

Non-linear Panel Data Liquidity Model of Islamic and Conventional Banks

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Abstract: Banks and liquidity risk are synonymous with each other due to inevitable asset-liability mismatches derived from deposit and lending activities. The study aims to investigate this issue by highlighting a new insight into the non-linear function between profitability and liquidity risk. With the aspiration to include both Islamic and conventional banks from nine Asia-Pacific countries, this study involves the unbalanced panel data of a 10-year period that covers from 2011 to 2020. The final sample ends with 285 banks and 2,116 observations. The study employs a quadratic random effect model with clusters adjusted errors comprised of five interest predictors namely profitability, credit risk, bank capital, income diversification and bank size. The findings discover profitability, bank capital, income diversification, size and economic condition play vital roles in managing banks liquidity. The findings reveal the existence of moral hazard for larger and highly capitalized banks with greater exposure to liquidity risk. High-margin banks are also prone to maintain lower liquidity levels, thus exposed to greater risk. Banks are advocated to elevate higher earnings and maintain adequate levels of capital and assets with the caution of moral hazard issues. Therefore, the regulatory body in each country is proposed to intervene and monitor especially the higher margin banks to lessen the moral hazard issue.

Keywords: *Lending, Deposit, Banks, Financial Risk*

1. Introduction and Background

The issue of bank liquidity continues to be a crucial concern in the financial sector, requiring focused attention and effective management strategies. Despite the existence of regulatory frameworks such as Basel III and risk management practices, bank's liquidity positions are still under threat from several challenges and potential risks. Banks face difficulties to balance the short-term funding requirements (deposits) with long-term investment assets (financing) (Horváth et al., 2016). The quest for optimal liquidity position is more complicated by the dynamic landscape of inconstant and volatile market conditions, economic uncertainties, and fluctuation of interest rates especially in the aftermath of the recent Covid-19 pandemic. The after-effect of the pandemic makes the liquidity position of the banks more fragile. The inability to maintain enough liquid assets to meet short-term obligations when it is due causes the banks at the vulnerable risk of encountering liquidity shortages, hindering their ability to meet deposit withdrawals and fulfill ongoing operational obligations, ultimately leading to potential financial distress, liquidity crises or liquidity risk.

Because the banks are the heart of a country, overexposure or unmanageable liquidity crises or liquidity risk of the individual bank would have substantial impacts on the broader financial system, to a large extent a country. This is due to the interconnectedness among the banks within the financial system (Zhang et al., 2021). The banks are interdependent through the interbank financing relationship. Therefore, liquidity shocks of an individual bank could trigger other banks within the financial system to be affected as well during the stress periods. In fact, this is the reality of the previous global financial crisis of 2007-2009. According to Alshammari (2023), some banks faced financial hardship during the global financial crisis period due to mismanagement of liquidity. Liquidity shocks of an individual bank have the capability to threaten the stability of other banks in the financial system especially those with unsound liquidity positions hence, causing systemic vulnerabilities. The effect is more vulnerable in the case of larger unsound banks. Yet, the study does not refuse the possibility that smaller bank could also spark the fragility of financial system. Evidently, collapse of Northern Rock during the global financial crisis 2007-2009 affect other banks in the system (Shin, 2009; Spatareanu et al., 2018).

Knowing the banking business, risk is inevitable. The banks cannot eliminate the risk, but it can be mitigated. Although regulators have come up with regulations and guidelines on bank liquidity one after another, it is still a hot topic to be discussed. Therefore, the study attempts to answer twofold questions, (i) What actually

drives the liquidity risk of a bank? and (ii) is there any non-linear relationship between profitability and liquidity risk? Growing literature shows profit of the banks at one end hinders liquidity risk. However, at the other end, the profit possibly promotes the liquidity risk. Thus, the study evaluates from the lens of liquidity position whether the banks should cautiously maintain the profit just enough or should increase their profit as much as possible. Thus, the banks need to adjust liquidity management strategies to accommodate the shifting dynamics while ensuring that robust risk management practices are implemented. Unlike most previous studies that focus on the linear relationship, the novelty and contribution of this study emphasize the effect of a non-linear relationship between profitability and liquidity risk of banks in Asia Pacific countries.

The rest of the paper is structured as follows. The study provides a brief survey of the literature on liquidity risk. Then, Section 3 explains the data and methodology. Section 4 exhibits the findings and discussion of the proposed model. Section 5 concludes.

2. Literature Review

This section discusses the related literature review on liquidity risk. In the first paragraph, the study discusses a theoretical literature review followed by empirical literature to support the relationship of potential determinants of liquidity risk. There are a few related theories explaining the relationship of potential determinants towards liquidity risk among others, risk absorption theory, financial fragility crowding out theory and too big to fail theory. Repullo (2004) and von Thadden (2004) explain the risk absorption theory and postulate capital is positively related to liquidity risk. This is due to the authors indicating banks that are highly capitalized hold less liquidity thus, greater liquidity risk exposure. The relationship shows that highly capitalized banks have less urgency to hold more liquidity as the banks have more capital to absorb sudden losses.

Diamond and Rajan (2000) oppositely conjecture a negative relationship between capital and liquidity risk based on financial fragility crowding out theory. The authors highlight that lower capital induces a lower liquidity position hence, greater liquidity risk exposure. The authors further emphasize that banks that have low capital would actively monitor their borrowers. This increases the capability of the banks to offer more financing. As a result, the banks would have low liquidity and become more fragile thereby vulnerable to the great liquidity risk. Similarly, Gorton and Winton (2000) and Gorton and Winton (2017) disclose that highly capitalized banks are less active in monitoring their borrowers. This crowding out deposits for financing, hence, increases the liquidity of the banks. Due to that reason, the banks become less fragile and thus less exposed to liquidity risk.

Another theory that is related to liquidity risk is the too-big-to-fail theory. The theory indicates that banks, especially large banks have more risk appetite due to these banks are confident that the regulators would bail them out in the case of failure (Stern & Feldman, 2004). The bailout policy encourages the banks to take more risk in this case, the liquidity risk. The following paragraph discusses the debatable empirical evidence on liquidity risk. Bank earns profit mainly through financing activities. Highly profitable banks increase the liquidity position of the banks. A bank can use profits as a reliable source of liquidity as they improve a firm's cash holdings, which in turn boosts its liquidity. Since the banks have more profits, these banks are possibly holding a significant amount of liquidity. Due to that, the banks most likely are less pressured to meet the demand withdrawal from the customers thereby, more exposed to liquidity risk (Al-Homaidi et al., 2019). In another vein, banks with high profitability tend to hold less amount of liquidity (Deléchat et al., 2012). This would result in greater liquidity risk exposure. Among others, the reason behind it is possibly due to the banks having good safety nets to cover for sudden liquidity shocks.

Many reasons may trigger the earnings of the bank, such as the decrease in net interest income, market pressure or due to the bank offering cheaper rates to meet the competition in the banking sector. It is because a bank holds a great amount of liquid financial assets in its portfolio beyond the amount needed. However, an excess of liquid assets may also harm the liquidity management of the bank (Matsuoka, 2018). According to Mashamba (2022), profitable banks in emerging market economies are less subject to financial constraints, which means these banks can easily mobilize external financing when needed. Due to that reason, these

banks tend to hold less liquidity thereby greater exposure to liquidity risk.

Ghenimi et al. (2021) discovered a positive relationship between credit risk and liquidity risk for both conventional and Islamic banks in the Middle East and North Africa (MENA) region. The authors further explain that the greater credit risk of conventional banks induces the majority of the depositors to withdraw their funds thus leading to greater liquidity risk exposure. As for the Islamic banks, the authors indicate that Islamic banks in the MENA region are highly reliant on the real estate sector. In the case of borrowers' default, it would result in greater credit risk hence, the banks tend to face less capability to meet the demand withdrawal from the customers. Roman and Şargu (2015) depict greater credit risk lessens the liquidity position of the banks thus, greater exposure to liquidity risk. On the contrary, Morina and Qarri (2021) find higher credit risk reduces the liquidity risk of the banks. This is possibly due to the banks that have greater credit risk having more liquidity to buffer for large withdrawal attempts from the depositors and thereby, less exposure to liquidity risk.

Mongid (2015) finds reduce in capital lowers the ability of the bank to buffer the possible liquidity problem that may harm the banking stability. This portrays lower capital of the bank caused higher liquidity risk exposure among the Islamic rural banks in Indonesia. The author further explains that liquidity risk is reduced when enhancing the leverage of the banks. This is because the banks tend to provide more liquidity to buffer for sudden shocks as they increase the leverage of the banks. This situation denies the negative statement that Islamic rural banks have a limited ability to absorb more funding. Increasing bank leverage induces a reduction of liquidity risk. Although the author is aware that an increase in leverage may pose a threat to the bank, the return for shareholders increases as the bank improves its leverage level. In addition, banks are more likely to rely on debt to finance their business. It is due to the nature of the banking business itself, wherein it receives deposits from the customer and afterward provides lending to the borrower. As a result, the bank has a larger capacity to absorb more funding hence, there would be more investment in liquid assets. As such, it enables the bank to create more liquidity of the bank and concurrently reduces the liquidity risk of the bank. Similarly, Ayed et al. (2021) discovered capital is negatively related to the liquidity risk of banks in the Middle East and North Africa (MENA) region. The relationship depicts that higher capital encourages the banks to hold more liquidity positions. This is possibly due to the banks that hold adequate amounts of capital are easier to hold high-quality liquid assets thereby, less exposure to liquidity risk. Zins and Weill (2017) evidence that Islamic bank holds more capital equity than their conventional peer. This is because Islamic bank lacks accessibility to the interbank market in vast countries and cannot rely on instruments such as derivatives and hedging tools as sources of their liquid funds. Due to this reason, an Islamic bank is highly exposed to face liquidity risk. As a result, Islamic bank tends to rely more on capital equity, and it is advisable to have lower short-term debt.

Calmès and Théoret (2014) discovered income from non-traditional banking businesses is more volatile compared to the traditional banking business. Better diversified banks are less exposed to vulnerable liquidity risk. This is because better-diversified banks are more flexible in managing unexpected liquidity problems (Baselga-Pascual et al., 2015). Hou et al. (2018) reveal that highly reliant banks on income diversification induce lower liquidity risk exposure. This is due to the banks that rely more on non-traditional banking businesses and less focus on financing activities. As a result, the banks can hold a buffer of liquidity thus, less exposure to liquidity risk.

According to Deari et al. (2022) bank size significantly influences the liquidity risk of the banks. The authors further indicate larger banks are good at managing their liquidity thus, less exposure to liquidity risk. This is because large banks hold more liquidity to buffer for sudden shocks. However, Riahi (2019) shows a positive relationship between size and liquidity risk. The author further emphasizes larger banks are exposed to the vulnerability of liquidity risk. This is due to the banks are risk appetite which, heavily involved in risky investment. Due to that, large banks are more prone to greater liquidity risk. Mashamba (2022) reveals small banks depend more on themselves in liquidity management by keeping large liquidity buffers probably because they have limited access to external funding. Thus, smaller banks are less exposed to liquidity risk. In other veins, Anginer et al. (2018) discovered large banks tend to hold less amount of liquidity due to these banks' belief that regulators would bail them out in the case of financial distress. Thus, these banks would target low liquidity to hold consequently, greater exposure to liquidity risk. The relationship is in accordance

with the theory of too big to fail (Stern & Feldman, 2004, Alfalah et al., 2022).

Deari et al. (2022) show a positive relationship between economic growth and liquidity risk. This indicates, that during the booming of the economy, banks tend to hold less liquidity possibly due to the banks disbursing more financing during the time. Because of that, the banks are highly likely to hold a low percentage of liquidity thereby, greater exposure to liquidity risk. Riahi (2019) discloses a similar point of view whereby, improvement of the economy leads to greater liquidity risk. During the downturn of the economy, banks hold more liquidity buffers thereby less exposure to liquidity risk. However, during the boom, these banks tend to hold a low liquidity buffer because of greater demand for risky financing (Acharya et al., 2011). This indicates the banks practice moral hazard to earn more during the booming economic condition. Due to that reason, the banks are highly likely to face greater liquidity risk during the booming of the economy. Given the inconclusive evidence, the study proposes the following hypotheses:

- H1:** There is a significant relationship between profitability and liquidity risk of the banks.
- H2:** There is a significant relationship between credit risk and liquidity risk of the banks.
- H3:** There is a significant relationship between capital and liquidity risk of the banks.
- H4:** There is a significant relationship between income diversification and liquidity risk of the banks.
- H5:** There is a significant relationship between the size and liquidity risk of the banks.
- H6:** There is a significant difference in liquidity risks between Islamic and conventional banks.
- H7:** There is a significant relationship between the economy and the liquidity risk of the banks.

3. Methodology

The study collects banks' financial data from the FitchConnect database of commercial banks comprised of Islamic and conventional banks. The yearly data were obtained from a sample of Asia Pacific countries that covers 10 years from 2011 to 2020. Due to data availability issues, the sample ends up with 9 countries namely Malaysia, Indonesia, Thailand, Brunei, Singapore, Philippines, Bangladesh, Pakistan and Kazakhstan. The unbalanced panel data consists of 2,116 observations from 285 banks. The main goal of the study is to examine factors that crucially influence banks' liquidity risk. Five (5) potential determinants were identified in the model explicitly; profitability, credit risk, bank capital, income diversification and bank size. Additionally, the model includes a type dummy to distinguish between Islamic and conventional banks as well as economic growth to control for country variations. Table 1 exhibits a list of variables employed in the model with the proxy and measurement.

Table 1: List of Variables and Proxies

	Notation	Proxy Measurement	Sources
Dependent Variable			
Liquidity risk	LR	Loans to deposits and short-termElbadry (2018); Jordà et al. (2021) funding (%)	
Independent Variables			
Profitability	PRO	Net interest income to averageDeléchat et al. (2012); Hou et al. assets (%) (2018); Zhang et al. (2021)	
Credit risk	CR	Non-performing loans to gross loansBaselga-Pascual et al. (2015); Riahi (%) (2019)	
Capital	CAP	Equity to total asset (%)	Ghenimi et al. (2021); Hou et al. (2018)
Income diversification	YD	Non-interest income to grossCuong and Vinh (2019) revenues (%)	
Size	SIZE	Total assets (USD billion)	Ayed et al. (2021)
Type	TYPE	1 = Islamic banks 0 = Conventional banks	Azmat et al. (2020); Bitar et al. (2017); Ibrahim (2020)
Economy	ECO	Gross domestic product (USDMashamba (2022) billion)	

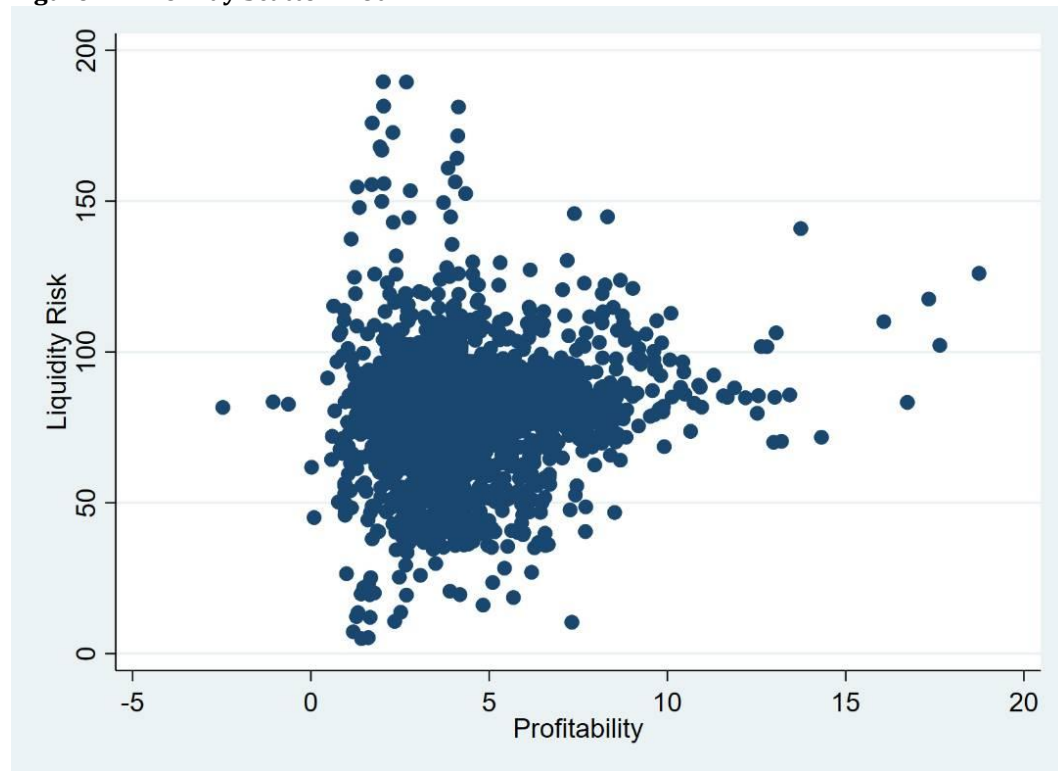
Figure 1 illustrates a two-way scatter plot between profitability and liquidity risk signals a probable of more

than one regime of curve shapes. Hence, the study proposes a non-linear model of liquidity risk with a quadratic function of banks' profitability. The general equation of the proposed model is exhibited in Eq. (1).

$$LR_{it} = \beta_0 + \beta_1 PRO_{it} + \beta_2 PRO_{it}^2 + \beta_3 CR_{it} + \beta_4 CAP_{it} + \beta_5 YD_{it} + \beta_6 SIZE_{it} + \beta_7 TYPE_{it} + \beta_8 ECO_{it} + e_{it} \text{ Eq. (1)}$$

The study conducts pre-testing to diagnose if there is any peculiarity in data that includes the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, Wooldridge test for autocorrelation, variance inflation factor (VIF) test for multicollinearity and Fisher-type unit-root based on Phillips-Perron for stationary issue. Most importantly, preceding the non-linear model development, the study verifies the existing curve shapes of more than one regime with a U-test (Lind & Mehlum, 2010). The test aims to identify the presence of a U-shaped or inverse U-shaped relationship between the explanatory variable and the predictor on a specific interval. The null hypothesis of the test proposes a monotone or inverse U-shaped while rejecting the null allows the acceptance of the alternate hypothesis that proposes the existence of a U-shaped relationship. Further, the study proceeds with panel data testing to determine the most appropriate panel data estimation for the model. The study employs the F-Chow Test, Brush-Pagan Lagrange Multiplier (BPLM) test, and Hausman Test for the data testing.

Figure 1: Two-way Scatter Plot



4. Results

Prior literature discussion of banks' liquidity risk based on a linear model may not fully expose the key strategy in managing this risk. Predicting the existence of a non-linear relationship motivates the study to proceed with the proposed model to enlighten the body of knowledge on banks' liquidity issues as well as to provide practical solutions and strategies with regard to liquidity risk in banking.

Before the estimation, the study identifies heteroscedasticity and serial correlation issues that suggest the remedy of using standard error adjusted for banks cluster. There is no serious multicollinearity and unit root issue detected in the model. Random effect model (REM) with cluster adjusted standard error is embarked to reveal insightful findings of Islamic and conventional banks' liquidity risks in the selected Asia Pacific countries.

The model developed in the study incorporates the quadratic function of banks' profitability on liquidity risk. Figure 2 displays the two regimes of curve shapes that imply a U-shaped relationship between profitability and liquidity risk where the relationship is negative for lower-earning banks while after a certain threshold, the relationship changes to be positive for higher-earning banks. To proceed with the quadratic regression model, it is expected that both profitability and its squared term must be statistically significant. Table 2 provides descriptive statistics and Table 3 portrays the estimation result for the quadratic model. The U-test for level and squared term profitability is statistically significant at the 1% level confirming the sample split as illustrated in Figure 2.

Figure 2: Two-way Scatter Plot with Two Regimes



Table 2: Descriptive Statistics

VARIABLES	OBS.	MEAN	MIN	P50	MAX	SD	SKEW.	KURT.
Liquidity risk	2,116	79.64	5.00	81.76	189.58	20.71	0.26	6.11
Profitability	2,116	4.22	-2.47	3.92	18.74	2.14	1.45	7.47
Credit risk	2,116	5.36	0.01	3.07	101.22	8.19	5.39	45.05
Capital	2,116	11.92	-1.03	10.63	49.17	5.99	2.07	9.97
Income diversification	2,116	24.81	-49.18	24.03	99.08	14.74	0.72	4.27
Size	2,116	15.35	0.05	3.40	430.00	43.40	5.89	43.27
Economy	2,116	490.59	12.61	340.44	1049.33	307.09	0.69	1.83

The final sample comprises 285 banks (Islamic and conventional banks) with 2,116 observations. The Wald- χ^2 for the estimation is significant at a 1% level specifying a good fit model. While the study period covers 10 years, the unbalanced panel has an average of 7 years for each bank with a minimum of 3 years per bank. The random effect GLS regression reveals all predictors in the model are significant except for credit risk and bank type. The coefficient indicates a positive relationship between credit risk and liquidity risk, where banks with higher credit risk encounter greater liquidity risk. The relationship, however, is not statistically significant. Type dummy is also found to be insignificant to the liquidity risk of Islamic and conventional banks. However, relatively Islamic banks have lower liquidity risk in comparison to conventional banks in these 9 sample countries.

As profitability is deemed to be a statistically important determinant in monitoring liquidity risks, banks in different regimes need to consider a unique strategy. As such, the estimation shows a significant relationship between profitability and liquidity risk in both level and squared terms. Extreme values obtained from the U-test are reported in Table 3 at 6.77. The extreme point indicates the turning point of the relationship between profitability and liquidity risk. The threshold reveals banks with profitability lower than 6.77 percent experience adverse effects of liquidity risk with lower profitability. Islamic and conventional banks in Asia Pacific countries that earn profits at a lower threshold need to secure higher profits to attain lower liquidity risk. The negative relationship between profitability and liquidity risk in the lower threshold is statistically significant at the 5% level. Banks with lower thresholds rely on profitability to lift banks image via stability to secure more deposits from customers. Sustain deposits from customers substantially improve banks' liquidity, thus lessening the exposure of liquidity risk (Alshammari, 2023). It is worth noting, that the mean and median of banks' profitability are approximately 4 percent (refer to Table 2). While the turning point is 6.77 percent, this empirical finding entails majority of the banks in the sample fall under the lower threshold with a negative relationship between profitability and liquidity risk.

Table 3: Quadratic estimation of banks liquidity in Asia Pacific

	COEFFICIENT		ROBUST ERROR	STANDARD Z
Profitability	-2.979	**	1.184	-2.520
Profitability^2	0.220	***	0.081	2.710
Credit risk	0.123		0.084	1.460
Capital	0.637	***	0.167	3.810
Income diversification	-0.218	***	0.053	-4.100
Size	0.027	**	0.011	2.480
Type	-0.656		2.566	-0.260
Economy	0.013	***	0.004	3.720
_cons	77.002	***	5.614	13.720
Number of observations	2,116			
Number of groups	285			
Min. observation per group	3			
Avg. observation per group	7			
Max. observation per group	10			
Wald chi2(8)	93.53	***		
U-test t-value	2.60	***		
Extreme point	6.77			

Note: ***, ** and * indicate 1%, 5% and 10% significance levels.

Oppositely, the remaining banks that earn a profit of 6.77 percent or more would procure a positive effect on liquidity risk with lower profitability. The null hypothesis for the upper threshold can be rejected at a 1% significant level. Banks in this upper threshold encounter greater liquidity risk with higher profitability. Financing activities are undoubtedly the core business that contributes to the main earnings for both Islamic and conventional banks. Banks with high profitability are pressured to sustain earnings and would be prone to offer extensive amounts of financing. Excessive financing activities jeopardize banks' liquidity as the bank is exposed to higher liquidity risk. Banks with greater profits, above the threshold are susceptible to the moral hazard issue when the banks are willing to accept more risk to earn greater profits (Acharya et al., 2011). Strategically, banks with higher profits need to be more cautious about financing and lending activities to manage an acceptable level of liquidity risk. Despite, solely focusing on the profit's agenda, banks must scrutinize the financing activities with careful and prudent assessment.

While relying too much on financing activities causes to liquidity trade-off, banks alternatively could consider income generation from other business activities via income diversification. Finding in Table 3 finds a significant negative relationship between income diversification and liquidity risk. The alternate hypothesis can be accepted at a 99% confidence interval. The result infers that Islamic and conventional banks of the sample countries can ascertain lower liquidity risk by focusing more on income diversification activities. Alternative income generation activities for banking business revolve around fees, charges, commissions and

interest and/or dividends from financial investment. While most of these activities involve liquid assets, having more income diversification secures banks' liquidity level, thus lowering liquidity risk (Hou et al., 2018). On the contrary, banks with less diversified portfolio have to count on financing and lending activities for income generation which later lead to greater exposure of liquidity risk.

Bank capital and size are also found to be essential in controlling liquidity risk for Islamic and conventional banks in the selected Asia Pacific countries. The positive relationships are statistically significant at 1% and 5% significant levels for capital and size respectively. The findings imply the moral hazard theory of too big-to-fail for large banks with huge capital. Banks with high capital are vulnerable to liquidity risk. Similarly, banks with huge amounts of assets maintain a low level of liquidity and are exposed to greater risk. These banks are inclined to take more risk in their decision-making with the mindset that big and well-capitalized banks have a high potential for bail-out, should the bank face unfortunate events (Anginer et al., 2018). Meanwhile, banks with lower capital have less liquidity risk. The same goes for small banks when these banks need to be more careful in their business decision-making to avoid any unprecedented situation. Small banks and banks with lower capital maintain their liquidity at an acceptable level to avoid unmanageable liquidity risk (Mashamba, 2022).

Last but not least, the model includes economic factors as a control variable to capture variation and heterogeneity issues between countries. Interestingly, the estimations discover economic condition as a determining factor that significantly influences banks' liquidity risk. The positive relationship is statistically significant at the 1% level. A country with promising economic growth stimulates massive business opportunities. With the pro-cyclical concept, banks yield on the economy to generate more business to boost income (Deari et al., 2022). Offering more financing and lending activities to the market source to greater liquidity risk for the banks. During a deficit period, the pro-cyclical theory suggests lesser business financing, thus minimizing bank liquidity risk.

5. Conclusion

The study attempts to investigate banks' fragility specifically by focusing on banks' liquidity risk. While liquidity risk is certain for banking business, it is crucial for both Islamic and conventional banks to fully comprehend the issue and come up with effective mitigating strategies. The study samples nine (9) Asia Pacific countries that include both Islamic and conventional banks for the model estimations. Primarily, the study aims to examine the critical elements that play as driving forces to bank liquidity. On top of that, the study conjecture banks with different level of profitability implement different strategies to maneuver banks' liquidity risk, hence introducing squared term for banks' profitability in the model. The quadratic model is predicted to provide insightful knowledge on banks' liquidity, hence fruitful for banks' decision-making with regard to liquidity management.

The findings disclose profitability, capital, income diversification, size and economic condition play vital roles in designing banks liquidity management. The quadratic function of profitability empirically suggests the two (2) regimes of curve shape on the relationship between profitability and liquidity risk. Expectantly, lower-margin banks strive to earn higher profits to minimize liquidity risk. In contrast, higher-margin banks have more flexibility and less reliance on illiquid investment activities such as financing and lending, to mitigate liquidity risk. Nevertheless, banks on this threshold, are highly likely to compromise their liquidity level to earn more via financing activities. Intervention and monitoring from regulatory bodies in each country are of the essence to dampen the moral hazard issue among higher-margin banks.

In a similar vein, banks with prominent capital and assets size, are comfortable holding lower liquidity levels as the banks are likely to endanger the moral hazard issue of too-big-to-fail. In this sense, Islamic and conventional banks must reckon on the adequate value of capital and assets to minimize banks' liquidity risk. Optionally, banks focus on income diversification to lower liquidity risk by providing alternative investment activities diverting from illiquid financing activities to more liquid assets. Islamic and conventional banks are anticipated to strategies on alternative business and investment activities to strengthen the bank liquidity level.

The study empirically concludes the Islamic and conventional banks in the selected Asia Pacific countries adopt the pro-cyclical theory when it comes to the country's economy. During booming economic conditions, there is a high stimulation of economics and business activities, leading to greater opportunities for financing and lending activities. In pro-cyclical theory, banks would favorably seize the opportunity to earn more with the trade-off of bank liquidity level. Contrariwise, banks are more reserved in financing and lending activities during economic downturns, hence minimizing liquidity risk.

The study recognizes the limitation of the investigation mainly on the data availability. Due to missing values and outlier detection, the observations shrink to the final number of observations with nine (9) remaining countries. Given vast future data availability, future research may consider splitting the sample between Islamic and conventional banks to anticipate distinct strategies between the two (2) groups of banks in Asia Pacific countries.

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