Banking Market Size Structure and Financial Stability: Evidence from Eight Asian Countries

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ABSTRACT: Using commercial bank data from eight major Asian countries, we examine the relationship between the banking market size structure and the stability of financial institutions. We show that larger banks tend to have lower capital adequacy ratios, liquidity ratios, and distance-to-default ratios. We further find that a rise in large banks' market power, accompanying an increase in their market shares, lowers the capital adequacy of small banks. Small banks' non-performing loans and the possibility of their bankruptcy also increase as large banks' market shares rise. Our study suggests that large banks' greater market shares are associated with small banks' financial instability. Overall, our findings are consistent with the notion of the recent banking literature that has important antitrust policy implications.

KEYWORDS: large bank, banking market, size structure, financial stability, Asian countries

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1. Introduction

Bank size has substantially increased around the world in recent years.[1] In the U.S., bank upsizing has progressed rapidly over the past three decades due to advances in information technology, an increase in the number of bank branches, and the mitigation of geographical restrictions on bank consolidation. The number of commercial banks in the U.S. peaked at 14,496 in 1984, then decreased to 6,096 in 2012. Banks' average asset size rose from US$167 million to US$2.196 billion, a 12-fold leap, during the same period. However, the Herfindahl-Hirschman Index (HHI) remained intact over the same period. This is largely attributable to market extension consolidations.[2]

The majority of existing studies examine the relationship between the market power of large multi-market banks and consumer financing or small- and medium-sized enterprise (SME) financing. Peek and Rosengren (1998) and Strahan and Weston (1998) find that although consolidation between small banks increases SME financing, a large bank's acquisition of a small bank decreases SME financing. However, Berger, Saunders, Scalise, and Udell (1998) argue that a decrease in upsized banks' market shares of SME loans causes an increase in SME loans by other financial institutions due to external effects. The literature examining the effects of bank consolidations on competition and market structure focuses on the U.S. context. On the other hand, there is a lack of bank consolidation studies that focus on competition and financial stability in Asia, although the banking industry in that region has become increasingly important in recent years.

In this paper, we examine the relationship between the banking market size structure and the stability of financial institutions using commercial bank data from eight major Asian countries. Our definition of banking market size structure is similar to one by Berger, Rosen, and Udell (2007), defining banking market size structure as the distribution of market shares of different size classes of banks in a domestic banking market. We use the capital adequacy ratio, net write-off rate, liquidity ratio, and distance-to-default as our financial stability measures. We also explore how an increase in the market shares of large banks affects the financial stability of small banks in Asian economies. We find that larger banks in the major Asian markets tend to have lower capital adequacy, liquidity, and

[1] Figure 1 shows the annual changes of total asset size for the three largest banks from the eight Asian countries that we explore in this paper. Among those nations, China records the highest change in its top three banks, with total assets for 2012 showing 19 times larger than total assets for 1994. Malaysia records a 14.9 times increase, while Thailand shows an 11.6 times increase in total assets over the same period. Overall, Figure 1 shows that bank size has grown substantially during the 1994-2012 period in the eight Asian countries.

[2] In their elaborate model, Park and Pennacchi (2009) argue that a greater presence of large multimarket banks (LMBs) tends to promote competition in retail loan markets but also tends to harm competition in retail deposit markets. Thus, they find that a greater presence of LMBs in a local market tends to lower small business loan rates but also tends to lower retail deposit rates.

distance-to-default ratios. We further show that an increase in large banks' market share decreases the capital adequacy and liquidity ratios of small banks in the same country. Small banks' non-performing loans and the possibility of their bankruptcy also increase as large banks' market power rises. Overall, our study indicates that greater large banks' market shares are associated with small banks' financial instability.

Several important policy implications are derived from our results. First, large banks' regulatory forbearance and moral hazard problems arising from anticipating too-big-to-fail policies could be an adverse effect on the management of the stability of financial institutions. Second, a greater large bank presence in major Asian markets will aggravate the leading banks' abuse of their market power and increase the systemic risk due to excessive market concentration by a few large banks. Finally, large banks' market power resulting from an excessive increase in their market shares is highly likely to accelerate their tendency to cherry-pick prime loans.[3] Thus, the profitability of small banks is likely to worsen and small banks are more likely to have incentives to invest in subprime loans to make up for decreased profitability.

The remainder of the paper is organized as follows. We discuss the relevant literature in Section 2. In Section 3, we present our sample data and the empirical methods used to test our hypotheses. We provide our empirical results in Section 4. Finally, Section 5 concludes.

2. Literature review

Previous literature examines the relationship between bank consolidation and profitability. A few studies show that bank consolidation improves efficiency and profitability in the U.S. and Europe (Rhoades 1998; Vennet 1996). Berger (1999) argues that bank consolidation increases profitability, but fails to improve cost efficiency. However, more studies do not find a significant relationship between bank consolidation and profitability or financial stability. Demsetz and Strahan (1997) show that large banks' financial stability has not improved as they have an incentive to improve profitability by investing in risky assets, although they are better diversified than small banks. Hughes, Lang, Mester, Moon (1999) suggest that large banks do not perform well, although they are well diversified. The Group of Ten (2001) examines the relationship between the risks and efficiency gains of financial market consolidations in the U.S. It argues that the effects of bank consolidations are unclear and that

[3] Large banks mostly provide loans to borrowers with the highest creditworthiness, resulting in their monopoly of prime loans.

there is little empirical evidence that banks benefit from consolidation through economies of scale and scope. Ito and Krueger (2007) argue that East Asian countries engage in financial deregulation and bank consolidation, which affects the exchange rates, interest rates, and capital flow. McKinnon and Pill (1996) insist that financial deregulation, such as stabilization programs, initially improve economic performance and result in large inflows of foreign capital. These results create excessive optimism regarding financial deregulation among domestic residents, international investors, and the policy authorities. However, the economy later collapses into a recession, financial crisis, and capital flight because banks are not efficient information conduits between depositors and borrowers. Berger and Udell (2002) explore the inner workings of relationship lending and bank organizational structure. They find that the lending relationship depends on the accumulation over time of soft information by the loan officer and that a bank's agency problems may best be resolved by restructuring the bank to form smaller banks. Thus, the literature on whether bank consolidations (or bank upsizing) help to improve management efficiency and financial stability remains controversial.

Bank upsizing can increase the possibility of bankruptcy. For instance, financial supervisory authorities are less likely to conduct a thorough investigation into large banks because they are more complex than small banks. This can affect the large banks' financial stability. Large banks face moral hazard problems due to too-big-to-fail policies, which may adversely affect their management of their financial stability. De Nicolo and Kwast (2002) find that the interdependency of U.S. large complex banking organizations increases significantly after consolidations. De Nicolo, Bartholomew, Zaman, and Zephirin (2004) examine the influence of 500 large banks in 90 countries on systemic risk and show that the banks manage their assets dangerously after consolidations. Bikker and Haaf (2002) examine the relationship between competitive conditions and the market structure in the banking industry. They show that competition is becoming weaker in local markets and stronger in international markets, implying that more large banks impairs competitiveness in financial market. Berger and Frame (2007) further find that a greater market presence of large banks significantly lowers the loan rate premiums of small business loans. However, loan rate premiums are not affected by the lending bank's size when the market presence of large banks is considered. Hannan and Prager (2009) argue that small and single market banks' profitability is highly related to the presence of large and small market banks in rural banking markets. They show that an increased presence of large or small market banks negatively affects the profits of small single market banks. Overall, the literature suggests that the profitability of small banks is likely to worsen if large banks have greater market power.

3. Research Design

3.1. Sample Selection and Variables

We examine the relationship between the banking market size structure and the stability of financial institutions using financial statement data collected from Bankscope by Bureau van Dijk between 1994 and 2012. Our analysis focuses on China, Malaysia, Taiwan, Indonesia, Korea, Thailand, Japan, and the Philippines. We use Malaysia, Indonesia, Korea, Thailand, and the Philippines because these countries experienced the Asian financial crisis. China, Taiwan, and Japan are chosen because they have large banking markets in Asia. The sample consists of 6,924 firm-year observations.[4]

The capital-asset ratio is used as a proxy to analyze the effect of bank upsizing on capital adequacy. Equity capital consists of core capital (tier 1) and supplementary capital (tier 2). Its proxy is measured by dividing the equity capital by the risk-weighted assets. The net write-off rate is used as a proxy of asset soundness and is measured by dividing net write-offs by total liabilities. The liquidity ratio is used as a proxy of liquidity and is measured by dividing liquid assets by the sum of deposits and short-term funds. The distances-to-default of individual banks is used as a proxy of the bankruptcy probability. The distance-to-default is calculated by dividing the sum of the return on assets (ROA) and capital-asset ratio by the standard deviation of the ROA and taking the natural logarithm of the result, following Laeven and Levine (2009).

Herfindahl–Hirschman Index (HHI) is used to control the market structure. It is estimated by squaring the market shares of all of the commercial banks and summing the results. A bank with a large market share is therefore given a high weight. If there are few banks in the market and they have an uneven size distribution, the HHI rises and the market approaches a monopoly. We use the combined market shares of the top three banks, based on their annual deposits, in each country for the large banks' market shares.[5] We use the logarithm of total assets as the proxy variable of bank size, following Kang (2006). The small bank dummy has the value 1 if the annual total assets of the banks belong to the tertiles.[6] The diversification of the banks is measured with the non-interest income ratio, which is the ratio of the non-interest income to the operating income, as suggested by Stiroh (2006). We use the leverage ratio, which is the ratio of total leverage to capital assets. ROA is the ratio of net

[4] Our sample comprises 6,924 firm-year observations, of which 1,325 firm-years are from China, 503 from Malaysia, 654 from Taiwan, 1,059 from Indonesia, 343 from Korea, 334 from Thailand, 2,207 from Japan, and 499 from the Philippines.

[5] We calculate the HHI based on the total deposits of the individual banks in a local market, following the definition by Park and Pennacchi (2009). They also use the HHI and large banks' market shares to control for the market size structure.

[6] The small bank dummy is used in the panel regression, univariate mean analysis, and Wilcoxon rank sum test.

income to total assets.[7] We winsorize the dependent and explanatory variables at the 1st and 99th percentiles to minimize outlier problems.

3.2. Empirical design

We conduct univariate mean tests and Wilcoxon rank sum tests to analyze the effects of an increase in the large banks' market shares on the smaller banks (i.e., the balloon effect). We conduct an empirical examination using multivariate regressions with two-way fixed effect models with four dependent variables, the capital adequacy ratio, net write-off rate, liquidity ratio, and distance-to-default.[8] The two-way fixed effect models are panel regression analysis models that are one-way fixed effect model which considers an error term as the fixed constant effect of individual banks in regression analyses and whose characteristic effect of time is under control. Thus, we prevent the endogeneity problems that can occur in a pooled ordinary least square analysis, in which the characteristics of the individual banks are not controlled.[9] The empirical estimation is made using:

$$Dependent\ Variable_{it} = \alpha + \beta_1 HHI_{it-1} + \beta_2 CR3_{it-1} + \beta_3 Ln\ TA_{it-1} + \beta_4 Non\text{-}Int.\ Inc._{it-1} + \beta_5 Lev._{it-1} + \beta_6 ROA_{it-1} + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it}, \quad (1)$$

$$Dependent\ Variable_{it} = \alpha + \beta_1 HHI_{it-1} + \beta_2 CR3_{it-1} + \beta_3 Ln\ TA_{it-1} + \beta_4 SB\ Dum. + \beta_5 SB{*}CR3_{it-1} + \beta_6 Non\text{-}Int.\ Inc._{it-1} + \beta_7 Lev._{it-1} + \beta_8 ROA_{it-1} + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it}. \quad (2)$$

We use the capital-asset ratio, net write-off rate, liquidity ratio and distance-to-default as the dependent variables in Equations (1) and (2) to measure financial stability. *HHI* is Herfindahl–Hirschman Index and *CR3* is the total deposit share of the three biggest banks in a local market. The *HHI* and *CR3* are used to control the characteristics of the banking market structure of each country. *Ln TA* is the natural logarithm of total assets and is used as an explanatory variable to measure bank upsizing. In Equation (2), we also use the interaction term between the small bank dummy (*SB Dummy*) and the three largest banks' market shares (*CR3*) to analyze the balloon effect of an increase in the three largest banks' market shares on small banks. As in previous studies, we use the control variables of the non-interest income ratio (*Non-Int. Inc.*), leverage ratio (*Lev.*), and *ROA* to test the bank characteristics. We use a one year lag for all of the explanatory variables to account for the lagging relationship between the dependent variable and independent variables, consistent with prior

[7] The definition, calculation formula, and source of the variables used in the panel regression analysis are shown in Appendix A.

[8] Although we do not tabulate the results, we also estimate a regression with country fixed effects and find the same results.

[9] We perform the Hausman specification test (Wooldridge 2002) to determine whether the fixed-effects or random-effects model is more appropriate. The test gives a χ^2 of 115.97 ($p = 0.000$), so we use the fixed-effects model.

studies.

3.3. Summary Statistics and Correlations

The descriptive statistics of the major variables are described in Table 1. The mean of the capital adequacy ratio is 14.93% and the median is 11.60%. The mean (median) of the liquidity ratio is 25.17% (17.41%), the minimum value is 2.01%, and the maximum value is 162.57%, showing that the liquidity ratio differs greatly from bank to bank. The mean (median), minimum, and maximum values of the three largest banks' market shares are 44.01% (44.58%), 26.27% and 69.04%, respectively. The results imply that there may be a concentration problem with the large banks because in most countries, the three largest banks' market shares are over half of the market.[10]

Table 2 shows the Pearson correlations between the major variables. Total assets have significantly negative correlations with the capital adequacy rate, net write-off rate, liquidity, and distance-to-default in both the full sample and a subsample of the 1997 crisis countries. Our results show that there are negative links between bank upsizing and financial stability, as measured by the capital adequacy ratio, net write-off rate, liquidity ratio, and distance-to-default.

4. Empirical Results

4.1. Univariate tests

Table 3 shows the results of t-tests and Wilcoxon rank sum tests between large and small banks, analyzing the effect on small banks as the large banks' market shares increase. We divide the banks into large and small banks, based on the top tertile and bottom tertile of total assets. We also split the sample into two markets with a decreasing large bank share market and an increasing large bank share market. If a large bank's market share decreases in comparison with the previous year, that bank is in the decreasing large bank share market and takes the value of 1. In contrast, large banks in the increasing large bank share market have greater market shares at t than at t-1 and take the value of 0.[11]

According to the results of Panel A in Table 3, the mean capital adequacy ratio of small banks in the decreasing large bank share market is 28.8% and the median is 16.0%. However, the mean capital

[10] China has the highest concentration, followed by Korea, Thailand, Indonesia, Malaysia, the Philippines, Japan, and Taiwan.

[11] The increasing large bank share market comprises 3,972 firm-year observations and the decreasing large bank share market comprises 2,952 firm-year observations.

adequacy ratio of small banks in the increasing large bank share market is 21.8% and the median is 14.3%. The difference in the mean capital adequacy ratio of small banks between the two groups is 7.0%. The capital adequacy ratios of small banks in the increasing large bank share market are significantly lower at the 5% significance level. The results of Wilcoxon rank sum tests also show that the capital adequacy ratios of small banks in the increasing large bank share market are significantly lower than in the decreasing large bank share market at the 1% significance level. Our results indicate that as large banks' market shares grow, their market power increases, which lowers the capital adequacy ratios of small banks (i.e., the balloon effect). The mean capital adequacy ratio of large banks in the decreasing large bank share market is 10.7% and the median is 10.5%. The mean capital adequacy ratio of large banks in the increasing large bank share market is 11.8% and the median value is 11.0%. The results suggest that if large banks' market shares increase, their capital adequacy ratios improve, whereas the capital adequacy ratios of small banks deteriorate.

Panel B of Table 3 shows the differences in the net write-off rates of small and large banks in the decreasing and increasing large bank share markets. The mean net write-off rate of small banks in the decreasing large bank share market is 0.71% and the median is 0.14%. However, the mean net write-off rate of small banks in the increasing large bank share market is 1.72% and the median is 0.28%. Therefore, the net write-off rates of small banks in the increasing large bank share market are significantly higher than those of small banks in the decreasing large bank share market, at the 1% significance level. Wilcoxon rank sum tests also show that the net write-off rates of small banks in the increasing large bank share market are significantly higher than those of small banks in the other group. Banks prefer borrowers with prime credit ratings and collateral. Large banks' excessive market power is highly likely to lead to their monopoly of prime loans, as their dominance accelerates their trend of cherry-picking loans to borrowers with prime credit ratings. Small banks' profitability will then gradually decline, giving them huge incentives to invest in risky sub- or non-prime loans to make up for their decrease in profitability. Our results imply that an increase in the excessive market power of large banks exacerbates the asset quality of small banks through the balloon effect.

We show the differences in the liquidity ratio in the decreasing and increasing large bank share markets in Panel C of Table 3. The liquidity ratios of the large banks in the increasing large bank share market decrease significantly, compared to those in the other group.[12] Panel D of Table 3 shows that the differences in the distance-to-default of small and large banks in the decreasing and increasing large bank share markets. We find that the mean distance-to-default of small banks in the decreasing

[12] These results may be driven by an increase in the competition between the large banks.

large bank share market is 3.10. However, the average distance-to-default of small banks in the increasing large bank share market is 2.82. The distance-to-defaults of small banks in the increasing large bank group are significantly lower than in the decreasing group at the 5% significance level. Our results show that a rise in large banks' market shares causes instability of small banks and increases the probability of bankruptcy. Similarly, Hannan and Prager (2009) find that the presence of multi-market banks negatively affects the profitability of small banks. However, Hannan and Prager (2009) argue that the negative effect of the presence of multi-market banks on the profitability of single-market banks only occurs in rural banking markets and non-metropolitan statistical areas. Thus, we have a different scope, as we focus on Asian countries rather than defining urban and rural areas of banking markets.

4.2. Multivariate Analysis

We examine the relationship between the banking market size structure and the stability of financial institutions in Section 5.2. Table 4 shows the effects of bank size on financial stability, measured with the capital adequacy ratio, net write-off rate, liquidity ratio, and distance-to-default. We also explore the effect of changes in large banks' market shares on the financial stability of small banks.

Models (1)-(3) in Table 4 show a significantly negative relationship between bank size and the capital adequacy rate, at the 1% significance level. Based on the Models, a one standard deviation increase in the logarithm of total assets at time t-1 will increase the capital adequacy rate by 9.786-13.564. Our results imply that larger banks tend to have lower capital adequacy rates. A change in lending policies may drive these lower capital adequacy ratios. For instance, large banks may consider themselves too big to fail and engage in more risky lending practices, resulting in lower capital adequacy ratios. Berger and Udell (2002) argue that financial instability is amplified because it is difficult for supervisory authorities to investigate large financial institutions in detail. Kang (2006) argues that bank upsizing makes it difficult for supervisory authorities to monitor financial institutions, due to their size and complexity. Bank upsizing increases the possibility of regulatory forbearance by supervisory authorities. Our results imply that supervisory authorities' lenient regulations and large banks' moral hazard problems, arising from anticipating a too-big-to-fail policy, may lead to the recorded decline in banks' capital adequacy rates.

Model (2) in Table 4 shows the effect on small banks caused by increases in the market shares of large banks. Interestingly, the coefficients of the large banks' market shares are insignificant, whereas the interaction term between the small bank dummy and the large banks' market shares has a

significantly negative relationship with the capital adequacy ratio. Our results show that an increase in the market power of large banks negatively affects the capital adequacy rates of small banks, which is consistent with Table 3, Panel A. We use a term reflecting the interaction between the Asian financial crisis countries dummy, small bank dummy, and large banks' market shares to show the difference in the balloon effect in the Asian financial crisis countries and non-Asian financial crisis countries in Model (3) of Table 4. We find that the association between bank size and capital adequacy is greater in Asian financial crisis countries than in non-Asian financial crisis countries. Our results suggest that large banks' stronger market power, stemming from their growing market shares, is likely to cause them to monopolize prime loans by accelerating their trend to cherry-pick, especially in Asian financial crisis countries. Small banks that experience declines in their profitability are likely to have better incentives to increase their investments in subprime loans, to make up for their reduced profits. Our results indicate that an increase the market shares of large banks may be one factor that worsens small banks' stability.

Models (4)-(6) in Table 4 show the effect of bank size on the net write-off rate and its balloon effect in small banks. We find that the interaction term between the small bank dummy and large banks' market shares has a positive relationship with the net write-off rate, significant at the 5% level in Models (5) and (6). Again, Hannan and Prager (2009) similarly find that the presence of multi-market banks negatively affects the profitability of small banks, but focus on the urban/rural divide, rather than on Asian countries as we do here. The excessive market power of large banks may negatively affect small banks' asset soundness. Although bank size has a significantly negative relationship with net write-off rate in Model (4), bank size and net write-off rate have an insignificant relationship in Models (5) and (6). It is therefore difficult to conclude that larger banks tend to have lower net write-off rates.

We examine the relationship between bank size and the liquidity ratio in Models (7)-(9) in Table 4. Our results show that bank size and the liquidity ratio have a negative relationship, significant at the 1% level. A one standard deviation increase in the logarithm of total assets at time t-1 is associated with a decrease in the liquidity ratio of 12.916, 23.018, and 25.082 in Models (7)-(9) of Table 4. Large banks generally have higher credit ratings than small banks and large banks' funding costs are generally lower than those of small banks (Kang 2006). A large bank size may therefore lower large banks' incentives to prepare against urgent funding and to maintain high liquid asset ratios. Models (8) and (9) show the effect on small banks of an increase in large banks' market shares: the interaction term

between the small bank dummy and large banks' market shares is significantly negative.[13] Our results suggest that an increase in large banks' market shares reduces small banks' liquidity ratios, which indicates that large banks' abuse of their market power may reduce the liquidity ratios of small banks.

We use the distance-to-default of each bank to analyze the effect of bank upsizing on distance-to-default in Table 7.[14] In Models (10)-(12), distance-to-default has a significantly negative relationship with bank size. A one standard deviation increase in the logarithm of total assets at time t-1 increases distance-to-default by 0.392-0.470 in Models (10)-(12). Larger banks are more likely to have higher possibility of bankruptcy, which may be related to lenient regulations by supervisory authorities toward large banks and the moral hazards of large banks. In Model (11), the interaction term between the small bank dummy and large banks' market shares shows a significantly negative relationship between the two, but the total effect of the market shares of large banks on distance-to-default is still significantly positive. Our results show that larger banks tend to have lower capital adequacy ratios, liquidity ratios, and distance-to-defaults.[15] We find that an increase in large banks' market shares worsens the capital adequacy, asset soundness and liquidity of small banks and decreases their distance-to-default. Large banks' excessive use of their market power is likely to undermine small banks' financial stability and reduce the efficiency of resource allocation in financial markets.

4.3. Robustness tests

In this section, we examine whether our primary results are robust to conducting first-difference regressions, using macro variables and two-way clustering or White's robust standard error, modifying the sample composition, and performing sensitivity tests in Tables 5-8. The results of the robustness tests support the arguments presented regarding the main results.

4.3.1. First-difference regressions

In Table 5, we perform a robustness test by replacing the dependent and independent level variables with difference variables. We also use macro variables for each country, such as the gross domestic product (GDP) per capita and the interbank lending rate, following Chan, Covrig, and Ng

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[13] The interaction term between the Asian financial crisis countries dummy, small bank dummy and large banks' market shares has a significantly positive relationship with the liquidity ratio. Thus, the association between bank size and liquidity is weaker in Asian financial crisis countries than in non-Asian financial crisis countries, as shown in Model (9) of Table 4.

[14] Distance-to-default expresses the inverse relationship of the possibility of bankruptcy.

[15] We also verify our results by conducting separate regressions for each country in our untabulated results and find that the results are qualitatively identical to those of our earlier tests.

(2005), Lamont, Polk, and Saa-Requejo (2001), and Keim and Stambaugh (1986).[16] Consistent with the evidence presented earlier, the results of Models (1) and (2) in Table 5 show that larger banks are likely to have lower capital adequacy rates. We find that the liquidity ratio and distance-to-default have significantly negative relationships with bank size in Models (5)-(8). However, we do not find a significantly negative association between the net write-off rate and bank size.

4.3.2. Macro variables, two-way clustering, and sample composition

We increase the confidence in our results by including macro variables for each country and using two-way clustering by time and country in Models (1), (3), (5), and (7) in Table 6.[17] We also use White's robust standard error for solving the heteroskedasticity problem in Models (2), (4), (6), and (8) in Table 6. Consistent with the evidence presented earlier, our findings show that larger banks tend to have lower capital adequacy rates, liquidity ratios, and distance-to-defaults. There is an insignificant association between bank size and the net write-off rate. It can be argued that Japan and China have different characteristics to Asian emerging countries. We address this concern in Table 7. We exclude the Japanese sample in Models (1), (3), (5), and (7). We exclude the Japanese and Chinese samples in Models (2), (4), (6), and (8). The results are qualitatively unchanged by these exclusions.

4.3.3. Sensitivity tests

In Panels A and B of Table 8, we perform sensitivity tests for our primary results. We use the Asian financial crisis dummy and global financial crisis dummy with the same control variables to rule out the influence of the financial crisis on the banks' financial stability. Our results show that all of the dependent variables on the capital-asset ratio, net write-off rate, liquidity ratio, and distance-to-default have significantly negative relationships with bank size. Our untabulated results suggest that the above results are unchanged when we estimate the financial stability-bank size associations for non-Asian financial crisis period (e.g. excluding the 1997 Asian crisis years).

5. Concluding Remarks

Commercial banks have continued to increase in size around the world since 2000. In the U.S., the

[16] Chan et al. (2005) use the GDP per capita as a proxy for measuring economic development. Lamont, Polk, and Saa-Requejo (2001) and Keim and Stambaugh (1986) use the interbank lending rate as a proxy for measuring the monetary policy.

[17] Our results are unchanged when we use clustered standard errors with two-way clustering by time and firm, following Petersen (2009).

average bank size has increased more than twelve times in the past three decades. A number of studies document the competitive effects of bank size increase due to consolidation in the U.S. There is, however, a lack of research on bank size with a focus on competition and financial stability for Asian countries.

This paper examines the relationship between the banking market size structure and the stability of financial institutions using commercial bank data from eight major Asian countries. We explore how an increase in large banks' market shares affects the financial stability of small banks in Asia. Our empirical evidence shows that larger banks in the major Asian markets tend to have lower capital adequacy ratios, liquidity ratios, and distance-to-defaults. We find that as large banks increase their market power by increasing market shares, the capital adequacy and liquidity ratios of small banks are lowered. Small banks' non-performing loans and the possibility of their bankruptcy also increase as large banks increase their market shares. Our results indicate that greater market shares by large banks are positively associated with small banks facing financial instability.

Our results have several policy implications. First, regulatory forbearance and large banks' moral hazard problems, due to too-big-to-fail policies, may adversely affect the management of banks' financial stability. Stricter regulatory supervision for large banks' financial stability is required in this region. Second, greater large bank presence worsens the large banks' excessive market power and increases the systemic risk due to the concentration of large banks. Antitrust banking market policies should be carefully designed and put into place. Third, large banks' market power is likely to accelerate their monopoly of prime loans. Thus, the profitability of small banks is likely to worsen and small banks are more likely to have incentives to invest in subprime loans to make up for their decreased profitability. Regulators should therefore consistently monitor the soundness of small banks.

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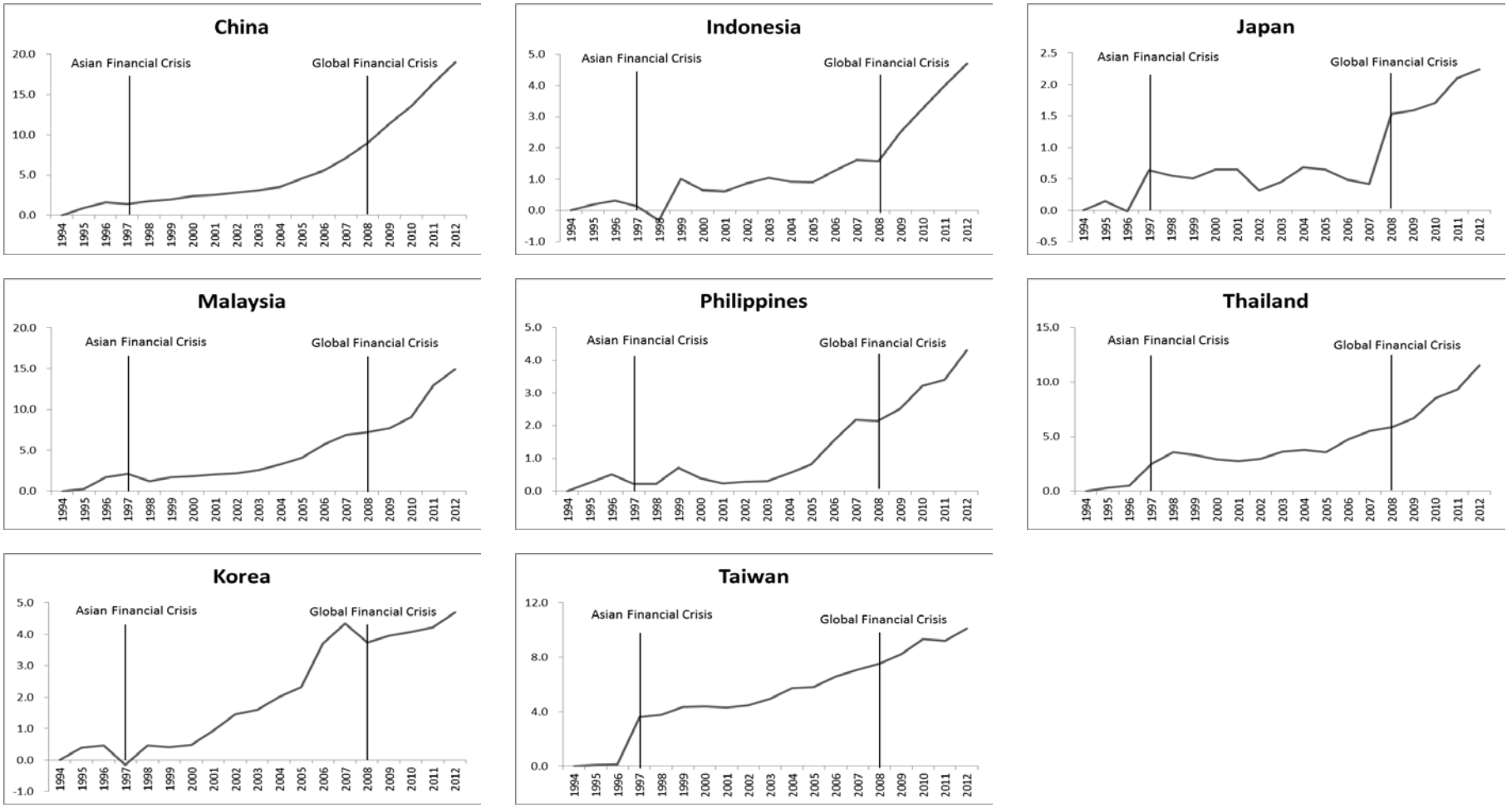
Appendix A
Regression Variable Definitions and Data Sources

Variable	Definition	Source
Panel A. Dependent variables		
Capital Adequacy Ratio	This ratio is the total capital adequacy ratio under the Basle rules. It measures Tier 1 + Tier 2 capital, which includes subordinated debt, hybrid capital, loan loss reserves, and the valuation reserves as a percentage of risk weighted assets and off balance sheet risks.	Bankscope
Net Write-off Rate	The net charge off or the amount written off from loan loss reserves less recoveries, which is measured as a percentage of gross loans. It indicates what percentage of today's loans have been written off the books.	Bankscope
Liquidity Ratio	The liquidity ratio is calculated by dividing liquid assets by deposits and short term funds. This is a deposit run-off ratio and measures what percentage of customer and short term funds could be meet if they were withdrawn suddenly.	Bankscope
Distance-to-default	Distance-to-default is measured as the ratio of the ROA plus the capital asset ratio divided by the standard deviation of the ROA (Laeven and Levine 2009). A higher distance-to-default means that a larger negative return is required to render the bank insolvent.	Authors' calculations based on Laeven and Levine (2009)
Panel B. Independent variables		
HHI	The HHI (Herfindahl–Hirschman Index) is an indicator of the amount of competition in the banking industry. It is defined as the sum of the squares of the deposit shares of commercial banks.	Authors' calculations based on Park and Pennacchi (2009)
CR3	The proportion of deposits in each country and year for the three largest banks in that country.	Authors' calculations based on Bankscope
Ln TA	Ln TA is a proxy variable for bank size and is the ratio of the logarithm of total assets.	Authors' calculations based on Bankscope
Asian Fin. Crisis Dummy	The Asian financial crisis dummy is a dummy variable with a value of 1 for observations in the post-Asian financial crisis period from 1999 to 2001 and 0 otherwise.	Authors' calculations based on Bankscope
Global Fin. Crisis Dummy	The global financial crisis dummy is a dummy variable with a value of 1 for observations in the post-global financial crisis period from 2009 to 2011 and 0 otherwise.	Authors' calculations based on Bankscope

SB Dummy	The SB dummy is a small bank dummy variable with a value of 1 if a bank's total assets exceed the median total assets value each year and 0 otherwise.	Authors' calculations based on Bankscope
Non-Int. Income Ratio	This ratio is a proxy variable for bank diversification. It is defined as the ratio of a bank's non-interest income to its operating revenue.	Authors' calculations based on Bankscope
Leverage Ratio	The leverage ratio is calculated by dividing gross loans by equity.	Authors' calculations based on Bankscope
ROA	The ROA is a variable for comparing the efficiency and operational performance of banks, as it compares the returns generated from the assets financed by each bank.	Bankscope
GDP per Capita	The GDP per capita is calculated by dividing the GDP by the population.	World Bank (http://www.worldbank.org)
Interbank Rate	The interbank rate is interbank lending rate that usually meets the short- and medium-term financing needs of the private sector.	World Bank and Thomson DataStream

Figure 1. The annual bank size growth of the three largest domestic banks in eight major Asian emerging markets from 1994 to 2012, expressed as the change from the 1994 level.



Notes: The y-axis represents the annual bank size growth compared with 1994 and x-axis represents year. Source: Authors' calculations based on Bankscope.

Table 1. Descriptive statistics.

	Mean	SD	Min	P25	Median	P75	Max
Capital Adequacy Ratio	14.93	12.42	2.78	9.61	11.60	14.95	93.00
Net Write-off Rate	1.07	2.16	-1.49	0.02	0.32	1.23	13.97
Liquidity Ratio	25.17	25.95	2.01	8.82	17.41	31.57	162.57
Distance-to-default	3.00	1.25	-2.29	2.41	3.18	3.70	5.65
HHI	933	311	507	691	895	1,104	1,934
CR3	44.01	9.21	26.27	38.26	44.58	49.61	69.04
Ln TA	8.70	2.00	3.81	7.52	8.84	10.03	13.52
Non-Int. Income Ratio	21.47	19.78	-31.48	9.18	17.49	29.79	100.25
Leverage Ratio	58.27	16.41	5.18	49.59	61.52	70.08	86.04
ROA	0.43	1.84	-10.54	0.11	0.43	1.14	5.25
Number of Obs.	6,233	6,233	6,233	6,233	6,233	6,233	6,233

Notes: This table reports summary statistics of bank characteristics for eight major Asian emerging markets during 1994-2012 period.

Table 2. Correlations between bank size and financial stability.

	Full Sample (Obs. = 6,924)	1997 Crisis Countries (Obs. = 2,738)
Ln TA		
Capital Adequacy Ratio	-0.412	-0.441
	(0.000)	(0.000)
Net Write-off Rate	-0.097	-0.142
	(0.000)	(0.000)
Liquidity Ratio	-0.432	-0.415
	(0.000)	(0.000)
Distance-to-default	-0.024	-0.248
	(0.085)	(0.000)

Notes: Bank upsizing is represented by the logarithm of total assets, following the literature. Financial stability is measured by the capital adequacy ratio, net write-off rate, liquidity ratio, and distance-to-default. The analysis is repeated using the full sample and a subsample of 1997 crisis countries. The *p*-value is in parentheses.

Table 3. Univariate mean test of the balloon effect between large and small banks.

	Panel A: Capital Adequacy Ratio							
	Decreasing large bank share market		Increasing large bank share market		Difference			
	Mean	Median	Mean	Median	Mean	t-stat.	Median	p-value
Small Banks	28.755	16.020	21.787	14.265	6.968**	2.082	1.755***	0.000
Large Banks	10.686	10.500	11.788	11.030	-1.102*	-1.725	-0.530***	0.005
	Panel B: Net Write-off Rate							
	Mean	Median	Mean	Median	Mean	t-stat.	Median	p-value
Small Banks	0.718	0.140	1.723	0.280	-1.005***	-3.254	-0.140**	0.030
Large Banks	0.931	0.215	0.653	0.240	0.277	1.588	-0.025	0.525
	Panel C: Liquidity Ratio							
	Mean	Median	Mean	Median	Mean	t-stat.	Median	p-value
Small Banks	48.985	33.050	49.984	31.390	-0.999	-0.235	1.660	0.479
Large Banks	25.029	16.360	13.467	9.840	11.561***	3.154	6.520***	0.000
	Panel D: Distance-to-default							
	Mean	Median	Mean	Median	Mean	t-stat.	Median	p-value
Small Banks	3.096	3.362	2.822	3.176	0.274**	1.968	0.186	0.146
Large Banks	3.027	3.203	2.965	3.159	0.062	0.501	0.044	0.934

Notes: This table shows the differences in the means and medians of the financial stability measures in the decreasing and increasing large bank share markets. We divide the banks into subsamples of large and small banks using the top and bottom tertiles of total assets. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 4. Panel regressions of the financial stability measures on bank size and the balloon effect.

Dependent Variable	Capital Adequacy Ratio			Net Write-off Rate			Liquidity Ratio			Distance-to-default		
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
HHI_{t-1}	-0.006***	-0.005	-0.005	0.001	0.001	0.001	0.029***	0.054***	0.057***	-0.001***	-0.001***	-0.001***
	(-3.38)	(-1.53)	(-1.60)	(-0.23)	(0.64)	(0.60)	(4.00)	(4.35)	(4.51)	(-6.84)	(-5.08)	(-5.11)
$CR3_{t-1}$	0.085	-0.005	0.012	0.002	-0.058	-0.054	-1.017***	-1.428***	-1.555***	0.027***	0.031***	0.032***
	(1.30)	(-0.05)	(0.11)	(0.06)	(-1.27)	(-1.19)	(-3.85)	(-3.09)	(-3.32)	(5.99)	(4.66)	(4.73)
Ln TA_{t-1}	-4.893***	-6.782***	-6.159***	-0.238**	-0.226	-0.154	-6.458***	-11.509***	-12.541***	-0.196***	-0.235***	-0.218***
	(-18.21)	(-16.83)	(-14.09)	(-2.16)	(-1.57)	(-0.97)	(-5.64)	(-6.59)	(-6.77)	(-10.54)	(-9.44)	(-8.05)
SB Dummy		8.596***	9.071***		-2.116**	-2.323**		1.653	1.490		0.528***	0.542***
		(2.61)	(2.76)		(-2.07)	(-2.23)		(0.14)	(0.13)		(2.60)	(2.66)
SB*$CR3_{t-1}$		-0.114**	-0.010		0.046**	0.058**		-0.483**	-0.576***		-0.008**	-0.006
		(-2.03)	(-0.16)		(2.30)	(2.52)		(-2.38)	(-2.73)		(-2.42)	(-1.42)
Asian Fin. Cr.*SB*LB Sh_{t-1}			-0.020***			-0.002			0.034*			-0.001
			(-3.62)			(-1.05)			(1.66)			(-1.60)
Non-Int. Income $Ratio_{t-1}$	-0.031***	-0.045***	-0.044***	-0.002	0.001	0.001	-0.134***	-0.151***	-0.151***	-0.001**	-0.001**	-0.001**
	(-4.46)	(-4.26)	(-4.20)	(-0.74)	(0.34)	(0.35)	(-4.39)	(-3.14)	(-3.15)	(-2.45)	(-2.17)	(-2.14)
Leverage $Ratio_{t-1}$	-0.155***	-0.170***	-0.168***	-0.012***	-0.008	-0.007	-0.569***	-0.610***	-0.609***	-0.008***	-0.007***	-0.007***
	(-14.43)	(-10.82)	(-10.69)	(-2.81)	(-1.41)	(-1.29)	(-12.12)	(-8.80)	(-8.78)	(-10.42)	(-7.02)	(-6.95)
ROA_{t-1}	0.362***	0.477***	0.468***	-0.282***	-0.218***	-0.219***	-0.072	0.156	0.176	0.055***	0.047***	0.047***
	(5.48)	(5.12)	(5.03)	(-12.59)	(-7.55)	(-7.57)	(-0.25)	(0.37)	(0.42)	(11.99)	(8.24)	(8.19)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.137	0.171	0.176	0.171	0.163	0.163	0.051	0.074	0.075	0.146	0.162	0.163
Number of Obs.	4,957	3,213	3,213	3,761	2,464	2,464	6,233	4,046	4,046	4,950	3,206	3,206

Notes: This table presents the estimation results from regressing the financial stability ratios on the logarithm of total assets, which is a proxy variable of bank upsizing, with control variables and firm and year fixed effects. The t-statistics are in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 5. Robustness tests: First-difference regressions of the financial stability measures on bank size.

Dependent Variable	△Capital Adequacy Ratio		△Net Write-off Rate		△Liquidity Ratio		△Distance-to-default	
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\triangle HHI_{t-1}$	-0.001	-0.001	-0.003***	-0.003**	0.002	-0.002	-0.001***	-0.001***
	(-0.75)	(-0.72)	(-2.80)	(-2.28)	(0.32)	(-0.23)	(-2.74)	(-3.38)
$\triangle CR3_{t-1}$	0.023	0.003	0.070**	0.047	0.085	0.166	0.012***	0.015***
	(0.43)	(0.06)	(1.99)	(1.24)	(0.36)	(0.68)	(2.71)	(3.07)
$\triangle$Ln TA_{t-1}	-1.663***	-1.856***	-0.321	-0.312	-3.929**	-5.233***	-0.062**	-0.089***
	(-4.53)	(-4.75)	(-1.47)	(-1.34)	(-2.27)	(-2.91)	(-1.98)	(-2.69)
$\triangle$Non-Int. Income $Ratio_{t-1}$	-0.008	-0.008	-0.001	0.001	-0.113***	-0.118***	0.001	0.001
	(-1.60)	(-1.44)	(-0.36)	(0.22)	(-4.65)	(-4.80)	(1.28)	(1.53)
$\triangle$Leverage $Ratio_{t-1}$	-0.014	-0.012	0.008	0.014**	0.029	0.033	-0.003***	-0.004***
	(-1.24)	(-1.00)	(1.27)	(2.07)	(0.55)	(0.62)	(-3.35)	(-3.71)
$\triangle ROA_{t-1}$	-0.191***	-0.155***	-0.203***	-0.176***	-0.891***	-0.922***	-0.049***	-0.052***
	(-3.91)	(-3.04)	(-8.82)	(-7.40)	(-3.96)	(-3.99)	(-11.83)	(-12.03)
$\triangle$GDP per $Capita_{t-1}$		0.001*		0.001		0.001**		0.001***
		(1.85)		(0.68)		(2.10)		(2.68)
△ Interbank $Rate_{t-1}$		0.219***		0.125***		-0.117		-0.008*
		(4.08)		(4.68)		(-0.50)		(-1.87)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.010	0.016	0.035	0.044	0.010	0.012	0.041	0.046
Number of Obs.	4,208	4,021	2,952	2,883	5,477	5,145	4,205	4,018

Notes: This table presents the estimation results of regressing the financial stability ratios on the logarithm of total assets, which is a proxy variable of bank upsizing, with control variables and firm and year fixed effects. The t-statistics are in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 6. Robustness tests: Panel regressions with macro variables and two-way clustering or White standard error.

Dependent Variable	Capital Adequacy Ratio		Net Write-off Rate		Liquidity Ratio		Distance-to-default	
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI_{t-1}	-0.004	-0.004	0.001	0.001	0.027	0.027	-0.001	-0.001***
	(-0.61)	(-1.40)	(0.52)	(0.87)	(1.31)	(0.83)	(-1.40)	(-3.48)
$CR3_{t-1}$	-0.082	-0.082	-0.038	-0.038	-0.923	-0.923	0.015	0.015**
	(-0.37)	(-0.78)	(-0.47)	(-0.86)	(-1.33)	(-1.09)	(0.78)	(1.97)
Ln TA_{t-1}	-5.168***	-5.168***	-0.034	-0.034	-6.343***	-6.343*	-0.220***	-0.220***
	(-3.66)	(-6.13)	(-0.10)	(-0.18)	(-2.64)	(-1.89)	(-4.09)	(-7.09)
Non-Int. Income $Ratio_{t-1}$	-0.032*	-0.032***	0.003	0.003	-0.137	-0.137*	-0.001*	-0.001
	(-1.95)	(-2.61)	(0.58)	(0.56)	(-1.65)	(-1.92)	(-1.83)	(-1.32)
Leverage $Ratio_{t-1}$	-0.169**	-0.169***	0.001	0.001	-0.551***	-0.551***	-0.009***	-0.009***
	(-2.59)	(-4.89)	(0.18)	(0.18)	(-6.06)	(-4.32)	(-2.89)	(-5.52)
ROA_{t-1}	0.314*	0.314*	-0.236***	-0.236***	0.075	0.075	0.047***	0.047***
	(1.91)	(1.71)	(-4.10)	(-4.44)	(0.09)	(0.10)	(3.57)	(4.30)
GDP per $Capita_{t-1}$	0.001**	0.001***	-0.001***	-0.001***	0.001	0.001	0.001**	0.001***
	(2.03)	(4.68)	(-3.23)	(-6.94)	(-0.18)	(-0.22)	(2.34)	(3.34)
Interbank $Rate_{t-1}$	-0.102	-0.102	0.267***	0.267***	0.344	0.344	-0.017	-0.017*
	(-0.48)	(-0.64)	(10.44)	(5.97)	(0.62)	(0.61)	(-1.28)	(-1.94)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by Country	Yes	-	Yes	-	Yes	-	Yes	-
Cluster by Year	Yes	-	Yes	-	Yes	-	Yes	-
White Robust-Std. Error	-	Yes	-	Yes	-	Yes	-	Yes
R-squared	0.810	0.154	0.458	0.215	0.505	0.054	0.919	0.165
Number of Obs.	4,753	4,753	3,684	3,684	5,899	5,899	4,746	4,746

Notes: This table presents the estimation results of regressing the financial stability ratios on the logarithm of total assets, which is a proxy variable of bank upsizing, with control variables and firm and year fixed effects. The t-statistics are in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 7. Robustness tests excluding Japan and China from the sample.

Dependent Variable	Capital Adequacy Ratio		Net Write-off Rate		Liquidity Ratio		Distance-to-default	
	W/O Japan	W/O Japan and China	W/O Japan	W/O Japan and China	W/O Japan	W/O Japan and China	W/O Japan	W/O Japan and China
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI_{t-1}	-0.007**	0.001	0.001	0.001	0.025***	-0.005	-0.001***	-0.000**
	(-2.43)	(-0.07)	(-0.26)	(0.50)	(2.61)	(-0.60)	(-5.00)	(-2.02)
$CR3_{t-1}$	-0.034	-0.076	0.037	0.023	-0.778**	0.009	0.018***	0.012*
	(-0.34)	(-0.69)	(0.77)	(0.39)	(-2.10)	(0.03)	(2.92)	(1.90)
Ln TA_{t-1}	-6.400***	-7.665***	-0.123	-0.342*	-8.736***	-7.007***	-0.284***	-0.344***
	(-15.86)	(-14.65)	(-0.79)	(-1.70)	(-5.63)	(-4.46)	(-11.57)	(-11.50)
Non-Int. Income $Ratio_{t-1}$	-0.035***	-0.031**	0.003	0.005	-0.061	-0.017	-0.001**	-0.001
	(-3.36)	(-2.58)	(0.84)	(1.20)	(-1.57)	(-0.48)	(-2.09)	(-1.09)
Leverage $Ratio_{t-1}$	-0.177***	-0.162***	0.001	0.004	-0.569***	-0.525***	-0.009***	-0.007***
	(-11.88)	(-9.08)	(0.16)	(0.55)	(-9.98)	(-9.97)	(-9.52)	(-6.80)
ROA_{t-1}	0.345***	0.299***	-0.225***	-0.226***	0.528	0.648**	0.045***	0.039***
	(3.70)	(2.93)	(-7.91)	(-7.01)	(1.48)	(2.18)	(8.01)	(6.75)
GDP per $Capita_{t-1}$	0.001***	0.001***	0.001	0.001	0.001*	0.001***	0.001***	0.001***
	(5.32)	(4.25)	(-0.75)	(-1.47)	(1.79)	(2.59)	(3.67)	(3.00)
Interbank $Rate_{t-1}$	0.090	-0.277**	0.211***	0.161***	1.088***	0.821**	-0.006	-0.022***
	(0.91)	(-2.01)	(6.61)	(3.27)	(3.25)	(2.12)	(-1.06)	(-2.78)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.180	0.200	0.179	0.191	0.072	0.082	0.200	0.235
Number of Obs.	2,932	2,157	2,276	1,703	3,883	2,793	2,925	2,152

Notes: This table presents the estimation results of regressing the financial stability ratios on the logarithm of total assets, which is a proxy variable of bank upsizing, with control variables and firm and year fixed effects. The t-statistics are in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 8. Sensitivity Tests.

Panel A: The full sample of eight Asian countries

Dependent Variable	Capital Adequacy Ratio		Net Write-off Rate		Liquidity Ratio		Distance-to-default	
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI_{t-1}	-0.013***	-0.010***	-0.002**	-0.003***	0.030***	0.033***	-0.001***	-0.001***
	(-7.10)	(-5.81)	(-2.29)	(-3.70)	(4.55)	(4.97)	(-10.10)	(-9.06)
$CR3_{t-1}$	0.390***	0.288***	0.012	0.051**	-0.885***	-1.011***	0.047***	0.041***
	(6.49)	(4.74)	(0.48)	(2.05)	(-3.78)	(-4.25)	(11.28)	(9.73)
Ln TA_{t-1}	-2.610***	-2.936***	-0.732***	-0.768***	-3.881***	-4.392***	-0.025*	-0.044***
	(-13.29)	(-14.48)	(-9.18)	(-9.40)	(-4.55)	(-4.97)	(-1.83)	(-3.14)
Non-Int. Income $Ratio_{t-1}$	-0.029***	-0.027***	-0.001	-0.001	-0.142***	-0.140***	-0.001**	-0.001**
	(-4.10)	(-3.88)	(-0.47)	(-0.41)	(-4.68)	(-4.62)	(-2.23)	(-2.09)
Leverage $Ratio_{t-1}$	-0.174***	-0.171***	-0.020***	-0.024***	-0.552***	-0.548***	-0.010***	-0.009***
	(-16.24)	(-16.19)	(-4.69)	(-5.66)	(-12.01)	(-12.02)	(-12.83)	(-12.65)
ROA_{t-1}	0.351***	0.394***	-0.282***	-0.314***	0.012	0.060	0.057***	0.058***
	(5.28)	(6.05)	(-12.69)	(-14.42)	(0.04)	(0.22)	(12.26)	(12.85)
Asian Fin. Crisis	-2.981***		1.807***		-2.208		-0.217***	
	(-2.64)		(4.43)		(-0.46)		(-2.75)	
Global Fin. Crisis		-2.138*		0.037		-3.649		-0.077
		(-1.89)		(0.09)		(-0.65)		(-0.97)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.101	0.109	0.140	0.134	0.043	0.044	0.100	0.105
Number of Obs.	4,957	4,957	3,761	3,761	6,233	6,233	4,950	4,950

Panel B: Subsample of the Asian financial crisis countries

Dependent Variable	Capital Adequacy Ratio		Net Write-off Rate		Liquidity Ratio		Distance-to-default	
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI_{t-1}	-0.009**	-0.005	0.004**	0.002	-0.010	-0.006	-0.001***	-0.001***
	(-2.57)	(-1.59)	(2.24)	(1.36)	(-0.99)	(-0.55)	(-4.68)	(-3.82)
$CR3_{t-1}$	0.308***	0.170	-0.098*	-0.036	0.392	0.211	0.040***	0.034***
	(2.62)	(1.45)	(-1.72)	(-0.60)	(1.15)	(0.62)	(5.97)	(4.96)
Ln TA_{t-1}	-4.333***	-4.218***	-0.311**	-0.685***	-7.121***	-6.807***	-0.093***	-0.085***
	(-10.78)	(-10.39)	(-2.12)	(-4.67)	(-5.67)	(-5.28)	(-3.99)	(-3.63)
Non-Int. Income $Ratio_{t-1}$	-0.040***	-0.040***	0.002	0.004	-0.058	-0.060	-0.001	-0.001
	(-2.78)	(-2.74)	(0.41)	(0.80)	(-1.35)	(-1.41)	(-0.80)	(-0.80)
Leverage $Ratio_{t-1}$	-0.168***	-0.163***	-0.009	-0.015**	-0.524***	-0.514***	-0.008***	-0.008***
	(-8.82)	(-8.60)	(-1.32)	(-2.25)	(-9.00)	(-8.86)	(-7.58)	(-7.38)
ROA_{t-1}	0.435***	0.547***	-0.284***	-0.344***	0.628*	0.824**	0.055***	0.061***
	(3.72)	(4.93)	(-8.19)	(-10.32)	(1.81)	(2.54)	(8.23)	(9.61)
Asian Fin. Crisis	-5.217**		2.606***		-6.102		-0.256*	
	(-2.26)		(3.18)		(-0.87)		(-1.93)	
Global Fin. Crisis		-2.873		-0.896		-14.771*		-0.152
		(-1.15)		(-1.02)		(-1.70)		(-1.04)
Intercept Term	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.139	0.136	0.178	0.151	0.061	0.062	0.122	0.120
Number of Obs.	1,793	1,793	1,370	1,370	2,470	2,470	1,788	1,788

Notes: Panels A and B present additional robustness tests with the same control variables, the Asian financial crisis dummy, and the global financial crisis dummy, using the full sample of eight Asian countries and a subsample of the 1997 Asian financial crisis countries. The t-statistics are in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.