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The interrelationships between bank risk and charter value in **ASIAN-5**

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ABSTRACT

This study examines the interrelationships between bank risk and charter value in five countries in Southeast Asia (ASEAN-5) from 2006 to 2019 using a simultaneous equations model. The findings show a two-way relationship between bank risk and charter value. More specifically, the positive relationship between charter value and bank risk implies that banks with a more excellent charter value tend to pursue fast growth strategies and thus may face a higher risk. This positive link, however, only holds up to a certain level of charter value. On the other hand, the negative impact of bank risk on charter value argues that more risky banks tend to generate lower returns, thus reducing charter value. Additionally, a bidirectional relationship between them still holds when using an alternative measure of bank risk and controlling for the global financial crisis and governance indicators. Therefore, our findings provide critical implications for policymakers, managers, and academics.

ARTICLE HISTORY

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KEYWORDS Bank risk-taking; charter

value; ASEAN-5; 3SLS; SEM

1. Introduction

The banking system is critical to most economies worldwide, particularly those that are bank-based. Indeed, since banks provide the primary funding to firms and households and facilitate payment management systems. The recent global financial crisis reemphasized factors that discipline bank risk-taking must be improved. These elements include regulatory discipline and bank capital charter (also known as bank self-discipline) (Guevie & Lai, 2003). Additionally, Jones, Miller, and Yeager (2011) highlighted that charter value is one of the essential parts of the banking industry because of its ability to reduce moral hazard incentives that may arise from deposit insurance schemes. Furthermore, the charter value hypothesis also argues that charter value self-regulates bank risk-taking and offers a valuable source of monopoly power to banks (Demsetz, Saidenberg, & Strahan, 1996; Gan, 2004; Ghosh, 2009a; Gonzalez, 2005; Jones et al., 2011; Keeley, 1990). Consequently, the greater charter value could reduce risk-taking behaviours and improve bank capital because of more significant bankruptcy costs faced by banks if they fail. On the other hand, banks that often seek more returns, higher margins, and profitability tend to engage more in new financial instruments and rely more on

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short-term debt. This shift towards new market-based instruments at a larger scale and riskier business models is challenging for banks with more excellent charter value (Martynova, Ratnovski, & Vlahu, 2014).

Several studies have attempted to examine the relationship between bank risk and charter value. On the one hand, early studies have shown that banks with high charter value tend to face lower default risk (Demsetz et al., 1996; Gropp & Vesala, 2004; Herring & Vankudre, 1987; Keeley, 1990; Marcus, 1984). On the other hand, Agusman, Gasbarro, and Zumwalt (2006) demonstrated that charter value is positively associated with bank risk.¹ Furthermore, a few studies indicated that greater risk may weaken charter value (Ghosh, 2009a). All in all, prior studies have suggested the possibility that a bidirectional relationship between charter value and bank risk may exist. That is a gap that this study aims to address. When considering the size and impact of some emerging markets like Southeast Asia on the world economy, it is surprising that no empirical studies have attempted to investigate the interrelationship between bank risk and charter value in this region.

This study focuses on the original five members of the Association of Southeast Asian Nations (ASEAN-5), including Vietnam, Indonesia, Thailand, Malaysia, and the Philippines. With an average growth rate of 5.3 percent between 2006 and 2019, ASEAN-5 is considered one of the world's fastest-growing economies (WB, 2019). Some of them (e.g., Vietnam) are regarded as Asia's next dragons (Nguyen, Roca, & Sharma, 2014). As a crucial pillar of the financial sector, the development of the banking system is essential to the remarkable economic growth of ASEAN-5. For instance, 16-18% of the Vietnamese economic growth was attributed to the banking system (Stewart, Matousek, & Nguyen, 2016). Thus, bank stability has attracted much attention from academics, practitioners, and policymakers. The ASEAN-5 banking sectors have undergone regulatory adjustments due to past financial crises such as the Asian Financial Crisis and the Global Financial Crisis (GFC) (Noman & Isa, 2021). The ASIAN-5 banks have approached Basel III by gradually increasing their average capital to assets from 8.4% in 2006 to 11.5% in 2019 (IMF, 2019). Theoretically, this requirement was supposed to reduce bank instability by limiting more considerable exposure to riskier investments. However, increased capital requirements pressure may cause banks to have a lower charter value, ultimately increasing bank risk-taking (Le, 2018, 2019; Zhang & Jiang, 2018).

The present study contributes to the existing literature in two main ways. First, most studies have examined the one-way relationship between bank risk and charter value. For instance, several studies have investigated the effect of charter value on bank risk (Bakkar, Rugemintwari, & Tarazi, 2020; Daher, Masih, & Ibrahim, 2019; Ghosh, 2009b). Other studies, however, have examined the effect of bank risk on charter value (Ghosh, 2009a). As argued above, the possible two-way relationship between bank risk and charter value may exist. Examining this interrelationship in ASEAN-5 banking systems will add more evidence to the extant literature in emerging markets, especially Southeast Asia. Second, the impact of charter value on bank risk and vice versa would differ given the regulatory environments and economic conditions confronted by banks across countries and the

¹For most (but not all) metrics of bank risk, Agusman et al. (2006) showed a positive relationship between charter value and bank risk.

various level and quality of services related to deposits and loans among nations. Therefore, the lessons drawn from prior studies may not automatically apply to other markets. By providing evidence on the bidirectional relationship between charter value and bank risk in ASEAN-5, this study would provide significant implications for bank practitioners and policymakers in strengthening the regional banking systems.

Using a unique dataset of 79 listed banks from 2006 to 2019, the findings show a twoway relationship between charter value and bank risk in ASEAN-5. More specifically, the charter value may increase bank risk-taking. However, the findings document an inverted U-shaped relationship between them. Simultaneously, the results indicate a negative impact of bank risk on charter value. Similar results are still obtained when running several robustness checks.

The rest of this paper is structured as follows: Section 2 presents a brief literature review on the relationships between charter value and bank risk. Section 3 presents the methodology and data used. Section 4 reports empirical results, while Section 5 concludes this study.

2. A brief overview of the literature

The literature on the relationship between bank risk and charter value can be divided into two strands. The first strand has focused on the one-way relationship between charter value and bank risk. The second strand has attempted to examine the impact of bank risk on charter value. These will be discussed in turn.

In the first strand, the early work of Hellmann, Murdock, and Stiglitz (2000) and Repullo (2004) has proposed theoretical models about the disciplining effects of charter value on bank risk-taking. The charter value is conventionally measured by the gap between a bank's market value and its book value. Since regulatory decisions are based on book-value capital measurements, banks have more incentive to maintain a high book capital ratio and minimize risk. Similarly, a seminal work by Buser, Chen, and Kane (1981) claimed that charter value is a critical factor that is the ability to limit banks' risktaking incentives. Early studies in the US market have provided a negative relationship between charter value and bank risk-taking. Keeley (1990) argued that once bank charter value is reduced due to the increasingly competitive environment, banks are more incentive to take more risks. Similarly, Brewer and Saidenberg (1996) showed a negative association between bank charter value and the volatility of the daily stock price. In a consistent manner, other studies have demonstrated that a greater charter value provides banks more incentives to self-regulate their risk-taking behavior (Galloway, Lee, & Roden, 1997; Herring & Vankudre, 1987; Marcus, 1984). When considering the impact of the global financial crisis, Jones et al. (2011) found that the overall reduction in charter value contributes to increasing bank risk-taking, which ultimately results in the subprime financial crisis. Using the European data, Gropp and Vesala (2004) also found similar findings. Because the charter value of a bank belongs to its shareholders, a greater charter value should discourage bank risk-taking (Haq, Avkiran, & Tarazi, 2019). Regarding emerging markets, Zhang and Jiang (2018), using Chinese data, confirmed that a lower charter value caused by increased capital requirement pressure may induce banks to take more risk. In the same vein, Ghosh (2009b), using Indian data, showed that banks with lower charter values tend to take a greater risk.

However, other studies have indicated opposite findings. Using a moral-hazard framework, Park (1997) contended that increasing charter value may lead to a more incredible risk interior solution. Using large banks in the US and Europe, Bakkar et al. (2020) found that higher charter value amplifies standalone and systemic risk if banks pursue a focus strategy. Similarly, Hoang, Faff, and Haq (2014), using banks from G7 nations, emphasized that charter value is positively related to banking system risk. Using the sample of Asian banks, Agusman et al. (2006) also provided the same conclusion, and the results are still robust when using different measures of bank risk.

In the second strand, limited studies have attempted to examine the impact of bank risk and charter value. A study by Ghosh (2009a) has indicated that banks that face higher risk tend to have diminished charter value. All in all, the literature may suggest the interrelationships between bank risk and charter value. Therefore, the first hypothesis is formed as follows:

H_{1:} There is a bidirectional relationship between charter value and bank risk.

One may argue that the positive impact of charter value on bank risk may exist up to a certain level. Ghosh (2009a) found a quadratic relationship between charter value and bank risk in the Indian banking system. Following their suggestion, the second hypothesis is established as follows:

H_{2:} There is a non-linear relationship between charter value and bank risk.

3. Methodology and data

3.1. Methodology

As explained in Section 2, charter value (*CV*) and bank risk (*RISK*) are considered the two endogenous variables in this study. Following the suggestion of Ngo and Le (2019), Le, Ho, Nguyen, and Ngo (2021), and among others, a simultaneous equations model (SEM) is used to deal with the concurrent relationship between *CV* and *RISK*. It is acknowledged that several techniques could be used within the SEM framework, such as the Granger causality test (Fiordelisi, Marques-Ibanez, & Molyneux, 2011), three-stage least squares (3SLS) (Le, 2019; Nguyen & Le, 2022), two-stage least squares (2SLS) (Kwan & Eisenbeis, 1997), generalized methods of moments (Le et al., 2021), and seemingly unrelated regressions (Altunbas, Carbo, Gardener, & Molyneux, 2007). The advantages and disadvantages of these techniques are well explained by Nguyen and Nghiem (2015), Nosier and El-Karamani (2018), and Nguyen and Le (2022). For the want of space, the explanations are not repeated. Following Ngo and Le (2019) in cross-country and Nguyen and Nghiem (2015) in India, a SEM with the 3SLS estimator is used in this study because 3SLS is proved to be more efficient than 2SLS (Belsley, 1988; Intriligator, 1978).

Our baseline model is formed as follows:

$$RISK = f(CV, Bank \ controls, Macro \ Controls)$$
(1)

$$CV = f(RISK, Bank controls, Macro Controls)$$
 (2)

where CV is measured by the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks (González-Rodríguez, 2008). Additionally, we follow Martinez-Miera and Repullo (2010) to use squared charter value (*SQCV*) in the model to investigate whether a non-linear relationship between charter value and bank risk may exist.

Because listed banks are included in our analysis, *RISK* is preferably proxied by the yearly volatility of weekly stock returns (Galloway et al., 1997; Ghosh, 2009a; Hovakimian & Kane, 2000). Accordingly, higher risk means higher volatility in stock returns. For robustness checks, we use *ZSCORE* as a measure of bank stability (Le, 2021; Lepetit & Strobel, 2013; Nguyen, Le, & Ho, 2021). *ZSCORE* = $\frac{\text{ROA}_{i,t} + \text{EQUITY}_{i,t}}{\sigma_{\text{ROA}_i}}$ where ROA_{i,t} and *EQUITY*_{*i*,*t*} are the current value of ROA and the ratio of total equity to total assets, respectively while σ_{ROA_i} is the standard deviation of ROA over the sample period. In addition, the natural logarithm of *ZSCORE* value is used to reduce the problem of a highly skewed distribution of *ZSCORE*. Because a greater value of *ZSCORE* means lowered bank insolvency risk, we use the inverse of *ZSCORE* to maintain consistency with the analysis of *RISK*. For ease of exposition, *ZSCORE* is still labeled as the inverse of the natural logarithm of *ZSCORE* in the remainder of our study.

A number of independent variables are included in equations 1–2 to determine the critical factors that affect bank risk and charter value. It is worth noting that these variables are similar but not identical to those in prior studies, so as to better reflect the ASEAN-5 institutional and regulatory framework.

For the determinants of bank risk (Eq. 1), we control for bank profitability (ROA), bank liquidity (LATA), banking openness (FREE), and economic growth (GDP). Bank profitability, as measured by returns on assets (ROA), can withstand financial shocks better, thus improving bank stability (Athanasoglou, Brissimis, & Delis, 2008). Higher profitability, however, may imply high-risk premia when there is insufficient bank regulation and asymmetric information (Hellmann et al., 2000). LATA, the ratio of liquid assets to total assets, is used to control for liquidity risk. A high value of LATA implies a more stable bank (Shim, 2013; Vithessonthi, 2014). However, banks that hold more liquid assets tend to yield lower risk-adjusted returns because these assets often generate lower returns than others (Delis & Staikouras, 2011; Ho et al., 2021). Following Mercieca, Schaeck, and Wolfe (2007) and Le and Nguyen (2021), FREE, the banking freedom index is used to control for the effect of the openness of the banking system. The higher value of FREE is, the greater degree of the banking system's openness is. Le et al., (2020) argued that higher banking freedom is associated with more stability since a more open condition may encourage banks to engage in those activities that are the most relevant to their strategies and goals to manage risk appropriately. Furthermore, GDP, as measured by the annual growth rate of the economy, is used to account for the economic conditions that may affect bank risk-taking behaviour (Le & Nguyen, 2021; Le et al., 2020).

For the determinants of charter value (CV) (Eq. 2), we control for bank size (SIZE), lending specialization (LOAN), bank funding (DEPO), bank diversification (NIC), and economic growth (GDP). SIZE, the natural logarithm of total assets, may affect bank charter value (Keeley, 1990) because large banks with more market power will attract

more depositors, thus increasing charter value (Akhtar & Saleem, 2021; Gonzalez, 2005). *LOAN*, the ratio of total loans to total assets, and *DEPO*, the ratio of total deposits to total assets are used to examine whether bank charter value is affected by rents earned from the loan and deposit markets (Ghosh, 2009a). *NIC*, the ratio of non-interest income to total income, is used to study whether a shift toward non-traditional activities may increase bank profitability, thus improving charter value (Ghosh, 2009b). *GDP*, the economic growth rate, accounts for the economic conditions that may influence bank charter value.

Following prior studies such as Le and Pham (2021), and Nguyen (2012), we employ the pairwise Granger causality test to examine whether CV and *RISK* are possibly endogenous. The pairwise Granger causality model is constructed as follows:

$$RISK_{i,t} = \alpha_{0,i} + \sum_{j=1}^{k} \alpha_{1,i} RISK_{i,t-j} + \sum_{j=1}^{k} \alpha_{2,i} CV_{i,t-j} + \varepsilon_{i,t}$$
(3)

$$CV_{i,t} = \beta_{0,i} + \sum_{j=1}^{k} \beta_{1,i} CV_{i,t-j} + \sum_{j=1}^{k} \beta_{2,i} RISK_{i,t-j} + v_{i,t}$$
(4)

where *i* represents the number of banks in the panel (i = 1, 2, 3, ..., N), *t* denotes the time period (t = 1, 2, 3, ..., T), and *j* is the lag length. Error terms, ε_t and v_t , account for white noise and are possibly correlated for a given bank. The Granger causality between CV_t and *RISK*_t exists if the sets of their coefficients in equations 3–4 are statistically significant (Granger, 1969). Table 1 shows the results of the pairwise Granger causality tests using the panel regression with one and two lags as suggested by Nguyen (2012) and Wooldridge (2001). The findings show that the bi-directional relationship between CV and *RISK* may exist in most cases. Similar results are also obtained when observing the Granger causality between *ZSCORE* and CV.

Once the factors that affect charter value and bank risk are identified, Equations 1-2 should be entered in a simultaneous model because of two main reasons. The first reason is that the error terms from both equations are possibly correlated due to using the same dataset. Since random errors and endogenous parameters are correlated, inconsistent and biased estimators may be derived from the simultaneous equation bias if ignored. The second reason is that a contemporaneous relation between error terms exists as they may contain factors that were excluded from the equations. Because banks provide universal products and services across countries in the region, the impact of the excluded factors on the association between CV and RISK for one entity is similar to another. Consequently, these errors should be connected and yield consistent findings.

As endogenous issues may cause inconsistent estimators of biased SEM, the use of a system estimating technique should consider these matters. To validate the reliability of

Number of Lags	1		2		
Null Hypothesis	F-Statistics	Prob.	F-Statistics	Prob.	
RISK does not Granger cause CV	55.161	0.000	0.653	0.524	
CV does not Granger cause RISK	12.854	0.000	11.902	0.000	

 Table 1. Pairwise Granger-causality tests.

RISK = the yearly volatility of weekly stock returns; CV = the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks.

a simultaneous equations system, the identification test is used. The process of excluding exogenous and counting endogenous variables in the equation must meet the ordinary order condition for individual equation calculation with instrument variables. Baum (2007) suggested that the rank of the instrument matrix can be solved by the sufficient rank criterion. In our analysis of the 3SLS estimator embedded a SEM, each equation may meet the individual-equation order and rank criteria for identification, but the system is still undetermined. Therefore, the identifiability in the system is the association between the reduced form of the linear system and the structural coefficient matrices. According to the rule of thumb, the values of the structural coefficients that range from -0.5 to 0.5 are considered an identification benchmark in SEM (Greene, 2003; Wooldridge, 2001). The data in Table 2 reveal the consistent values of endogenous and exogenous variables in the equations. The same results are true when using *ZSCORE* as an alternative measure of *RISK* although they cannot be presented due to the length restriction.

3.2. Data

Our data was gathered from three main databases. We only focus on listed banks because we use both market and accounting measures of bank risk for robustness. Listed banks were primarily collected from Refinitiv Eikon deposited at Thomson Reuter. Initially, a sample of 100 listed banks in ASEAN-5 was obtained. To examine the interrelationship between charter value and bank risk, banks with data availability of more than four consecutive years were analyzed in our study. After excluding banks with insufficient data to calculate our main dependent variable, this arrived at a sample of 79 banks between 2006 and 2019, yielding a total of 1,106 observations.² While data on GDP was achieved from the World Bank database (WB, 2019), the data on FREE was acquired from the Heritage Foundation database. Nonetheless, the country that had the most banks was Indonesia (43%), and the least was Vietnam (11.39%). The Philippines, Malaysia, and Thailand accounted for 18.98%, 13.92%, and 12.65%, respectively. Note that Singapore is not considered in our study because it is identified as a developed country.

Table 3 indicates the mean of *RISK* is 80.2% with a greater standard deviation, implying a large difference in stock returns' volatility of banks across nations in ASEAN-5. Furthermore, the mean bank charter value (CV) is \$US 85,100 billion with a high standard deviation, suggesting a significant difference in the charter value of banks in the region. Also, the mean of *LATA* and *NIC* is 12.7% and 28.8%, respectively. The average ratio of total deposit to total assets (*DEPO*) is 76.7%, while the average ratio of total loans to total assets (*LOAN*) is 0.6%. *FREE* has a value of 49.36 with a higher standard deviation, arguing a substantially different degree of the banking systems' openness among these nations.

4. Results

4.1. Our baseline results

Table 4 indicates a negative association between *CV* and two measures of bank risk. Also, the correlations between independent regressors are relatively not high. Based on the

²For instance, Vietnamese banks were required to publish their audited financial information since 2006 (Le, 2019).

			Endog	genous coefficients m	atrix			
	RISK	C						
RISK	<u>-</u> ا							
CA	0.5	.						
Exogenous coefficients matrix								
SQCV	SIZE	ROA	LATA	LOAN	DEPO	NIC	FREE	GDP
0.5	0	0.5	0.5	0	0	0	0.5	0.5
0	0.5	0	0	0.5	0.5	0.5	0	0.5
<i>RISK</i> = the yearly volatility of wee period, combined with current pe value of common stocks; <i>SQCV</i> =	kly stock returns; Z eriod values of ROA squared charter va	SCORE = the inversion that the inversion of the second text of the second state of the	se of the natural loga the natural logarithm tural logarithm of tota	arithm of Z-score whe of the book value of al assets; ROA, returns	re Z-score is measure assets minus the book on assets; <i>LATA</i> = lic	d by a standard dev c value of equity min quid assets to total a:	iation of ROA over us deferred taxes pl ssets; <i>LOAN</i> = tota	the examined us the market loans to total
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Table 2. Simultaneous equations system.

assets; DEPO = total deposits to total assets; NIC = non-interest revenue to total revenue; FRE = the banking freedom index; GDP = the growth rate of gross domestic products.

Variables	Definitions	Obs.	Mean	SD	Min	Max
RISK	The yearly volatility of weekly stock returns	1,106	0.802	2.341	0.072	18.585
CV	The natural logarithm of the book value of assets minus	1,106	85,100 ¹	200,000 ¹	66.5 ¹	1,240,000 ¹
	the book value of equity minus deferred taxes plus the market value of common stocks.					
ZSCORE	The inverse of the natural logarithm of Z-score where	1,106	0.034	0.007	0.029	0.046
	Z-score is measured by a standard deviation of ROA					
	over the examined period, combined with current					
	period values of RUA and EQUITY					
SIZE	The natural logarithm of total assets	1,106	84,000 ²	202,000 ²	2.07 ²	1,490,000 ²
ROA	Returns on assets	1,106	0.014	0.009	-0.024	0.038
LATA	Liquid assets to total assets	1,106	0.127	0.075	0.003	0.336
LOAN	Total loans to total assets	1,106	0.594	0.141	0.300	0.853
DEPO	Total deposits to total asset	1,106	0.767	0.092	0.505	0.908
NIC	Non-interest revenue to total revenue	1,106	0.288	0.155	0.019	0.662
FREE	The banking freedom index	1,106	49.358	11.177	30	70
GDP	The growth rate of gross domestic products	1,106	0.053	0.016	-0.015	0.075

Table 3. Descriptive statistics of variables used.

^{1,2}These values are converted in \$US billion for ease of interpretation. All variables are winsorized at 1% and 99% levels except for macroeconomic variables.

Table 4	 Corre 	lation	matrix.
---------	---------------------------	--------	---------

RISK										
0.29***	ZSCORE									
-0.02	-0.32***	CV								
0.05	-0.16***	0.70***	SIZE							
0.04	-0.02	0.10***	0.05*	ROA						
0.03	-0.03	-0.05	-0.02	0.07**	LATA					
-0.09***	-0.33***	0.26***	0.18***	0.05*	-0.35***	LOAN				
0.05*	-0.09***	0.13***	0.05*	-0.25***	0.14***	0.18***	DEPO			
-0.01	-0.13***	-0.05	-0.23***	0.05	-0.18***	-0.01	0.02	NIC		
-0.17***	-0.47***	0.05*	-0.26***	0.08***	-0.11***	0.30***	-0.09***	0.10***	FREE	
0.08***	-0.16***	0.05	0.18***	0.01	0.26***	-0.17***	0.08***	-0.08***	-0.28***	GDP

RISK = the yearly volatility of weekly stock returns; ZSCORE = the inverse of the natural logarithm of Z-score where Z-score is measured by a standard deviation of ROA over the examined period, combined with current period values of ROA and EQUITY; CV = the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks; SQCV = squared charter value; SIZE = the natural logarithm of total assets; ROA, returns on assets; LATA = liquid assets to total assets; LOAN = total loans to total assets; DEP = total deposits to total assets; NIC = non-interest revenue to total revenue; FREE = the banking freedom index; GDP = the growth rate of gross domestic products. All variables are winsorized at 1% and 99% levels except for macro-economic variables. *, ** and *** denote the significance at the 10%, 5%, and 1% levels, respectively.

results of pairwise Granger causality between RISK and CV as shown in Table 1, the concurrent relationship between them should be estimated by SEM with the 3SLS estimator.

The data shown in Part 1 of Table 5 indicate a positive relationship between CV and both measures of bank risk, implying that charter value may increase bank risk-taking and reduce banking stability. This finding somewhat supports the suggestion of Bakkar et al. (2020) and Park (1997) that a better charter value resulting from fast growth strategies may induce banks to engage more in risky investments. However, the negative coefficients on *SQCV* suggest that an inverted U-shaped relationship between them may exist. This result demonstrates that a positive link between charter value and bank risk only holds up to a certain level. Therefore, hypothesis 2 cannot be rejected. As per the charter value hypothesis, bank shareholders who protect their charter value against adverse shocks or excessive risk-taking tend to put more effort into closely monitoring and supervising bank operations. This thus may limit banks to take riskier investments (Demsetz et al., 1996; Jones et al., 2011).

The findings also indicate that *FREE* is negatively associated with both measures of bank risk. This may emphasize that increased openness of the banking system tends to mitigate bank risk-taking and enhance bank stability (Barth, Caprio, & Levine, 2004; Le et al., 2020; Mercieca et al., 2007). Additionally, a positive relationship between *GDP* and *RISK* implies that banks are more likely to pursue aggressive growth strategies through excessive lending and investments during the period of economic expansion, thus may increase bank risk (Le, 2018).

Furthermore, the findings also discover that bank profitability (ROA) and bank liquidity (LATA) hardly have any influence on bank risk (RISK). When observing bank stability, a negative relationship between LATA and ZSCORE may imply that banks with more tremendous liquid assets have higher profitability, thus improving bank stability (Bourke, 1989). The expected bankruptcy cost hypothesis posits that increased liquid assets holding mitigates a bank's probability of default (Bordeleau & Graham, 2010).

The data presented in Part 2 of Table 5 show that both measures of bank risk are negatively and significantly associated with CV, implying that a greater level of bank risk and instability may lower profitability – thus, reducing bank charter value. Nonetheless, this is comparable with the findings of Ghosh (2009a) in India.

Furthermore, the negative coefficients on *SIZE* imply that larger banks tend to lower their charter value. This finding is in line with those of De Nicolo (2000). The positive coefficients on *DEPO* in both measures of bank risk demonstrate the importance of depositors' funding in banks' financing activities, thus bank charter value (Keeley, 1990). In addition, *GDP* is found to have a positive impact on *CV*. This result shows that economic growth may boost demand for banking services and products during cyclical upswings, thus enhancing bank profitability (Le & Ngo, 2020) which ultimately increases charter value. This result is comparable with those of Ghosh (2009b).

All in all, the findings show a bidirectional relationship between bank risk and charter value. More specifically, charter value tends to increase bank risk, whereas charter value is negatively affected by risk-taking behaviour. Therefore, hypothesis 1 cannot be rejected.

4.2. Robustness checks

It is worth mentioning that our primary interest variable is *RISK*. Hence, this section only reports the results of using RISK due to the length restrictions. However, similar results of using ZSCORE are still obtained and available upon request. Several robustness checks are performed as follows.

Following prior studies by Le et al. (2020), Fu, Lin, and Molyneux (2015), and others, we account for the impact of the recent global financial crisis. The BIS (2010) classified the period of July 2007-March 2009 as an acute financial crisis. Due to the availability of yearly data, we consider the years 2007–2009 as the crisis period in this study. *CRISIS* is a dummy variable that has a value of 1 for the years 2007–2009 and 0 otherwise. The use of this variable is also considered by Le and Nguyen (2021) and Le and Ngo (2020). Part 1 of Table 6 (second column) demonstrates that *CV* affects *RISK* positively, whereas *RISK*

- - -

Part 1. Equation (1) of SEI	M		
	RISK		ZSCORE
Constant	-231.630(85.547)	Constant	-0.628(0.276)
CV	16.82***(6.048)	CV	0.051***(0.019)
SQCV	-0.296***(0.104)	SQCV	-0.001***(0.000)
ROA	0.131(0.088)	ROA	-0.000(0.000)
LATA	-1.103(0.862)	LATA	-0.014***(0.004)
FREE	-0.019***(0.007)	FREE	-0.000***(0.000)
GDP	0.128**(0.052)	GDP	-0.001***(0.000)
Bank fixed effects	Yes	Bank fixed effects	Yes
No. Obs	1,016	No. Obs	1,016
Part 2. Equation (2) of SE	Μ		
	CV		CV
Constant	57.807(12.711)	Constant	42.358(5.239)
RISK	-3.844***(0.758)	ZSCORE	-265.529***(19.972)
SIZE	-0.826**(0.405)	SIZE	0.029(0.131)
LOAN	-4.078(3.125)	LOAN	-2.573***(0.701)
DEPO	9.176**(4.555)	DEPO	2.7***(0.812)
NIC	-1.151(1.624)	NIC	-0.708(0.590)
GDP	0.583**(0.228)	GDP	0.375***(0.047)
Bank fixed effects	Yes	Bank fixed effects	Yes
No. Obs	1,016	No. Obs	1,016

Table 5. Our baseline models' results.

RISK = the yearly volatility of weekly stock returns; ZSCORE = the inverse of the natural logarithm of Z-score where Z-score is measured by a standard deviation of ROA over the examined period, combined with current period values of ROA and EQUITY; CV = the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks; SQCV = squared charter value; SIZE = the natural logarithm of total assets; ROA, returns on assets; LATA = liquid assets to total assets; LOAN = total loans to total assets; DEPO = total deposits to total assets; NIC = non-interest revenue to total revenue; FREE = the banking freedom index; GDP = the growth rate of gross domestic products. The table contains the results estimated using a SEM with the 3SLS estimator. All variables are winsorized at 1% and 99% levels except for macroeconomic variables. ** and *** denote the significance at the 5%, and 1% levels, respectively.

impacts CV negatively. CRISIS generally exacerbates the volatility of bank stock returns. This somehow supports the early suggestion of Akhtar (2021) and Thampanya, Wu, Nasir, and Liu (2020). Furthermore, Part 2 of Table 6 emphasizes that charter value exists in the presence of the global financial crisis in ASEAN-5. When a crisis occurs, banks tend to improve their charter value to deal with the impact of the global financial crisis (Thakor, 2015).

We also investigate whether the interrelationships between charter value and bank risk may differ among bank sizes. Prior studies such as Berger and Bouwman (2009), Le and Pham (2021), and Le (2019) classified banks with having total assets greater or smaller than the median as large and small ones, respectively. The data indicated in Columns 3-4 of Table 6 show that a two-way relationship between bank risk and charter value still holds for the case of large banks. When observing small banks, the only one-way positive association between bank risk and charter value is found. Nonetheless, our main findings are confirmed.

Furthermore, we follow Le (2022) and Bahadir and Valey (2019) to control for the quality of institutions. These indicators such as the average indices of Political Stability, Voice and Accountability are included into equations 1–2. The data on these indicators were obtained from the Worldwide Governance Indicators held in the World Bank

	A unhala samunla	Creall hanks	Launa hanka
	A whole sample	Small Danks	Large banks
Part 1. Equation (1) of S	EM		
	RISK	RISK	RISK
Constant	-174.430(84.759)	5.675(129.510)	-146.769(51.742)
CV	12.597**(6.002)	0.101(9.312)	10.531***(3.608)
SQCV	-0.221***(0.103)	-0.011(0.163)	-0.187***(0.062)
ROA	0.106(0.078)	-0.024(0.252)	-0.041(0.083)
LATA	-0.925(0.752)	0.282(0.711)	-0.904(1.166)
FREE	-0.013**(0.006)	-0.003(0.032)	0.011(0.009)
GDP	0.214***(0.054)	0.110***(0.042)	0.630***(0.193)
CRISIS	0.894***(0.205)		
Bank fixed effects	Yes	Yes	Yes
No. Obs	1,016	546	560
Part 2. Equation (2) of S	EM		
	CV	CV	CV
Constant	57.734(15.933)	22.816(5.586)	53.857(12.740)
RISK	-6.120***(1.579)	-1.738***(0.398)	-4.280***(0.919)
SIZE	-0.951*(0.526)	0.146(0.241)	-0.943**(0.389)
LOAN	-4.125(5.062)	-0.923(0.945)	-11.451*(6.591)
DEPO	10.444(7.761)	1.090(1.881)	15.605**(7.515)
NIC	-0.875(1.929)	-0.813(1.184)	2.178(1.768)
GDP	1.467***(0.510)	0.189**(0.087)	1.592**(0.776)
CRISIS	6.008***(2.054)		
Bank fixed effects	Yes	Yes	Yes
No. Obs	1,016	546	560

Table 6. The results of considering the crisis and subsamples.

RISK = the yearly volatility of weekly stock returns; CV = the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks; SQCV = squared charter value; SIZE = the natural logarithm of total assets; ROA, returns on assets; LATA = liquid assets to total assets; LOAN = total loans to total assets; DEPO = total deposits to total assets; NIC = non-interest revenue to total revenue; FREE = the banking freedom index; GDP = the growth rate of gross domestic products. The table contains the results estimated using a simultaneous equations model with the 3SLS estimator. All variables are winsorized at 1% and 99% levels except for macroeconomic variables. *, ** and *** denote the significance at the 10%, 5%, and 1% levels, respectively.

database. Note that we include them in the separated model to avoid multicollinearity problems.

Again, Table 7 shows a bidirectional association between bank risk and charter value. Moreover, both Political Stability and Voice and Accountability are more likely to mitigate the volatility of bank stock returns. This suggests that a sound and wellimplemented environment and enforced norms may improve bank operation, especially the credit process. For example, this may effectively facilitate both credit grants and credit recovery, thus enhancing operational efficiency and performance (Godlewski, 2005). Furthermore, the findings also show that charter value is negatively affected by political stability. This can be explained by the fact that better quality of the institutional environment is more likely associated with higher bank market concentration, which leads to financial instability (González-Rodríguez, 2008; Saif-Alyousfi, Saha, & Md-Rus, 2020). This may ultimately decrease bank charter value.

5. Conclusion

This study investigated the interlink between bank risk and charter value in the ASIAN-5 between 2006 and 2019 using a SEM with the 3SLS estimator for a sample of 79 listed

Part 1 Equation (1) of SEM

		RISK
Constant	-186.822(80.676)	-232.458(85.630)
CV	13.502***(5.703)	16.698***(6.028)
SQCV	-0.236**(0.098)	-0.293***(0.104)
Political Stability	-1.461***(0.296)	
Voice and Accountability		-1.373**(0.653)
Control variables	Yes	Yes
Bank fixed effects	Yes	Yes
Observations	1,016	1,016
Part 2. Equation (2) of SEM		
		CV
Constant	72.098(18.890)	55.661(14.050)
RISK	-6.910***(1.843)	-4.265***(0.866)
Political Stability	-9.172***(3.274)	
Voice and Accountability		-2.937(2.324)
Control variables	Yes	Yes
Bank fixed effects	Yes	Yes
Observations	1,016	1,016

Table 7. Robustness checks when using governance indicators	Table 7	 Robustness 	checks	when	using	governance	indicators.
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RISK = the yearly volatility of weekly stock returns; CV = the natural logarithm of the book value of assets minus the book value of equity minus deferred taxes plus the market value of common stocks; SQCV = squared charter value. The same set of control variables in equations 1–2 is used. The table contains the results estimated using a simultaneous equations model with the 3SLS estimator. All variables are winsorized at 1% and 99% levels except for macroeconomic variables. ** and *** denote the significance at the 5%, and 1% levels, respectively.

banks. The findings indicate a bidirectional association between bank risk and charter value. More specifically, a positive impact of charter value on bank risk shows that banks with higher charter value have more incentives to accumulate risk. This may imply that pursuing fast-growing policies or focus strategies may induce banks to take higher risks. However, the findings demonstrate the existence of an inverted U-shaped relation between them. Therefore, the charter value should be considered as a good tool for bank managers to control bank risk in the long term. Simultaneously, a negative relationship between bank risk-taking and charter value may argue that more risky banks tend to lower their charter value. This thus reinforces the importance of charter value in determining bank risk-taking. Therefore, the authorities should pay more attention to bank charter value to strengthen the resilience of the banking systems in the ASEAN-5, especially in the case of large banks.

In addition, the results highlight that a more free banking system may lower bank risktaking and enhance bank stability. Therefore, the authorities should take further measures to speed up the integration of their banking system into the regional and global financial systems. When considering the effects of governance indicators, the findings also demonstrate the significance of political stability and voice and accountability in controlling bank risk. This suggests that the policymakers in ASEAN-5 should further consider these indicators in strengthening banking systems. Our findings also reveal that charter value is negatively associated with bank size and positively related to bank funding. To improve charter value, bank managers should develop an appropriate plan to secure stable funding and attract more deposits. However, this study may suffer some limitations. This study used a panel data of 79 listed banks in ASEAN-5 from 2006 to 2019. Perhaps, further research may extend period coverage and the number of banks in different areas to confirm our findings. Especially, the negative impact of the COVID-19 pandemic on the banking system is acknowledged in the literature (Boubaker, Le, & Ngo, 2022; Elnahass, Trinh, & Li, 2021; Le, Ho, Nguyen, & Ngo, 2022) thus, this impact should be considered in future studies when examining the interrelationship among bank risk and charter value. Last but not least, the emergence of alternative digital lending (e.g., fintech credit and bigtech credit) may challenge the function of the banking system (Le, 2022; Le et al., 2021). Future research may consider the impact of fintech development when investigating the interrelationships between charter value and bank risk.

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