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The Bright Side of Market Power in Asian Banking
Implications of Bank Capitalization and Financial Freedom

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Using a sample of listed banks in the Asia-Pacific region from 2000 to 2016, this paper documents that higher bank market power reduces risk taking, but increases loan growth and performance from interest income and non-interest income. This highlights the bright side of bank market power in general. However, the positive effect of bank market power on financial stability is more pronounced for well-capitalized banks, although their performance tends to decline and loan growth is unaffected following an increase in market power. Hence, bank capitalization plays an important role in strengthening financial stability due to an increase in bank market power. Moreover, banks with higher market power located in countries with lower degree of financial freedom exhibit lower riskiness, higher loan growth, and better performance. Greater authorities' control in the financial sector is essential, not only to enhance financial stability, but also to boost financial intermediation and bank performance following an increase in bank market power.

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1. Introduction

Since the 2008 global financial crisis (GFC), heightened academic and policy debates regarding the role of bank consolidation to restore financial stability continues to emerge. Some argue that bank consolidation that results in higher market power will mitigate bank moral hazard behavior following the seminal work by Keeley (1990), but it is also true that bank consolidation in the form of mergers and acquisitions (M&As) can render banks systemically important, which may in turn enables banks to exploit government bailout by pursuing greater risk taking. Yet, consolidation that increases bank market power also enables banks to charge higher lending rates, precipitating entrepreneurial moral hazard that in turn deteriorates bank stability due to an increase in non-performing loans (Boyd and De Nicolo, 2005).

Accordingly, bank consolidation in developed countries have been revisited. For instance, Bank of England casts doubt on M&A policies in banking and questions whether or not UK large banks should be split up to reduce fiscal cost in times of crisis (Bertay et al., 2013). In the US, the Wall Street Reform and the Dodd-Frank Act also explicitly prohibit the merger of two banks when their total liabilities are higher than 10% of the US financial system's total liabilities. For emerging market countries, bank consolidation through M&As indeed becomes one of the major banking reforms in times of crisis. Santoso (2009) documents that the growth of bank consolidation in the aftermath of the 1997 Asian crisis (AFC) has reached 25% per year. Similarly, foreign direct investment in Asian banking also exhibits the second largest after Latin American banking in 2000s (Soedarmono et al., 2013).

Nevertheless, the impact on financial stability of greater consolidation that alters market power in Asian banking exhibits mixed results depending on the measures of bank consolidation or competition. Fu et al. (2014) document that higher bank-level market power in Asian banking is beneficial for financial stability, but higher market concentration exacerbates higher default probability in banking. Using an aggregate measure of market power in banking following Uchida and Tsustui (2005), Soedarmono and Tarazi (2016) also find the identical results in which the aggregate measure of market power in banking negatively affects financial stability.

In this paper, we revisit prior literature on the implications of bank market power in the Asian context, in order to highlight whether or not bank consolidation policies need to be addressed to increase bank market power. Recent development in the post-GFC period suggests that strengthening financial stability in the Asian banking industry is globally important, in addition to the fact that the banking industry is still the major source of finance for private sector in Asian countries. Vinayak et al. (2016) highlight that bank performance in Asian countries is higher than other countries around the world and thus, Asian banks contribute substantially to affect global banking stability and performance. Specifically, ROEs (return on equities) in Asian banking has reached 10-14% during 2010-2014, while bank ROEs in

other countries only reached 5-7% in the same period. Asian banks' contribution to net income in global banking has also reached around 50% from 2009 to 2014. Hence, assessing factors that enhance stability and performance in Asian banking is essential for the global economy.

Yet, higher profitability in Asian banking than the rest of the world might indicate that Asian banking is likely to undertake greater risk taking, although it does not necessarily lead to financial crises. Soedarmono et al. (2013) highlight that Asian banking is indeed prone to moral hazard after the AFC, especially if banks operate in less competitive markets. Their results suggest that higher capitalization in Asian banking due to an increase in market power is not sufficient to mitigate the adverse effect of greater bank risk taking, which results in higher bank default probability. Moral hazard is also considered as an antecedent of risk- taking behavior of Asian banks in the credit markets during the 1990s that ended up in the AFC.

Prior literature elucidate that bank moral hazard can come from cross-selling behavior in banking, which may lead to loan mispricing and excessive loan growth. While excessive loan growth is detrimental for bank stability (see e.g. Soedarmono et al., 2017; Foos et al., 2010), greater cross-selling behavior also exacerbates bank riskiness, although such trend occurs in European banks (Lepetit et al., 2008a & 2008b). Cross-selling behavior is likely to occur when banks increase non-interest income by reducing interest income. In this regard, banks expand loans with lower interest rates, while a decline in interest income is subsequently compensated by selling other types of products that generate fee-based and commission income.

In the Asian context, only Trinugroho et al. (2014) document using a sample of Indonesian banks that cross-selling behavior occurs, because higher income diversification leads to lower net interest margin. However, whether or not Asian banking is also prone to cross-selling behavior that may spur imprudent loan growth, remains unexplored by previous studies. In this paper, instead of assessing the link between non-interest income and risk to depict cross- selling behavior, we extend the bank competition-stability literature by highlighting whether the link between bank market power and financial stability is affected by loan growth, net interest margin, and non-interest income that may indicate cross-selling behavior.

The rest of this paper is structured as follows. In Section 2, we describe related literature review on the competition-stability nexus in banking, as well as cross-selling behavior and sources of moral hazard in banking. Section 3 provides description of our dataset, variables and methodology used in this paper. Section 4 discusses our empirical results combined with a battery of robustness checks, while Section 5 concludes the paper.

2. Related review of literature and contribution

Regarding the impact of bank consolidation or competition on financial stability, studies can be partitioned into two strands of literature: the franchise value literature and the competition-stability literature. While the former argues that greater competition or lower market power in banking deteriorates bank stability due to a decline in bank franchise value that precipitates excessive risk taking (e.g. Keeley, 1990; Turk-Ariss, 2010), the latter documents the adverse impact of market power in banking due to borrower moral hazard in the credit market (Boyd and De Nicolo, 2005; Boyd et al., 2006; Uhde and Heimeshoff, 2009). During the last decade, studies on the competition-stability nexus in banking also have embraced several channels.

The first channel attempts to explain factors that might affect the nexus between competition and stability in banking. These factors include bank capitalization or moral hazard to exploit government bailout (e.g. Berger et al., 2009; Soedarmono et al., 2013); bank efficiency as in Turk-Ariss (2010); economic growth as in Soedarmono et al. (2011); or various macroeconomic environments as in Beck et al. (2013). For instance, Berger et al. (2009) document that the nexus between market power and risk in banking can be explained by the degree of bank capitalization. Specifically, although bank market power in developed countries is positively linked to non-performing loans (supporting the competition-stability literature), higher market power is also negatively linked to lower insolvency risk (supporting the franchise value literature) because higher market power also enables banks to increase capitalization. Soedarmono et al. (2013) find oppositely using a sample of Asian banks in which banks in countries with less competitive banking industry exhibit higher riskiness, because their capital ratios are not sufficient to cover greater risk taking as shown by higher income volatility. However, these results are also conditional on financial crisis and moral hazard due to the size of systemically important banks.

In parallel, Turk-Ariss (2010) suggests that higher profit efficiency can also explain as to why higher market power can strengthen stability in banking, while Soedarmono et al. (2011) highlight the importance of business cycle in influencing the nexus between competition and stability in Asian banking. Meanwhile, Beck et al. (2013) report that the effect of bank competition on financial stability varies according to the degree of systemic fragility, the quality of credit information sharing, deposit insurance credibility, activity restrictions and stock exchanges development.

The second channel emphasizes on the measurement of bank competition or consolidation in assessing the competition-stability nexus in banking. Uhde and Heimeshoff (2009) consider bank concentration ratios to analyze the effect of bank consolidation on financial stability in Europe. Fu et al. (2014) use a sample of commercial banks in the Asia-Pacific region and find that higher bank-level market power is associated with lower bank riskiness, but higher bank concentration at the country level exacerbates bank riskiness. In their study, bank-level

market power is assessed through a two-factor Lerner index, while the share of the three largest banks total assets is used as a proxy for bank concentration. Kasman and Kasman (2015) support the franchise value hypothesis in the Turkish banking sector in which the Boone indicator and the Lerner index are used as proxies for bank competition. Goetz (2018) use a novel approach to capture market contestability and finds that greater competition reduces bank riskiness due to an increase in profitability and asset quality.

Moreover, a recent study by Amidu and Wolfe (2013) investigates the interplay of bank competition, income diversification and financial stability. Using a sample of banks in 55 developed and developing countries during the 2000-2007 period, their results suggest that greater competition enhances stability in banking, as greater competition enables banks to pursue income diversification. Another strand of literature sheds light on the loss-leader hypothesis or the cross-selling hypothesis, describing one of the plausible channels through which income diversification exacerbates bank riskiness. Specifically, banks with higher share of non-interest income exhibit lower net interest margin and loan spread due to loan mispricing (Lepetit et al., 2008b). Such loan mispricing behavior in turn leads to higher bank riskiness when non-interest income increases (Lepetit et al., 2008a).

In this paper, we contribute in two directions in relation to the bank competition-stability literature. First, we do not only focus on the link between bank market power and stability as in prior literature (e.g. Fu et al., 2014; Boyd et al., 2006; Turk-Ariss, 2010), but also assess whether higher bank market power is likely to precipitate cross-selling behavior in banking. In other words, we assess the impact of bank market power on bank risk, loan growth, intermediation cost, and non-interest income. Secondly, this paper examines whether the impact of bank market power on risk, loan growth, intermediation cost and non-interest income depends on bank-specific and country-specific factors.

As a bank-specific factor, we focus on analyzing the influence of bank capitalization in affecting the impact of bank market power on risk taking, loan growth, intermediation cost and non-interest income. Although a large number of studies analyze the nexus betweeen capitalization and risk in banking, no consensus has been reached yet. On one hand, bank capital ratios are considered as financial buffer that mitigates various types of risk (e.g. Anginer et al., 2014; Berger et al., 2009; DeYoung et al., 2018; Anginer et al., 2018). On the other hand, a negative link between capital and stability in banking is also found by previous studies, because higher capital ratios increase the cost of capital, which drives banks to undertake higher risk taking to offset higher cost of capital (e.g. Bitar et al., 2018; Iannotta et al, 2007). In parallel, Naceur and Kandil (2009) report that higher capital ratios are associated with higher intermediation cost. Hence, bank capitalization can affect the extent to which banks with higher market power behave in terms of risk taking and cross selling strategies.

As a country-specific factor that affects the competition-stability nexus, we analyze on the role of financial freedom. Indeed, financial freedom can be beneficial for banks, because

greater financial freedom may strengthen bank efficiency and reduce bank funding cost (e.g. Chortareasa et et al., 2012; Goddard et al., 2011; Roychoudhury and Lawson, 2010). However, only limited attention is devoted to investigate the impact of financial freedom in banking using cross-country analysis in the Asian context, although the 1997 Asian crisis was partly explained by massive financial liberalization and bank moral hazard during the 1990s (Soedarmono et al., 2013). Only Lin et al. (2016) investigate the role of financial freedom in weaknening or strengthening the link between bank ownership and efficiency in 12 Asian countries. It is shown that foreign ownership is positively linked to higher bank efficiency, especially for countries with high financial freedom. For countries with higher level of financial freedom, higher government (domestic) ownership is also found to increase (reduce) bank efficiency.

3. Data, variables and methodology

3.1. Data

Our dataset covers balance-sheet and income statement information from a sample of 265 publicly-traded banks during the 2000-2016 period. Countries considered in this study include: China (21), Hong Kong (21), Indonesia (43), Japan (93), South Korea (11), Malaysia (10), the Philippines (17), Singapore (4), Taiwan (21), Thailand (12) and Vietnam (12).[1] Meanwhile, all bank-level data is obtained from Thomson Reuters Datastream International. We also retrieve country-level data, such as per capita income and the degree of financial freedom. Per capita income data comes from World Bank, while financial freedom data is obtained from Heritage Foundation.

3.2. Dependent variables

Several dependent variables reflecting bank risk taking, financial intermediation, intermediation cost, and non-interest income measures are incorporated in this study. To reflect bank risk taking, we opt to use a Z-score indicator (*ZROA*) and the ratio of loan loss provisions to total loans (*LLP*). The higher the degree of *ZROA*, the lower the insolvency risk of banks. Conversely, the higher the ratio of loan loss provisions to total loans, the higher the degree of bank credit risk. Following Lepetit and Strobel (2013) who construct an accurate measurement of Z-score index, *ZROA* for each bank is calculated as follows:

$$ZROA_{i,t} = \frac{AVROA_i + EQTA_{i,t}}{SDROA_i}$$

[1] Numbers in the bracket represent the number of bank sample for each country.

AVROA represent the mean of bank *i*'s return on assets (*ROA*) during the 2000-2016 period. *ROA* is the ratio of after-tax income to total assets. *EQTA* is a time-varying indicator of leverage for bank *i*, which is calculated using the ratio of total equity to total assets. *SDROA* represents bank *i*'s income volatility calculated using the standard deviation of *ROA* from 2000 to 2016 period.

To reflect financial intermediation, we use two measures of bank loan growth as in Soedarmono et al. (2017). These include annual loan growth adjusted by total assets (*DLOAN*) and simple annual loan growth (*LOANG*) with the following formula in which *t* is year index , while *L* and *TA* indicate total loans and total assets, respectively.

$$DLOAN_{i,t} = L_{i,t} - 0.5(TA_{i,t} - L_{i,t}) - TA_{i,t-1}$$

$$LOANG_{i,t} = L_{i,t} - L_{i,t-1} \mid L_{i,t-1}$$

For the proxy of intermediation cost, we use the ratio of net interest margin to total earning assets (*NIMTEA*) and the ratio of net interest margin to total assets (*NIMTA*). The higher the degree of *NIMTEA* or *NIMTA*, the higher intermediation cost of banks. Finally, we use the ratio of non-interest income to total earning assets (*NNITEA*) and the ratio of non-interest income to total assets (*NNITA*) to reflect bank activity expansions that may induce cross- selling behavior.

3.3. Bank market power

Unlike Uhde and Heimeshoff (2009) who consider the measure of concentration ratios in analyzing the impact of bank consolidation on financial stability in Europe, this paper opts to use the measure of bank-level market power to assess bank consolidation, because concentration ratios are rather a crude measure to reflect competitiveness and efficiency that might be gained by banks due to consolidation (Beck, 2008). In order to reflect bank-market power, we construct a Lerner index. For bank *i* at year *t*, the Lerner index is represented by the following formula:

$$LERNER_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}}$$

Higher *LERNER* means higher bank market power. Meanwhile, *P* represents price level, which is the ratio of gross revenue to total assets. We define gross revenue as the sum of non- interest revenue and interest revenue. In the meantime, *MC* is marginal cost computed using the following formula:

$$MC_{i,t} = \frac{TC}{TA}\left(\propto_1 + \propto_2 \ln(TA) + \sum_{j=1}^{2} \gamma_j \ln(W_j)\right)$$

TC reflects total cost, which is the sum of non-interest expenses and interest expenses. Moreover, the coefficients related to $\propto_1$, $\propto_2$ and γ_j need to be estimated using a trans-logarithm cost function with two input factors represented by W_1 and W_2 following Fu et al. (2014). W_1 is the cost of third party funds computed using the ratio of interest expenses to total deposits. Total deposits include savings, current account, and demand deposits. Eventually, W_2 represents overhead cost computed using the ratio of non-interest expenses to total assets. In next turn, the trans-logarithm cost function can be estimated as follows:

$$\ln(TC) = \propto_0 + \propto_1 \ln(TA) + \frac{1}{2}\propto_2 (\ln(TA))^2 + \sum_{j=1}^{2} \beta_j \ln(W_j) + \sum_{j=1}^{2}\sum_{k=1}^{2} \beta_{jk} \ln(W_j)\ln(W_k) + \sum_{j=1}^{2} \gamma_j \ln(TA)\ln(W_j) + \varepsilon$$

3.4. Control variables

Several bank-specific and country-specific control variables are also considered in this study. Bank-specific control variables comprise the ratio of customer deposits to total assets (*DTA*), the ratio of total equity to total assets (*EQTA*), the ratio of total expenses to total income (*OVER*), and bank size represented by the logarithm of total assets (*SIZE*).

The higher the share of deposits, banks may have more incentives to undertake higher risk taking to cover the cost of deposits, which prevents withdrawal risk from bank depositors (Soedarmono and Tarazi, 2016). Meanwhile, *EQTA* is included to control for the degree of bank capitalization that may affect bank stability, although the concensus has not been reached yet. As stated earlier, we will also consider EQTA as a moderating variable in the nexus between bank market power and risk taking. Following Soedarmono et al. (2013), OVER and SIZE are also included to control for efficiency and too-big-to fail effects, respectively.

Regarding country-specific control variables, we include the logarithm of per capita income (LGDPC) and the degree of financial freedom (*FINFREE*) to control for the degree of economic development and financial openness, respectively. Higher *FINFREE* means higher financial openness at the country level that enables banks to develop various activities.

3.5. Methodology

Our research methodology utilized in this paper consists of three stages. In the first stage, we regress dependent variables reflecting bank risk taking, loan growth, intermediation cost, or non-interest income on bank market power (*LERNER*) and control variables. Here, we consider *LERNER* as a predetermined variable instead of a strictly exogenous variable, because *LERNER* is estimated from a marginal cost function affected by bank-specific

characteristics. In the second stage, we incorporate the interaction term between bank market power (*LERNER*) and capitalization (*EQTA*) to investigate whether or not the effect of bank market power on risk taking, loan growth, intermediation cost and non-interest income is conditional on bank capitalization. In the third stage, we repeat the first stage but we incorporate the interaction term between *LERNER* and *FINFREE* (or *LERNER* x *FINFREE*) to highlight whether financial freedom matters in influencing the effect of bank market power on risk taking, loan growth, intermediation cost, and non-interest income. We also treat *LERNER* x *FINFREE* as a predetermined variable.

Our regression models are estimated using a dynamic panel data methodology with a two- step GMM (generalized methods of moments) estimator (or the system GMM estimator) as in Soedarmono and Tarazi (2016). This is to avoid potential reverse causality problems between bank market power and a set of dependent variables. Specifically, we follow Arellano and Bover (1995) and Blundell and Bond (1998). The system GMM estimation is developed from the one-step GMM that may suffer from the validity issues of instrumental variables, particularly when the lagged values of independent variables follows a random walk pattern. Baltagi (2005) also documents that the system GMM estimation tends to be more efficient than the standard GMM estimation.

Moreover, we also utilize the orthogonal deviation transformations of instrumental variables to control for bank-specific characteristics and conduct a finite sample correction as initiated by Windmeijer (2005) to ensure for the robustness of estimation results. Eventually, the results from the system GMM estimation are valid when the AR(2) test and the Hansen-J test are not statistically rejected, highlighting that no second-order autorcorrelation between errors can be detected and that the validity condition of the identifying restrictions in dynamic panel data models is not violated, respectively.

4. Empirical results

Table 1 presents the descriptive statistics of all variables considered in this study. All variables are economically plausible and hence, winsorization to eliminate outliers is not undertaken. In Table 2, we show the average values of explanatory variables of interest (*LERNER*) and dependent variables representing bank risk, intermediation cost and non- interest income.

From Table 2, we report that Indonesia (Japan) exhibits the highest (lowest) degree of loan loss provisions in banking relative to other countries. Meanwhile, Singapore has the lowest degree of bank default probability, while its credit risk in banking is also among the lowest. Thailand exhibits the highest degree of default probability in banking, which might be due to the effect of the 1997/1998 Asian crisis in which Thailand was hardest hit relative to other Asian countries (Agusman et al., 2008). The Chinese banking industry is the least competitive, as its market power (*LERNER*) accounts for the highest. The Korean banking industry is the most competitive relative to other countries considered in this study. In turn, Table 3 shows the correlation structure of all explanatory and dependent variables. It is shown that no substantial correlation can be detected among explanatory variables, suggesting no potential multicollinearity issues.

Table 4 presents our empirical results regarding the role of bank market power in affecting risk taking, loan growth, intermediation cost and non-interest income. It is shown that higher market power (*LERNER*) is associated with higher *ZROA* (lower insolency risk) at the 1% level. Higher bank market power also does not exacerbate credit risk, albeit not significant. This is in line with the franchise value hypothesis, suggesting that bank market power is a self-disciplining factor that prevents banks from undertaking too much risk (e.g. Keeley, 1990; Berger et al., 2009; Ariss, 2010). From Table 4, higher bank market power increases loan growth (*DLOAN* or *LOANG*), net interest margin (*NIMTEA* or *NIMTA*), and non-interest income (*NNITEA* or *NNITA*).

[Insert Table 4 here]

In general, higher bank market power, which can presumably be gained through consolidation, is beneficial not only for bank stability, but also for financial intermediation and bank performance. For Asian banks, an increase in loan growth due to higher market power is unlikely to be driven by cross-selling and loan mispricing behavior, because net interest margin and non-interest income also increase following an increase in bank market power. Higher market power therefore enables Asian banks to pursue prudent lending behavior and income diversification. Our results are consistent with Fu et al. (2014) in which higher bank-level market power, not higher bank concentration at the country level, strengthens bank stability in the Asia-Pacific region. These findings are also in line with

Turk-Ariss (2010) who assess the link between market power and stability in banking using a global sample of commercial banks from developing countries.

In the next turn, we examine whether the impact of bank market power on risk, loan growth, net interest margin, and non-interest income is conditional on the degree of bank capitalization and financial freedom. Table 4 presents empirical results regarding the joint impact of bank market power and capitalization on various dependent variables, while Table 5 documents whether financial freedom at the country level affects the nexus between bank market power, risk, loan growth, net interest margin and non-interest income.

[Insert Table 5 here]

In Table 4, we report that the positive impact of bank market power on financial stability (measured by *ZROA* or *LLP*) is more pronounced for banks with higher capitalization. Bank capitalization is indeed essential in the nexus between bank market power and financial stability, as in Berger et al. (2009) or Soedarmono et al. (2013). However, banks with higher capitalization experience lower performance due to a decline in net interest margin and non-interest income, particularly when market power increases. Meanwhile, there is no significant impact of bank-level market power on the loan growth of well-capitalized banks. Higher bank market power in well-capitalized banks is therefore deterimental for bank performance and financial intermediation to a lesser extent.

Table 5 shows our empirical results regarding the impact of financial freedom on the link between market power, risk, loan growth, net interest margin and non-interest income in Asian banking. For banks operating in countries with higher degree of financial freedom, higher market power is deterimental for bank stability and to a lesser extent, bank performance. Meanwhile, the positive impact of bank market power on loan growth is not altered by the degree of financial freedom. Hence, our empirical results highlight that banks in countries with greater authorities control in the financial sector (or lower degree of financial freedom) are likely to benefit from higher market power in which bank stability, loan growth, net interest margin and non-interest income tend to increase. Our results regarding the benefits of greater authorities control in the financial sector in strengthening the bright side of bank market power are somehow consistent with prior literature highlighting the importance of financial regulation to boost bank efficiency and diminish risk taking (e.g. Agarwal et al., 2014; Barth et al., 2013).

Regarding the validity tests of the empirical results from Table 3 to Table 5, we report the AR(2) test and the Hansen-J test for each regression. All regression models show that the AR(2) test and the Hansen-J test are both not significant at least at the 5% level, suggesting that our dynamic panel data models are valid. Moreover, aside from considering different

proxies for bank risk taking, loan growth, intermediation cost and non-interest income, we also conduct several robustness checks.

Firstly, we eliminate Japanese banks from our sample to avoid a sample bias because the number of Japanese banks dominates our sample. In the next turn, we run a two-step GMM estimation using this new sample and the empirical results are not altered as shown in Table 6, Table 7 and Table 8. Secondly, we repeat the estimation with and without Japanese banks, but we consider the first-difference transformation instead of the orthogonal deviations transformation of instruments.[2] Our results also remain consistent with previous discussions and the validity tests of our dynamic panel data models are not violated.

[Insert Table 6, Table 7 and Table 8 here]

5. Concluding remarks

In this paper, we use a sample of publicly-traded banks from the Asia-Pacific region from 2000 to 2016, in order to revisit the literature on the implications of bank market power in emerging market economies. Our empirical results from a dynamic panel data methodology shed light on the positive impact of bank market power on financial stability, loan growth, and bank performance from both interest and non-interest income. These results indeed highlight the bright side of bank market power in the Asia-Pacific region and hence, we advocate the importance of bank consolidation policies aiming to increase bank market power in general.

However, our deeper investigation shows that the implications of bank market power is conditional on bank-specific and country-specific characteristics. Only in banks with higher capitalization that higher market power can alleviate bank riskiness, although bank performance tends to decline. In the meantime, the role of market power in reducing risk and increasing performance in banking is more pronounced for countries with lower levels of financial freedom. In other words, banks operating in countries with greater government control in the financial sector exhibit lower riskiness, higher interest margins, and higher non- interest income when bank market power increases. In addition, the positive link between market power and loan growth in banking remains consistent regardless of the degree of financial freedom.

This paper therefore offers at least two policy implications with regards to banking reforms in emerging markets, especially in times of financial instability. First, we highlight the importance of strengthening bank market power including through bank consolidation to

[2] This robustness check is not presented in this paper, but is available upon request.

restore bank health and improve bank performance. Secondly, strengthening bank capitalization and authorities control in the financial sector are also necessary in addition to implementing policies to increase bank market power.

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Appendix

Table 1. Descriptive statistics.

Variable	Definition	Obs.	Mean	Std. Dev.	Min	Max
ZROA	*Z-score* index; higher value means lower default probability	3691	28.61045	33.36028	-89.44382	560.5242
LLP	Ratio of loan loss provisions to total loans	3406	0.0081536	0.035091	-0.3623386	1.760829
NIMTEA	Ratio of net interest income to total earning assets	3663	0.0287677	0.0284566	-0.1665564	0.6936626
NIMTA	Ratio of net interest income to total assets	3670	0.0229484	0.0171079	-0.0430188	0.3263811
NNITEA	Ratio of non-interest income to total earning assets	3663	0.0223612	0.2483271	-0.0326115	14.326
NNITA	Ratio of non-interest income to total assets	3668	0.0141391	0.1193324	-0.0234671	7.183931
LERNER	Lerner index; higher value means higher market power	3635	0.379096	0.1019089	-0.045114	0.5859655
DTA	Ratio of total deposits to total assets	3651	0.8123893	0.1280116	0.0182743	0.9823498
EQTA	Ratio of total equity to total assets	3696	0.0851937	0.0830685	-0.2748754	0.9135168
OVER	Ratio of total operating income to total operating expenses	3646	0.041914	0.0784022	0.002302	4.410242
SIZE	Logarithm of total assets	3696	28.23296	2.365356	19.01722	33.48373
FINFREE	Financial freedom index; higher value means higher financial openness	4470	0.4946756	0.1655313	0.3	0.9
LGDPC	Logarithm of per capita gross domestic product (GDP)	4470	9.357794	1.292919	6.766171	10.85621

Source: Authors' calculation.

Table 2. The average value of variables by country.

Variables	Country Code										
	CH	HK	ID	JP	KR	MY	PH	SG	TH	TW	VN
ZROA	32.5617	40.1482	26.6252	30.7850	21.5109	29.6230	23.8934	48.1934	13.9377	22.7240	30.1239
LLP	0.0096	0.0060	0.0164	0.0032	0.0123	0.0094	0.0116	0.0037	0.0131	0.0101	0.0102
NIMTEA	0.0293	0.0306	0.0555	0.0152	0.0276	0.0293	0.0597	0.0235	0.0323	0.0174	0.0305
NIMTA	0.0226	0.0200	0.0457	0.0138	0.0245	0.0234	0.0325	0.0185	0.0290	0.0142	0.0294
NNITEA	0.0069	0.0131	0.0146	0.0166	0.0382	0.0131	0.1080	0.0216	0.0224	0.0136	0.0178
NNITA	0.0053	0.0095	0.0120	0.0095	0.0331	0.0106	0.0491	0.0143	0.0201	0.0111	0.0168
LERNER	0.4458	0.3690	0.3169	0.4247	0.2939	0.3523	0.3565	0.4170	0.3431	0.3308	0.3103
DTA	0.8478	0.8011	0.7989	0.8696	0.6612	0.7842	0.7383	0.7271	0.7379	0.7550	0.7989
EQTA	0.0544	0.1494	0.1249	0.0529	0.0683	0.0782	0.1397	0.1303	0.1098	0.0880	0.0968
OVER	0.0305	0.0316	0.0916	0.0202	0.0615	0.0360	0.0777	0.0309	0.0487	0.0279	0.0695
SIZE	27.7759	26.0182	30.2207	28.7913	31.3711	25.2089	25.3368	24.5941	26.5674	27.1408	32.3126
FINFREE	0.3118	0.9000	0.4000	0.4813	0.6118	0.4277	0.4993	0.6588	0.5765	0.5529	0.3059
LGDPC	8.2092	10.3034	7.9704	10.7071	9.9278	9.0752	7.6134	10.6593	8.4567	9.7662	7.0904

Source: Authors' calculation.

Table 3. Baseline regressions.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.78368***	0.3695***	0.14191***	0.23450***	0.6048***	0.6699***	0.7780***	0.2945***
	(0.106)	(0.110)	(0.051)	(0.047)	(0.023)	(0.038)	(0.040)	(0.059)
LERNER	22.0965***	0.0018	0.16151***	0.24761**	0.0532***	0.0418***	0.3841***	0.2031***
	(7.356)	(0.011)	(0.052)	(0.100)	(0.007)	(0.005)	(0.054)	(0.028)
DTA	0.6043	-0.0075	0.00034	-0.06604	-0.0002	0.0019	-0.1131***	-0.0763***
	(2.471)	(0.006)	(0.026)	(0.051)	(0.002)	(0.002)	(0.029)	(0.015)
EQTA	23.6725**	0.0002	0.00695	-0.15105	0.0201*	0.0333***	-0.2197***	-0.0948**
	(9.162)	(0.020)	(0.066)	(0.123)	(0.010)	(0.010)	(0.080)	(0.040)
OVER	-0.2647	0.1303***	-0.20519***	-0.21556***	0.1430***	0.0708***	3.1719***	1.5959***
	(2.179)	(0.037)	(0.009)	(0.020)	(0.004)	(0.004)	(0.096)	(0.046)
SIZE	0.1735	-0.0003	0.00394***	0.00256*	0.0002**	0.0006***	-0.0100***	-0.0045***
	(0.130)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)	(0.001)
FINFRE	-0.5756	-0.0027	0.06268***	0.03739	0.0090***	0.0063***	-0.0400**	-0.0121
	(2.210)	(0.002)	(0.021)	(0.030)	(0.002)	(0.001)	(0.016)	(0.008)
LGDPC	0.3225	-0.0002	-0.03420***	-0.05431***	-0.0029***	-0.0022***	0.0427***	0.0207***
	(0.386)	(0.000)	(0.004)	(0.006)	(0.000)	(0.000)	(0.004)	(0.002)
Observations	3,273	2,533	2,768	2,717	3,271	3,274	3,271	3,274
Number of bankid	262	255	257	257	263	263	263	263
AR(2) test	0.253	0.657	0.899	0.857	0.191	0.066	0.457	0.658
Hansen-J test	0.870	0.952	0.751	0.788	0.842	0.847	0.843	0.871

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.

Table 4. The joint implications of bank market power and bank capitalization.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.76395***	0.3734***	0.17286***	0.24520***	0.6080***	0.6761***	0.7319***	0.3157***
	(0.001)	(0.001)	(0.051)	(0.044)	(0.020)	(0.029)	(0.034)	(0.064)
LERNER	9.9088	0.0109***	0.11518**	0.29038***	0.0703***	0.0244***	0.5451***	0.2521***
	(8.217)	(0.000)	(0.057)	(0.104)	(0.014)	(0.009)	(0.070)	(0.038)
LERNER x EQTA	136.5499***	-0.0740***	0.00044	-0.89027	-0.1539*	0.1490	-1.6404***	-0.5299**
	(41.538)	(0.002)	(0.418)	(0.765)	(0.088)	(0.078)	(0.443)	(0.239)
DTA	0.6279	-0.0068***	0.01247	-0.04800	0.0006	0.0019	-0.1115***	-0.0731***
	(2.567)	(0.000)	(0.025)	(0.045)	(0.002)	(0.002)	(0.030)	(0.016)
EQTA	-21.2050	0.0268***	0.03648	0.20151	0.0702*	-0.0138	0.3063**	0.0728
	(13.070)	(0.001)	(0.142)	(0.300)	(0.036)	(0.025)	(0.145)	(0.077)
OVER	-1.9644	0.1366***	-0.21255***	-0.20833***	0.1439***	0.0679***	3.2270***	1.6173***
	(3.186)	(0.001)	(0.014)	(0.019)	(0.004)	(0.003)	(0.064)	(0.031)
SIZE	0.1292	-0.0003***	0.00395***	0.00296*	0.0003**	0.0006***	-0.0096***	-0.0043***
	(0.148)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)
FINFRE	-2.1267	-0.0020***	0.05582***	0.04305	0.0117***	0.0044***	-0.0251	-0.0090
	(2.490)	(0.000)	(0.020)	(0.030)	(0.002)	(0.001)	(0.016)	(0.008)
LGDPC	0.6254	-0.0003***	-0.03169***	-0.05387***	-0.0033***	-0.0018***	0.0398***	0.0199***
	(0.385)	(0.000)	(0.004)	(0.006)	(0.000)	(0.000)	(0.004)	(0.002)
Observations	3,273	2,533	2,768	2,717	3,271	3,274	3,271	3,274
Number of bankid	262	255	257	257	263	263	263	263
AR(2) test	0.359	0.661	0.764	0.858	0.202	0.057	0.974	0.266
Hansen-J test	0.988	0.991	0.977	0.898	0.992	0.955	0.969	0.899

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.

Table 5. The joint implications of bank market power and financial freedom.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.82199***	0.3937***	0.15013***	0.24716***	0.6084***	0.7101***	0.7756***	0.3067***
	(0.097)	(0.108)	(0.000)	(0.001)	(0.021)	(0.040)	(0.044)	(0.064)
LERNER	49.9620**	-0.0213***	0.02311***	0.13618***	0.1031***	0.0439***	0.3966***	0.1874***
	(20.048)	(0.021)	(0.003)	(0.006)	(0.022)	(0.009)	(0.128)	(0.062)
LERNER x FINFREE	-66.8518**	0.0349***	0.22204***	0.06372***	-0.1083***	-0.0175	-0.0402	0.0160
	(29.932)	(0.040)	(0.007)	(0.011)	(0.037)	(0.018)	(0.185)	(0.094)
DTA	0.7063	-0.0061	0.00203	-0.05050***	0.0006	0.0022	-0.1194***	-0.0782***
	(2.386)	(0.006)	(0.001)	(0.002)	(0.002)	(0.002)	(0.031)	(0.016)
EQTA	19.5574**	0.0049	0.01291***	-0.11640***	0.0211**	0.0313***	-0.2622***	-0.1168***
	(8.493)	(0.019)	(0.003)	(0.005)	(0.010)	(0.009)	(0.083)	(0.042)
OVER	0.2294	0.1124***	-0.20629***	-0.21867***	0.1430***	0.0707***	3.1729***	1.5954***
	(1.972)	(0.032)	(0.000)	(0.001)	(0.004)	(0.004)	(0.100)	(0.048)
SIZE	0.1886*	-0.0003	0.00406***	0.00274***	0.0002**	0.0006***	-0.0105***	-0.0047***
	(0.108)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
FINFRE	24.1418**	-0.0156	-0.02779***	0.00832*	0.0489***	0.0119*	-0.0291	-0.0194
	(11.523)	(0.015)	(0.003)	(0.005)	(0.014)	(0.007)	(0.071)	(0.036)
LGDPC	0.2235	-0.0002	-0.03302***	-0.05115***	-0.0029***	-0.0019***	0.0426***	0.0206***
	(0.328)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.002)
Observations	3,273	2,533	2,768	2,717	3,271	3,274	3,271	3,274
Number of bankid	262	255	257	257	263	263	263	263
AR(2) test	0.226	0.622	0.851	0.909	0.213	0.067	0.453	0.707
Hansen-J test	0.890	0.993	0.897	0.995	0.982	0.998	0.979	0.997

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.

Table 6. Baseline regressions excluding Japanese banks.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.77424***	0.37097***	0.12461**	0.21815***	0.60224***	0.63940***	0.38687***	0.48382***
	(0.115)	(0.118)	(0.055)	(0.050)	(0.024)	(0.041)	(0.122)	(0.087)
LERNER	22.28785***	0.00113	0.20239***	0.34152***	0.05846***	0.04761***	0.43139***	0.21341***
	(7.750)	(0.012)	(0.058)	(0.109)	(0.007)	(0.005)	(0.064)	(0.034)
DTA	1.86841	-0.00766	0.03792	-0.01514	0.00364	0.00562*	-0.10398**	-0.05760***
	(2.449)	(0.006)	(0.033)	(0.061)	(0.003)	(0.003)	(0.042)	(0.020)
EQTA	17.37951**	0.00217	0.04967	-0.14144	0.02435**	0.04003***	-0.23789***	-0.10563**
	(8.255)	(0.020)	(0.064)	(0.123)	(0.010)	(0.011)	(0.086)	(0.045)
OVER	-0.62271	0.13082***	-0.20541***	-0.21067***	0.14286***	0.07094***	3.18599***	1.59810***
	(1.816)	(0.040)	(0.010)	(0.018)	(0.005)	(0.005)	(0.098)	(0.044)
SIZE	0.18178	-0.00031	0.00553***	0.00514***	0.00033**	0.00075***	-0.01166***	-0.00541***
	(0.134)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)	(0.001)
FINFRE	-2.30447	-0.00480	0.03330	-0.00129	0.00751***	0.00456***	-0.03278	-0.01660
	(2.437)	(0.003)	(0.022)	(0.039)	(0.002)	(0.002)	(0.022)	(0.011)
LGDPC	1.02521*	0.00025	-0.02220***	-0.03407***	-0.00209***	-0.00161***	0.04025***	0.02074***
	(0.563)	(0.001)	(0.004)	(0.008)	(0.000)	(0.000)	(0.006)	(0.003)
Observations	2,019	1,559	1,611	1,566	2,018	2,020	2,018	2,020
Number of bankid	170	167	166	166	171	171	171	171
AR(2) test	0.250	0.783	0.972	0.741	0.214	0.073	0.927	0.889
Hansen-J test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.

Table 7. The joint implications of bank market power and bank capitalization: Non-Japanese banks sample.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.76511***	0.37412***	0.17492***	0.23613***	0.60761***	0.65560***	0.35285***	0.45756***
	(0.002)	(0.005)	(0.002)	(0.004)	(0.001)	(0.005)	(0.014)	(0.008)
LERNER	10.50036***	0.01370***	0.16106***	0.35752***	0.08189***	0.03185***	0.57817***	0.27364***
	(0.610)	(0.001)	(0.014)	(0.017)	(0.001)	(0.001)	(0.011)	(0.005)
LERNER x EQTA	120.77248***	-0.08827***	-0.08503	-1.00518***	-0.21591***	0.12266***	-1.66675***	-0.64319***
	(6.326)	(0.012)	(0.099)	(0.097)	(0.010)	(0.005)	(0.082)	(0.035)
DTA	2.09502***	-0.00631***	0.03855***	0.00963	0.00572***	0.00457***	-0.08894***	-0.04833***
	(0.550)	(0.001)	(0.006)	(0.006)	(0.001)	(0.000)	(0.006)	(0.003)
EQTA	-23.26719***	0.03331***	0.08975**	0.27178***	0.09611***	-0.00074	0.32383***	0.11014***
	(2.822)	(0.005)	(0.038)	(0.037)	(0.004)	(0.002)	(0.029)	(0.013)
OVER	-2.46021*	0.13617***	-0.20662***	-0.20453***	0.14411***	0.06772***	3.23872***	1.61653***
	(1.293)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.007)	(0.004)
SIZE	0.15703***	-0.00027***	0.00540***	0.00577***	0.00042***	0.00071***	-0.01136***	-0.00512***
	(0.026)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FINFRE	-3.57150***	-0.00402***	0.02675***	0.00245	0.01020***	0.00362***	-0.02963***	-0.01563***
	(0.318)	(0.001)	(0.004)	(0.008)	(0.000)	(0.000)	(0.004)	(0.002)
LGDPC	1.26254***	0.00010	-0.01975***	-0.03343***	-0.00247***	-0.00136***	0.04093***	0.02119***
	(0.097)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	2,019	1,559	1,611	1,566	2,018	2,020	2,018	2,020
Number of bankid	170	167	166	166	171	171	171	171
AR(2) test	0.334	0.782	0.780	0.738	0.236	0.061	0.220	0.295
Hansen-J test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.

Table 8. The joint implications of bank market power and financial freedom: Non-Japanese banks sample.

Explanatory Variables	Dependent Variables							
	Risk		***Loan Growth***		***Intermediation Cost***		***Non-Interest Income***	
	ZROA	*LLP*	*DLOAN*	*LOANG*	*NIMTEA*	*NIMTA*	*NNITEA*	*NNITA*
Dep.Var(-1)	0.81021***	0.38767***	0.13344***	0.23421***	0.60507***	0.69191***	0.45832***	0.51421***
	(0.110)	(0.117)	(0.002)	(0.003)	(0.003)	(0.006)	(0.016)	(0.015)
LERNER	50.26107**	-0.03348	0.04352*	0.25601***	0.10840***	0.04703***	0.46603***	0.21087***
	(20.876)	(0.025)	(0.029)	(0.032)	(0.002)	(0.002)	(0.020)	(0.009)
LERNER x FINFREE	-59.91322*	0.05342	0.34776***	0.09622	-0.10354***	-0.01146***	-0.11251***	-0.01789
	(30.959)	(0.043)	(0.060)	(0.067)	(0.003)	(0.004)	(0.030)	(0.014)
DTA	1.90640	-0.00685	0.02461***	-0.00623	0.00465***	0.00568***	-0.10154***	-0.05228***
	(2.464)	(0.007)	(0.004)	(0.009)	(0.001)	(0.001)	(0.006)	(0.003)
EQTA	15.79016*	0.00746	0.03813***	-0.10849***	0.02528***	0.03622***	-0.27928***	-0.11917***
	(8.429)	(0.019)	(0.008)	(0.018)	(0.001)	(0.001)	(0.011)	(0.005)
OVER	0.37314	0.10379***	-0.20059***	-0.21985***	0.14290***	0.07018***	3.19167***	1.59201***
	(3.597)	(0.037)	(0.002)	(0.007)	(0.001)	(0.001)	(0.017)	(0.007)
SIZE	0.20382*	-0.00024	0.00624***	0.00491***	0.00033***	0.00070***	-0.01216***	-0.00567***
	(0.121)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FINFRE	20.78104*	-0.02412	-0.11255***	-0.03670	0.04660***	0.00843***	-0.00377	-0.01354**
	(11.024)	(0.017)	(0.024)	(0.027)	(0.001)	(0.001)	(0.012)	(0.005)
LGDPC	0.64295	0.00001	-0.01755***	-0.03501***	-0.00230***	-0.00125***	0.04095***	0.02131***
	(0.472)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	2,019	1,559	1,611	1,566	2,018	2,020	2,018	2,020
Number of bankid	170	167	166	166	171	171	171	171
AR(2) test	0.230	0.740	0.939	0.793	0.233	0.069	0.881	0.901
Hansen-J test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source and notes: Authors' calculation. The definition of variables are described in Table 1. Models are estimated using a system GMM taking into account orthogonal transformation of instruments. ***, ** and * indicate statistical significant at the 1%, 5% and 10% levels, respectively. Robust standard errors are presented in parentheses. Models are valid when the AR(2) test and the Hansen-J test are not statistically significant.