

Liquidity and Risk Impact on Bank Capital

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ABSTRACT

This study aims to investigate the impact of bank liquidity and other factors impact on bank capital in the post-crisis conditions of emerging Asian economies. Data is gathered from 150 banks using central bank databases of 5 countries covering the period from 2018 to 2022. The study applied both random effect method estimation and pooled ordinary least squared method to analyze the data and identify the relationship. The results of both models show that there is a significant and positive relationship between liquidity and bank capital, indicating that increased liquidity is associated with higher levels of banking capital. Both interest rates and bank size also exhibit positive and significant impacts on the maintenance of bank capital. Market funding is directly correlated with capital, while gross domestic product and bank risk show a negative association with banking capital.

Keywords: Bank capital, GDP, liquidity, risk.

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1. INTRODUCTION

This research aims to explore the repercussions of the financial crisis on bank capital within emerging economies in Asia, focusing on the interplay between bank liquidity, risk, and capital. Numerous inquiries arise regarding the associations among these factors. Specifically, does the present scenario indicate a correlation between bank liquidity and capital, and is this correlation consistent across all banks? Furthermore, does a bank's risk profile contribute to influencing its capital, and if so, which types of risks carry more weight? Additionally, does the overall economic landscape impact bank capital, and if it does, which economic factors are pivotal in managing the inter-related aspects of bank capital, liquidity, and risk?

In response to the previous financial crisis, the Basel Committee has proposed new regulations known as Basel Accord III, with the goal of protecting banks from various risks, such as liquidity shortages, credit risk, operational risk, and interest rate risk. These regulations mandate higher capital buffers and increased levels of liquid assets compared to the previous Basel II standards. As a result, the requirements for bank capital and liquidity have become crucial considerations in examining the complex relationships among bank capital, liquidity, and risk. The level of bank capital is intricately linked to both bank liquidity and risk. Despite this inherent connection, there is a scarcity of empirical evidence on these dynamics, particularly in the context of emerging economies in Asia during the post-crisis era.

According to [Barth et al. \(2008\)](#), there are differences among Asian countries regarding bank capital requirements. Their research reveals that while some countries increased their bank capital requirements, others took different paths. The final section of this paper consists of conclusions and recommendations. Theoretical investigations into the comprehensive analysis of bank capital, liquidity, and risk have been numerous, yet certain issues remain inadequately addressed. This research aims to fill these gaps in the existing literature through several key contributions. First and foremost, unlike prior studies that mainly focus on industry-level determinants of bank capital, liquidity, and risk, overlooking external factors, this study uniquely integrates both external and internal factors concurrently. Secondly, a common drawback identified in the literature relates to the inappropriate incorporation of econometric techniques, resulting in inconsistent and biased estimates. This research strives to address and rectify this issue. Furthermore, the study holds potential significance in influencing the reformulation of regulations to address contemporary challenges within the Asian banking system. By offering insights into the factors that have become prominent concerns following the implementation of Basel Accord III regulations on bank liquidity, risk, and capital, this research aims to inform decision-makers, analysts, policymakers, and various stakeholders, including governments and investors. It is worth noting that this study represents a pioneering effort in the Asian region, shedding light on critical issues

that have not been adequately explored since the 2007–2008 financial crisis. Specifically, this research breaks new ground by being the first in the region to identify factors that have emerged as major considerations post-Basel Accord III regulations. Additionally, the study seeks to validate the impact of the currently implemented regulations recommended by Basel Accord III in the Asian context.

No prior research has tackled these inquiries, especially within the emerging economies of the Asian region. Despite numerous studies conducted in developed countries such as the United States and European nations, there has been a lack of focus on the rapidly expanding and crucial role played by the emerging economies of Asia in the global financial system. The following section of this study offers an extensive review of pertinent literature, followed by segments on sources for data collection, the econometric model, and empirical discoveries.

2. LITERATURE REVIEW

Previous studies investigating the association between bank risk and bank capital have yielded diverse results. Some research has discovered a positive correlation between bank risk and capital, as exemplified by Raz (2018), who examined evidence from Indonesian banks and corroborated the “regulatory hypothesis” posited by Shrieves and Dahl (1992). In a recently published paper, Haneef et al. (2018) argued that losses covered by bank earnings, included in tier-1 capital, contribute to this positive relationship. Similarly, Demirgüç-Kunt and Huizinga (1999) found empirical support for a positive link between risk and capital.

Conversely, other scholars have identified a negative relationship between risk and bank capital, aligning with the “moral hazard hypothesis,” where banks, due to deposit insurance, may be inclined to take more risks. This perspective, as outlined by Demirgüç-Kunt and Kane (2002) and Brewer and Lee (1986), suggests that losses absorbed by earnings, including those covered by tier-1 capital, could lead to a decrease in tier-1 capital. Hugonnier and Morellec (2017) provided additional insights, highlighting in their research that the bank leverage and liquidity recommended by Basel-III could reduce the probability of default.

Further, Chiamonte and Casu (2017) conducted a study on the influence of bank leverage and liquidity recommended by Basel-III on the probability of default. They concluded that both risk and bank capital have an impact on the profitability of banks. DeYoung and Jang (2016) conducted a study where they discovered empirical evidence regarding the loan-to-deposit rate and net stable fund ratio, identifying these ratios as influential for all categories of banks. Additionally, their findings indicated that as the size of banks increases, the level of liquidity tends to decrease. Diamond and Kashyap (2016) argued that liquidity standards recommended by regulators in Basel-III influenced the incentives of banks. While these regulations decreased the probability of running, they also imposed higher liquidity costs on banks. In the corporate realm, capital and liquidity have consistently served as fundamental metrics for assessing strength and soundness.

In the United States, analysts and rating agencies employed various techniques, such as the CAMELS methodology approach, to evaluate the soundness of organizations.

Distinguin et al. (2013) carried out a study investigating the correlation between bank liquidity and regulatory capital. Their findings suggested that banks typically reduce their regulatory capital when generating liquidity and during periods of lower liquidity funding risk. Beltratti and Stulz (2012) conducted a study proposing that banks tend to decrease their capital in conditions favorable to liquidity creation and during times of lower liquidity funding requirements. Carmona (2007) explored the impact of illiquidity on smaller U.S. banks, advising that they maintain higher liquidity to mitigate default risk.

Recent studies have underscored the link between aggressive lending, reliance on short-term funding, low-quality assets, low capitalizations, and low profitability with risk (Cole & White, 2012). Altunbas et al. (2017) argued that banks’ capital incentivizes risk-taking, both at lower and higher levels, and emphasized the importance of excluding certain banks from the sample for analysis. The dataset comprised 379 banks divided nonlinearly into three categories—small, medium, and large—based on their asset volume.

Delis and Staikouras (2011) identified a direct relationship between bank capital and risk-taking behavior. The data for this study, spanning from 2011 to 2016, were gathered from the World Bank website and central banks of respective economies. Banks were categorized into different groups for analysis, considering the diversity in bank data to prevent misleading findings. This categorization also addressed variations in the activities of banks based on their size, aligning with earlier studies conducted by scholars like Cole and Gunther (1995), Wheelock and Wilson (2000), and DeYoung (2003). Pettway (1976) conducted a seminal study exploring the relationship between capital structure and bank risk in the U.S. over a four-year period, revealing a direct association between risk and equity ratio.

3. ECONOMETRIC MODEL

In this study, two different methods of regression estimation were used. Applying the Hausmann test equation, we have identified that random effect method is the best estimation for the dataset. To check the robustness of the results, we have also applied pooled ordinary least squared method. The regression equation is as follows:

$$BC_i = \beta_0 + \beta_1 LR_{it} + \beta_2 IR_{it} + \beta_3 BS_{it} + \beta_4 GDP_{it} + \beta_5 MFI_{it} + \beta_6 BR_{it} + e_{it} \quad (1)$$

where t denotes the time within the banking data, and the beta parameters represent the structural elements of the equation. The variable i is used to identify individual banks, and e stands for the error term. Each coefficient, reflecting changes in variables, indicates the short-term impact on bank capital in the econometric model. Analyzing panel data presents challenges, including heteroscedasticity, autocorrelation, and cross-dependence, requiring careful consideration to avoid biased estimators.

TABLE I: VARIABLES

| Symbol | Variable | Proxies | Hypothesis relationship |
|--------|--------------------|--------------------------------------|-------------------------|
| BC | Bank capital ratio | Total equity/Total assets | N/A |
| LQ | Bank liquidity | Liquid asset/Total assets | Positive |
| IR | Interest rate | Year-on year change in interest rate | Positive |
| BS | Bank size | Log of total assets | Positive/Negative |
| GDP | GDP growth rate | Economic growth | Positive/Negative |
| MF | Market funding | Liabilities & deposits/Total assets | Positive |
| BR | Z score | Bank risk | Negative |

4. VARIABLES

The study uses data from 150 banks collected from central bank databases of 5 countries covering the period from 2018 to 2022. The researchers utilized the Bank Capital Ratio (BC) as the dependent variable in their model, measuring it as the ratio of a bank's total equity to its total assets. They expected a positive coefficient for the Bank Capital Ratio, attributing it to the notion that higher equity enhances a bank's capacity to absorb losses, a perspective supported by researchers such as [Bernanke et al. \(1991\)](#); [Salma et al. \(2023\)](#) and [Francis and Osborne \(2012\)](#).

The study concentrated on several factors, including liquidity, risk, market funding, market share, and firm size. Liquidity was assessed by determining the ratio of liquid assets to total assets. An essential variable, risk, was computed as the overall risk factor of banks using the z-score ([Anjom & Faruq, 2023](#)). Economic indicators like the growth of real gross domestic product and interest rates were taken into account to evaluate their influence. Risk, in this study, was derived by summing equity and return on assets, divided by the standard deviation of return on assets, adopting the approach of [Boyd and Graham \(1988\)](#), [Laeven and Levine \(2009\)](#), and [Barry et al. \(2011\)](#). Bank size, measured as the natural logarithm of total assets, was included as a control variable. The impact of bank size was uncertain, as theories suggested that larger banks might extend more significant credits due to expectations of government bailouts. Market funding, represented by the ratio of total liabilities less total deposits to total assets, was another variable under consideration. The directional effect of market funding varied based on bank size, potentially being positive for larger banks and negative for smaller ones. The variables of interest are presented in [Table I](#).

5. RESULTS AND DISCUSSION

The statistical analysis follows a chi-squares distribution with degrees of freedom corresponding to the number of free variables. The null hypothesis involves the random

TABLE II: RANDOM EFFECT MODEL

| Variable | Estimate | Std. error | t-value | Probability |
|----------|----------|------------|---------|-------------|
| LQ | 0.0676 | 0.0891 | 0.0861 | 0.0094 |
| IR | 0.8699 | 0.3079 | 2.5932 | 0.2e-16 |
| BS | 1.0303 | 0.8602 | -1.2143 | 3.4e-28 |
| GDP | -0.9294 | 2.0509 | 1.9159 | 0.7850 |
| MF | 0.4344 | 0.3379 | 0.7785 | 0.6987 |
| BR | -1.1514 | 0.0328 | 29.194 | 2.2e-32 |

TABLE III: POOLED ORDINARY LEAST SQUARE MODEL

| Variable | Estimate | Std. error | t-value | Probability |
|----------|----------|------------|---------|-------------|
| LQ | 0.0396 | 0.0154 | 0.0441 | 0.0021 |
| IR | 0.2569 | 0.9604 | 2.2173 | 0.0001 |
| BS | 0.0354 | 0.2354 | -1.6504 | 0.0023 |
| GDP | -0.6580 | 2.3509 | 1.2104 | 0.0014 |
| MF | 0.6547 | 0.6641 | 0.0547 | 0.9821 |
| BR | -1.0325 | 0.0057 | 29.369 | 0.7654 |

TABLE IV: CORRELATION MATRIX

| | LQ | IR | BS | GDP | MF | BR |
|-----|-------|-------|-------|-------|-------|-------|
| LQ | 1.0 | -0.69 | 0.35 | -0.35 | 0.43 | 0.11 |
| IR | -0.69 | 1.00 | 0.07 | 0.03 | -0.28 | -0.30 |
| BS | 0.35 | 0.07 | 1.0 | 0.09 | -0.17 | 0.24 |
| GDP | -0.35 | 0.03 | 0.09 | 1.00 | -0.06 | -0.14 |
| MF | 0.43 | -0.28 | -0.17 | 0.06 | 1.0 | 0.42 |
| BR | 0.11 | -0.30 | 0.24 | -0.14 | 0.42 | 1.0 |

effect, while the alternative hypothesis pertains to the fixed effect. The Hausmann test equation is expressed as follows:

$$\chi^2(7) = (b - B)'[(Vb - VB) - 1](b - B) \quad (2)$$

The results (see [Table II](#)) of the Hausmann test indicate that the random effects model is more appropriate than the fixed effects model for this panel dataset. With a p-value of 0.0827 surpassing the significance level of 0.05, the null hypothesis is accepted.

Consistent findings from both the random effects model and the pooled ordinary least squares (POLS) approach underscore the robustness of the dataset. In the random effects model, the R-squared and adjusted R-squared values are 75.58% and 72.01%, respectively. For the POLS model, these figures are 78.96% and 75.14%. Both models effectively capture a significant portion of the variability in bank-specific and macroeconomic variables.

The random effect model shows that liquidity has a positive and significant impact on the bank capital. Higher liquidity supports higher banking capital. Interest rate and bank size both have positive and significant impact on maintaining bank capital. Market funding is directly linked with the capital, whereas gross domestic product and bank risk have a negative relationship with the banking capital. The results depicted similarities with the previous research.

The results ([Table III](#)) from the pooled ordinary least squares (POLS) method indicate that liquidity has a noteworthy positive effect on bank capital, suggesting that increased liquidity is associated with higher levels of banking capital. Additionally, both interest rates and bank size

exhibit positive and significant influences on the maintenance of bank capital. Referring to [Table IV](#), market funding is directly correlated with capital, while gross domestic product and bank risk demonstrate a negative association with banking capital. These findings align closely with the earlier results obtained.

6. CONCLUSION

This research seeks to explore how bank liquidity and bank risk influence bank capital in commercial banks situated in emerging Asian economies in the aftermath of the 2007–2008 financial crisis. The study offers new perspectives on the dynamics of bank capital in these economies post the adoption of Basel III. The outcomes validate a negative association between bank liquidity and bank capital for medium and large-sized banks, whereas a positive connection is evident for small-sized banks. These results underscore the variation in the behavior of banks regarding the interplay between bank capital and liquidity in emerging Asian economies.

The study underscores the necessity for differentiated regulations tailored to the specific categories of banks, suggesting that policymakers should account for the distinct needs and constraints of various bank sizes when formulating new regulations. The results imply that banks, particularly smaller ones, may not need to actively manage liquidity to adjust capital. Both the random effect and pooled ordinary least squares methods concur that liquidity significantly and positively influences bank capital, indicating that heightened liquidity is associated with increased levels of banking capital. Furthermore, the positive and significant impact of interest rates and bank size on maintaining bank capital is consistent with the findings of previous analyses. Conversely, market funding is found to be directly linked to capital, while gross domestic product and bank risk exhibit a negative association with banking capital, aligning closely with earlier results.

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

REFERENCES

- Altunbas, Y., Gambacorta, L., Marqués-Ibáñez, D., & Mistrulli, P. E. (2017). Does monetary policy affect bank risk-taking? *International Journal of Central Banking*, 13(3), 33–75.
- Anjom, W., & Faruq, A. T. M. O. (2023). Financial stability analysis of Islamic banks in Bangladesh. *European Journal of Business and Management Research*, 8(3), 320–326.
- Barry, T. A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking & Finance*, 35(5), 1327–1340.
- Barth, J. R., Caprio, G., & Levine, R. (2008). Bank regulations are changing: For better or worse? *Comparative Economic Studies*, 50, 537–563.
- Beltratti, A., & Stulz, R. M. (2012). The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics*, 105(1), 1–17.
- Bernanke, B. S., Lown, C. S., & Friedman, B. M. (1991). The credit crunch. *Brookings Papers on Economic Activity*, 1991(2), 205–247.
- Boyd, J. H., & Graham, S. L. (1988). The profitability and risk effects of allowing bank holding. Federal Reserve Bank of Minneapolis. *Quarterly Review-Federal Reserve Bank of Minneapolis*, 12(2), 3.
- Brewer, E., III, & Lee, C. F. (1986). How the market judges bank risk. *Federal Reserve Bank of Chicago Economic Perspectives*, 10(6), 25–31.
- Carmona, C. (2007). Liquidity risk and liquidity creation in financial institutions. *The Quarterly Review of Economics and Finance*, 46(1), 1–17.
- Chiaromonte, L., & Casu, B. (2017). Capital and liquidity ratios and financial distress. Evidence from the European banking industry. *The British Accounting Review*, 49(2), 138–161.
- Cole, R. A., & Gunther, J. W. (1995). Separating the likelihood and timing of bank failure. *Journal of Banking & Finance*, 19(6), 1073–1089.
- Cole, R. A., & White, L. J. (2012). Déjà vu all over again: The causes of U.S. commercial bank failures this time around. *Journal of Financial Services Research*, 42(1–2), 5–29.
- Delis, M. D., & Staikouras, C. (2011). Supervisory effectiveness and bank risk. *Review of Finance*, 15(3), 511–543.
- Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2), 379–408.
- Demirgüç-Kunt, A., & Kane, E. J. (2002). Cross-country evidence on deposit-insurance. *The Quarterly Review of Economics and Finance*, 42(4), 695–699.
- DeYoung, R. (2003). De novo bank exit. *Journal of Money, Credit and Banking*, 35(5), 711–728.
- DeYoung, R., & Jang, K. Y. (2016). Do banks actively manage their liquidity? *Journal of Banking & Finance*, 66, 143–161.
- Diamond, D. W., & Kashyap, A. K. (2016). Liquidity requirements, liquidity choice, and financial stability. In *Handbook of macroeconomics* (vol. 2, pp. 2263–2303). Elsevier.
- Distinguin, I., Roulet, C., & Tarazi, A. (2013). Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking & Finance*, 37(9), 3295–3317.
- Faruq, A. T. M. (2023). The determinants of foreign direct investment (FDI) a panel data analysis for the emerging asian economies. arXiv preprint arXiv:2307.07037.
- Francis, B., & Osborne, M. (2012). Capital ratios and bank lending: A matched bank approach. *Journal of Financial Intermediation*, 21(2), 295–314.
- Haneef, R., Archer, S., & Karim, R. A. A. (2018). Regulatory aspects of the Islamic capital market and Basel III requirements—Shari ‘ah-compliant bank capital instruments. In *Islamic capital markets and products: Managing capital and liquidity requirements under Basel III* (pp. 221–236).
- Hugonnier, J., & Morellec, E. (2017). Bank capital, liquid reserves, and insolvency risk. *Journal of Financial Economics*, 125(2), 266–285.
- Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, 93(2), 259–275.
- Pettway, R. H. (1976). The effect of bank capital ratios on the risk and return of bank shares. *Journal of Finance*, 31(5), 1277–1296.
- Raz, A. F. (2018). Risk and capital in Indonesian large banks. *Journal of Financial Economic Policy*, 10(1), 165–184.
- Salma, U., Khan, M. F. H., & Billah, M. M. (2023). Foreign capital and economic growth: Evidence from Bangladesh. arXiv preprint arXiv:2312.04695.
- Shrieves, R. E., & Dahl, D. (1992). The relationship between risk and capital in commercial banks. *Journal of Banking & Finance*, 16(2), 439–457.
- Wheelock, D. C., & Wilson, P. W. (2000). Why do banks disappear? The determinants of U.S. bank failures and acquisitions. *The Review of Economics and Statistics*, 82(1), 127–138.