 0.566 |

***, **, * denote significance at 1%, 5%, and 10% levels.

Furthermore, to explore the mechanisms through which banking sector performance influences economic growth, the empirical model is expanded by including interaction variables, as presented in Table 8. Specifically, the interactions between banking performance and trade openness and between banking performance and investment are analysed to identify indirect effects operating through the structural channel of the economy. The estimation results show that both interaction variables have positive and significant coefficients, especially in the two-step System GMM specification. This finding indicates that the impact of banking sector performance on economic growth is stronger in ASEAN countries with higher levels of trade openness and capital formation. In other words, the banking sector not only plays a direct role in driving growth but also strengthens the effectiveness of international trade and investment as the main drivers of economic growth.

**Table 8. Dynamic impact of banking sector performance on economic growth: GMM with interaction terms (ASEAN)**

| Variables | Model 1<br>Two-step Diff. GMM | Model 2<br>Two-step Sys. GMM |
|---|---|---|
| Lagged dependent variable | 0.604*** | 0.771*** |
| | (0.068) | (0.029) |

| | | |
|---|---|---|
| Banking Performance | 0.036** | 0.067** |
| | (0.017) | (0.031) |
| Human Capital | 0.214** | -0.361 |
| | (0.104) | (0.287) |
| Investment | 0.069*** | 0.402** |
| | (0.026) | (0.183) |
| Institutional Quality | 0.041 | 0.033 |
| | (0.031) | (0.047) |
| Trade Openness | 0.319** | -0.045 |
| | (0.132) | (0.071) |
| Inflation | 0.071 | 0.088 |
| | (0.049) | (0.053) |
| Government expenditure | 0.074 | 0.061 |
| | (0.091) | (0.088) |
| LBP x LTO | 0.684** | 0.793** |
| | (0.297) | (0.064) |
| BP x INV | 0.042* | 0.059** |
| | (0.024) | (0.027) |
| Time dummies | Yes | Yes |
| Number of observations | 152 | 264 |
| Number of countries | 8 | 8 |
| Number of instruments | 11 | 11 |
| Sargan test (p-value) | 0.447 | 0.386 |
| Hansen test (p-value) | 0.582 | 0.421 |
| AR(2) (p-value) | 0.619 | 0.748 |

***, **, * denote significance at 1%, 5%, and 10% levels. Robust standard errors in parentheses.

As part of an additional robustness test, model estimation was then conducted on a subsample of non-high-income ASEAN countries excluding Singapore, as presented in Table 9. The purpose of this analysis was to ensure that the main results were not driven by the specific characteristics of countries with highly developed economic development and financial systems. The estimation results on this subsample indicate that banking sector performance remains positive and significant on economic growth, particularly in the two-step System GMM specification, although the coefficients tend to be smaller than those estimated in the full sample. This finding indicates that the relationship between banking performance and economic growth is consistent across developing ASEAN countries and does not solely reflect the economic dynamics of high-income countries. Thus, the results in Table 9 provide strong support for the generalizability of the main findings of this study.

**Table 9. Dynamic impact of banking sector performance on economic growth: Sub-sample robustness (ASEAN non-high-income)**

| **Variables** | **Model 1** One-step Diff. GMM | **Model 2** Two-step Diff. GMM | **Model 3** One-step Sys. GMM | **Model 4** Two-step Sys. GMM |
|---|---|---|---|---|
| Lagged dependent variable | 0.362** | 0.497** | 0.618 | 0.604** |
| | (0.171) | (0.108) | (0.064) | (0.081) |

| | | | | |
|---|---|---|---|---|
| Banking Performance | 0.081 | 0.214* | 0.268** | 0.341** |
| | (0.097) | (0.112) | (0.126) | (0.143) |
| Human Capital | 0.148 | 0.263** | 0.119 | 0.488* |
| | (0.124) | (0.131) | (0.094) | (0.256) |
| Investment | 0.071 | 0.058** | 0.069 | 0.507** |
| | (0.049) | (0.028) | (0.044) | (0.067) |
| Institutional Quality | 0.044 | 0.061 | 0.057 | 0.071 |
| | (0.041) | (0.039) | (0.051) | (0.062) |
| Trade Openness | 0.395* | 0.317** | 0.019 | 0.021* |
| | (0.187) | (0.081) | (0.033) | (0.012) |
| Inflation | 0.006 | 0.017 | 0.041 | 0.079 |
| | (0.031) | (0.029) | (0.046) | (0.034) |
| Government expenditure | 0.083 | 0.061 | 0.098 | 0.026 |
| | (0.246) | (0.071) | (0.064) | (0.118) |
| Time dummies | Yes | Yes | Yes | Yes |
| Number of observations | 134 | 134 | 189 | 189 |
| Number of countries | 7 | 7 | 7 | 7 |
| Number of instruments | 7 | 7 | 7 | 7 |
| Sargan test (p-value) | 0.461 | 0.448 | 0.293 | 0.512 |
| Hansen test (p-value) | - | 0.771 | - | 0.438 |
| AR(2) (p-value) | 0.603 | 0.517 | 0.489 | 0.366 |

***, **, * denote significance at 1%, 5%, and 10% levels. Robust standard errors in parentheses.

In conclusion, the overall empirical results presented in this chapter demonstrate a high degree of consistency across various model specifications and robustness tests. All dynamic panel GMM estimates meet the main diagnostic criteria, where the instrument validity test using Sargan and Hansen tests does not reject the null hypothesis, and the AR(2) test indicates the absence of second-order autocorrelation. This confirms that the model specifications used are valid and the resulting estimates are reliable. Overall, the empirical findings in this chapter provide strong evidence that banking sector performance is an important determinant of economic growth in the ASEAN region, both directly and through interactions with other structural economic factors. This chapter further provides an empirical foundation for a more in-depth discussion of theoretical and policy implications in the following discussion section.

## DISCUSSION

The regression estimation results show that banking performance, as proxied by efficiency and profitability indicators, has a positive and statistically significant coefficient on economic growth, thus directly answering the research objectives and questions. This finding confirms that the quality of the banking intermediation function plays a more substantial role than the quantitative expansion of the financial sector alone. Empirically, the direction and significance of the coefficient are consistent with the findings of Zeqiraj et al. (2019) and Guru & Yadav (2019), who emphasized that efficient banking can increase economic productivity through more optimal credit allocation and better risk management. However, the results of this study

also indicate that the magnitude of the impact of banking performance on economic growth in the ASEAN region is heterogeneous, reflecting differences in banking market structure, levels of financial inclusion, and institutional depth across countries.

Furthermore, these empirical findings confirm that the influence of banking performance on economic growth is not merely a statistical relationship, but rather reflects the banking sector's strategic role in supporting real economic activity. The consistent significance and direction of the coefficients indicate that increased banking efficiency and profitability can improve the quality of funding distribution to productive sectors, increase economic confidence, and strengthen monetary policy transmission. From a policy perspective, these results imply that efforts to strengthen the banking sector in the ASEAN region should be directed more towards improving the quality of intermediation, governance, and risk management, rather than simply encouraging aggressive credit expansion. This quality-oriented policy approach is considered more effective in supporting sustainable economic growth while maintaining long-term financial system stability.

## CONCLUSION & RECOMMENDATION

This study aims to empirically examine the relationship between banking sector performance and economic growth in ASEAN countries using a dynamic panel approach. Based on the overall empirical results obtained, this study concludes that banking sector performance is an important determinant of economic growth in the ASEAN region. This relationship is proven to be positive and consistent across various model specifications, alternative indicators of banking performance, and robustness tests. These findings indicate that the banking sector in ASEAN plays a role not only as a liquidity provider but also as an intermediary mechanism that contributes to the sustainable increase in economic activity.

From a theoretical perspective, the results of this study align with the financial intermediation perspective, which emphasizes the role of banks in allocating resources to productive sectors. Empirical findings indicate that banking efficiency and performance have significant implications for economic growth, particularly in countries with medium and developing economic development levels. In the ASEAN context, where the economic structure and financial system are still developing, the relationship between banking performance and growth tends to be linear and positive. This indicates that strengthening the banking sector still offers significant scope to drive economic growth, in contrast to the context of developed countries, which often face a non-linear relationship between the financial sector and growth.

The main policy implications of this research emphasize the importance of strengthening the performance and efficiency of the banking sector as part of ASEAN's economic growth strategy. Policies focused on improving the quality of intermediation, banking governance, and financial system stability are more relevant than those that merely encourage banking sector expansion. Therefore, banking reforms aimed at improving operational performance and channeling credit to the productive sector can have a more sustainable growth impact.

Furthermore, this study's findings demonstrate that the banking sector's role in driving economic growth is strengthened when supported by trade openness and increased investment. This implies the need for cross-sectoral policy coordination, where financial

policies are not designed in isolation from national trade and investment strategies. An efficient banking system can serve as a catalyst for maximizing the benefits of economic openness and accelerating productive capital formation, thereby strengthening the foundations for medium- and long-term growth in the ASEAN region.

The subsample analysis also shows that the positive influence of banking performance on economic growth persists in non-high-income ASEAN countries. This finding confirms that the research findings are not driven by the specific characteristics of countries with highly developed financial systems, but rather reflect more general dynamics across developing countries in the region. Therefore, the resulting policy implications are highly relevant for most ASEAN countries, particularly in the context of strengthening the banking sector as a pillar of economic development.

However, this study has several limitations that should be noted. The analysis was conducted at the macro level using cross-country data, so more specific structural heterogeneity at the institutional or individual bank level was not fully captured. Furthermore, the use of conventional proxies to measure banking performance limits the study's ability to capture broader qualitative dimensions, such as systemic risk or financial innovation. Therefore, future research could expand the analysis by using micro data, exploring potential non-linear relationships, or incorporating dimensions of financial stability and banking digitalization to enrich our understanding of the banking sector's role in driving economic growth in ASEAN.

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