

Loan Portfolio Composition and Bank Risk: An Accounting-Based Evidence from Asia-Pacific Countries

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ARTICLE INFO	ABSTRACT
<p>Keywords: <i>Loan Portfolio, Bank Risk, Asset Quality, Credit Risk, Banking Accounting</i></p> <p>DOI: http://dx.doi.org/10.22437/jssh.v9i2.54982</p> <p>Received: October 15, 2025</p> <p>Reviewed: November 23, 2025</p> <p>Accepted: December 20, 2025</p>	<p><i>This study aims to examine the effect of loan portfolio composition on bank risk in Asia-Pacific countries. From a banking accounting perspective, loan portfolio composition represents a key component of earning assets, reflecting asset quality, credit risk exposure, and the effectiveness of banks in managing income sources and risk. This study employs data from commercial banks across 15 Asia-Pacific countries over the period 2011–2022. Bank risk is measured using the Ln.Z-score, while loan portfolio composition is proxied by income diversification. The results indicate that loan portfolio composition has a negative effect on bank risk, suggesting that banks with more diversified loan portfolios tend to have lower risk and greater income stability. This study contributes to the banking accounting literature by highlighting that loan portfolio composition is not only an intermediation instrument but also an important indicator of asset quality, credit risk, and financial stability. The findings provide practical implications for regulators and bank management in strengthening risk measurement, reporting, and monitoring systems.</i></p>

1. Introduction

The global banking industry has undergone significant transformation over the past few decades, driven by financial deregulation, rapid technological advancement, and continuous financial innovation. These developments have encouraged banks to expand their business models by offering a wider range of financial services and diversifying their sources of income (Adesina, 2021; De Jonghe et al., 2015). Such transformations are expected to improve bank performance through economies of scale and scope, enhance profitability, and potentially reduce risk exposure.

From a banking accounting perspective, this transformation is not only reflected in the expansion of total assets and operational activities but also in the increasing complexity of loan portfolio composition, income structure, and risk management practices. Loan portfolio composition represents a core component of banks' earning assets and serves as a key indicator of asset quality, credit risk exposure, and income sustainability. As banks diversify their lending activities and income sources, they must also manage more complex risk structures, requiring more sophisticated measurement, monitoring, and reporting systems.

The importance of loan portfolio composition has attracted considerable attention from regulators, policymakers, and researchers. This is because the structure of a bank's loan portfolio is closely linked to credit risk concentration, provisioning adequacy, and the stability of earnings. A more diversified portfolio may allow banks to spread risk across different sectors, borrowers, or financial activities, thereby reducing vulnerability to specific shocks. However, increased diversification may also introduce new risks, including higher operational complexity, information asymmetry, and agency problems. Existing literature presents mixed empirical findings regarding the relationship between loan portfolio composition and bank risk. On one hand, diversification is often associated with reduced risk due to the benefits of risk spreading and income stabilization (Saunders et al., 2020). On the flip side, diversification may lead to greater risk-taking behavior, particularly when banks expand into unfamiliar or more complex financial activities without adequate risk management systems (De Jonghe et al., 2015; Ma & Nguyen, 2021; Usman, 2023). From an accounting standpoint, such conditions may result in declining asset quality, increased credit loss recognition, and more complex risk disclosures.

This dual perspective can be further explained using portfolio theory Markowitz (1952), which suggests that diversification can reduce unsystematic risk. In the banking context, a well-structured and diversified loan portfolio can help reduce income volatility and improve risk management. However, the effectiveness of diversification largely depends on the bank's capacity to manage information, assess asset quality, and implement strong internal controls. Without adequate governance and risk management, diversification may instead increase exposure to hidden risks. Furthermore, the too-big-to-fail hypothesis and unstable banking hypothesis provide additional theoretical explanations for the relationship between portfolio complexity and risk. Large and complex banks may have greater incentives to engage in riskier activities due to expectations of regulatory support, potentially leading to moral hazard (Gennaioli et al., 2013; Minsky, 1977)). Conversely, smaller banks may also exhibit higher risk due to limited transparency and weaker monitoring capabilities (Lee & Zhang, 2022). These contrasting perspectives highlight that the impact of loan portfolio composition on bank risk is not straightforward and depends on institutional and managerial factors.

Given these inconsistencies, the net effect of loan portfolio composition on bank risk remains an open empirical question. This issue becomes particularly relevant in the context of Asia-Pacific countries, which exhibit diverse banking structures, regulatory frameworks, and levels of financial market development. In emerging economies, diversification may provide opportunities for income growth but may also increase risk due to weaker regulatory oversight and limited information quality. Therefore, this study aims to examine the effect of loan portfolio composition on bank risk in Asia-Pacific countries using an accounting-based approach. Unlike prior studies that focus primarily on bank size or general diversification, this study emphasizes loan portfolio composition as a key determinant of asset quality, credit risk exposure, and financial stability.

This study contributes to the literature in several ways. First, it provides empirical evidence on the role of loan portfolio composition in influencing bank risk within a heterogeneous regional context. Second, it integrates accounting and financial perspectives by linking portfolio structure with risk measurement and financial reporting. Third, it offers practical implications for bank management and regulators in designing strategies that balance income diversification with risk control and financial stability pay.

2. Literature Review

2.1 Banking Risk and Accounting Perspective

Bank risk reflects the potential for financial loss arising from uncertainty in banking activities, particularly those related to asset quality, credit exposure, and financial stability. From a banking accounting perspective, risk is closely linked to how banks measure, recognize, and report financial information, especially in relation to credit risk and asset valuation (Lepetit & Strobel, 2013; Risfandy et al., 2022). Loan portfolios composition represents the largest component of banks' earning assets and are a primary source of credit risk. Changes in portfolio composition directly affect asset quality, loan loss provisions, and financial reporting transparency. Therefore, understanding bank risk requires not only financial analysis but also an accounting-based perspective that emphasizes measurement accuracy, disclosure, and prudential practices (Fu et al., 2014).

In the banking literature, risk is commonly proxied by the Z-score, which reflects the distance of a bank from insolvency. A higher Z-score indicates greater financial stability and lower probability of default, while a lower value suggests higher vulnerability to financial distress ((Beck et al., 2013); (Lepetit & Strobel, 2013)). From an accounting standpoint, this measure integrates profitability, capital adequacy, and earnings volatility, making it a comprehensive indicator of bank risk. Thus, the accounting perspective provides a critical framework for analyzing bank risk, as it links portfolio structure, asset quality, and financial reporting practices in assessing the overall stability and sustainability of banking institutions.

2.2 Loan Portfolio Composition and Asset Diversification

Loan portfolio composition refers to the structure and allocation of loans across different sectors, borrowers, and income sources. It reflects the extent to which banks diversify their earning assets and manage credit exposure. According to portfolio theory Markowitz (1952), diversification can reduce unsystematic risk by spreading exposure across multiple assets. In the banking context, diversification of loan portfolios may enhance income stability, reduce credit concentration, and improve risk management. Empirical studies support this argument, showing that banks with more diversified portfolios tend to experience lower income volatility and improved financial stability (Saunders et al., 2020). However, diversification also requires effective allocation strategies and risk assessment capabilities to achieve optimal outcomes.

2.3 Portfolio Complexity and Bank Risk

While diversification offers potential benefits, increasing portfolio complexity may introduce additional risks. Complex loan portfolios often involve multiple financial instruments, sectors, and income sources, which can increase information asymmetry and monitoring difficulties. The unstable banking hypothesis suggests that larger and more complex banks are more likely to engage in risky activities, increasing their vulnerability to financial shocks (Gennaioli et al., 2013; Minsky, 1977). From an accounting perspective, this complexity complicates asset valuation, credit risk recognition, and financial disclosure.

Empirical studies also indicate that excessive diversification may increase risk when not supported by strong governance and internal control systems (Wang & Lin, 2021; Wu et al., 2020). Thus, diversification does not automatically lead to risk reduction, particularly in the presence of weak risk management. products.

2.4 Bank Size, Governance, and Risk-Taking Behavior

Bank size and institutional capacity play a crucial role in determining the effectiveness of portfolio diversification. Larger banks typically have more advanced risk management systems, better access to information, and more experienced management teams (Nguyen & Dang, 2022). However, the too-big-to-fail hypothesis suggests that large banks may take excessive risks due to expectations of regulatory support, leading to moral hazard (Vallascas & Keasey, 2012). Conversely, smaller banks may also exhibit higher risk due to limited transparency and weaker monitoring systems (Lee & Zhang, 2022). This dual perspective indicates that the impact of loan portfolio composition on risk depends not only on diversification but also on governance quality, information transparency, and institutional capacity.

2.5 Loan Portfolio Composition and Bank Risk: Empirical Evidence

Empirical findings on the relationship between loan portfolio composition and bank risk remain inconclusive. Some studies find that diversification reduces risk by stabilizing income and spreading exposure (Saunders et al., 2020). Other studies show that diversification increases risk due to complexity, agency problems, and information asymmetry (Wang & Lin, 2021). This inconsistency suggests that the effect of loan portfolio composition is context-dependent, influenced by factors such as:

- a. Risk management capability
- b. Internal control systems
- c. Regulatory environment
- d. Macroeconomic conditions

Bank operating in emerging markets may face greater challenges in managing diversified portfolios due to limited information quality and weaker regulatory frameworks.

3. Research Methodology

3.1 Research Design

This study employs a quantitative explanatory research design using a panel data approach to examine the effect of loan portfolio composition on bank risk across Asia-Pacific countries. The explanatory design is appropriate as the study aims to test causal relationships between variables based on established theoretical frameworks, particularly portfolio theory and banking risk literature (Markowitz, 1952; Saunders et al., 2020). The use of panel data, which combines cross-sectional (across banks) and time-series (over years) observations, allows for a more comprehensive analysis of dynamic relationships and improves estimation efficiency compared to purely cross-sectional or time-series models (Baltagi, 2021). This approach is particularly relevant in banking studies, where risk behavior evolves over time and varies across institutions.

The study focuses on commercial banks operating in 15 Asia-Pacific countries during the period 2011–2022, a region characterized by heterogeneous financial systems, regulatory environments, and economic conditions. This diversity provides a suitable context for examining how loan portfolio composition influences bank risk under varying institutional settings. Overall, the research design is suitable for capturing both cross-country variation and

temporal dynamics, enabling robust empirical analysis of the relationship between portfolio structure and bank stability.

3.2 Sample

The sample of this study consists of commercial banks operating in 15 Asia-Pacific countries over the period 2011–2022. Bank-level data were obtained from the BankFocus database, while macroeconomic data were sourced from the World Bank database, ensuring data reliability and consistency across countries. To ensure data quality and comparability, several selection criteria were applied:

- a. Banks must have complete financial statements, including balance sheet and income statement data.
- b. Banks must report key financial variables—such as total assets, total liabilities, and net income—for at least four consecutive years.
- c. Banks must have a minimum total asset value of USD 500,000, ensuring the inclusion of economically relevant institutions.

After applying these criteria, the final dataset consists of 6,401 observations, representing a balanced and sufficiently large sample for panel regression analysis. To address potential outliers and extreme values, the data were winsorized at the 1st and 99th percentiles, following standard practice in empirical finance research (Dawn C. Porter & Damodar N Gujarati, 2008).

This sampling approach ensures that the dataset captures diverse banking characteristics across countries while maintaining statistical robustness and minimizing bias due to extreme observations.

3.3 Instruments

This study utilizes secondary data derived from financial databases. The measurement of variables is based on established proxies widely used in banking and accounting literature. Dependent Variable in this research is Bank Risk. Bank risk is measured using the natural logarithm of the Z-score (Ln Z-Score), which serves as a proxy for insolvency risk ((Fu et al., 2014; Lepetit & Strobel, 2013). The Z-score reflects the distance between a bank's current financial position and the point of insolvency. A higher Z-score indicates:

- a. Greater financial stability
- b. Lower probability of default

Thus, Ln Z-score is treated as an inverse measure of bank risk. Loan Portfolio Composition is used as Independent Variable in this research. Loan portfolio composition (PORT) is proxied by the ratio of non-interest income to total operating income, representing the degree of income diversification. This measure captures:

- a. The extent to which banks rely on non-traditional income sources
- b. The diversification of earning assets beyond interest-based activities

Higher values of PORT indicate a more diversified portfolio structure. To ensure robustness, several control variables are included:

- a. Capital (EQTA): Equity to total assets ratio, representing capital adequacy
- b. Bank Size (SIZE): Natural logarithm of total assets
- c. Economic Growth (Ln GDP): Proxy for macroeconomic performance
- d. Inflation (INF): Indicator of macroeconomic stability

These variables are commonly used in banking studies to control for internal and external factors affecting bank risk ((Beck et al., 2013); (Risfandy et al., 2022)).

3.4 Data Analysis Procedures

The data were analyzed using panel regression analysis to examine the relationship between loan portfolio composition and bank risk. The baseline econometric model is specified as follows:

$$RISK_{ijt} = \alpha + \beta_1 PORT_{ijt} + \varphi X_{ijt} + \gamma Y_{jt} + \varepsilon_{ijt}$$

Banks, countries, and time are represented by the indices *i*, *j*, and *t*, respectively; the size of the credit portfolio is described by the variable *PORT* (size and scope); *X* denotes control variables at the bank level, and *Y* denotes control variables at the country level. Furthermore, the proxy for capital considered in this study is the capital ratio.

4. Finding

4.1 Descriptive Statistics

Descriptive statistics are presented to provide an overview of the data characteristics used in this study, including the mean, standard deviation, minimum, and maximum values of each variable. The average value of Ln Z-Score is 3.674, indicating a relatively moderate level of bank stability across the sample. Since Z-score is an inverse measure of risk, higher values reflect lower insolvency risk (Beck et al., 2013; Fu et al., 2014). The variation between the minimum and maximum values suggests differences in risk profiles among banks.

The main independent variable, loan portfolio composition (*PORT*), has a mean value of 0.176, indicating that non-interest income accounts for about 17.6% of total bank income. This reflects a moderate level of income diversification. The wide range of values shows variation in portfolio strategies across banks. The alternative measure, net fee and commission income (*NFC*), has a relatively low average, suggesting that most banks rely primarily on interest income. However, some banks show higher values, indicating more diversified income structures.

Regarding control variables, bank size (*SIZE*) shows considerable variation, indicating the presence of both small and large banks in the sample. The capital ratio (*EQTA*) has an average of 0.099, suggesting that banks generally maintain moderate capital levels to absorb potential losses. From a macroeconomic perspective, economic growth (*Ln GDP*) shows relatively stable variation, while inflation (*INF*) varies more widely, indicating differences in economic conditions across countries. Overall, the descriptive statistics indicate sufficient variation in the data, supporting further empirical analysis of the relationship between loan portfolio composition and bank risk. A detailed summary of descriptive statistic is presented in Table 1.

Table 1. Descriptive statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln-ZScore	6.401	3.674	0.812	1.15	5.529
Ln-ZScore2	6.392	3.679	0.804	1.165	5.527
PORT	6.401	0.176	0.152	-0.822	1.836
NFC	6.342	0.004	0.023	-0.025	1.125
SIZE	6.401	16.616	1.768	10.734	22.458
EQTA	6.401	0.099	0.081	0.008	0.994
Ln. GDP	6.401	28.467	1.525	24.939	30.519
INF	6.401	2.687	3.239	-1.139	49.721

4.2 Diagnostic Test

After examining the descriptive statistics and confirming that the values of all variables are consistent with theoretical expectations, the next step involves conducting diagnostic tests to ensure the validity of the regression model. In particular, this study evaluates the presence of multicollinearity, which may distort the estimation results and reduce the reliability of the regression coefficients. To detect multicollinearity, this study employs two commonly used approaches: the pairwise correlation matrix and the Variance Inflation Factor (VIF). The pairwise correlation matrix is used to identify the strength of the linear relationship between independent variables. According to Dawn C. Porter & Damodar N Gujarati (2008), a correlation coefficient exceeding 0.80 indicates a potential multicollinearity problem.

In addition, the VIF is used to assess the extent to which the variance of an estimated regression coefficient is inflated due to multicollinearity. A higher VIF value indicates a stronger linear relationship among independent variables, which may weaken the precision of the estimates. Based on prior literature, a VIF value below 10 is generally considered acceptable, indicating the absence of serious multicollinearity issues (Hook Law Siong, 2018). The results of the diagnostic tests show that all correlation coefficients are below the critical threshold and that all VIF values fall within the acceptable range (see Table 2). Therefore, it can be concluded that no multicollinearity problem exists in the dataset, and the regression model is suitable for further analysis.

Table 2. Pairwise correlation

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)
(1) Ln-ZScore	-	1.00					
(2) PORT	1,19	0.09*	1.00				
(3) CAP	1,31	0.03*	0.18*	1.00			
(4) SIZE	1,37	0.19*	0.15*	-0.22*	1.00		
(5) Ln.GDP	1,23	0.12*	-0.11*	-0.10*	0.32*	1.00	
(6) INF	1,17	-0.27*	-0.15*	0.04*	-0.21*	-0.30*	1.00

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.3 Regression Results

Table 3 below presents the regression results.

Table 3. Regression Results

Variables	Independent variable			
	Model 1	Model 2	Model 3	Model 4
PORT	0.164*** (0.046)	0.092** (0.039)		
NFC			0.733*** (0.167)	0.196 (0.171)
CAP	3.865*** (0.306)	3.843*** (0.305)	4.025*** (0.345)	3.982*** (0.339)
SIZE	-0.082*** (0.020)	-0.103*** (0.017)	-0.080*** (0.021)	-0.103*** (0.018)

Ln. GDP	0.143*** (0.030)	0.190*** (0.027)	0.137*** (0.031)	0.188*** (0.027)
INF	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Constant	0.549 (0.707)	-0.440 (0.633)	0.698 (0.701)	-0.384 (0.625)
Year control	Yes	Yes	Yes	Yes
N. Observations	6,401	6,393	6,342	6,336
R-squared	0.604	0.679	0.604	0.680
Number of banks	604	603	601	600

5. Discussion

The findings indicate that loan portfolio composition has a significant effect in reducing bank risk, as evidenced by the positive coefficient of the independent variable (PORT) in Table 3 (Models 1–2). Given that bank risk is measured using the Ln Z-Score, this result implies that an increase in income diversification, particularly through non-interest income, leads to higher Z-score values, thereby reducing the probability of bank insolvency. This finding supports the portfolio management hypothesis, which suggests that banks with more diversified income streams are better positioned to mitigate risk. By expanding into non-interest income activities, banks reduce their reliance on traditional lending income and improve earnings stability. Moreover, this result aligns with the economies of scope and synergy hypothesis, where banks benefit from additional information, cross-functional activities, and operational efficiency when engaging in diversified financial services. These advantages contribute to improved risk management and financial resilience. The findings are consistent with prior empirical studies, including (Sanfilippo-Azofra et al., 2018; Saunders et al., 2020; Wang & Lin, 2021), which document that income diversification enhances bank stability.

Turning to the control variables, bank capital (CAP) demonstrates a positive and statistically significant effect on Ln Z-Score, indicating that higher capital levels contribute to lower bank risk. This finding suggests that capital serves as a crucial strategic buffer that enhances solvency and reduces the likelihood of default. Well-capitalized banks are better equipped to absorb unexpected losses and maintain financial stability. This result is consistent with previous studies (Noman et al., 2018; Muizzuddin et al., 2021)), which emphasize the importance of capital adequacy in limiting excessive risk-taking behavior. In contrast, bank size (SIZE) exhibits a negative and significant relationship with Ln Z-Score across all models, indicating that larger banks tend to face higher levels of risk. This finding may be explained by the increased operational complexity associated with large banking institutions. Larger banks typically engage in more diverse financial activities, have broader market exposure, and operate within more complex organizational structures. These factors can create challenges in internal monitoring, risk control, and governance. Thus, despite benefiting from economies of scale and better access to funding, larger size does not necessarily imply lower risk.

From a macroeconomic perspective, economic growth (Ln GDP) shows a positive and significant effect on Ln Z-Score, suggesting that stronger economic conditions contribute to lower bank risk. Improved macroeconomic performance enhances borrowers' repayment capacity and reduces the likelihood of credit defaults. In contrast, inflation (INF) does not

exhibit a significant effect on bank risk. This may indicate that the impact of inflation is indirect, operating through other channels such as interest rates, funding costs, or credit quality. Additionally, banks may have adaptive mechanisms to mitigate inflationary pressures, such as adjusting lending rates or implementing asset-liability management strategies.

Overall, the regression results highlight that internal bank-specific factors play a more dominant role in determining bank risk compared to external macroeconomic variables. In particular, loan portfolio composition and capital strength contribute to risk reduction, while bank size is associated with increased risk. Although fee-based income (NFC) shows potential as a diversification tool, its effect is not consistently significant across all model specifications. These findings suggest that effective bank risk management cannot rely solely on asset growth or business expansion strategies. Instead, banks must focus on maintaining high-quality loan portfolios, strengthening capital structures, and carefully managing organizational complexity. For regulators, the results emphasize the importance of monitoring capital adequacy and loan portfolio quality as key determinants of banking stability, particularly for large and complex institutions.

6. Conclusion

This study aims to examine the effect of loan portfolio composition on bank risk, while also considering the role of internal bank factors and macroeconomic conditions. Bank risk is measured using the Ln Z-Score, which serves as an inverse proxy for insolvency risk. Therefore, a higher Ln Z-Score indicates lower bank risk, while a lower value reflects greater financial vulnerability. The results show that loan portfolio composition has a positive and significant effect on Ln Z-Score, indicating that better portfolio management contributes to lower bank risk. Banks that maintain a more balanced, diversified, and prudent loan portfolio are better able to preserve asset quality and absorb potential losses.

Furthermore, net fee and commission income shows a positive relationship with Ln Z-Score, although its significance is not consistent across all models. This suggests that fee-based income has the potential to reduce risk through income diversification, but its effectiveness depends on the stability and nature of the services provided. The findings also reveal that capital has a consistently positive and significant effect on bank stability, highlighting the importance of strong capital buffers in reducing risk. In contrast, bank size shows a negative and significant relationship with Ln Z-Score, indicating that larger banks do not necessarily face lower risk due to increased operational complexity and broader exposure. From a macroeconomic perspective, economic growth (GDP) contributes to lower bank risk, while inflation does not show a significant effect. Overall, the results emphasize that bank risk is primarily driven by internal factors, particularly loan portfolio composition, capital strength, and organizational complexity.

From a policy perspective, efforts to reduce bank risk should focus on improving loan portfolio quality, strengthening capital adequacy, and managing business complexity. Bank management should ensure that credit expansion is not solely driven by asset growth but also considers borrower quality, sector concentration, and overall portfolio risk. Regulators are also encouraged to enhance risk-based supervision, especially for large and complex banks, to prevent excessive risk accumulation. Additionally, the development of fee-based income can be promoted as a diversification strategy, provided it is supported by strong governance, effective risk management, and adequate consumer protection.

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