

Bank's Management Efficiency and Credit Risk In The ASEAN-6 Banking Industry

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ABSTRACT

This study investigates the impact of management efficiency on credit risk in the ASEAN-6 banking industry, comprising Singapore, Malaysia, Indonesia, Thailand, Vietnam, and the Philippines. We analyze a sample of 122 banks from 2009 to 2022, utilizing panel data analysis with a random effect model (REM). The study addresses four key research questions: (1) What is the impact of management efficiency on credit risk? (2) Does bank size moderate the relationship between management efficiency and credit risk? (3) Does the corruption index moderate the relationship between management efficiency and credit risk? (4) Does Islamic banking perform better than conventional banks?

Our findings reveal a negative and significant relationship between management efficiency and credit risk, indicating that higher management efficiency leads to increased credit risk. The study also finds that Islamic banks exhibit higher credit risk compared to conventional banks. Interaction effects show that larger banks and those in less corrupt countries tend to have lower credit risk. These results suggest that while efficient management practices are crucial, they may lead to higher risk if not accompanied by adequate risk management strategies. Additionally, the regulatory environment and bank size play a significant role in mitigating credit risk. The implications of these findings are vital for bank managers and policymakers. Bank managers should balance efficiency with robust risk management practices, and policymakers should consider the regulatory environment and corruption levels when formulating policies for the banking sector.

Keywords: Management Efficiency, Credit Risk, Islamic Banking, Bank Size, and Corruption Index.

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INTRODUCTION

The efficiency of bank management is a critical determinant of the stability and performance of the banking sector. Effective management practices are essential for mitigating risks and ensuring sustainable growth, particularly in the dynamic and diverse economic environments of the ASEAN-6 countries: Singapore, Malaysia, Indonesia, Thailand, Vietnam, and the Philippines. This study aims to explore the impact of management efficiency on credit risk within this region, focusing on how bank size and institutional factors, such as corruption, moderate this relationship.

Management efficiency, often measured by the cost-to-income ratio, indicates how well a bank utilizes its resources to generate income. A lower ratio suggests higher efficiency, while a higher ratio indicates inefficiency. Prior research has shown that efficient management can significantly reduce operational costs and improve profitability (Berger & DeYoung, 1997; Louzis et al., 2012). However, there is also evidence suggesting that increased efficiency might be associated with higher risk-taking, as banks may reduce expenditure on risk management to cut costs (Ghosh, 2015).

Credit risk remains a prominent concern in banking, directly impacting a bank's financial performance and stability. In this study, credit risk is measured using the ratio of total loans to total assets, which indicates the proportion of a bank's assets that are invested in loans. High levels of this ratio can suggest an aggressive lending strategy, leading to higher credit risk if not managed properly. Studies have shown that high levels of non-performing loans (NPLs) can indicate poor credit risk management and adversely affect a bank's profitability and solvency (Oluwafemi et al., 2013; Chimkono et al., 2016). Effective credit risk management requires a balanced approach that ensures sufficient capital reserves while managing the risks associated with high loan levels.

The interaction between management efficiency and credit risk is further complicated by the size of the bank. Larger banks may benefit from economies of scale and more diversified portfolios, which can reduce risk (Hasanov et al., 2018). However, they may also engage in more complex and riskier financial activities, which require robust risk management practices to handle the increased complexity and associated risks (Correa & Goldberg, 2020). Additionally, the regulatory and institutional environment, particularly the level of corruption, plays a crucial role in shaping the risk profile of banks. High corruption levels can undermine regulatory effectiveness and increase systemic risks (Ghosh, 2015).

Furthermore, Islamic banking, characterized by its adherence to Sharia principles, presents unique risk management challenges and opportunities. Some studies suggest that Islamic banks are more resilient to financial crises due to their risk-sharing principles. For instance, Islamic banks demonstrated stronger resilience on average during the global financial crisis, attributed to the fundamental principles of Islamic finance, which include risk-sharing, avoidance of leverage, and speculative financial products (IMF, 2010; World Bank, 2015). However, other studies indicate that Islamic banks may face higher credit risks due to limited diversification options and reliance on specific financing contracts (Misman & Bhatti, 2020; Chamberlain et al., 2018). Recent research by Elnahass et al. (2021) during the Covid-19 pandemic found that while Islamic banks exhibited higher insolvency and asset risks, they also demonstrated superior profitability and lower operational risks compared to their conventional counterparts. Moreover, research indicates that Islamic banks were less affected in terms of financial performance and stability compared to their conventional counterparts, underscoring the robustness of their risk-sharing mechanisms.

This study addresses four primary research questions: (1) What is the impact of management efficiency on credit risk? (2) Does bank size moderate the relationship between management efficiency and credit risk? (3) Does the corruption index moderate the relationship between management efficiency and credit risk? (4) Does Islamic banking perform better than conventional banks? By analyzing data from 122 banks in the ASEAN-6 region over the period 2009-2022, this study aims to provide comprehensive insights into the interplay between management efficiency and credit risk, contributing to the literature on banking performance and risk management.

LITERATURE REVIEW

Management Efficiency and Credit Risk

The concept of management efficiency is central to understanding bank performance, particularly in relation to credit risk. Efficient management practices are essential for reducing operational costs and

enhancing profitability (Berger & DeYoung, 1997; Louzis et al., 2012). However, there is a paradox where the pursuit of efficiency might inadvertently lead to higher credit risk if banks compromise on their risk management practices to cut costs. Ghosh (2015) highlights this dilemma, noting that banks with higher efficiency may take on more risk due to reduced investment in risk management frameworks.

Recent studies have reinforced these findings, demonstrating that the relationship between management efficiency and credit risk remains significant in contemporary banking environments. A 2023 study by Pathak et al., published in McKinsey, found that banks with higher management efficiency tended to have increased credit risk, especially in volatile economic conditions. This underscores the importance of a balanced approach where efficiency gains are not achieved at the expense of robust risk management.

Impact of Bank Size

The size of a bank brings unique challenges that influence its risk profile and efficiency. Large banks often benefit from economies of scale, which can lead to lower operational costs and enhanced profitability. However, they also face increased complexities that require robust risk management frameworks. Laeven et al. (2016) noted that larger banks are subject to more stringent regulatory scrutiny, necessitating sophisticated compliance and risk management practices to handle their diverse and complex operations.

Demirgüç-Kunt and Huizinga (2010) emphasized the importance of comprehensive stress testing in large banks to predict and mitigate potential financial shocks. Such practices are crucial for understanding the potential impact of adverse economic conditions on a bank's financial health. The ability to anticipate financial shocks is a key component of effective risk management in large banks. Correa and Goldberg (2020) further argue that robust risk management practices are essential for handling the increased complexity and associated risks of larger financial institutions. They highlight the necessity for large banks to invest in advanced risk management systems to manage the higher level of risk that comes with their size and scope of operations.

Institutional Factors: The Role of Corruption

The regulatory and institutional environment, particularly the level of corruption, significantly influences banks' risk. High levels of corruption can undermine regulatory effectiveness and increase systemic risks within the banking sector (Ghosh, 2015). The corruption index, which reflects the accountability, efficiency, and credibility of a country's institutions, impacting banks' risk management practices. Karadas and Ozdemir (2023) highlights that banks operating in less corrupt environments tend to exhibit lower credit risks, as effective regulatory frameworks support better risk management. This underscores the significance of institutional factors in shaping the risk dynamics of banks, suggesting that policies aimed at reducing corruption can enhance banking stability.

Furthermore, studies have shown that the impact of corruption on bank risk profiles extends beyond regulatory inefficiencies. According to Kaufmann et al. (2011), corruption can lead to higher transaction costs and reduced investment in the banking sector, impacting not just credit risk but also the overall financial stability of the banking system. This broader impact is critical as it affects the entire financial ecosystem. North (1990) emphasized the importance of institutional development, such as strong legal frameworks and transparent governance practices, in mitigating the adverse effects of corruption and enhancing the effectiveness of regulatory environments. Effective institutional development can help create a more stable and predictable environment for banks to operate in, thereby reducing risks associated with corruption.

Islamic vs. Conventional Banking

Islamic banking, governed by Sharia principles, presents unique challenges and opportunities in risk management. Studies have shown mixed results regarding the resilience of Islamic banks compared to their conventional counterparts. Some research suggests that Islamic banks exhibit higher resilience during financial crises due to their risk-sharing principles (IMF, 2010; World Bank, 2015). However, other studies indicate that Islamic banks may face higher credit risks due to limited diversification options and reliance on specific financing contracts (Misman & Bhatti, 2020; Chamberlain et al., 2018). Elnahass et al. (2021) provide a nuanced view, showing that during the Covid-19 pandemic, Islamic banks exhibited higher insolvency and asset risks but also demonstrated superior profitability and lower operational risks compared to conventional banks. This complexity underscores the need for tailored risk management strategies in Islamic banking to balance efficiency and risk.

Additionally, specific factors contribute to the credit risk of Islamic banks. Abedifar et al. (2013) discussed how profit-and-loss sharing (PLS) contracts, despite promoting risk-sharing, expose Islamic banks to higher credit risks during economic downturns due to squeezed profit margins. Beck et al. (2013) argued that the limited availability of Sharia-compliant financial instruments restricts the ability of Islamic banks to diversify their investment portfolios, which can exacerbate credit risk exposure. This dual nature of risk and resilience in Islamic banks highlights the importance of developing tailored risk management strategies that leverage their unique strengths while mitigating their specific vulnerabilities.

Theoretical Framework

This study draws from several theoretical perspectives to provide a comprehensive understanding of the relationship between operational efficiency, cost efficiency, and risk management in banking. These theories collectively underscore the importance of optimizing processes, managing costs strategically, and aligning managerial incentives with organizational goals to enhance overall performance and stability.

Operational and Cost Efficiency Theory

Operational efficiency emphasizes the optimization of business processes and the reduction of operational costs to enhance profitability and performance. In the banking sector, efficient operations are crucial for improving risk management and maintaining financial stability. Berger and Humphrey (1997) conducted a comprehensive study on the efficiency of financial institutions, highlighting that operational efficiency significantly enhances bank performance. Similarly, Altunbas et al. (2007) found that operational efficiency is positively associated with better financial performance and improved risk management in European banks. These findings underscore the importance of streamlined operations in mitigating risks and bolstering financial resilience.

Cost efficiency theory is often linked to the broader framework of Transaction Cost Economics (TCE) proposed by Coase (1937) and further developed by Williamson (1979). TCE examines the cost of transactions and the structures that minimize these costs, providing a grand theoretical basis for understanding cost efficiency. Hughes et al. (1996) found that cost efficiency is a significant determinant of bank performance, with more cost-efficient banks showing higher profitability and lower risk. Mester (1996) analyzed the cost efficiency of banks and concluded that cost-efficient banks are better positioned to withstand financial shocks and market volatility.

In the banking sector, operational and cost efficiencies are crucial for maintaining a competitive edge and ensuring long-term sustainability. Banks that optimize their operations and manage costs effectively can reduce their overall expenses, improve their cost-income ratio, and enhance their financial stability. This efficiency also enables banks to allocate more resources towards

risk management and innovation, thereby improving their ability to handle unforeseen challenges.

By achieving operational and cost efficiency, banks can achieve a balanced approach to efficiency and risk management. This integrated approach is particularly relevant for Islamic banks in Indonesia and the ASEAN region, where unique regulatory and market conditions necessitate tailored risk management strategies. Efficient operations and cost management can help Islamic banks navigate these challenges while leveraging their unique strengths.

Agency Theory

Agency theory, as discussed by Hill and Jones (1992), posits that managers may prioritize their personal objectives over those of shareholders, potentially leading to organizational inefficiencies. In the banking context, this might result in a trade-off between achieving operational efficiency and maintaining robust risk management practices. When managers focus solely on operational efficiency without adequate consideration of risk management, the bank may be exposed to greater risks, undermining financial stability. This theory underscores the need for balanced management practices that align the interests of managers and shareholders while ensuring effective risk mitigation.

Empirical Evidence from Recent Studies

Empirical studies have extensively explored the relationship between management efficiency and credit risk across various banking environments. Louzis et al. (2012) found that efficient management practices in Greek banks were associated with lower non-performing loans, indicating that operational efficiency can contribute to better credit risk management in certain contexts. Conversely, Oluwafemi et al. (2013) showed that higher efficiency in Nigerian banks correlated with higher credit risk, highlighting the potential trade-offs and contextual nuances that can influence this relationship.

Further insights come from recent studies that delve into the impact of technological integration and stringent risk controls on credit risk. Tan (2016) found that technological integration significantly reduced credit risk in Chinese banks by enhancing management efficiency and innovation in risk management practices. This suggests that the adoption of advanced technologies can play a crucial role in mitigating credit risk through improved efficiency.

Similarly, Dietrich and Wanzenried (2011) emphasized that efficient management, coupled with stringent risk controls, effectively reduced the likelihood of loan defaults in Swiss banks. This indicates that not only operational efficiency, but also robust risk management frameworks are essential for minimizing credit risk. These findings collectively highlight that while management efficiency is a critical factor in reducing credit risk, the specific outcomes are influenced by the broader economic, regulatory, and technological environment in which banks operate. Understanding these nuances can help in developing tailored risk management strategies that are effective across different contexts.

METHOD

This study examines the impact of management efficiency on credit risk in the ASEAN-6 banking industry, which includes Singapore, Malaysia, Indonesia, Thailand, Vietnam, and the Philippines. These countries were selected due to their significant contribution to ASEAN's GDP, reaching 70% (Statista, 2022), indicating their importance to the regional economy. The sample consists of 122 banks from 2009 to 2022.

The main model of the study is described as follow:

$$CR_{it} = a_0 + a_1 IB_{it} + a_2 ME_{it} + a_3 Bank_{it-1} + a_4 Macro_{jt-1} + a_5 CORR_{jt-1} + a_6 COV_{jt} + \varepsilon_{ijt} \dots\dots\dots(1)$$

Where a_0 is the constant, and $a_1 - a_6$ are coefficients. The subscripts i, t , and j denote the bank, time, and country respectively, while ε_{ijt} represents the error term. The dependent variable, credit risk (CR), is calculated as the ratio of total loans to total assets, indicating the level of risk associated with the bank's lending activities. The main independent variable, management efficiency (ME), is proxied by the cost-to-income ratio. A lower ME score indicates higher management efficiency, whereas a higher score indicates lower efficiency.

Additionally, control variables include dummy variables for the type of bank (IB), where 1 represents an Islamic bank and 0 a conventional bank. Other control variables are the bank's size (SIZE), calculated as the logarithm of the bank's total assets, and loan growth (LNGR), defined as $\frac{Loan_t - loan_{t-1}}{Loan_{t-1}} \times 100\%$. Moreover, the capital to liability ratio (CAPLIB) is used as a proxy for the bank's ability to fulfil its liabilities. The macroeconomic variables in the model consist of bank concentration (CONS), calculated as the proportion of assets held by the three largest banks in the country, economic growth (EG), measured as $\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \times 100\%$, and the inflation (INF) rate is calculated using the price consumer index at the country level. For the institutional development variable, we use the corruption index (CORR) as a proxy, reflecting the accountability, efficiency, and credibility of a country's institutions based on the World Bank Indicator (WBI). Additionally, the COV variable is a dummy variable where 1 represents the years 2020 to 2021, indicating the period of financial turmoil during the pandemic, and 0 represents other periods.

$$CR_{it} = a_0 + a_1 IB_{it} + a_2 ME_{it} + a_3 ME * SIZE_{it} + a_4 Bank_{it-1} + a_5 Macro_{jt-1} + a_6 CORR_{jt-1} + a_7 COV_{jt} + \varepsilon_{ijt} \dots\dots\dots (2)$$

$$CR_{it} = a_0 + a_1 IB_{it} + a_2 ME_{it} + a_3 ME * CORR_{it} + a_4 Bank_{it-1} + a_5 Macro_{jt-1} + a_6 CORR_{jt-1} + a_7 COV_{jt} + \varepsilon_{ijt} \dots\dots\dots (3)$$

To answer the second research question, the interaction between SIZE and ME is analyzed as shown in equation (2). Similarly, CORR is interacted with ME to address the third research question, as depicted in equation (3). For both the second and third questions, the marginal effect of ME on the bank's credit risk is calculated by considering the interaction terms in equations (2) and (3). To examine the marginal effect of ME, we adopt the approach of Law et al. (2020) and Danlami et al. (2022) using the following equation:

$$\frac{\partial CR_{it}}{\partial ME_{it}} = \beta_2 + \alpha SIZE_{it} \dots\dots\dots (4)$$

$$\frac{\partial CR_{it}}{\partial ME_{it}} = \beta_2 + \alpha CORR_{it} \dots\dots\dots (5)$$

Where β_2 represents the coefficient of ME, and α is the coefficient of the interaction variable between ME and SIZE in equation (2) and between ME and CORR in equation (3). According to Brambor et al. (2006), interaction effects cannot be interpreted solely from the coefficients of the interacting variables or every single variable that becomes the element of interaction. Instead, they must be assessed using equations (4) and (5), which involve calculating the new standard error.

The fourth research question will be answered based on the value and significance of the IB coefficient. If IB is significant, it indicates a difference between Islamic and conventional banks. A negative sign of the IB coefficient suggests that Islamic banks are less risky than conventional banks, while a positive sign indicates the opposite.

To estimate the model, we adopt panel data analysis using the random effect model (REM) due to the presence of time-invariant variables, following previous studies by Mohammad et al. (2020) and Fakhrunnas and Nahda (2023). Additionally, we conduct robustness tests to ensure the consistency of the results, as suggested by Ibrahim and Law (2019) and Kim et al. (2020). These tests include using the selected bank's size, two-stage least square (2SLS), and Hausman-Taylor regression. Finally, a one-

period lag is applied to the independent variables to address potential causality issues with the dependent variable.

RESULTS

Table 1 provides a description of the variables used in the study. The yearly average credit risk (CR) in the ASEAN-6 banking industry is 55%, with the lowest CR at 5% and the highest at 83%. This percentage indicates the bank's aggressiveness in providing credit to its customers; a higher CR percentage suggests higher risk exposure. Additionally, the average management efficiency (ME) score is 64%. A higher ME score indicates less efficient management, as it means higher costs relative to income. Conversely, a lower ME score reflects higher efficiency, indicating that the bank spends less to generate more profit. The average loan growth (LNGR) shows healthy financing growth within the banking sector, as it demonstrates double-digit yearly growth.

However, there is significant disparity in bank size within the ASEAN-6, as evidenced by the standard deviation of assets reaching USD 29.2 billion. This variation is likely due to different characteristics of the banking industries in each country. For instance, in Indonesia, most banks are focused on retail banking and offer limited banking products, often being government-owned at the provincial level to support regional development. In contrast, Singapore does not require regional banks to stimulate the local economy due to different regional characteristics. Another notable finding from Table 1 is the banking concentration, which reveals that in some years, three banks can control 100% of the assets in the industry. This indicates a strong domination of the banking sector by a small number of banks.

Table 1. Description of Variables

Variable	Obs	Mean	Std. dev.	Min	Max
CR	1,472	55.32%	17.99%	5.15%	82.79%
Islamic	1,521	0.14	0.35	0.00	1.00
ME	1,490	64.11%	45.17%	9.57%	356.95 %
CAPLIB	1,521	44.55%	153.97%	1.62%	1270.06%
LNGR	1,396	15.66%	32.37%	-37.58%	206.90%
ASSET	1,521	USD 11.7 Bn	USD 29.2 Bn	USD 0.019 Bn	USD 214 Bn
CONS	1,410	49.55%	14.21%	37.85%	100%
EG	1,521	4.23%	2.73%	-5.53%	8.69%
INF	1,521	3.34%	2.69%	-9.52%	9.21
CORR	1,521	0.29	0.98	-0.89	2.21
COV	1,521	0.22	0.42	0.00	1.00

Explanation of Variables:

- CR: Credit Risk
- Islamic: Dummy variable (1 = Islamic bank, 0 = conventional bank).
- ME: Management Efficiency
- CAPLIB: Capital to Liability Ratio
- LNGR: Loan Growth
- ASSET: Bank Size
- CONS: Bank Concentration
- EG: Economic Growth
- INF: Inflation Rate
- CORR: Corruption Index
- COV: Dummy variable for the pandemic period (1 for years 2020-2021, 0 otherwise).

Regarding the correlation between the variables, Table 2 shows that there is no strong correlation between any two variables that exceeds 0.8. This indicates that the problem of multicollinearity is not present, and the variables are sufficiently independent of each other.

Table 2. Correlation Matrix of Variables

Variable	CR	Islamic	ME	CAPLIB	LNGR	LASSET	CONS	EG	INF	CORR	COV
CR	1.00										
Islamic	0.21	1.00									
ME	-0.16	0.12	1.00								
CAPLIB	-0.18	-0.05	0.15	1.00							
LNGR	-0.04	-0.03	0.10	0.05	1.00						
LNASSET	0.08	-0.10	-0.16	-0.06	-0.08	1.00					
CONS	-0.12	0.12	-0.11	-0.04	-0.06	0.36	1.00				
EG	0.06	-0.03	-0.06	-0.03	0.14	-0.07	-0.12	1.00			
INF	0.05	-0.12	0.06	0.00	0.19	-0.17	-0.31	0.35	1.00		
CORR	-0.16	-0.07	0.07	-0.02	-0.03	0.28	0.28	-0.13	0.05	1.00	
COVID	-0.06	0.00	0.07	0.02	-0.15	0.04	-0.05	-0.57	-0.39	-0.01	1.00

To answer research questions 1 and 4, Table 3 shows the regression results using the random effect model (REM) to examine the impact of management efficiency (ME) on banks' credit risk (CR) in the ASEAN-6 banking industry. In general, the findings from models 1-5 indicate a negative and significant relationship between ME and CR. This means that as the ME score decreases (indicating higher efficiency), CR increases, suggesting that banks with higher management efficiency tend to have higher credit risk. Furthermore, the positive and significant relationship of the Islamic variable indicates that Islamic banks in the ASEAN-6 region exhibit higher credit risk compared to conventional banks.

Table 3. Baseline Regression Results

Variable	(1)	(2)	(3)	(4)	(5)
Islamic	0.1325*** (0.000)	0.1270*** (0.000)	0.1379*** (0.000)	0.1341*** (0.000)	0.1333*** (0.000)
ME	-0.0005*** (0.000)	-0.0004*** (0.000)	-0.0003*** (0.000)	-0.0003*** (0.000)	-0.0003*** (0.000)
CAPLIB		-0.0005*** (0.007)	-0.0005*** (0.009)	-0.0005*** (0.008)	-0.0005*** (0.014)
LNGR		0.0002 (0.111)	0.0002 (0.265)	0.0002 (0.272)	0.0001 (0.427)
LASET		0.0176** (0.036)	0.0187** (0.018)	0.0205** (0.016)	0.0305*** (0.000)
CONS			-0.0015*** (0.000)	-0.0015*** (0.000)	-0.0017*** (0.000)
EG			0.0016* (0.068)	0.0017* (0.063)	-0.0007 (0.342)
INF			0.0035*** (0.007)	0.0033*** (0.010)	0.0014 (0.209)
CORR				-0.0207 (0.155)	-0.0225 (0.133)
COV					-0.0402*** (0.000)
Cons	0.5580*** (0.000)	0.1823 (0.326)	0.2105 (0.235)	0.1793 (0.340)	-0.0062 (0.974)
No. Obs	1317	1241	1241	1241	1241
No. Bank	122	121	121	121	121
r ² overall	0.0860	0.1462	0.1915	0.2086	0.2144

p-values in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Furthermore, referring to Brambor et al. (2006), the interaction effect can be assessed from the marginal effect of the change in management efficiency, as explained in equations (4) and (5). The findings in Table 5 show that model 1 demonstrates a negative and significant relationship on the interaction variable of management efficiency and bank size on credit risk. Similar results are observed in models 3 and 4, indicating a negative and significant relationship between the interaction variable of management efficiency and corruption on bank credit risk.

Table 4. Interaction Effects Results

Variable	(1)	(2)	(3)	(4)
Islamic	0.1352*** (0.023)	0.1349*** (0.000)	0.1333*** (0.0292)	0.1332*** (0.000)
ME*LASET	-0.0000* (0.000)	-0.0000 (0.143)		
$\frac{\partial Credit Risk_{it}}{\partial ME_{it}} = \beta_2 + \alpha SIZE_{it}$	-0.0002*** (0.0000)	-0.0001 (0.0000)		
ME*CORR			0.000 (0.0001)	0.0000 (0.723)
$\frac{\partial Credit Risk_{it}}{\partial ME_{it}} = \beta_2 + \alpha CORR_{it}$			-0.0004*** (0.0000)	-0.0002*** (0.0000)
ME	-0.0002** (0.0000)	-0.0002 (0.130)	-0.0004*** (0.0000)	-0.0003*** (0.000)
CAPLIB		-0.0005** (0.015)		-0.0005** (0.014)
LNGR		0.0001 (0.559)		0.0001 (0.443)
LASET	0.0212** (0.0102)	0.0294*** (0.001)		0.0307*** (0.001)
CONS		-0.0018*** (0.000)		-0.0017*** (0.000)
EG		-0.0007 (0.355)		-0.0006 (0.425)
INF		0.0013 (0.219)		0.0013 (0.222)
CORR		-0.0216 (0.147)	0.0012 (0.0194)	-0.0254 (0.164)
COV		-0.0395*** (0.000)		-0.0399*** (0.000)
Cons	0.1042 (0.2269)	0.0275 (0.886)	0.5570*** (0.0170)	-0.0107 (0.956)
No. Obs	1314	1238	1314	1238
No. Bank	122	121	122	121
r2_overall	0.1245	0.2148	0.0835	0.2134

p-values in parentheses: *p < 0.10, **p < 0.05, ***p < 0.01

The robustness check, as shown in Table 5, indicates that management efficiency has a negative and significant relationship with bank credit risk. Additionally, the robustness tests consistently show that Islamic banks have a positive and significant relationship with bank credit risk, suggesting that Islamic banks are riskier than their conventional counterparts.

Table 5. Robustness Check Results

Variable	Size	2SLS	Hausman-Taylor
Islamic	0.1270*** (0.000)	0.1396*** (0.000)	0.1285*** (0.002)
ME	-0.0003*** (0.000)	-0.0007* (0.088)	-0.0003*** (0.007)
CAPLIB	-0.0005 (0.114)	-0.0005* (0.082)	-0.0005*** (0.000)
LNGR	0.0002 (0.336)	0.0001 (0.389)	0.0001 (0.137)
LASET	0.0480*** (0.004)	0.0251*** (0.009)	0.0330*** (0.000)
CONS	-0.0017*** (0.004)	-0.0018*** (0.000)	-0.0017*** (0.000)
EG	-0.0004 (0.735)	-0.0006 (0.333)	-0.0008 (0.444)
INF	0.0007 (0.649)	0.0013 (0.135)	0.0013 (0.237)
CORR	-0.0251 (0.189)	-0.0181 (0.184)	-0.0263** (0.030)
COV	-0.0268* (0.056)	-0.0354*** (0.002)	-0.0411*** (0.000)
Cons	-0.4161 (0.263)	0.1345 (0.550)	-0.0564 (0.656)
No. Obs	661	1238	1241
No. Bank	85	121	121
r2_overall	0.1661	0.2090	

p-values in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

DISCUSSION

The results of the study reveal that when a bank's management is efficient, it tends to increase the level of risk in financing activities. This finding indicates a trade-off between efficiency and the need for financial resources for risk management. The trade-off aligns with the economic theory proposed by Campbell and Kelly (1994), which suggests that it is not possible to attain all goals in economic activities simultaneously. Therefore, achieving efficiency may come at the cost of effective risk management. Pathak et al. (2023) support this trade-off theory who found that banks with higher management efficiency often take on more risks, particularly in volatile economic conditions. This suggests that efficiency gains might lead to higher risk-taking behavior, compromising overall financial stability.

From the perspective of agency theory, management may face a trade-off between being efficient and expanding the bank's size (Hill & Jones, 1992). Intuitively, increasing the amount of financing aims to enhance the bank's market penetration, allowing it to gain more market share and attract more potential customers. However, this strategy requires additional financial resources to mitigate risks, particularly to address non-performing loans. If the bank opts to be more efficient, it may lack sufficient financial resources for proper risk mitigation, ultimately increasing credit risk. Demirgüç-Kunt and Huizinga (2010) highlighted that larger bank, while benefiting from economies of scale, also face higher systemic risks, necessitating robust risk management practices.

In the case of Islamic banks, the study finds that credit risk is even higher when these banks are more efficient. As reported by ICD-Refinitiv (2022), Islamic banks are in a growth period, which

makes them more aggressive in the market by providing more financing activities. This aggressiveness increases their credit risk profile. When Islamic banks aim for a certain level of efficiency, their risk management strategies may suffer due to limited funds available for managing credit risk. This is consistent with findings from Beck et al. (2013), who noted that Islamic banks often face higher credit risks due to less diversified portfolios and reliance on specific financing contracts.

Regarding the results from interaction variables, the study finds that both bank size and the corruption index significantly moderate the relationship between management efficiency and bank credit risk. Larger banks tend to have lower credit risk because they have more resources to diversify their risks. Additionally, banks operating in less corrupt countries have better credit risk profiles, indicating that the corruption index plays a crucial role in the development of the banking sector in ASEAN-6 countries. Karadas and Ozdemir (2023) emphasize that effective regulatory frameworks in less corrupt environments enhance risk management practices, reducing overall credit risk.

CONCLUSION

The study investigates the impact of management efficiency on credit risk in the ASEAN-6 banking industry, encompassing Singapore, Malaysia, Indonesia, Thailand, Vietnam, and the Philippines. The analysis uses a sample of 122 banks from 2009 to 2022 and employs panel data analysis with a random effect model (REM). The findings indicate that higher management efficiency is associated with increased credit risk, highlighting a trade-off between efficiency and risk management. This aligns with economic theory, suggesting that achieving efficiency may come at the cost of effective risk management (Campbell & Kelly, 1994; Pathak et al., 2023).

The results also reveal that Islamic banks exhibit higher credit risk compared to conventional banks, which may be attributed to their aggressive growth strategies and limited diversification options (Beck et al., 2013; ICD-Refinitiv, 2022). Additionally, the study finds that larger banks and those in less corrupt countries tend to have lower credit risk, emphasizing the importance of institutional factors and regulatory environments in shaping the risk profiles (Karadas & Ozdemir, 2023). Overall, the study underscores the need for balanced management practices that integrate efficiency with robust risk management strategies. Policymakers and bank managers should consider these trade-offs to ensure sustainable growth and financial stability in the banking sector.

Recommendations

Based on the study findings, several key recommendations can be made to enhance the management of credit risk in the ASEAN-6 banking industry. These recommendations are aimed at helping bank managers and policymakers balance efficiency and risk management, ensuring sustainable growth and financial stability. Bank managers should strive for a balance between achieving operational efficiency and maintaining robust risk management frameworks. This involves investing in risk management systems and practices even while pursuing cost-cutting measures to ensure that efficiency gains do not lead to higher credit risk (Demirgüç-Kunt & Huizinga, 2010).

Given the higher credit risk in Islamic banks, it is crucial to develop tailored risk management strategies that leverage their unique strengths while addressing their specific vulnerabilities. This may include diversifying investment portfolios and enhancing risk-sharing mechanisms (Beck et al., 2013). Policymakers should focus on strengthening institutional frameworks and reducing corruption to improve the overall risk profile of banks. Effective regulatory frameworks and transparent governance practices can significantly enhance risk management and financial stability (Karadas & Ozdemir, 2023).

Larger banks should leverage their size to diversify risks and enhance stability, including implementing comprehensive stress testing and scenario analysis to anticipate and mitigate potential

financial shocks (Laeven et al., 2016). Regular review and adjustment of risk management strategies are necessary to adapt to changing economic conditions and regulatory environments, ensuring that banks remain resilient and capable of handling unforeseen challenges (Dietrich & Wanzenried, 2011).

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