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IMPLICATIONS ON BANK RISK AND FINANCIAL INTERMEDIATION OF BANKING REFORMS IN EMERGENT ECONOMIES

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1

« La faculté n'entend donner aucune approbation
ou improbation aux opinions émises dans les thèses;
elles doivent être considérées comme propres à leurs auteurs. »

Table of Contents

Chapter 6. Threshold effect and financial intermediation in economic development

Acknowledgements

General Introduction

Recent crises in a world we live now suggest the increasing needs for better understanding how financial development does not cause financial fragility but at the same time, can play necessary role in economic development. From time to time, unlike economic development that is structured by complex patterns, economic crises are not much more than a repetitive pattern with different triggers. Crises were always started by strong macroeconomic performance, mania and excessive expectation that feed up speculative bubbles, amplify prices volatility, disturb productions, and finally end up in economic downturns. This pattern has already been seen since the Tulip Mania crisis of 1634, the South Sea bubble of 1719, the Dot Com crisis of 1990 and various contemporary financial crises over the last two decades that devastated both the developing and developed world.

Admittedly, contemporary financial crises in particular were mostly triggered by financial sectors and thus, casting doubts on financial liberalization policies that spur financial development. As a matter of fact, such development cannot also be separated from the collapse of Bretton Woods system in 1971 and financial ramifications of the oil price shocks in 1973 that have made more attractive international capital market and less restricted emergent economies. These environments have further allowed large corporations, banks and states in Third World countries to easily access foreign credit and investment market. As emergent economies started to adopt a floating exchange rate along with financial liberalization, the volatility of their domestic currency value of growing external debts increased and exacerbated the currency risk faced by their state and banking industry, a dominant financial industry in emergent economies. Consequently, while emergent economies have benefited the most from financial development, financial crises have also increasingly linked to emerging world crises and more specifically, banking crises, since banks had the substantial level of currency risk due to large un-hedged foreign debt exposure (Eichengreen and Arteta, 2000). In most of Third World crises from 1980 to 1997, moreover, the affected countries were also the ones having poor enforcement of prudential banking regulations to ensure safe borrowing and lending practices among banks (Williamson and Mahar, 1998).

Despite its possible adverse impact on financial stability, financial development is also admitted as one of the determinants of economic growth. Spillover effects from greater financial globalization during the nineties have indeed led emergent economies to spur

industrialization at different levels, although such development was accompanied by financial crises. Financial crises therefore challenge the wave of financial liberalization, and affect institutional and policy reforms in emergent economies. Nowadays, financial stability that enhances macroeconomic performance has become a major concern, not only to policy makers but also to multilateral and bilateral agencies. For instance, International Monetary Fund and World Bank, have shifted funding away from project loans for infrastructure to program loans focusing on institutional and policy reforms in financial sector during the Third World crises - such as the debt crises, the Latin America's Tequila shocks, and the 1997 Asian crisis (Cook, 2009).

With regards to the importance of financial sector in emergent economies, particularly banking sector, extensive studies are thus required to ensure for bank healthiness and hence, banking sector can perform its function as financial intermediary. The aim of this dissertation is therefore to contribute to the banking literature through independent essays highlighting aspects that enhance bank stability and financial intermediation in the case of emergent economies. This dissertation contributes in two directions. First, we examine the implications of banking sector reforms on bank stability through empirical investigations. In this regard, Asian countries are taken into close consideration, since little has been written to study banking industry in this region. Second, we study the link between banking sector and economic growth in order to re-evaluate the important aspects of financial intermediation, particularly in emergent economies. We believe that such an issue is of particular interest to policy makers in facing the current situation with increasing instability, since there are some situations due to banking crises and liquidity traps in which banking sector does not always contribute to boost economic growth. Due to the empirical difficulties in assessing liquidity trap problems leading to the occurrence of a threshold effect that impedes financial intermediation and economic growth, the second objective is assessed through a theoretical approach. This dissertation is thus elaborated into three parts. Part I and Part II are devoted to assess the impact of banking sector reforms on financial stability, while Part III reformulates the finance-growth nexus in emergent economies by taking into account the presence of threshold effect which to some extents can provide another room for improving banking reforms. The structure of this dissertation is presented as follows.

Part I. Financial reforms in Asian banks: Consolidations and stability in banking

Part I is devoted to investigate the implication of banking reforms on financial stability in Asia, where we focus on bank consolidation policies that have been implemented in the aftermath of the 1997 Asian crisis. Part I consists of two chapters. Chapter 1 investigates the link between bank consolidations and financial stability in the Asian context. As bank consolidations affect the degree of competition in the banking market, we investigate the link by using the measure of market power in banking. Our study covers the 1994-2009 period and hence, we also take into account the impact of Asian crisis of 1997 and the U.S. credit crisis of 2008. Chapter 2 again examines the impact of bank consolidations on financial stability, particularly during a relatively calm period after the 1997 Asian crisis. Instead of analyzing Asian banks over a long-run period, we focus on the 2001-2007 period in which we isolate both the 1997 Asian crisis and the 2008 credit crisis. Furthermore, we augment the analysis by considering the influence of expansionary economic environment, an issue that remains unexplored in the banking literature.

Part II. Capitalization and bank performance: Lessons from Indonesia

Part II deals with another major financial reform in Asia, that is bank capitalization. Bank capital ratios indeed play a significant role to enhance financial stability, since the insufficient levels of capital ratio can deteriorate bank insolvency risk as discussed in Part I. However, too much capital ratios can hinder productive investments and economic growth. Bris and Cantale (2004) formulate such a hypothesis through a theoretical model where risky but socially desirable loans are bypassed by bank managers who preserve their private interest by holding greater capital ratio. In the presence of asymmetric information, greater capital ratio in banking can therefore indicate the presence of agency conflicts between bank managers and shareholders which is often referred to as managerial entrenchment. More specifically, managerial entrenchment is likely to exist when a higher capital ratio is associated with an increase in monitoring costs borne by bank managers in order to preserve bank stability, but at the cost of a decline in bank opportunities to undertake socially profitable projects. By extension, as monitoring costs increase, the cost of intermediation tends to increase and hence, hindering economic growth.

Our present study is the first to provide empirical evidence on the work of Bris and Cantale (2004) by using a sample of commercial banks in Indonesia. There are several reasons why the Indonesian banking industry is relevant to this issue. First, agency conflicts between shareholders and managers in banking were perceived as the major source of governance

problems in Indonesian banks prior to the Asian crisis of 1997/1998 (Pangestu, 2003; Prasetyantoko and Soedarmono, 2009). Second, Indonesia was the country hardest hit by the Asian crisis of 1997, leading to the occurrence of credit crunch and financial disintermediation in the aftermath of the Asian crisis (Agung et al, 2001). Third, along with credit crunch problems, the Indonesian banking industry also exhibits the highest cost inefficiency ratio in Southeast Asia during the last decade, even though the level of capitalizations and non-performing loans can be well maintained. From such perspective, we seek an explanation why banking inefficiency occurs in such a well performing banking system. Presummably, the presence of managerial entrenchment problem may explain the origin of bank inefficiency that in turn impede financial intermediation.

Part II is elaborated into two chapters. As we work on a single country setting, understanding specific issues in such a country becomes essential. Chapter 3 begins with the description of the Indonesian banking evolution since financial deregulation in the end of eighties until recently. This chapter particularly highlights the sequence of events during the 1998 banking crisis and several policy responses to overcome the crisis, including contemporary prudential regulations in the 21st century. Chapter 4 then aims to seek an explanation why inefficiency and financial disintermediation remain a major concern in Indonesian banks in the post-1997 crisis period. Specifically, we investigate whether or not managers in Indonesian banks are likely to be self-interested by examining the impact of capital ratios on the cost of intermediation, risk and profitability.

Part III. Boosting economic growth in emergent economies: Rethinking the role of financial intermediation

In the previous chapter, the presence of managerial entrenchment that impedes financial intermediation has been exhaustively studied through the link between capital ratio, the cost of intermediation, risk, and profitability in banking. Our findings show that greater capital ratio indeed increases the cost of intermediation, which is likely due to the presence of self-interested managers. To the extent that higher intermediation costs deteriorate credit demand, higher intermediation cost can in turn hinder economic growth. In the meantime, Chapter 2 have shown the importance of economic growth in order to neutralize bank moral hazard in emergent economies with less competitive banking market as in Indonesia. Economic growth becomes therefore an important dimension of bank stability.

In parallel, previous empirical research indicate that financial development - at least until some levels – cannot boost economic growth and hence, indicating the presence of threshold effect. Previous literature further point out that weak institutional development may lead to the occurence of threshold effect due to high intermediation cost in banking. Banking reforms in emergent economies with weak institutional quality, moreover, can further contribute to exacerbate intermediation costs due to inefficient monitoring costs, as discussed in Chapter 4. Hence, the research on the finance-growth nexus in emergent economies need to take threshold effect into consideration due to shortcomings that mostly occur in emergent economies. To our best knowledge, there has been no much attempt to incorporate the existence of threshold effect into the finance-growth nexus and hence, our present study aims to fulfil this gap by focusing on the case of emergent economies.

Part III is elaborated into two chapters. Chapter 5 begins with a brief overview of economic thoughts that have become the major foundation of the finance-growth nexus. Initially, we draw the Schumpeterian conception on ***innovation*** (or ***creative destruction***) to understand the role of financial intermediary in innovation processes. To complement the Schumpeterian conception, we then retrieve the Keynesian conception on ***expectation*** and ***uncertainty***. The Keyenesian conception focuses on the role of liquidity preferences amongst economic agents that influence decisions to consume or to invest in long-term and productive assets. Financial intermediary, in principle, is to accommodate all types of agent with different liquidity preferences. Chapter 6 then reformulates the finance-growth nexus in emergent economies, where financial intermediary becomes a liquidity provider that optimizes both consumption and productive investment. Finally, we modify several hypotheses in the previous studies to highlight the presence of threshold effect.

Part I. Financial reforms in Asian banks:
Consolidations and stability in banking

Chapter 1
Bank competition, risk and capital ratio: Evidence from Asia during 1994-2009[1]

Abstract

This chapter attempts to analyze the link between competition and stability in the Asian banking industry. Based on a broad set of commercial banks over the 1994-2009 period, our results indicate that a higher degree of market power in the banking industry is associated with higher bank risk taking, higher bank insolvency risk, but also higher bank capital ratios. Our findings highlight a moral hazard presumption in Asian banks. Although banks in less competitive markets hold more capital, the levels of capitalisation are not high enough to offset the impact on default risk of higher risk taking. Such findings hold during the credit crisis of 2008 but not during the Asian financial crisis of 1997. These results have important policy implications for bank consolidation.

Keywords: bank consolidation, moral hazard, Asian banks, financial crisis

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[1] The earlier version of this chapter has been presented at (1) the 2011 French Finance Association Conference (AFFI), May 10-11, 2010, Saint Malo, as well as (2) 27th Symposium on Money, Banking and Finance, June 17-18, 2010, Bordeaux, France.

1 Introduction

For Asian countries, the 1997 financial crisis indeed changed dramatically the destiny of the region that was praised as the most remarkable economy in the 20th century. At the same time, the Asian crisis also highlighted a new era in the Asian financial system. The decade from 1994 and its interconnected phases of boom, bust and reforms provide a unique analytical feature. Specifically, during the 1994-1997 period, liberalization and globalization in banking hit Asia hard in a short span of time that ended up rapidly in a financial crisis (Cook, 2009).

On July 2, 1997, the governor of the Thai central bank pointed out that there was no need to increase Thai's foreign reserves to defend the Thai Baht currency from speculative attacks. Despite Asia had become a well-known destination for international capital, this date noted a turning point in foreign investors' confidence in the Asian economic prospects. International investors began to withdraw their funds in vast quantities from Asia. In countries with a few capital controls, foreign capital outflow was especially devastating. In the second half of 1997, capital outflows from Asian countries reached to at least $34 billion (Radelet and Sachs, 1998). Many of these countries have further experienced currency shocks that devaluated 40–80 percent of their initial currency value in a few of months, causing the collapse of banking industries and deteriorating economic condition of up to 15 percent of the gross domestic product (Satyanath, 2006; Goldstein, 1998).

However, the root causes of the crisis were not only due to speculative attacks or currency shocks, but also due to the institutional weaknesses in banking and corporate sectors as observed in many Asian countries (Furman et al, 1998). Such weaknesses include corporate sector vulnerability due to weak corporate governance, and the unsupervised financial liberalisation of the 1980s that has resulted in unfettered competition on the credit market, notably on real estate markets (Sachs and Woo, 2000).

In the aftermath of the 1997 Asian crisis, despite the fact that Asian firms have attracted foreign investment, firms still face corporate governance problems, poor accounting standards, non-transparent management, and a governance system with weak protections for minority shareholders (Park, 2006). In this context, bank risk becomes again an important issue, as banking is the predominant source of finance for private sector businesses in Asian countries (Adams, 2008).

Likewise, several financial reforms, such as bank capitalisations and consolidations, have also been implemented to moderate excessive bank competition and to reinforce

financial stability[2]. Nevertheless, the effectiveness of such reforms remains questionable. Brana and Lahet (2009) provide evidence that the stringency of bank capital requirements, following the 1988 Basel accord in the pre-Asian crisis period, played a major role in the capital crunch of Japanese banks and hence shrinking foreign assets held by Japanese banks in Thailand in the 1990s. Regarding bank consolidations, bank mergers and acquisitions (M&As) have grown rapidly in Asia with a growth rate reaching 25 percent per year as of 2003. However, such consolidations do not necessarily build stronger banks, as Cook (2009) noted that consolidation can lead to "too big to fail" effects in banking, increasing risk-taking incentives through "gamble for resurrection" strategies to exploit state bailouts and to transfer losses from shareholders to the taxpayers.

With deeper regards to consolidation in Asian banks, William and Nguyen (2005) point out that the time period following the 1997 Asian crisis was characterized by substantial changes in the Asian banking industry encompassing bank restructuring programs and widened access to foreign ownership. There are several explanations that highlight the importance of foreign bank participation during the period of crises. Peek and Rosengreen (2000) offer some possible reasons. First, during financial crises, both non-resident foreign banks and incumbent foreign banks are the ones that become an alternative for depositors to save their money, since depositors no longer trust domestic banks. Second, domestic banks can obtain benefit from sound prudential regulations by allowing greater participation of foreign banks with strong control from their parent institutions. Moreover, in the context where bank regulators can not enforce prudential regulations on bank loan portfolios, higher foreign banks participation can favour greater competition to cope with domestic banks' weaknesses.

In the aftermath of the 1997 Asian crisis, Domanski (2005) further documents that during 2001-2005, Foreign Direct Investment (FDI), particularly cross-border M&As entering banks in Third World countries, increased significantly to US$ 67.5 billion, while only US$ 2.5 billion during 1991-1995. Asia becomes the second largest recipient of cross-border bank M&A after Latin America, in which Asia accounts for 36 percent of total bank M&A values. In this regard, Jeon et al. (2011) highlight, from a sample of Asian and Latin American banks during 1997-2008, that higher banks' foreign ownership enhances competition in the banking market through spillover effects from foreign partners to domestic counterparts. Still, the link between bank competition and stability remains unexplored in the Asian context.

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[2] See Williams and Nguyen (2005) and Klingebiel et al (2001) for further discussion on the financial reforms in Asian countries.

This issue becomes more important when we consider the trend of financial globalisation that has recently driven Asian banks to evolve both nationally and internationally, as well as to shift their traditional activities into investment banking activities (Moshirian, 2008; Adams, 2008). Berger and Mester (2003) argues that, as banks expand their scope of activities into more various products and identify new growth opportunities across national borders, moral hazard can arise and bank supervisors need to raise concern on this issue.

This chapter is therefore the first to analyze the implications of bank consolidations and potential moral hazard effects on the safety of the Asian banking industry. More specifically, we examine the impact of market power in the banking industry on risk taking, capitalisation and insolvency risk in Asian banks[3]. We consider the 1994-2009 period and a broad set of commercial banks in Asian countries that have been affected by the 1997 Asian financial crisis. These include Indonesia, Malaysia, Thailand, and South Korea that were severely devastated by the banking crisis, as well as China, India, Hong Kong, Pakistan, Philippines, Sri Lanka, Taiwan, and Vietnam that were less affected.

The rest of this chapter is structured as follows. Section 2 provides a literature review on the relationship between bank market power and risk. Section 3 describes the data, variables and provides descriptive statistics. Section 4 highlights the econometric specification and methodology used in this study. Section 5 discusses our empirical findings, while Section 6 provides a broad set of sensitivity analyses. Section 7 concludes the chapter.

2. Literature review and research focus

The link between bank market power and financial stability has become a lively debate during the last two decades following financial deregulation and crises throughout the world. Marcus (1984) is the first to build a theoretical model showing that competition on the deposit market drives banks to undertake risk-taking strategies due to the contraction in banks' franchise value. This view is well-known as the "franchise value" hypothesis.

Broecker (1990) supports the "franchise value" hypothesis by obtaining a negative relationship between average banks' credit quality and the number of banks on the market. Besanko and Thakor (1996) highlight that a higher degree of bank competition is associated with a decrease in information rents obtained from relationship lending which in turn inceases bank risk taking. Matutes and Vives (1996) further show that market power lowers bank

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[3] Higher market power in the banking industry is associated with less competition in the banking market.

default probability, although an imperfect competition framework with product differentiation is taken into account.

Keeley (1990) is the first to show that competition in the U.S banking industry in the aftermath of financial deregulation erodes bank charter value and induces banks to take on more risk. Demsetz et al. (1996) also analyze the U.S banking industry and find that banks with higher market power are the ones with higher solvency ratios and lower asset risk. In a single-country setting, Bofondi and Ghobi (2004) find that the increased number of banks in the Italian banking system worsens the default rate of loans, while Jimenez et al. (2008) shed light on the negative relationship between the Lerner index and risk taking for Spanish banks. In a cross-country setting, Levy-Yeyati and Micco (2007) find a negative impact of competition on bank stability in Latin American countries.

While the empirical literature mainly reports the impact of bank competition on bank risk taking, Beck et al. (2006) emphasise the effect of bank concentration on the probability of banking crises. From 69 countries during the 1980-1997 period, they find that banking crises are less likely to occur in a more concentrated banking system. In the case of Russian banks, Fungáčová and Weill (2009) find that a higher degree of bank competition is associated with an increase in bank failures. In the case of developing countries over the 1999-2005 period, Ariss (2010) finds that greater bank market power enhances bank stability and profit efficiency, although it also deteriorates cost efficiency.

In spite of a growing literature supporting the "franchise value" hypothesis, Boyd and De Nicolo (2005) propose another view known as the "competition-stability" hypothesis. They show that bank market power in the deposit market induces banks to increase the cost of borrowing for entrepreneurs. Such a strategy can increase entrepreneurial moral hazard to undertake risky projects which in turn increases entrepreneurial default risk. Higher entrepreneurial default risk therefore erodes the solvency of banks through the risk-shifting mechanism as developed by Stiglitz and Weiss (1981).

Boyd et al. (2006) provide evidence that supports the "competition-stability" hypothesis. For a U.S. as well as an international bank sample, they show that a higher degree of bank competition is not necessarily associated with an increase in the probability of bank failures. In the case of European banks, Uhde and Heimeshoff (2009) also highlight that bank concentration deteriorates financial stability. This negative effect of bank concentration on financial stability is more severe in the less developed countries of Eastern Europe. A similar trend is observed in Southeast Asia, where by Molyneux and Nguyen-Linh (2008) show that bank competition does not erode bank stability.

Allen and Gale (2004) argue that the relationship between bank competition and risk can be influenced by asymmetric information. They show that resource allocation in a perfectly competitive market following a Schumpetarian style, i.e. such as as competition through innovation, is constrained-efficient. Under some conditions, such an efficiency is driven by financial instability (risk taking). Hence, there could be a trade-off when competition in banking increases. For such reasons, policy makers tend to enforce prudential regulations, such as capital requirements, instead of enhancing bank consolidation and concentration that in some cases may induce bank inefficiency[4].

Building on the contribution of Hellmann et al (2000), Repullo (2004) constructs a dynamic model of imperfect competition where banks have two investment choices, i.e. a safe asset and a gambling asset. He shows that when bank competition increases, only the gambling equilibrium exists. In this case, capital requirements can play a crucial role to ensure the existence of a prudent equilibrium, if the cost of raising capital exceeds the return on the prudent assets. Hence, capital requirements only affect deposit rates to maintain bank charter value.

Using a sample of 543 banks operating in 13 Central and East European (CEE) countries over the period 1998-2005, Agoraki et al. (2009) find that capital requirements reduce risk in general, but for banks with higher market power this effect is significantly weaker or can be reversed. In other words, strict capital requirements should not be imposed in banks with higher market power, since this may erode bank charter value.

Based on a sample of 421 commercial banks from 61 countries, Behr et al. (2010) also show that, after controlling for financial development, legal system efficiency, and several individual bank and country-specific variables, the effectiveness of capital requirements to reduce bank risk taking only holds in banking markets with a lower degree of concentration. Such evidence reflects that a higher degree of bank concentration has already facilitated banks to reinforce their charter value and hence, increasing banks' capital ratios (Berger et al., 2009a). Therefore, the enforcement of non-binding capital requirements in well-capitalized banks can deteriorate bank stability due to a decrease in the monitoring intensity and the amount of capital held by the banks (Blum, 2003).

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[4] For a single-country study, see Kumbhakar et al. (2001) or Isik and Hassan (2003) who show that a higher degree of competition due to financial deregulation is associated with an increase in bank performance as banks improve their efficiency through operational savings. For a cross-country study, Brissimis et al (2008) show that financial deregulation in ten newly acceded countries in Europe increases banking competition and is followed by an increase in bank efficiency.

To our best knowledge, very few studies have sought to integrate bank capital ratios into the bank competition-stability nexus. While Schaeck and Cihak (2007) show that banks in a more competitive market tend to hold higher capital ratios as "*peer market discipline*" tools, Berger et al. (2009) find the opposite result. Berger et al. (2009) highlight that the "franchise value" hypothesis and the "competition-stability" hypothesis need not be opposing propositions. Based on a sample of 8,235 banks in developed countries, their empirical results indicate that a higher degree of bank market power is associated with an increase in non-performing loans, supporting the "competition-stability" hypothesis. On the other hand, a higher degree of bank market power is also associated with a decrease in bank insolvency risk and hence, highlighting the "franchise value" hypothesis. The latter finding is due to an increase in bank capital ratios when bank market power increases.

In this chapter, we add the existing literature on the relationships between bank competition, risk and capital ratio into two directions. First, unlike the previous literature that uses the market power index at the bank level, we analyze the impact of market power for the whole banking industry on individual bank risk taking, insolvency risk and capital ratios in the Asian context. In this study we investigate whether or not the self-disciplining factor implied by higher market power enhances banks' incentives to moderate excessive risk taking and to hold sufficient capital. Second, since our concerns are to highlight bank moral hazard issues, we also examine whether financial crises affect the impact of bank market structure on bank risk taking, insolvency risk and capital ratio.

Previous litterature on the bussiness cycle theory suggest that during a downturn period due to a financial crisis, banks are likely to be risk-averse by reducing loans extension and thus, building up capital ratios (Borio et al., 2001; Ayuso et al., 2004; Jokipii and Milne, 2008). Such a situation can reduce bank moral hazard to undertake excessive risk which will in turn reduce the systematic risk exposure of banks. Therefore, the impact of market power in the banking industry on bank misbehaviour in undertaking excessive risk might be altered during financial crisis. To this end, our study is useful to provide a benchmark for bank consolidation policies.

3. Data, variables and descriptive statistics

3.1 Data

The data used in this chapter are taken from several sources. Bank-level data are retrieved from BankScope Fitch IBCA to construct a sample consisting of an unbalanced panel of annual series for the 1994–2009 period covering the 1997/1998 Asian crisis and the 2008 credit crisis. We also impose some restrictions on our initial bank sample. Following Ariss (2010) we exclude banks with less than three consecutive yearly observations and banks that do not provide information on the main variables we use to calculate the degree of market power in the banking industry, such as interest expenses, loans, or net income.

We therefore end up with 686 commercial banks established in 12 countries in Asia (China (103), Hong Kong (68), India (84), Indonesia (108), Malaysia (63), Pakistan (34), Philippines (39), South Korea (50), Sri Lanka (14), Taiwan (50), Thailand (40), and Vietnam (33))[5]. Following Agusman et al. (2006) and Laeven (1999) who study Asian banks, we focus only on commercial banks, since commercial banks tend to have more freedom to choose their business mix and face similar restrictions across countries.

Meanwhile, country-level data, such as foreign exchange reserves, real gross domestic product and inflation rate, come from the International Financial Statistics database (IFS) provided by the International Monetary Fund. The annual countries' financial structure database comes from Beck and Demirgüc-Kunt (2009), while the countries' governance index comes from Kaufmann et al (2008). Finally, we also retrieve the economic freedom index provided by Heritage Foundation.

3.2 Bank competition

The method to estimate market power in the banking industry or simply referred to as bank competition is essential. Banks' net interest margin or profitability might not be appropriate indicators of the competitiveness of a banking industry as argued by Claessens and Laeven (2004). These measures can be influenced by various country-specific environments, such as country-level performance and stability, the form and the degree of taxation of financial intermediation, the quality of institutions and bank-specific factors.

In a similar vein, Beck (2008) sheds light on the weakness of the measure of bank market structure and concentration ratios to assess the degree of bank competition, since they fail to capture different strategies undertaken by banks. Consequently, such indicators only

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[5] The distribution of banks is shown in parentheses.

represent the actual market share, but do not necessarily capture bank competition as represented by the degree of market power in the whole banking industry.

In the meantime, previous papers also use H-statistic developed by Panzar and Rosse (1987) to assess the degree of competition in the banking market (Claessens and Laeven, 2004; Schaeck et al, 2009; Molyneux and Nguyen-Linh, 2008). However, Bikker and Bos (2008) highlight that the Panzar-Rosse approach must fulfill basic assumption that observations should be in long-run equilibrium. For this purpose, an equilibrium test should be established by equalizing adjusted rates of return across banks. At equilibrium, the rates of return should not be correlated with input prices or else, the H estimates are based on observations from a disequilibrium situation. Consequently, the H estimates do not representatively measure the degree of competition in banking.

For these reasons, we use the new industrial organisation approach developed by Uchida and Tsutsui (2005) to calculate the degree of market power for the whole banking industry. This method allows us to obtain a more straightforward measure of competition for at least three reasons. First, Uchida and Tsutsui (2005) provide the estimates of the degree of market power in the banking industry for each period, as they use panel data techniques. Second, such approach does not require any information on the market structure of each bank and a market equilibrium assumption. Third, this method allows us to determine the degree of market power endogeneously and hence, the different strategies of banks can be taken into account, e.g. whether banks mainly perform intermediation activities or else, banks engage more in non-interest income activities.

The method of Uchida and Tsutsui (2005) we use is essentially formalized by Bresnahan (1982) and Lau (1982). They develop a short-run empirical model for the market power of an average bank based on the intermediation paradigm following Schaffer (1989, 1993), in which banks produce one output using various input factors. Since banks produce only one output, it is necessary to only consider banks with similar characteristics. In this regard, we consider only commercial banks[6].

However, Agusman et al (2008) report that the nature of commercial banks in Asia is heterogeneous in terms of their possibilities to engage in investment banking activities. Some Asian countries restrict banks to engage in investment activities, while some other countries do not. On the one hand, the heterogeneity of our bank sample is still maintained although we

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[6] Ariss (2010) also focuses only on commercial banks in analyzing the impact of bank market power on bank risk and efficiency in developing countries around the world. Moreover, there is no available information in our bank sample related to interest expenses in investment banks, where the interest expenses variable is one of the main variables to estimate the degree of market power in the banking industry.

consider only commercial banks. On the other hand, as the method of Uchida and Tsutsui (2005) consider that banks only produce one output, we need to overcome bank heterogeneity problems. In order to anticipate that some Asian banks conduct non-interest income activities more than traditional ones (loans), we consider that bank input can come from assets other than loans[7].

Bresnahan (1982) and Lau (1982) consider that banks maximize profitability by equalizing marginal cost and perceived marginal revenue. Meanwhile, the perceived marginal revenue coincides with the demand price in competitive equilibrium, as well as the marginal revenue of the banking industry in the extremely collusive environment (Schaffer, 1993). More specifically, we jointly estimate a system of three equations that correspond to a translog cost function, to a bank profit maximization revenue function, and to an inverse loan demand function for each country, as shown in (1).

To define output, we follow Brissimis et al (2008) using total revenue from both interest and non-interest revenue. This construction allows us to implicitly capture the implications of a different strategy of banks, since they can perform both interest income and non-interest income activities for bank profitability, a trend which has been observed in most banking systems around the world.

$$
\begin{aligned}
\ln C_{it} &= b_0 + b_1 \overline{\ln q_{it}} + \frac{1}{2}b_2 \left(\overline{\ln q_{it}}\right)^2 + b_3 \overline{\ln d_{it}} + \frac{1}{2}b_4 \left(\overline{\ln d_{it}}\right)^2 + b_5 \overline{\ln w_{it}} + \frac{1}{2}b_6 \left(\overline{\ln w_{it}}\right)^2 \\
&\quad + b_7 \left(\overline{\ln q_{it}}\right)\left(\overline{\ln w_{it}}\right) + b_8 \left(\overline{\ln q_{it}}\right)\left(\overline{\ln d_{it}}\right) + b_9 \left(\overline{\ln d_{it}}\right)\left(\overline{\ln w_{it}}\right) + e_{it}^C \\
R_{it} &= \frac{\theta_t}{\eta_t} R_{it} + r_{it} q_{it} + c_{it} \left(b_1 + b_2 \left(\overline{\ln q_{it}}\right) + b_7 \left(\overline{\ln w_{it}}\right) + b_8 \left(\overline{\ln d_{it}}\right)\right) \\
&\quad + C_{it} \frac{q_{it}}{d_{it}} \left(b_3 + b_4 \left(\overline{\ln d_{it}}\right) + b_8 \left(\overline{\ln q_{it}}\right) + b_9 \left(\overline{\ln w_{it}}\right)\right) + e_{it}^S \\
\ln p_{it} &= g_0 - \left(1/\eta\right) \ln q_{it} + g_1 \ln GDPG_t + g_2 \ln IR_t + g_2 \ln TA_{it} + e_{it}^D
\end{aligned}
\tag{1}
$$

Variables with bars are deviations from their cross-sectional means in each time period to reduce multicollinearity. The degree of competition in each year is given by $\theta_t \in [0,1]$ representing the well-known conjectural variations of elasticity of total banking industry outputs with respect to the output of bank *i*. In the case of perfect competition, $\theta_t = 0$; under

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[7] Brissimis et al (2008) acknowledge this dimension by considering total revenue as output and total earning assets as one of the input factors, while Uchida and Tsustui (2005) only use revenue generated by loans as output and total loans as one of the input factors.

pure monopoly, $\theta_t = 1$; and finally, $\theta_t < 0$ implies pricing below marginal cost and could result, for example from a non-optimizing behavior of banks.

Specifically, C_{it} is measured by total expenses, q_{it} by total earning assets, d_{it} by total deposits and short-term funding, w_{it} by the ratio of operating expenses to total assets, R_{it} by total revenue, r_{it} by the ratio of interest expenses to total deposits, p_{it} by the ratio of total revenue to total earning assets. Meanwhile, $GDPG_t$, IR_t and TA_{it} are factors that affect demand, defined as the growth of real gross domestic product (GDP), the short-term interest rate, and bank total assets, respectively[8].

In the next turn, we perform country-level estimations and specify the Seemingly Unrelated Regression (SUR) method to solve System (1). To estimate θ_t we use annual time dummy variables, while to estimate η we use bi-annual time dummy variables (every two years). This is because the values taken by η are linearly dependent on the time-specific control variable (*GDPG* and *IR*) in the third structural equation of System (1). In the subsequent analyses, θ_t denotes the Lerner index (*LERNER*) of the banking industry in each country.

In this study, we also consider the square term $LERNER^2$ to capture possible non-linearity effects of market power on risk taking, insolvency risk and capital ratios. To calculate $LERNER^2$, we set $LERNER^2$ equal to zero if *LERNER* is negative.

3.3. Bank risk taking, insolvency risk and capital ratios

In order to measure bank risk taking, we use the standard deviation based on *ROA* (*SDROA*) and *ROE* (*SDROE*) as dependent variables. *ROA* is the return on assets or the ratio of net income to total assets, while *ROE* is the return on equity or the ratio of net income to total equity. Following Agoraki et al. (2009), *SDROA* and *SDROE* at time t are both calculated on the basis of observations of *ROA* and *ROE*, respectively, from time t to $t-2$ (a three period-based rolling window). For robustness, we also compute the standard deviations based on a two period-based rolling window.

To measure bank insolvency risk, we use two types of Z-score measures based on either *ROA* or *ROE* represented by *ZROA* or *ZROE*, respectively. *ZROA* indicates the number

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[8] Following Brissimis et al. (2008), the short-term interest rate can be interbank rate, money market rate, etc, depending on data availability in each country. As we estimate the degree of bank competition separately for each country, this procedure is not a potential problem as highlighted by Brissimis et al. (2008).

of standard deviations that a bank's *ROA* has to drop below its expected value before equity is depleted. Thus, a higher *ZROA* is associated with a decrease in a bank's default probability or bank's insolvency risk[9]. For each bank *i* and time *t*, *ZROA* is defined as follows

$$ZROA_{i,t} = \frac{ROA_{i,t} + EQTA_{i,t}}{SDROA_{i,t}}$$

EQTA is the ratio of total equity to total assets, and *SDROA* is calculated on the basis of a three-period rolling window as described above but we also consider a two-period rolling window for robustness. Likewise, we also consider the Z-score based on the return on average equity (*ZROE*) to capture bank insolvency risk. *ZROE* is defined as follows

$$ZROE_{i,t} = \frac{1 + ROE_{i,t}}{SDROE_{i,t}}$$

SDROE is also calculated on the basis of a three-period rolling window and, again, also for a two-period rolling window for robustness consideration.

To compute bank capital ratios, we consider the total risk-based capital ratio (*CAR*) as the dependent variable in order to be consistent with Repullo (2004) who argues that only the risk-based capital requirements can ensure banks' prudent behaviour. However, we also consider the ratio of total equity to total assets (*EQTA*) to account for the leverage ratio of banks. Blum (2008) highlights that the leverage ratio can be an alternative tool to discipline banks' risk-taking behaviour.

3.4. Control variables

First, we control for bank-specific effects. Bank deposits and loans are the major sources of bank risk. In this regard, we consider the ratio of total deposits and short-term funding to total assets (*DEPO*) and the ratio of total loans to total assets (*LOAN*). Higher loan loss provisions may also be associated with higher bank risk and in some cases lower capital adequacy ratios, since banks may use loan loss provisions for discretionary purposes. To account for this dimension, we incorporate the ratio of loan loss provisions to total loans (*LLP*). Moreover, higher bank monitoring costs can affect the stability of banks and bank capital ratios, even though their relationships are not predictable. We thus include the ratio of operating expenses to total assets (*OVERHEAD*) to take into account bank inefficiency. Finally, we also incorporate the logarithm of bank total assets (*SIZE*), since larger banks can

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[9] See Roy (1952) for further details on the construction of the Z-score variable.

suffer from "too big to fail" effects with incentives to take on more risk and at the same time, hold lower capital ratios.

Second, we control for country-specific environments that may affect bank risk and capitalization. Mohanty and Turner (2006) point out that foreign exchange reserves may impact the risk exposure of banks, as banks can be sensitive to movements of foreign exchange rates. We thus incorporate the foreign exchange reserve growth (*FOREXG*) as one of the control variables. Meanwhile, since macroeconomic developments are likely to affect the quality of banks' assets, we follow Schaeck and Cihak (2007) by including the inflation rate (*INF*) and the real gross domestic product growth (*GDPG*).

3.5. Data selection

To deal with outliers we impose several restrictions to our dataset. We eliminate the extreme bank/year values of some variables that exhibit left-skewed and/or right-skewed distributions. We clean *ROE* by eliminating both their 2.5 percent lowest and 2.5 percent highest values. We also eliminate the 2.5 percent highest values of *ZROA* and *ZROE*, since this variable exhibits a right-skewed distribution. For *DEPO*, we eliminate the values that are higher than 1 or lower than 0. For *OVERHEAD*, we eliminate its 2.5 percent highest values due to the right-skewed distribution observed.

3.6. Descriptive statistics

Table 1 reports descriptive statistics on the "clean" variables used in this study, while Table 2 shows the degree of market power in the banking industry for each country and at each time period.

In Table 1, we also present three indicators used as instrumental variables for *LERNER* discussed in the next section. We retrieve the rule of law index (*RLAW*) from Kaufman et al (2008), the ratio of stock market capitalisation to *GDP* (*STOCK*) from Beck and Demirgüç-Kunt (2009), and the economic freedom index (*ECOFREE*) from Heritage Foundation. *ECOFREE* is a composite index of 10 indicators ranking policies in the areas of trade, government finances, government interventions, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation and black market activity. The index scores from 0 to 100 with higher scores indicating policies being more conducive to competition and economic freedom.

From Table 2, the Indian banking industry exhibits a negative market power throughout the sample period, which might reveal a non-optimizing behavior of banks. Dash

and Cristabel (2009) support our findings since Indian banks experienced a sharp increase in their cost-to-income ratio during the period 2003-2008 while profitability has declined. Shanmugam and Das (2004) report that financial reforms during the period 1992-1999 have not helped banks to raise their interest margins. Das et al. (2004) also find that Indian banks were not much differentiated in terms of input or output technical efficiency, as well as cost efficiency. Such a non-optimizing behaviour of Indian banks might be due to the fact that the Indian banking industry is still dominated by the public sector (Dash and Cristabel, 2009). In the meantime, we observe that most of Asian countries except Thailand exhibit a negative market power during the periods around the 1997/1998 Asian crisis, suggesting that banks loose their market power during a downturn period which in turn impedes them to maintain profitability.

Insert Table 1 and Table 2 here

4. Econometric specification and methodology

Uhde and Heimeshoff (2009) investigate a closely related issue for European banks by studying the relationship between bank consolidation and financial stability. Our analysis departs from Uhde and Heimeshoff (2009) by considering the link with market power instead of concentration to account for the implications of bank consolidation. This is because bank consolidation is more likely to affect market power rather than concentration[10].

We construct Equation (2) that has often been used to test the relationship between market power and bank risk (Boyd et al, 2006; Brissimis et al, 2008; Agoraki et al, 2009).

$$Y_{ijt} = f\left(LERNER_{jt}, LERNER_{jt}^2, X_{jt}, Z_{ijt}\right) \tag{2},$$

where i, j, t are bank, country and time indexes, respectively. Y_{ijt} represents the dependent variable consisting either of bank risk taking, insolvency risk, or capital ratio measures, while X_{jt} and Z_{ijt} are country-specific and bank-specific control variables, respectively. Moreover, the recent empirical literature sheds light on the endogeneity issue in the nexus between market power and bank risk taking (Berger et al, 2009; Uhde and Heimeshoff, 2009; Gonzales, 2005; Schaeck and Cihak, 2007). The endogeneity issue of bank competition needs to be acknowledged, since bank competition can be affected by a number of bank-specific factors and macroeconomic environments that are not entirely captured in the competition

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[10] See DeYoung et al. (2009) for further details on the relationship between bank consolidation and market power.

measure. Accordingly, neglecting endogeneity can result in omitted variable bias. Endogeneity can also come from the reverse causality problem, where bank risk and capital ratio as dependent variables can affect bank competition. To deal with endogeneity that can arise from the competition-stability nexus, we estimate Equation (2) by specifying instrumental variables.

Claessens and Laeven (2004) argue that the quality of institutions that protects shareholders' rights is an important aspect for a well-functioning financial system. We thus consider *RLAW* as one of the instrumental variables which may affect the degree of banking industry market power. Moshirian (2009) accentuates that the quality of the macrogovernance environment related to shareholders' protections will enhance the degree of financial globalisation. If this is the case, higher *RLAW* can reduce bank market power as the competition level of the financial system due to financial globalisation increases.

Meanwhile, as discussed by Schaeck and Cihak (2007), a well developed financial market can change the competitive environment in which banks operate. By choosing *STOCK* as an instrumental variable, we aim to capture the effect of financial market development[11]. For instance, if the stock market is well developed, an increase in *STOCK* might imply that banks can choose to invest their funds on the stock market instead of providing loans to the private sector. Also, firms can have easier access to the market imposing more competivive pricing for bank loans. Finally, we also consider Economic Freedom (*ECOFREE*) as one of the instrumental variables for *LERNER* instead the Banking Freedom indicator used by Berger et al (2009), since the Economic Freedom index consists of a broader set of economic openness than the Banking Freedom index.

To estimate the impact of market power in the banking industry on bank risk-taking, insolvency risk and capital ratios with instrumental variables, we employ the Generalized Method of Moments (GMM) with fixed effect corrections[12]. By taking into account individual and time fixed effects, we can avoid drawbacks due to omitted variables. In addition, the use of the GMM method has two advantages. This method is robust to the distribution of errors and is considered as more efficient than Two-Stages Least Squares (2SLS) because it accounts for heteroskedasticity (Hall, 2005).

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[11] We have also used the ratio of private and public bond market capitalization to GDP (*BOND*). We prefer using *STOCK* because this variable is better informed than *BOND* for some countries. However, we also check the robustness by specifying *BOND* as instrumental variable instead of *STOCK*. The main results are unaltered.

[12] Berger et al (2009) also use the GMM method, while Schaeck and Cihak (2007) and Uhde and Hemishoff (2009) use the Two Stages Least Squares (TSLS) method.

In this study, we also consider whether financial crisis affects the impact of market power in the banking industry on bank risk taking, insolvency risk, and capital ratios. For such a purpose, we estimate (2) for three different cases: (1) overall 1994-2009 period; (2) the 1997-1999 period that represents the Asian crisis period; and (3) the 2007-2009 period to capture the credit crisis period. Cook (2009) emphasized on the 1997-1999 period to shed light on the Asian financial crisis. In the meantime, considering the 2007-2009 period to highlight the US crisis periods is consistent with higher volatility in the spread between *London Inter-Bank Offer Rates* (LIBOR) and *Overnight Indexed Swaps* (OIS) as shown in Graph 1.

5. Empirical results

To investigate the link between bank competition and stability, we proceed in three steps. First, we analyze the relationship between market power in the whole banking industry and bank-level risk taking. Second, we analyze the relationship with insolvency risk and third, we assess the relationship with bank capitalisation. We investigate each link by specifying instrumental variables for market power (*LERNER*). Table 3 shows that our instrumental variables (*ECOFREE*, *RLAW* and *STOCK*) are significantly related to the banking industry market power variable (*LERNER*).

In the case of Asian banks in general, and during the 1997-1999 period in particular, higher bank competition could be driven by better rules of law, a result which is consistent with the view that shareholder protection improves financial globalisation which in turn may increase the degree of competition among banks (Moshirian, 2009). Meanwhile, we denote that stock market capitalisation (*STOCK*) and economic freedom (*ECOFREE*) do not necessarily hinder the degree of market power in the banking industry. Both variables positively affect the degree of market power in the banking industry. On the contrary, the opposite results also hold for the 2007-2009 period, in which higher competition in banking is positively related to an increase in *STOCK* and *ECOFREE*, but not to an improvement in *RLAW*.

Insert Table 3 here

5.1. Overall period

To assess the link between bank competition and risk-taking, Table 4 shows the results obtained with GMM estimations when we use *SDROA* and *SDROE* as the dependent variables. Market power (*LERNER*) is positively related to both *SDROA* and *SDROE*, while there is no significant impact of $LERNER^2$ on both *SDROA* and *SDROE*. Such relationships indicate that market power in the banking industry increases bank risk taking[13].

Insert Table 4 here

From Table 4, moreover, we observe a negative impact of *LERNER* on both *ZROA* and *ZROE*. Meanwhile, $LERNER^2$ is positively related to *ZROA* and *ZROE* in both estimations with an inflection point of respectively 1.07 and 0.81. However, we observe that more than 99% of the observations are below 1.07 and more than 93% are below 0.81. These findings indicate that the relationship between *LERNER* and *ZROA* (or *ZROE*) tends to be negative and hence, higher market power in the banking industry increases bank insolvency risk[14].

We further investigate the impact of market power in the banking industry on bank capitalisation. In Table 4, our results indicate a positive impact of *LERNER* on bank capital ratios as measured by *EQTA* and *CAR*, while there is no significant relationship between $LERNER^2$ and the capital ratio variables (*EQTA* and *CAR*). These results show that market power facilitates banks to hold higher capital ratios, a result which is consistent with Berger et al (2009).

On the whole, considering all the results shown in Table 4, our findings indicate that market power in the banking industry has a positive impact on bank risk taking (*SDROA* and *SDROE*), insolvency risk (*ZROA* and *ZROE*), and capital ratios (*CAR* and *EQTA*). Although higher capital ratios are expected to lower bank default risk, higher risk taking will drive default risk in the opposite direction. Therefore, our results suggest that the increase in capital ratios in less competitive markets is not high enough to offset higher bank risk taking and to guarantee bank solvency. Our results also suggest that the self-disciplining factor induced by

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[13] To check for robustness, we also calculate respectively *SDROA* and *SDROE* on the basis of *ROA* and *ROE*, from time t and $t − 1$ (a two period-based rolling window). The estimation results are not altered, and the outputs for these specifications are available from the authors upon request.

[14] To check for robustness, we further employ *ZROA* based on *SDROA* which is calculated using observations of *ROA* at time t and $t − 1$ (a two period-based rolling window). The link between *LERNER* and *ZROA* is not altered. Analogically, we also compute *ZROE* on the basis of two-period rolling windows to define the standard deviation. The link between *LERNER* and *ZROE* is not altered.

higher market power is not sufficient to moderate excessive bank risk taking, and to increase bank incentives to hold sufficient capital to ensure bank solvency.

Our findings are in line with those of Agusman et al (2006), where greater charter value in Asian listed banks fails to reduce banks' income volatility. Our findings are also consistent with Molyneux and Nguyen-Linh (2008), where higher bank competition results in lower bank risk-taking in Southeast Asia. Our findings also support Schaeck et al (2009) who analyze the competition-stability nexus using the Panzar-Rosse approach. Using a sample of both developed and developing countries, including some of the Asian countries used in our study, they show that a more competitive banking market is less prone to a systemic banking crisis and exhibit increased time to crisis. Conversely, our findings differ from Ariss (2010) who studies developing countries in a cross-country setting, where greater bank market power is found to enhance bank stability. Such differences could be explained by the fact that we use a sample of different countries in our study, or that we focus on a panel data approach that considers time fixed effects. The importance of time-fixed effects in the nexus between bank competition and financial stability is shown in the next section, in which we analyze whether financial crises affect such relationships and hence, can alter our previous findings.

5.2. Do financial crises matter?

During a financial crisis that creates an economic downturn, it is perceived that banks tend to reduce loans extension and build up capital ratios, since capital is expected to buffer against the shocks of the crisis and to increase banks' competitive advantage in a market (Berger and Bouwman, 2009). Higher risk aversion of banks can moderate moral hazard in terms of excessive lending. Conversely, Brownbridge and Kirkpatrick (1999) point out that during a crisis, banks could behave imprudently due to a massive decline in bank capital ratios and an increase in maturity mismatch. This is because such situations erode the franchise value of banks encouraging risky or fraudulent behaviour, as banks face greater insolvency risk[15]. We therefore further analyze whether during financial crises, higher market power in the banking industry that facilitates banks to maintain their franchise value is important to

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[15] In the Asian context, Cook (2009) identifies two possible imprudent strategies during a crisis, namely "gambling for resurrection" and "looting". Gambling for resurrection is a strategy of distressed banks to maintain profitability by excessively increasing loans to high-risk but high-return borrowers. Meanwhile, distressed banks also tend to increase deposit rates in order to attract more deposits to fund these loans. Looting is a strategy of distressed banks to extend loans at "below-market" rates to related corporations (La Porta et al, 2001). See Cook (2009) for further discussions.

moderate bank moral hazard. Financial crises analyzed in this study include the 1997/1998 Asian crisis and the 2008 credit crisis.

In order to investigate our relationships during the 1997 Asian crisis, we repeat the estimations conducted in 5.1 for the 1997-1999 period. From Table 5, it appears that higher *LERNER* reduces bank risk taking as measured by *SDROE*. Meanwhile, higher *LERNER* also increases the Z-score index (*ZROE*), but reduces capital ratios as measured by either *EQTA* or *CAR*. These findings highlight that during the 1997 Asian crisis, higher market power in banking has a positive impact on bank stability, although banks in less competitive market decrease their capital ratios. Moreover, such findings could also be due to the fact that during a financial crisis banks' degree of risk aversion is higher and hence, the systematic risk exposure of banks declines. In this context, bank moral hazard is presumably less likely to operate during the 1997/1998 Asian crisis, although bank capital ratios are lower to cover bank risk-taking strategies.

We repeat the estimations conducted in 5.1 for the 2007-2009 period to analyze whether the impact of market power in the banking industry on bank risk taking, insolvency risk and capital ratios have changed during the 2008 US crisis. Table 6 presents our empirical results for the 2007-2009 period. During the 2008 crisis, higher *LERNER* increases bank risk-taking (*SDROE*), increases bank insolvency risk (*ZROA* or *ZROE*), and bank capital ratios (*EQTA* or *CAR*). These findings are similar to the case where estimations are conducted for the whole sample period (1994-2009). Our findings show that the 2008 crisis does not affect the risk-taking behaviour of Asian banks. Higher market power in the banking industry which is expected to enhance a self-disciplining factor of bank moral hazard fails to moderate bank risk taking and to sufficiently enhance bank capital ratios. As a whole, banks in less competitive markets still exhibit higher insolvency risks during the 2008 crisis period. This finding can also be explained by the fact that the 2008 crisis did not directly affect Asian banks (Standard and Poor, 2008).

6. Sensitivity analyses

In order to ensure the robustness of our results, we perform several sensitivity analyses. First, macroeconomic environments such as the differences in financial structure and development, as well as institutional development that affects economic and political characteristics, may explain bank risk exposures. To account for this dimension, we

incorporate country-specific dummy variables as explanatory variables in (2) [16]. Indonesia is treated as the numeraire country. As country-specific dummies are time-invariant variables, individual fixed effects corrections are no longer possible. By specifiying the GMM estimation with time fixed-effect corrections, our main empirical findings discussed in Section 5 are not altered.

Second, the trends of financial globalization in Asia might change the nature of banking products from traditional activities (deposits funded loans) to non-interest income-generating activities. Therefore, bank non-interest income may also explain some of the risk exposure of banks. We thus incorporate the ratio of non-interest income to total revenue (*NNI*) as an explanatory variable in (2). Moreover, we also take into account the loan growth rate (*LOANG*) as one of the control variables that affect bank capitalization (Ayuso et al, 2004). Using this new specification, our main findings remain consistent.

Third, we modify our estimation method to calculate the degree of market power in the banking industry by considering alternative specifications of the inverse demand function, as shown in (1). We use *OPL* (the ratio of operating expenses to total loans) instead of *SIZE* in the demand function, as bank monitoring costs can affect the pricing of bank loans. We also include the inflation rate (*INF*) to replace the short-term interest rate (*IR*). This alternative specification does not alter our main findings obtained in Section 5.

Moreover, for consistency with the majority of papers on cost efficiency/market power in the banking literature, Agoraki et al. (2009) use the Maximum Likelihood Estimation method (MLE) instead of running the SUR method used by Uchida and Tsutsui (2005). Hence, we also run the MLE method for (1) instead of using the SUR method. Overall, our results regarding the impact of market power in banking on bank risk taking, insolvency risk and capital ratios remain consistent.

7. Conclusion

In spite of a strong consolidation in Asian banking, there is no evidence that such a process enhances bank stability. This chapter attempts to assess such an issue by investigating the impact of market power in banking on bank risk taking, insolvency risk, and capital ratios. Based on a sample of 686 commercial banks in 12 Asian countries over the 1994-2009 period, our empirical results highlight that a higher degree of market power in banking is associated with an increase in bank risk taking, insolvency risk and capital ratios. However, these

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[16] Agusman et al. (2008) also use the similar approach to account for unobservable country-specific characteristics in the Asian context.

findings do not hold during the 1997 Asian crisis period (1997-1999), where higher market power decreases bank risk taking and insolvency risk, although it also decreases bank capital ratios. These results are robust to several sensitivity analyses.

Specifically, our findings for the whole period show that the increase in capital ratios in less competitive environments is not high enough to offset the effect of higher risk taking on bank insolvency risk highlighting possible moral hazard problems in Asian banks. Meanwhile, our findings for the 1997-1999 period indicate that during a crisis banks tend to reduce their systematic risk exposure. Market power in the banking industry does therefore not exacerbate banks' moral hazard in this regard.

These findings have various policy implications. In the Asian context, market power in the banking industry that enhances the self-disciplining effect induced by lower competition does neither moderate bank risk taking nor provide enough incentives for banks to hold sufficiently more capital to prevent higher default risk. Nevertheless, our results also suggest that during financial crises, particularly a crisis that directly affects the Asian banking industry, market power in banking might be necessary to overcome banks moral hazard.

Appendix

Table 1. Descriptive statistics

Variables	Definition	Mean	Median	Max	Min	Std. Dev.
Q	Total earning assets (million USD)	12359.5	1724.009	1.44E+06	0.126	58044.65
C	Total expenses (million USD)	90240.113	332.4945	13897949	0.013	529468.45
D	Total deposits and short term funding (million USD)	10535.445	1442.149	1431017.9	0.002	54044.344
R	Total revenue (million USD)	75003.77	191.72	13897949	-2754.779	483640.2
W	Ratio of total operating expenses to total assets	0.023908	0.018681	0.878493	1.65E-04	0.024928
R	Ratio of interest expenses to total deposits	0.10337	0.08026	8.5098	1.52E-02	0.21097
P	Ratio of total revenue to total earning assets	13.52625	0.106055	675.2431	-1.277457	32.28294
IR	Annual short-term interest rate	0.07779	0.0575	0.6279	0.0007	0.07444
NNI	Ratio of net non-interest income to total net income	0.200772	0.179505	0.656115	5.96E-06	0.179717
ROA	Ratio of net income to total assets	0.006636	0.008513	0.820643	-0.930017	0.040753
EQTA	Ratio of total equity to total asset	0.114508	0.080421	0.998759	0.000228	0.117799
SDROA	Standard deviation of ROA from a three-period rolling window	0.011291	0.003151	0.846356	5.55E-06	0.037181
ZROA	Z-score based on ROA from a three-period rolling window	47.03424	27.82038	371.9645	-0.388299	56.33229
ROE	Ratio of net income to total equity	0.097116	0.105828	0.358916	-0.616406	0.115637
SDROE	Standard deviation of ROE from a three-period rolling window	0.053057	0.031034	0.541942	0.0000118	0.065513
ZROE	Z-score based on ROE from a three-period rolling window	55.64348	34.74358	418.4576	1.445993	63.72547
DEPO	Ratio of total deposits and short-term funding to total assets	0.725742	0.786495	1	0.0000262	0.193805
LLP	Ratio of loan loss provisions to total loans	0.019337	0.008081	0.948693	0.0000136	0.051427
LOAN	Ratio of loans to total assets	0.54053	0.554632	0.995843	0.0000135	0.180878
OVERHEAD	Ratio of operating expenses to total assets	0.023908	0.018681	0.878493	0.000165	0.024928
SIZE	Logarithm of total assets	7.488353	7.568997	14.36128	-1.099613	2.011975
FOREXG	Annual growth rate of foreign exchange reserves	0.200202	0.147985	1.636324	-0.688591	0.290481
GDPG	Annual growth rate of GDP	0.055143	0.05901	0.14195	-0.13127	0.033925
INF	Annual inflation rate	0.060674	0.04674	0.5802	-0.03947	0.059013
RLAW	Rule of law index	0.129311	0.105705	1.575986	-1.000616	0.649938
ECOFREE	Economic Freedom index	61.45676	56.8	90.5	38.6	12.18869
STOCK	Ratio of stock market capitalisation to GDP	0.89522	0.409972	7.425013	0.00445	1.113848

Table 2. The Lerner index in the Asian banking industry. The Lerner index is calculated from the new industrial organisation approach following Uhida and Tsutsui (2005). A higher (lower) Lerner index is associated with an increase (decrease) in market power.

							Lerner Index					
	China	Hong-Kong	Indonesia	India	South Korea	Sri Lanka	Malaysia	Philippines	Pakistan	Thailand	Taiwan	Vietnam
1994	-0.282952	0.076967	0.346579	-0.961778	0.13124	0.175771	0.993463	0.13994	0.071763	0.665669	0.110994	0.27045
1995	-0.245039	-0.061084	0.234224	-0.865748	0.11629	0.116581	0.991431	0.133945	0.065709	0.60233	0.097823	0.201964
1996	-0.245702	-0.009032	0.204867	-0.795948	0.099509	0.12634	0.963911	0.16828	-0.067709	0.598937	0.084669	0.158095
1997	-0.260196	-0.053753	0.539131	-0.764381	0.144564	0.06195	0.932716	0.075777	-0.000681	0.548435	0.098973	0.120352
1998	-0.032251	-0.235858	1.929107	-0.659159	0.018185	0.044018	0.90165	-0.073066	0.029227	0.362615	0.158298	0.160778
1999	-0.316486	-0.674633	-0.16463	-0.986989	-0.349258	-0.506732	0.666228	-0.589532	-0.292432	0.279809	-0.216598	-0.144492
2000	-0.31412	-0.674264	-0.161723	-0.981867	-0.349958	-0.50754	0.66644	-0.589708	-0.294237	0.280852	-0.217567	-0.144491
2001	-0.319157	-0.673588	-0.161321	-0.982514	-0.347797	-0.507557	0.666529	-0.589205	-0.292336	0.280939	-0.217907	-0.144732
2002	0.238017	-0.670538	-0.161139	-0.981794	-0.346779	-0.507313	0.666583	-0.588759	-0.294709	0.280985	-0.218432	-0.144813
2003	0.300196	-0.66807	-0.160795	-0.981951	-0.344848	-0.506933	0.666762	-0.588055	-0.293095	0.281521	-0.217677	-0.144163
2004	0.360446	-0.668376	-0.160011	-0.982079	-0.344368	-0.506881	0.666432	-0.58868	-0.291035	0.282955	-0.217442	-0.14416
2005	0.34348	0.343875	0.367294	-0.359394	0.45999	0.116659	0.737229	0.192296	0.58054	1.000406	0.478611	0.341684
2006	0.305246	0.200099	0.385675	-0.381871	0.410134	0.118395	0.723376	0.165057	0.496203	0.883843	0.442693	0.285954
2007	0.338882	0.258267	0.488008	-0.362753	0.368536	-0.018932	0.733192	0.250056	0.416676	0.916002	0.329113	0.340667
2008	0.310007	0.32556	0.511161	-0.384193	0.245958	-0.049368	0.885034	0.169463	0.326171	0.971731	0.260864	0.217162
2009	0.384511	0.538758	0.524386	-0.31296	0.237408	-0.060188	0.957936	0.252745	0.283754	1.101859	0.414053	0.398163

Table 3. The first-stage regression between instrumental variables and market power in the banking industry. The dependent variable is the Lerner index (*LERNER*). *LERNER* is the market power index calculated from the new industrial organization approach following Uchida and Tsutsui (2005). *ECOFREE* is the economic freedom index retrieved from Heritage foundation. *RLAW* is the rule of law index constructed by Kaufmann et al (2008). *STOCK* is the ratio of stock market capitalization to GDP. *DEPO* is the ratio of total deposits to total assets. *LOAN* is the ratio of total loans to total assets. *LLP* is the ratio of loan loss provisions to total loans. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total assets. *FOREXG* is the growth of foreign exchange reserves. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. A constant is included but not reported. The model is estimated using the Ordinary Least Squares method. The *t-statistic* values are reported in parentheses. (***) indicates significance at the 1% level.

	1994-2009	*1997-1999*	*2007-2009*
Explanatory variables	*LERNER*	*LERNER*	*LERNER*
ECOFREE	0.0117***	0.0088***	-0.4704***
	(5.692)	(2.888)	(-14.502)
RLAW	-0.1445***	-0.1606***	0.0504***
	(-5.999)	(-2.581)	(21.435)
STOCK	0.0848***	0.0754**	-0.1333***
	(13.261)	(1.802)	(-11.572)
DEPO	-0.1484***	-0.0309	-0.108**
	(-3.935)	(-0.3025)	(-2.147)
LOAN	0.1689***	0.8532***	0.2791***
	(4.117)	(8.339)	(4.167)
LLP	1.269***	2.934***	-0.4269
	(5.345)	(13.043)	(-0.899)
OVERHEAD	-0.6379	-6.329***	-2.694***
	(-1.482)	(-5.246)	(-3.869)
SIZE	-0.0031	-0.005	0.0114**
	(-0.3409)	(-0.4365)	(2.165)
FOREXG	0.0755***	-0.1304**	0.0035
	(5.827)	(-2.454)	(0.1044)
GDPG	0.8439***	-1.202	1.426***
	(6.871)	(-1.064)	(3.788)
INF	-0.1429***	6.511***	0.8059***
	(-2.969)	(8.527)	(6.021)
R-square	0.27	0.41	0.38
Number of Observation	4826	947	966

31

Table 4. The impact of banking market power on bank risk and capital ratios for 1994-2009. *LERNER* is the market power index. *SDROA* (*SDROE*) is the standard deviation of return on assets (equity) calculated from a three-period based rolling window. *ZROA* (*ZROE*) is the Z-score index based on *ROA* (*ROE*). *EQTA* is the ratio of total equity to total assets. *CAR* is total risk-based capital ratio. *DEPO* is the ratio of total deposits to total assets. *LOAN* is the ratio of total loans to total assets. *LLP* is the ratio of loan loss provisions to total loans. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total assets. *FOREXG* is the growth of foreign exchange reserves. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. A constant is included but not reported. The model is estimated using the GMM method with cross-section and time fixed-effect corrections. The *t-statistic* values are reported in parentheses. (***) indicates significance at the 1% level, while (**) and (*) indicate significance at the 5% and 10% levels, respectively. Instrumental variables for *LERNER* consist of *ECOFREE* (economic freedom), *RLAW* (rule of law) and *STOCK* (the ratio of stock market capitalisation to GDP). *J-statistic* for over Hansen identification test is provided, its *p-value* is reported in parentheses. The models are valid if *J-statistics* do not reject H0.

| Explanatory variables	SDROA Model 1	SDROA Model 2	SDROE Model 1	SDROE Model 2	ZROA Model 1	ZROA Model 2	ZROE Model 1	ZROE Model 2	EQTA Model 1	EQTA Model 2	CAR Model 1	CAR Model 2
LERNER	0.0242***	0.00252	0.0415**	0.0206	-49.7***	-165.6***	-24.641*	-176.3***	0.054***	-0.0409	0.0561**	-0.2837
	(3.688)	(0.1401)	(2.044)	(0.5116)	(-2.872)	(-3.324)	(-1.183)	(-3.119)	(3.756)	(-0.613)	(1.972)	(-3.734)
LERNER_SQ		0.0142		0.0147		77.283**		108.69***		0.0572		0.3115
		(1.296)		(0.4865)		(2.501)		(2.915)		(1.019)		(3.715)
DEPO	0.00142	-0.00063	0.0324***	0.0303**	-37.79***	-48.92***	-25.469**	-40.02***	-0.135***	-0.144***	-0.118***	-0.149***
	(0.4093)	(-0.1639)	(3.082)	(2.565)	(-4.004)	(-4.479)	(-2.341)	(-3.188)	(-18.911)	(-8.278)	(-9.372)	(-4.988)
LOAN	-0.026***	-0.023***	-0.047***	-0.043***	31.994***	51.861***	32.694***	61.201***	0.0031	0.0218	-0.145***	-0.076***
	(-7.217)	(-4.887)	(-4.157)	(-3.145)	(3.279)	(3.985)	(2.808)	(3.889)	(0.4176)	(1.063)	(-10.578)	(-2.82)
LLP	0.1331***	0.1217***	0.0797	0.0582	3.104	-62.238	27.426	-142.99*	-0.188***	-0.219***	-0.0769*	-0.341***
	(10.491)	(7.841)	(1.53)	(0.6409)	(0.0923)	(-1.411)	(0.5035)	(-1.741)	(-6.928)	(-3.141)	(-1.688)	(-2.242)
OVERHEAD	0.0961***	0.0977***	0.6035***	0.6031***	-378.1***	-367.8***	-451.8***	-450.5***	0.5719***	0.5837***	0.3498***	0.3478
	(2.705)	(2.724)	(5.463)	(3.988)	(-3.965)	(-3.648)	(-3.937)	(-3.708)	(8.36)	(4.151)	(2.583)	(1.232)
SIZE	-0.0012	-0.00029	-0.00057	0.00033	3.303	8.244***	-4.313	2.289	-0.036***	-0.033***	-0.029***	-0.018***
	(-1.398)	(-0.2528)	(-0.2164)	(0.1109)	(1.41)	(2.603)	(-1.593)	(0.6266)	(-20.719)	(-8.077)	(-8.893)	(-2.874)
FOREXG	-0.0032**	-0.0033**	-0.0053	-0.0054	13.299***	12.329***	6.281	5.611	-0.009***	-0.0081	-0.0139**	-0.0149
	(-2.334)	(-2.396)	(-1.312)	(-1.232)	(3.664)	(3.199)	(1.5044)	(1.268)	(-3.145)	(-1.215)	(-2.073)	(-1.472)
GDPG	-0.0277*	-0.0218	-0.0414	-0.0359	76.454*	107.199**	72.109	114.204**	0.0184	0.0735	-0.0118	0.1858*
	-1.844	(-1.379)	(-0.9324)	(-0.6968)	(1.8823)	(2.402)	(1.566)	(2.246)	(0.5683)	(0.5425)	(-0.2198)	(1.945)
INF	0.0199***	0.0118	0.0429*	0.0352	-27.704	-70.525**	-12.826	-66.771**	0.0348**	0.0016	0.009	-0.148***
	(2.649)	(1.205)	(1.895)	(1.398)	(-1.342)	(-2.544)	(-0.5482)	(-2.159)	(2.189)	(0.0417)	(0.3508)	(-3.013)
R-square	0.42	0.41	0.37	0.37	0.31	0.22	0.27	0.18	0.77	0.76	0.68	0.46
J-statistic	1.77 (1)	0.059 (1)	2.33 (1)	2.13 (1)	7.35 (1)	0.33 (1)	9.53 (1)	0.0015 (1)	14.36 (1)	7.55 (1)	48.45 (1)	0.36 (1)
Number of Observation	4530	4530	4386	4386	4424	4424	4298	4298	4779	4779	3298	3298

32

Table 5. The impact of banking market power on bank risk and capital ratios for 1997-1999. *LERNER* is the market power index. *SDROA* (*SDROE*) is the standard deviation of return on assets (equity) calculated from a three-period based rolling window. *ZROA* (*ZROE*) is the Z-score index based on *ROA* (*ROE*). *EQTA* is the ratio of total equity to total assets. *CAR* is total risk-based capital ratio. *DEPO* is the ratio of total deposits to total assets. *LOAN* is the ratio of total loans to total assets. *LLP* is the ratio of loan loss provisions to total loans. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total assets. *FOREXG* is the growth of foreign exchange reserves. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. A constant is included but not reported. The model is estimated using the GMM method with cross-section and time fixed-effect corrections. The *t-statistic* values are reported in parentheses. (***) indicates significance at the 1% level, while (**) and (*) indicate significance at the 5% and 10% levels, respectively. Instrumental variables for *LERNER* consist of *ECOFREE* (economic freedom), *RLAW* (rule of law) and *STOCK* (the ratio of stock market capitalisation to GDP). *J-statistic* for over Hansen identification test is provided, its *p-value* is reported in parentheses. The models are valid if *J-statistics* do not reject H0.

	SDROA		SDROE		ZROA		ZROE		EQTA		CAR	
Explanatory variables	*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*
LERNER	0.0098	-0.0078	-0.0283**	0.0297	13.302	-17.542	35.689**	-39.636	-0.036***	-0.057*	-0.073***	-0.0598*
	(1.222)	(-0.4549)	(-1.972)	(0.5506)	(1.159)	(-0.3703)	(1.976)	(-0.7976)	(-4.726)	(-1.849)	(-3.854)	(-1.658)
LERNER_SQ		0.0086		-0.0299		14.976		38.395		0.0107		-0.0065
		(0.9165)		(-1.117)		(0.7021)		(1.573)		(0.7112)		(-0.2081)
DEPO	-0.0247	-0.0304	-0.0255	-0.0074	-21.984	-32.028	-59.691	-83.42*	-0.206***	-0.214***	-0.0922	-0.0841
	(-0.9298)	(-1.044)	(-0.5739)	(-0.1553)	(-0.8686)	(-1.137)	(-0.7934)	(-1.918)	(-8.935)	(-8.192)	(-1.649)	(-0.6777)
LOAN	-0.101***	-0.095***	-0.079***	-0.096***	4.499	12.897	73.039**	95.244***	0.0494***	0.0562***	-0.147***	-0.15***
	(-2.789)	(-2.692)	(-2.699)	(-2.883)	(0.2299)	(0.5409)	(2.159)	(3.131)	(3.265)	(3.126)	(-3.515)	(-6.405)
LLP	0.1158**	0.1151**	0.0098	0.0312	-20.052	-21.372	-26.525	-51.439	0.0493*	0.0478*	0.2462**	0.2471*
	(2.555)	(2.526)	(0.1829)	(0.5384)	(-0.7543)	(-0.7801)	(-0.4816)	(-0.9865)	(1.795)	(1.719)	(2.509)	(1.943)
OVERHEAD	0.1314	0.1252	-0.1748	-0.1699	-144.42	-153.23	570.374	559.11	0.1161	0.1173	0.3037	0.3281
	(0.5442)	(0.5155)	(-0.4609)	(-0.4425)	(-0.751)	(-0.7835)	(1.495)	(1.605)	(0.5252)	(0.5267)	(0.4473)	(0.6131)
SIZE	-0.021***	-0.0178**	-0.059***	-0.071***	7.746	13.192	34.724***	49.351***	-0.047***	-0.043***	-0.072***	-0.074***
	(-2.659)	(-2.526)	(-4.643)	(-4.31)	(0.6904)	(0.8743)	(3.158)	(3.279)	(-7.123)	(-5.076)	(-4.103)	(-6.268)
FOREXG	-0.0037*	-0.0036*	0.0216***	0.0212***	6.161	6.424	-3.784	-3.219	0.0048	0.0049	0.0099	0.0093
	(-1.691)	(-1.646)	(3.602)	(3.471)	(1.189)	(1.212)	(-0.7726)	(-0.5817)	(1.412)	(1.451)	(1.042)	(0.5856)
GDPG	-0.228***	-0.185***	-0.0262	-0.1675	-14.139	61.027	-15.212	178.62	0.0859	0.1335	0.3876*	0.3714***
	(-3.264)	(-2.708)	(-0.1432)	(-0.747)	(-0.0919)	(0.2995)	(-0.0976)	(0.8556)	(0.8694)	(1.113)	(1.814)	(16.939)
INF	0.3948***	0.3341***	-0.1746	0.00041	-411.33*	-514.99*	375.342	141.36	-0.48***	-0.554***	-1.746***	-1.707***
	(2.947)	(2.886)	(-0.7035)	(0.0014)	(-1.671)	(-1.716)	(1.175)	(0.5195)	(-3.528)	(-3.218)	(-4.821)	(-3.502)
R-square	0.53	0.53	0.59	0.59	0.37	0.36	0.49	0.45	0.92	0.92	0.79	0.79
J-statistic	12.79 (1)	12.23 (1)	1.78 (1)	0.48 (1)	7.55 (1)	9.53 (1)	2.79 (1)	0.11 (1)	11.75 (1)	11.05 (1)	0.64 (1)	0.62 (1)
Number of Observation	914	914	868	868	902	902	853	853	925	925	581	581

Table 6. The impact of banking market power on bank risk and capital ratios for 2007-2009. *LERNER* is the market power index. *SDROA* (*SDROE*) is the standard deviation of return on assets (equity) calculated from a three-period based rolling window. *ZROA* (*ZROE*) is the Z-score index based on *ROA* (*ROE*). *EQTA* is the ratio of total equity to total assets. *CAR* is total risk-based capital ratio. *DEPO* is the ratio of total deposits to total assets. *LOAN* is the ratio of total loans to total assets. *LLP* is the ratio of loan loss provisions to total loans. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total assets. *FOREXG* is the growth of foreign exchange reserves. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. A constant is included but not reported. The model is estimated using the GMM method with cross-section and time fixed-effect corrections. The *t-statistic* values are reported in parentheses. (***) indicates significance at the 1% level, while (**) and (*) indicate significance at the 5% and 10% levels, respectively. Instrumental variables for *LERNER* consist of *ECOFREE* (economic freedom), *RLAW* (rule of law) and *STOCK* (the ratio of stock market capitalisation to GDP). *J-statistic* for over Hansen identification test is provided, its *p-value* is reported in parentheses. The models are valid if *J-statistics* do not reject H0.

Explanatory variables	SDROA		SDROE		ZROA		ZROE		EQTA		CAR	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
LERNER	-0.0011	-0.0078	0.0284*	-0.1714	-62.708**	-3.112	-459.7***	-328.6***	0.0173	0.212**	0.0741**	0.1313***
	(-0.1661)	(-0.7556)	(0.4515)	(-1.529)	(-2.419)	(-0.0259)	(-3.297)	(-3.916)	(0.3965)	(2.463)	(2.313)	(2.813)
LERNER_SQ		0.0165		0.4907		-145.78		-321.88		-0.2188**		0.0012
		(0.8424)		(2.395)		(-0.6776)		(-1.608)		(-1.966)		(0.0134)
DEPO	0.0044	0.0042	0.0113	0.0136	-10.132	-12.411	10.261	8.715	-0.0613	-0.049***	-0.177***	-0.146***
	(1.392)	(1.302)	(0.3428)	(0.3481)	(-0.5247)	(-0.2878)	(0.284)	(0.251)	(-1.557)	(-7.594)	(-16.938)	(-16.41)
LOAN	0.00201	0.00069	-0.0045	-0.0363	-56.117	-44.044	74.014	94.879	-0.0308	-0.029***	-0.1836***	-0.192***
	(0.4802)	(0.1553)	(-0.1229)	(-0.7914)	(-1.131)	(-0.8074)	(0.6774)	(0.7929)	(-0.6622)	(-2.945)	(-9.309)	(-7.302)
LLP	0.0551***	0.0592***	0.3962***	0.5752***	-194.17***	-248.77*	727.64	610.21	-0.116	-0.1401	-0.0431	-0.0193
	(3.47)	(3.531)	(2.855)	(3.173)	(-6.949)	(-1.791)	(1.177)	(1.036)	(-0.7944)	(-1.637)	(-0.3471)	(-0.1706)
OVERHEAD	0.1353***	0.152***	1.677***	2.361***	-516.52**	-719.64	-1289***	-1738***	1.211*	1.161**	0.7026	0.819*
	(3.074)	(3.122)	(4.542)	(4.504)	(-2.411)	(-1.637)	(-4.183)	(-7.893)	(1.831)	(2.397)	(1.605)	(1.785)
SIZE	0.0019*	0.002*	0.0191*	0.0272**	-8.86***	-11.87	1.338	-3.998	-0.0303	-0.0259*	-0.0458***	-0.038***
	(1.738)	(1.764)	(1.775)	(2.055)	(-3.075)	(-0.8265)	(0.1193)	(-0.1983)	(-1.505)	(-1.936)	(-6.22)	(-3.863)
FOREXG	0.001	0.001	-0.0041	0.0044	3.038	0.6745	4.578	-0.9613	-0.000431	-0.0091**	0.0134***	0.0018
	(0.9544)	(0.9662)	(-0.4959)	(0.4239)	(0.8995)	(0.0562)	(0.1302)	(-0.0243)	(-0.0712)	(-1.976)	(5.474)	(0.2432)
GDPG	-0.0127	-0.0161	-0.0529	0.2787	296.43**	201.94	-494.19*	-711.7***	0.2413***	-0.074	0.0882	-0.117
	(-0.7116)	(-0.8685)	(-0.3411)	(1.207)	(2.145)	(0.9529)	(-1.902)	(-2.649)	(2.716)	(-1.069)	(0.6166)	(-0.8959)
INF	-0.0062	-0.0062	-0.0321	-0.0179	106.232***	102.21***	77.729*	68.456*	0.0306	0.0254	0.0394	0.0277
	(-1.583)	(-1.567)	(-1.141)	(-0.5275)	(3.777)	(3.445)	(2.088)	(1.929)	(1.119)	(1.083)	(1.113)	(0.7067)
R-square	0.39	0.38	0.48	0.26	0.32	0.29	0.32	0.29	0.9	0.88	0.86	0.85
J-statistic	8.44 (1)	7.56 (1)	8.59 (1)	0.33 (1)	0.96 (1)	0.35 (1)	0.26 (1)	0.005 (1)	17.29 (1)	11.62 (1)	10.12 (1)	12.99 (1)
Number of Observation	941	941	929	926	930	930	929	929	964	964	814	814

Figure 1.1. The Percentage of LIBOR-OIS spread for the US market during 2001-2010. LIBOR is the *London Inter-Bank Offer Rates* representing the interbank rate, OIS is the *overnight indexed swap*, an interest rate considered less risky than the corresponding interbank rate. A higher spread between LIBOR and OIS is associated with a decrease in liquidity in the money market, depicting the banking crisis period..
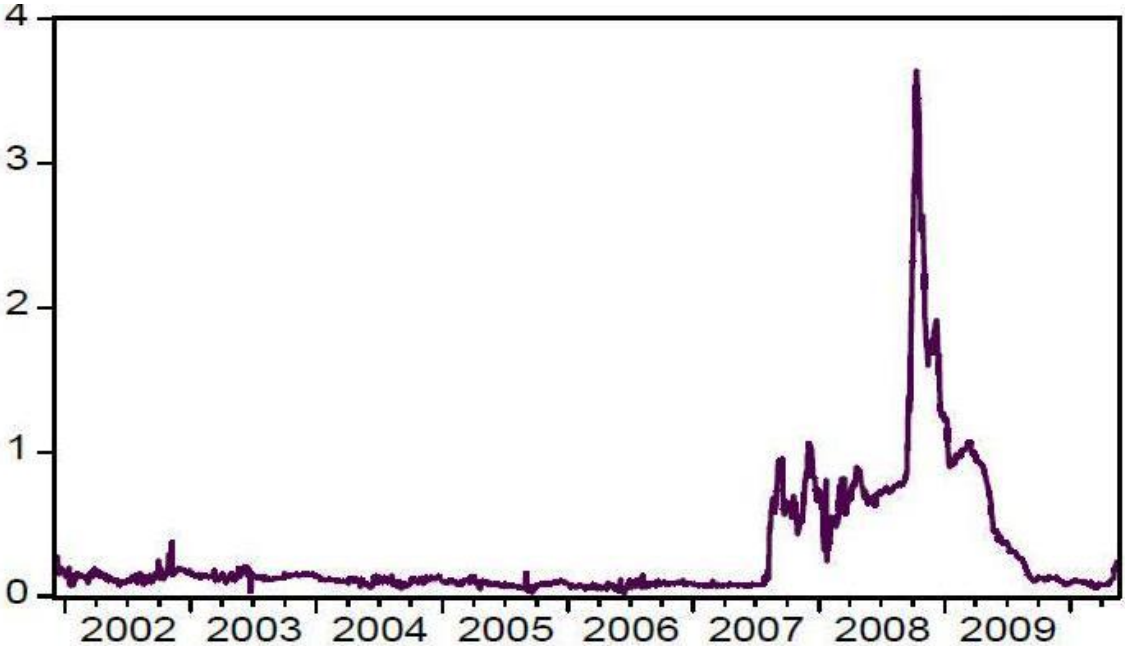
Source: Authors' calculation from Bloomberg

Chapter 2
Bank market power, economic growth and financial stability: Evidence from Asian banks[17]

Abstract

Following the 1997 Asian crisis, consolidations become one of the major financial reforms in Asian banking. This chapter examines the impact of bank consolidations on financial stability in order to highlight whether Asian banks are still prone to moral hazard in the aftermath of the 1997 Asian crisis. Using a sample of commercial banks from 12 Asian countries during the 2001-2007 period, our empirical findings highlight that higher market power in the banking market results in higher instability. Although banks are better capitalized in less competitive markets their default risk remains higher. A deeper investigation however shows that such a bank behaviour is dependent on the economic environment. Higher economic growth contributes to neutralize higher risk taking and higher instability in less competitive markets.

Keywords: Market Power, Financial Fragility, Economic Growth, Asian Banks

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[17] This chapter draws the contribution of [Soedarmono, W., Machrouh, F., Tarazi, A. 2011. Bank market power, economic growth and financial stability: Evidence from Asian banks. *Journal of Asian Economics* 22(6), 460-470]

1 Introduction

The 1997 Asian financial crisis has raised concerns regarding the stability of financial systems in Asian countries. Unlike the previous crises characterized by a failure of government macroeconomic policies, the 1997 crisis has cast doubts on the process of uncontrolled financial liberalization and its implications for the economy as a whole. In the Asian context, financial liberalization indeed resulted in unfettered bank competition on the credit market creating bubbles notably in real estate markets (Sachs and Woo, 2000).

Moreover, the 1997/1998 Asian crisis has also changed the structure of the banking industry and the nature of firms' corporate governance in Asia. In the banking industry, Asian countries have experienced the rapid growth of bank consolidations or mergers and acquisitions (M&As) that peaked to 25 percent per year as of 2003. Foreign Direct Investment (FDI), notably cross-border M&As involving banks in emerging countries, also showed an upward trend from US$ 2.5 billion during 1991-1995 to US$ 67.5 billion during 2001-2005 (Domanski, 2005; Moshirian, 2008). Asia therefore accounts for 36 percent of total bank M&As values, the second highest recipient of cross-border bank M&As after Latin America. Meanwhile, corporate governance reforms have also been implemented in the corporate sectors to eliminate incentives for imprudent strategies, including excessive short-term borrowing and speculative investments[18].

With regards to the implications of bank consolidations to recover distressed banks, Berger and Mester (2003) argue that market power gained by banks after consolidations increases banks' capacity to expand their activity into various products and across national borders. This process has lead to the emergence of large "too big to fail" banks and potentially to higher moral hazard incentives to exploit government bailout. In terms of corporate governance reforms in Asia, the corporate sectors also still face major challenges, such as poor accounting systems, non-transparent management, and weak protection for minority shareholders (Park, 2006). Because firms significantly depend on banks for their external funding (Adams, 2008), bank stability is a major concern for policy makers. Corporate sector vulnerability is indeed more likely to affect bank soundness through risk-shifting mechanisms (Stiglitz and Weiss, 1981) in bank-based financial systems.

In spite of the importance of such contemporary trends, few studies focus on the implications of bank consolidation on financial stability in the Asian context. Our chapter contributes to fulfil this gap using a sample of commercial banks from 12 Asian countries that

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[18] See Cook (2009) for deeper insights on the corporate governance reforms in various Asian countries.

have been affected by the 1997/1998 Asian crisis. These include China, Hong-Kong, India, Indonesia, Pakistan, Philippines, South Korea, Sri Lanka, Thailand, Taiwan, Thailand, and Vietnam. Specifically, we assess the link between market power in the banking industry and financial stability, as bank consolidations in the aftermath of the 1997/1998 Asian crisis can influence the degree of competition or market power in the banking industry. We work on a sample covering the 2001-2007 period and focus on the role of the economic environment. Specifically, we investigate the link between bank instability and market power using various risk measures and by taking economic growth into consideration.

The rest of this chapter is structured as follows. Section 2 provides a brief literature review on the nexus between bank market power and financial stability and discusses our research focus. Section 3 presents our data, variables and descriptive statistics. Section 4 highlights our econometric specification and methodology. Section 5 discusses our empirical findings, while Section 6 provides some sensitivity analyses. Section 7 concludes.

2. Bank market power and financial stability

Research on the link between bank competition and financial stability remains inconclusive. In the U.S. banking industry, Keeley (1990) is the first to document that greater bank competition after financial deregulation in the late eighties has encouraged banks to take on more risk, as bank charter value declined. Demsetz et al. (1996) support such findings in the U.S banking industry, where banks with higher market power exhibit higher solvency ratios and lower asset risk. Bofondi and Ghobi (2004) examine such a relationship for Italian banks and find that the loan default rate is positively associated to the number of banks operating in the industry. Jimenez et al. (2008) also find a negative impact of the Lerner index on risk-taking in Spanish banks. In a cross-country setting, Levy-Yeyati and Micco (2007) document that competition in banking erodes bank stability in Latin America. Yet, Beck et al. (2006) examine the effect of bank concentration on the probability of banking crises instead of considering bank risk taking issues. Working on 69 countries during 1980-1997, their empirical results highlight that countries with less competitive banking systems are less prone to banking crisis than the ones with greater bank competition. To sum up, the positive link between bank market power and financial stability is known as the "charter value" hypothesis in the literature.

Conversely, Boyd and De Nicolo (2005) develop an alternative view on the link between bank market power and financial stability, which is often referred to as the "competition-stability" hypothesis. By considering competition in both deposit and loan

markets, higher market power in the deposit market will drive banks to increase their loan interest rate. Such a bank behaviour raises entrepreneurial moral hazard which in turn increases banks' default risk through risk-shifting mechanisms following Stiglitz and Weiss (1981). Boyd et al. (2006) further provide empirical evidence for the "competition-stability hypothesis" based on US data. Uhde and Heimeshoff (2009) also support the competition-stability hypothesis using European data. Moreover, they also show that the concentration-fragility nexus is more likely to occur in the less developed countries of Eastern Europe.

In the meantime, few studies also consider bank capital ratios in the relationship between bank competition and financial stability. Schaeck and Cihák (2007) document that a competitive banking market drives banks to hold higher capital ratios to preserve their competitive advantages on their peers. On the contrary, Berger et al. (2009) show that higher bank market power enhances bank capitalization. Furthermore, their empirical results suggest that although higher bank market power increases non-performing loans, such trends are associated with a decrease in bank default risk. This is because the levels of capitalization in banks with higher market power are sufficient to cover an increase in bank non-performing loans and hence, bank stability is not affected.

Our study builds on the work of Berger et al. (2009), Udhe and Heimeshoff (2009), Schaeck and Cihák (2007), and Soedarmono et al. (2011), and extends it in other directions. First, Berger et al. (2009) estimate the degree of bank-level market power, while our study estimates the degree of market power for the whole banking system in order to account for bank consolidation trends that may change the degree of competition in the banking market. In this aspect, our conception on bank consolidation is close to Udhe and Heimeshoff (2009). However, we do not consider the implication of bank consolidations through the bank concentration channel as in Udhe and Heimeshoff (2009), but through the degree of market power in the banking market[19]. Second, we focus on the impact of bank competition on bank capitalization, insolvency risk and risk taking rather than non-performing loans. The notion of risk taking is an *ex-ante* action, while that of non-performing loans is an *ex-post* condition. To prevent excessive non-performing loans that may contribute to the occurrence of a financial crisis, raising concerns on bank moral hazard that leads to excessive risk taking is an important dimension. Third, we also consider the influence of macroeconomic performance on the nexus between bank competition and financial stability following Schaeck and Cihák (2007).

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[19] DeYoung et al (2009) provide a comprehensive discussion on the link between consolidation and market power in banking.

Schaeck and Cihák (2007) analyze the impact of country-level per capita income on the link between bank competition and the capital ratio, while we focus on the role of economic growth in the competition-stability nexus in banking. In this sense our work is also related to the literature on the procyclicality of bank capital buffer, showing that banks hold lower capital as economic growth increases (Ayuso et al, 2004; Jokipii and Milne, 2008). Hence, higher economic expansion could therefore affect the impact of bank competition on capital ratios that in turn could influence bank income volatility and insolvency risk[20]. Our chapter is close to Soedarmono et al. (2011) who investigate the competition-stability nexus for Asian banks showing that higher market power is associated with higher instability except during the 1997 financial crisis period. However, in their setting they do not take account for the role played by economic growth in the risk taking implications of bank competition.

3. Data sources, variables and descriptive statistics

3.1 Data sources

Our data come from several sources and consist of bank-specific and country-specific data. For bank-specific data, we start by taking from BankScope Fitch-IBCA, a set of annual series for the 1999-2007 period. We consider commercial banks in 12 Asian countries. These include China (137), Hong Kong (53), India (74), Indonesia (80), Malaysia (51), Pakistan (30), Philippines (41), South Korea (21), Sri Lanka (14), Taiwan (49), Thailand (23), and Vietnam (34)[21]. Our bank sample consists of 607 commercial banks. For country-specific data, we use several datasets such as the International Financial Statistics from the International Monetary Fund, the Financial Structure database from Beck and Demirgüç-Kunt (2009), the Governance Indicator index from Kaufmann et al (2008), and the Economic Freedom index from Heritage Foundation.

3.2 Bank Market Power

Claessens and Laeven (2004) argue that bank performance measures do not appropriately indicate the degree of bank market power, because such measures can be affected by various bank-level and country-level characteristics. Therefore, the degree of bank competition should be determined endogenously. In a similar vein, Beck (2008) highlights

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[20] The issue of procyclicality of bank capital is beyond the scope of this chapter but taking into account the role of economic growth on the link between market power and bank stability is an important dimension. As higher economic growth facilitates private sectors to grow, it may also help banks to increase their profitability without undertaking on excessive risk.

[21] The values in parentheses represent the number of banks obtained.

that using measures of bank market structure and concentration ratios to assess the degree of bank market power is inappropriate, since such measures do not account for differences in bank strategies. Consequently, such indicators only represent the actual market share, but do not necessarily reflect bank competition captured by the degree of bank market power.

Meanwhile, the use of the H-statistic developed by Panzar and Rosse (1987) can be an alternative method to infer the degree of market power in the banking industry (Claessens and Laeven, 2004; Molyneux and Nguyen-Linh, 2008). Nevertheless, a critical feature of the H statistic is that the Panzar-Rosse approach must be applied on the basis of observations that are in long-run equilibrium (Bikker and Bos, 2008). An equilibrium test needs to be conducted by equalizing adjusted rates of return across banks. At equilibrium, the rates of return will not be correlated with input prices. When the equilibrium test is rejected, then the *H* estimates should be interpreted with great caution, as they may be based on observation from a disequilibrium situation.

For such reasons, we use the new industrial organisation approach following Uchida and Tsutsui (2005), Brissimis et al (2008), and Soedarmono et al. (2011) to quantify the degree of market power in Asian banking. We thereby obtain a more tractable measure of bank competition. The merit of this non-structural measure of bank competition is to provide the estimates of the degree of banking industry market power in each period. Furthermore, this measure does not require any information on the market structure of each bank. Eventually, this method allows us to endogeneously determine the degree of market power in the banking industry.

More specifically, we estimate a system of three equations that correspond to a translog cost function, to a revenue function obtained from bank profit maximization, and to an inverse loan demand function. This system is shown in (1). In defining revenue, we follow Brissimis et al (2008) using total revenue from both interest and non-interest revenue. This construction allows us to implicitly capture the different strategy of banks in shifting their activities into non-interest income activities, as earnings can come from assets other than loans[22].

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[22] Uchida and Tsutsui (2005) only consider revenue generated by bank loans.

$$\ln C_{it} = b_0 + b_1 \overline{\ln q_{it}} + \frac{1}{2}b_2\left(\overline{\ln q_{it}}\right)^2 + b_3 \overline{\ln d_{it}} + \frac{1}{2}b_4\left(\overline{\ln d_{it}}\right)^2 + b_5\overline{\ln w_{it}} + \frac{1}{2}b_6\left(\overline{\ln w_{it}}\right)^2$$
$$+ b_7\left(\overline{\ln q_{it}}\right)\left(\overline{\ln w_{it}}\right) + b_8\left(\overline{\ln q_{it}}\right)\left(\overline{\ln d_{it}}\right) + b_9\left(\overline{\ln d_{it}}\right)\left(\overline{\ln w_{it}}\right) + e_{it}^C$$

$$R_{it} = \frac{\theta_t}{\eta_t}R_{it} + r_{it}q_{it} + c_{it}\left(b_1 + b_2\left(\overline{\ln q_{it}}\right) + b_7\left(\overline{\ln w_{it}}\right) + b_8\left(\overline{\ln d_{it}}\right)\right) \tag{1}$$

$$+ C_{it}\frac{q_{it}}{d_{it}}\left(b_3 + b_4\left(\overline{\ln d_{it}}\right) + b_8\left(\overline{\ln q_{it}}\right) + b_9\left(\overline{\ln w_{it}}\right)\right) + e_{it}^S$$

$$\ln p_{it} = g_0 - (1/\eta)\ln q_{it} + g_1\ln GDPG_t + g_2\ln OPL_{it} + e_{it}^D$$

Variables with bars represent deviations from their cross-sectional means in each time period, where this procedure is to cope with multicollinearity. The degree of market power in the banking industry in each year is given by $\theta_t \in [0,1]$ representing the well-known conjectural variations elasticity of total industry outputs with respect to the output of i-*th* bank. In the case of perfect competition, $\theta_t = 0$; under pure monopoly, $\theta_t = 1$; and finally, $\theta_t < 0$ implies pricing below marginal cost and could result, for example from a non-optimizing behavior of banks. In the special case of Cournot competition, θ_{it} is simply referred to as the market share of the i-*th* bank.

Moreover, C_{it} is defined as total expenses from both interest and non-interest income activities, q_{it} as total earning assets, d_{it} as total deposits and short-term funding, w_{it} as the ratio of operating expenses to total assets, R_{it} as total revenue, r_{it} as the ratio of interest expenses to total deposits, and p_{it} as the ratio of total revenue to total earning assets. Meanwhile, $GDPG_t$ and OPL_{it} are factors that affect demand, defined as the real gross domestic product (GDP) growth, and the ratio of operating expenses to total loans, respectively.

Following Brissimis et al (2008) and Soedarmono et al. (2011), System (1) is carried out country by country. To estimate θ_t we use dummy variables for each year, while to estimate η we use time dummy variables every two years due to the fact that η values are linearly dependent on the time-specific control variable (*GDPG*).

3.3. Financial stability

In this chapter, financial stability is captured by bank income volatility, insolvency risk and capitalization. In order to measure bank income volatility that reflects bank risk

taking strategies, we use the standard deviation of banks' return on average assets (*SDROA*) and that of banks' return on average equity (*SDROE*). *SDROA* is calculated from the return on average assets (*ROAA*) value from period t to $t - 2$ (a three-period rolling window). Analogically, *SDORE* is calculated from the return on average equity (*ROAE*) using a three-period rolling window. This approach is consistent with Agoraki et al. (2009)[23].

To account for bank insolvency risk, we use the Z-score method based on *ROAA*. The Z-score (*ZROA*) indicates the number of standard deviations that the bank's *ROAA* has to drop below its expected value before equity is depleted. Thus, higher Z-score is interpreted as a decrease in bank insolvency risk. *ZROA* is formulated as follows.

$$ZROA_{i,t} = \frac{ROAA_{i,t} + EQTA_{i,t}}{SDROA_{i,t}} \tag{2}$$

EQTA is the ratio of total equity to total assets. For robustness, we also consider the Z-score measure based on *ROAE* (*ZROE*) which is formulated as follows.

$$ZROE_{i,t} = \frac{ROAE_{i,t} + 1}{SDROE_{i,t}} \tag{3}$$

In order to capture the levels of bank capitalization, we use the total risk-based capital ratio (*CAR*) and the equity to total assets ratio (*EQTA*). *EQTA* is essentially a measure of leverage. The use of such a variable is consistent with Blum (2008) who highlights that the leverage ratio can be a tool to discipline bank moral hazard. Meanwhile, *CAR* is the sum of equity capital and other hybrid capital divided by risk-weighted assets. Repullo (2004) argues that risk-based capital requirements can overcome bank moral hazard in a competitive market.

3.4. Control variables

First, we incorporate country-specific control variables. We follow Schaeck and Cihák (2007) by considering the inflation rate (*INF*) and the real gross domestic product growth (*GDPG*), since macroeconomic developments are likely to affect the quality of banks' assets, as well as the level of bank capitalization.

Second, we also control for bank-specific characteristics. We consider the loan-to-deposit ratio (*LDR*) to capture bank liquidity that may affect bank default probability. We further incorporate the ratio of loan loss reserves to total loans (*LLR*) to account for credit risk, since credit risk is the major determinant of bank risk and capitalization. In the

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[23] It is worth noting that our study will only cover the 2001-2007 period, although our initial sample covers the 1999-2007 period. This is because our risk indicators are calculated based on a three-year rolling window started from 2001.

meantime, Foos et al. (2010) also document that excessive loan growth can result in higher bank riskiness and lower capital ratios. We thus include the loan growth rate as a control variable. We also control for the differences in technical efficiency following Agoraki et al. (2009) and Boyd et al. (2006). Technical efficiency is captured by the ratio of operating expenses to total assets (*OVERHEAD*). Bank size can also be a major factor of higher risk taking due to "too big to fail" effects in larger banks (Kane, 2000; Mishkin, 2006). To take into account size effects, we incorporate the logarithm of banks' total average assets (*SIZE*) in our estimations.

3.5. Descriptive statistics and the market power index

Table 1 and Table 2 respectively present the "clean" descriptive statistics of our data and on the Lerner index after imposing several restrictions on our dataset to exclude outliers that may affect our empirical results. Our restrictions are as follows. We exclude the 2.5% highest value of *LDR*, *OPL*, *OVERHEAD*, *ZROA* and *ZROE* because these variables have a right-skewed distribution. For *OVERHEAD*, we exclude all values that are less than 0. To this end, Table 2 shows the values taken by the Lerner index for each country every year.

4. Econometric model and estimation methodology

To assess the effect of bank competition on financial stability, we construct the following equation that is consistent with the previous literature (Boyd et al, 2006; Brissimis et al, 2008; Agoraki et al, 2009; Soedarmono et al, 2011).

$$STABILITY_{i,j,t} = \alpha_1 LERNER_{j,t} + \alpha_2 GDPG_{j,t} + \alpha_3 INF_{j,t} + \alpha_4 LDR_{i,j,t} + \alpha_5 LLR_{i,j,t}$$
$$+ \alpha_6 LOANG_{i,j,t} + \alpha_7 OVERHEAD_{i,j,t} + \alpha_7 SIZE_{i,j,t} + \varepsilon_{i,t}$$
(4)

where *i*, *j*, *t* indicates bank, country, and time index, respectively. Meanwhile, $STABILITY_{i,j,t}$ represents dependent variables consisting of *SDROA*, *SDROE*, *ZROA*, *ZROE*, *EQTA*, and *CAR*. Moreover, our chapter also examines whether the macroeconomic environment influences the nexus between bank competition and financial stability. For this purpose, we specify the following equation.

$$STABILITY_{i,j,t} = \alpha_1 LERNER_{j,t} + \alpha_2 GDPG_{j,t} + \alpha_3 LERNER * GDPG_{j,t}$$
$$+ \alpha_4 INF_{j,t} + \alpha_5 LDR_{i,j,t} + \alpha_6 LLR_{i,j,t} + \alpha_7 LOANG_{i,j,t} + \alpha_8 OVERHEAD_{i,j,t}$$
$$+ \alpha_9 SIZE_{i,j,t} + \varepsilon_{i,t}$$
(5)

To estimate (4), we run Fixed Effect (FE) regressions to correct unobservable bank-specific and time-specific characteristics. We also correct all possible residual

heteroskedasticity and autocorrelation problems using the appropriate White coefficient covariance method.

Recent empirical literature further sheds light on endogeneity problems in the nexus between bank competition and financial stability (Berger et al, 2009; Uhde and Hemishoff, 2009; Gonzales, 2005; Schaeck and Cihák, 2007). In order to take this issue into account, we further endogenize the measure of bank competition by specifying instrumental variables. For this purpose, we estimate (4) using the Generalized Method of Moments (GMM) with fixed-effect corrections instead of using the Two-Stages Least Squares (2SLS) method as in Udhe and Heimeshoff (2009) and Schaeck and Cihák (2007). In this regard, Hall (2005) shows that the GMM estimation is robust to the distribution of errors. The GMM estimation further accounts for heteroskedasticity and hence, the GMM estimation is more efficient than the 2SLS estimation.

With regards to instrumental variables for *LERNER*, we consider three macroeconomic variables. These include the ratio of stock market capitalization to *GDP* (*STOCK*), the rule of law index (*RLAW*), and the economic freedom index (*ECOFREE*). *STOCK* is retrieved from Beck and Demirgüç-Kunt (2009), while *RLAW* and *ECOFREE* are taken from Kaufmann et al (2008) and Heritage foundation, respectively.

STOCK is expected to influence *LERNER* because higher stock market development can affect the demand for banking services (Schaeck and Cihák, 2007). As the stock market develops, banks will compete with capital markets to preserve bargaining power in the market[24]. Moshirian (2009) also points out that greater minority shareholders' protection helps boosting financial globalization that in turn, affects the degree of competition in the banking market. In order to account for the quality of law enforcement that protect minority shareholders' rights, we thus consider the rule of law index (*RLAW*) as one of the instrumental variables for *LERNER*. Finally, we consider the degree of economic freedom (*ECOFREE*) as an instrumental variable for *LERNER*, as greater economic freedom can lead to new investment opportunities. Higher economic freedom is also associated with less bank activity restrictions, leading to greater banking product development that may in turn affect the degree of bank competition in the market.

Table 3 shows that such instrumental variables affect significantly the degree of market power in the banking market (*LERNER*). In the Asian context, greater bank competition is mainly due to stronger protections for minority shareholders represented by the

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[24] See Boot and Thakor (2000) for further discussions on the bank-capital market competition and the inter-bank competition.

rule of law index (*RLAW*), while with higher economic freedom and stock market development, banking markets are less competitive.

5. Empirical findings

In order to analyze the impact of market power in the banking market on bank risk taking, insolvency risk and capitalization, we proceed in two steps. First, we investigate the link in a general framework. Second, we consider how economic growth influences the link between market power in banking and financial stability, where financial stability refers to as bank risk taking, insolvency risk and capital ratios.

Table 4 shows our estimation results from the FE and the GMM regressions. Our results highlight that the degree of market power in the banking market (*LERNER*) is positively related to bank income volatility as measured by either *SDROA* or *SDROE*. Higher *LERNER* further exacerbates bank insolvency risk (*ZROA* or *ZROE*). However, higher *LERNER* is also associated with an increase in capital ratios (*EQTA* or *CAR*).

These findings indicate that although banks in less competitive markets are able to hold higher capital ratios, these levels are not sufficient to cover an increase in bank risk taking that in turn exacerbates bank insolvency risk. More precisely, Equation (2) can provide a straightforward intuition on such empirical findings, where the levels of capitalization are insufficient to cover banks' risk-taking. Since we observe that banks in less competitive markets are able to increase their equity to total assets ratio (*EQTA*), then according to Equation (2), the impact of market power (*LERNER*) on bank solvency ratio (*ZROA*) remains negative as long as *LERNER* is positively related to bank income volatiltiy (*SDROA*) and at the same time, a higher value of *LERNER* increases *SDROA* more strongly than *EQTA*. In other words, bank moral hazard in less competitive market is likely to exist.

Our findings are consistent with Molyneaux and Nguyen-Linh (2008), Agusman et al. (2006), and Soedarmono et al. (2011). Molyneaux and Nguyen-Linh (2008) document that higher bank competition reduces risk taking in Southeast Asian banks, while Agusman et al (2006) point out that higher charter value in publicly-traded banks in Asia fails to alleviate banks' asset risk. Our findings are also consistent with Soedarmono et al (2011), even tough they includes the financial crises period in their study.

On the contrary, our findings do not support the "charter value" hypothesis. More specifically, our findings differ from Ariss (2010) who finds that bank-level market power enhances the stability of banks in developing countries including some countries in Asia. Such different findings can be due to different econometric specifications. Ariss (2010)

considers a cross-section analysis, while our study employs panel data methodology that takes into account both time-specific and bank-specific characteristics. The composition of countries used in the study may also explain such differences, since macroeconomic and regulatory environements can influence the link between bank competition and financial stability.

However, previous studies do not take into account the influence of macroeconomic environments on the nexus between bank competition and financial stability. An exception is Schaeck and Cihák (2007) who consider the influence of country-level economic development on the link between bank competition and capital ratios. Their results indicate that higher bank competition as captured by the Panzar-Roose H-statistics tends to alleviate bank capital ratios in countries with greater *GDP* per capita.

Following Schack and Cihák (2007), we further investigate whether the macroeconomic environment affects the impact of bank competition on bank risk taking, insolvency risk and capital ratios. However, in this study we consider the influence of economic growth instead of country-level economic development used by Schaeck and Cihák (2007), since our sample consists of developing countries with presumably relatively more homogeneous economic development levels. More specifically, we follow the steps of Soedarmono et al. (2011) who consider the same sample of countries to investigate the impact of financial crises on the link between bank competition and risk. In the present study, we focus on the period after the 1997/1998 Asian crisis and extend their approach by introducing the effect of economic growth on the competition-stability nexus.

Table 5 shows our estimation results when we augment our model by introducing the interaction term between *LERNER* and *GDPG* as an explanatory variable. Following Schaeck and Cihák (2007) as well, *LERNER*GDPG* is treated as an endogenous variable. Our empirical results show that higher economic growth brings banks in less competitive markets to reduce bank risk taking (*SDROA* and *SDROE*), overcome insolvency risk (*ZROA* and *ZROE*) and increase the equity to total asset ratio (*EQTA*)[25].

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[25] Although *LERNER*GDPG* is negatively related to the total risk-based capital ratio (*CAR*), this result does not change the overall intuition with regard to the impact of economic growth on the link between bank competition and financial stability. As higher economic growth drives banks in less competitive market to reduce bank total risk-based capital ratio, such banks obviously tend to exhibit higher insolvency risks.

6. Sensitivity analyses

To check for robustness, we perform several sensitivity analyses. First, we modify the inverse loan demand function (the third equation) as shown in System (1) by including the logarithm of total assets (*SIZE*) as a control variable that influences the pricing of banking products. Using this different specification, the empirical findings discussed in Section 5 are not altered. Second, we also control for bank income diversification, since non-interest income can affect bank stability (Lepetit et al, 2008). Considering the ratio of non-interest income to total gross revenue (*NNI*) as a control variable does not change our main findings. Third, we further control for the macroeconomic environment by incorporating the ratio of the five largest banks' total assets to the banking system's total assets (*CFIVE*) following Schaeck and Cihák (2007). Our main findings remain the same. Fourth, we exclude the year 2007 from our sample to isolate the impact of the 2007 financial crisis. The link between bank competition and financial stability is not altered.

7. Conclusion

The process of bank consolidation is one of the major trends in Asian banking systems in the aftermath of the 1997/1998 financial crisis. As bank consolidations tend to affect the degree of bank competition (Jeon et al, 2011), this study examines the link between bank competition and financial stability in the Asian context, particularly in the post-1997/1998 crisis period.

Using a sample of commercial banks in 12 Asian countries over the 2001-2007 period, our empirical findings indicate that higher market power in the banking industry is associated with higher capital adequacy, but the level of capitalization is not sufficient to cope with bank moral hazard that induces excessive risk taking and exacerbates insolvency risk. However, stronger economic growth mitigates higher risk taking and higher instability in less competitive markets.

On the whole, in the aftermath of the 1997 Asian crisis, Asian banks in general still seem to suffer from moral hazard. Higher market power in banking that is expected to enhance banks' self-discipline still fails to moderate high risk taking. Nevertheless, such problems are less likely to occur in expansionary economic environments.

Appendix.

Table 1. Descriptive statistics

Variables	Definition	Mean	Median	Max	Min	Std. Dev.
Q	Total earning assets (million USD)	10580572	717091.5	8.63E+08	40.874	44235815
C	Total expenses (million USD)	562126.1	56354	43603212	0.81	2070488
D	Total deposit and short term funding (million USD)	9576041	682700	8.04E+08	7	39528240
R	Total revenue (million USD)	591999.3	63987.5	39037317	1.191	2102181
W	Total operating expenses to total assets	0.570559	0.02106	24.7477	1.54^{E}-08	2.334638
R	Ratio of interest expenses to total deposits	0.052744	0.029492	9.390108	8.27^{E}-05	0.321224
P	Ratio of total revenue to total earning assets	0.085879	0.059908	26.5119	0.000053	0.46607
OPL	Ratio of operating expenses to total loans	0.052548	0.036881	0.326245	0.011159	0.04426
ROAA	Return on average assets	0.00806	0.00865	0.71324	-0.59220	0.03779
EQTA	Ratio of equity to total asset	0.08316	0.05479	0.99877	0	0.10735
SDROA	Standard deviation of *ROA* from three-year rolling window	0.01530	0.00490	0.73111	0.00003	0.04668
ZROA	Z-score based on *ROA*	41.783	23.462	341.585	-5.809	54.937
ROAE	Return on average equity	0.08310	0.11021	9.67123	-7.24524	0.44664
SDROE	Standard deviation of *ROE* from three-year rolling window	0.05587	0.03537	0.69499	0.00000	0.06898
ZROE	Z-score based on *ROE*	49.489	30.939	387.056	-6.516	58.783
CAR	Ratio of total capital to risk-weighted assets	0.1756	0.125	0.9929	0.0008	0.1569
EQTA	Ratio of total equity to total assets	0.0746	0.0487	0.9987	-0.6321	0.1041
LDR	Ratio of total loans to total deposits	0.6587	0.6771	1.3803	0.000091	0.2103
LLR	Ratio of loan loss reserves to total loans	0.0598	0.0344	1	0.001	0.0094
LOANG	Annual loan growth	0.27035	0.11563	6.97646	-0.9650	0.8969
OVERHEAD	Ratio of operating expenses to total revenue	0.46555	0.3531	45.75	0.00029	1.2268
SIZE	Logarithm of total average asset	13.169	13.609	20.661	3.864	3.169
INF	Annual inflation rate	0.0358	0.0305	0.2075	-0.0395	0.0414
GDPG	Annual real gross domestic product growth	0.0064	0.0063	0.1140	-0.0022	0.0027
RLAW	Rule of law index from Kaufman et al (2008)	0.038706	0.027478	0.157711	0	0.03549
ECOFREE	Economic Freedom index from Heritage Foundation	60.1197	55.20	90	42	11.448
STOCK	Ratio of stock market capitalisation to GDP	0.8313	0.4047	5.005	0.0045	0.9903

Table 2. The Lerner index in the Asian banking industry. The Lerner index is calculated from the new industrial organisation approach following Uhida and Tsutsui (2005). A higher (lower) Lerner index is associated with an increase (decrease) in market power. Moreover, higher market power in the banking industry is associated with less bank competition.

	Lerner Index					
	China	Hong Kong	Indonesia	India	South Korea	Sri Lanka
2001	0.570440	0.428638	0.504237	-0.143449	0.395923	0.599729
2002	-1.560907	0.900392	0.489753	-0.118262	0.273264	0.741071
2003	-0.999889	0.935591	0.60836	-0.02357	0.410607	0.874385
2004	0.869676	0.70721	0.76211	0.000143	0.48544	0.915859
2005	0.822145	0.43478	0.730938	-0.026172	0.492796	0.859094
2006	0.797429	0.285657	0.688297	-0.075694	0.475937	0.813794
2007	0.790910	0.366164	0.75164	-0.100164	0.357278	0.704037
	Lerner Index					
	Malaysia	Philippines	Pakistan	Thailand	Taiwan	Vietnam
2001	0.712439	0.513135	0.571413	0.523875	0.155124	0.152861
2002	0.742263	0.635231	0.534409	0.498261	0.222008	0.018305
2003	0.75319	0.732586	0.641901	0.566692	0.271306	-0.192593
2004	0.766969	0.545519	0.709296	0.721333	0.359072	-0.051874
2005	0.775379	0.619123	0.666741	0.807386	0.318770	0.135218
2006	0.738516	0.638452	0.604942	0.761431	0.350857	0.137389
2007	0.716482	0.669991	0.600564	0.724995	0.334961	0.141521

Table 3. The first-stage regression between instrumental variables and market power in the banking industry. The dependent variable is the Lerner index (*LERNER*). Instruments consist of *ECOFREE*, *RLAW*, and *STOCK*. *ECOFREE* is the Economic Freedom index obtained from Heritage Foundation. *RLAW* is the Rule of Law index obtained from Kaufmann et al (2008). *STOCK* is the ratio of stock market capitalization to GDP obtained from Beck and Demirgüç-Kunt (2009). *LERNER* is the market power index calculated from the new industrial organization approach following Uchida and Tsutsui (2005). *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. *LDR* is the ratio of total loans to total deposits. *LLR* is the ratio of loan loss reserves to total loans. *LOANG* is the annual loan growth rate. *SIZE* is the logarithm of total average assets. *OVERHEAD* is the ratio of operating expenses to total revenue. A constant is included but not reported. The model is estimated using the Ordinary Least Squares method. The *t-statistic* values are reported in parentheses. (***) indicates significance at the 1% level, while (**) and (*) indicate significance at the 5% and 10% levels, respectively.

Explanatory variables	LERNER
ECOFREE	0.0196***
	(13.39)
RLAW	-0.346***
	(-15.53)
STOCK	0.0503***
	(3.459)
INF	1.433***
	(5.402)
GDPG	0.0041
	(1.202)
LDR	0.1314***
	(3.699)
LLR	0.0387
	(0.3564)
LOANG	0.0886***
	(5.622)
OVERHEAD	0.1947***
	(5.35)
SIZE	0.0022
	(0.6967)
R-square	0.22
Number of Observation	2302

Table 4. The nexus between market power in banking and financial stability. *SDROA* (*SDROE*) is the standard deviation of return on average assets (return on average equity) calculated from a three-period rolling window. *ZROA* (*ZROE*) is the Z-score index based on return on average assets (return on average equity). *LERNER* is the Lerner index capturing the degree of bank competition. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. *LDR* is the ratio of total loans to total deposits. *LLR* is the ratio of loan loss reserves to total loans. *LOANG* is the annual loan growth rate. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total average assets. Estimations are carried out using the Panel Least Squares with individual and time fixed-effects (FE), as well as using the Generalized Method of Moment (GMM) with individual and time fixed-effects. For those using the GMM, *LERNER* is instrumented with the Economic Freedom index (*ECOFREE*), the Rule of Law index (*RLAW*) and the ratio of stock market capitalization to GDP (*STOCK*). Hausman test for random effects is provided, as well as *J-statistic* for over identification condition. The *t-statistics* values are in parentheses. A constant is included but not reported.

Explanatory variables	SDROA		SDROE		ZROA		ZROE		EQTA		CAR	
	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
LERNER	0.00095**	0.0022	0.0268***	0.031*	-8.624*	-147.1***	-14.766**	-203.8***	0.0075**	-0.0428	0.0043	0.1466**
	(2.0002)	(0.5925)	(3.139)	(0.4759)	(-1.944)	(-3.317)	(-2.886)	(-4.135)	(2.311)	(-1.473)	(0.6626)	(2.309)
GDPG	0.00913	0.0906***	1.961***	1.965***	-129.21	-360.3**	-251.09**	-565.3***	0.107	0.0234	-0.1141	0.1576
	(1.319)	(6.725)	(9.775)	(8.019)	(-1.189)	(-2.271)	(-2.025)	(-3.41)	(1.333)	(0.2253)	(-0.8105)	(0.8569)
INF	0.0091	0.0093	0.0888	0.2238*	-4.601	-17.016	4.385	-14.357	0.054	0.0469	0.0479	0.0519
	(1.319)	(1.334)	(0.4956)	(1.761)	(-0.0722)	(-0.2062)	(0.0602)	(-0.1345)	(1.157)	(0.9679)	(0.5683)	(0.4477)
LDR	-0.005***	-0.005***	-0.150***	-0.141***	22.88**	3.169	36.238***	7.501	0.0859***	0.0786***	-0.033**	-0.0195
	(-3.766)	(-3.339)	(-6.866)	(-5.689)	(1.981)	(0.1955)	(2.717)	(0.3671)	(10.051)	(5.17)	(-2.022)	(-0.6507)
LLR	0.0082**	0.0071*	-0.1011	-0.1568**	-91.85***	20.987	-33.41	114.57**	-0.255***	-0.2128**	0.1746***	0.0687
	(2.551)	(1.596)	(-0.5759)	(-2.019)	(-3.258)	(0.4103)	(-1.038)	(2.247)	(-12.247)	(-2.157)	(3.182)	(0.6428)
LOANG	-0.000182	-0.00035	0.0019	-0.000392	-6.813**	11.229	-1.822	21.818**	-0.014***	-0.0071	-0.036***	-0.047***
	(-0.5533)	(-0.5913)	(0.3951)	(-0.0378)	(-2.276)	(1.623)	(-0.533)	(2.438)	(-6.116)	(-1.414)	(-8.218)	(-3.494)
OVERHEAD	0.0073***	0.0073***	0.0857***	0.1162***	-32.85***	-31.07***	-28.42***	-26.548**	-0.0011	8.33E-05	-0.038***	-0.039***
	(7.374)	(7.301)	(2.087)	(6.187)	(-3.648)	(-2.661)	(-2.779)	(-2.188)	(-0.1714)	(0.0097)	(-3.249)	(-2.906)
SIZE	-0.0008***	-0.001***	-0.019***	-0.018***	1.5901	10.965***	6.082***	18.547***	-0.0014	0.002	-0.00025	-0.0104*
	(-4.414)	(-2.809)	(-12.122)	(-3.355)	(1.013)	(3.042)	(3.402)	(4.395)	(-1.227)	(0.703)	(-0.089)	(-1.658)
R-square	0.5	0.5	0.45	0.47	0.32	0.15	0.24	0.1	0.79	0.76	0.79	0.71
Hausman Test	46.121***	NA	61.699***	NA	35.071***	NA	39.231***	NA	404.52***	NA	203.42***	NA
J-statistics	NA	33.37	NA	44.31	NA	5.3	NA	6.11	NA	2.62	NA	0.69
Number of Observation	1946	1946	1913	1935	1935	1935	1937	1937	1992	1992	1584	1584

Table 5. The influence of economic growth on the nexus between market power in banking and financial stability. *SDROA* (*SDROE*) is the standard deviation of return on average assets (return on average equity) calculated from a three-period rolling window. *ZROA* (*ZROE*) is the Z-score index based on return on average assets (return on average equity). *LERNER* is the Lerner index capturing the degree of bank competition. *GDPG* is the real gross domestic product growth rate. *INF* is the inflation rate. *LDR* is the ratio of total loans to total deposits. *LLR* is the ratio of loan loss reserves to total loans. *LOANG* is the annual loan growth rate. *OVERHEAD* is the ratio of operating expenses to total assets. *SIZE* is the logarithm of total average assets. Estimations are carried out using the Panel Least Squares with individual and time fixed-effects (FE), as well as using the Generalized Method of Moment (GMM) with individual and time fixed-effects. For those using the GMM, *LERNER* is instrumented with the Economic Freedom index (*ECOFREE*), the Rule of Law index (*RLAW*) and the ratio of stock market capitalization to GDP (*STOCK*). Hausman test for random effects is provided, as well as *J-statistic* for over identification condition. The *t-statistics* values are in parentheses. A constant is included but not reported.

Explanatory variables	SDROA		SDROE		ZROA		ZROE		EQTA		CAR	
	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
LERNER	0.0184***	0.0514	0.2762***	1.435**	-52.67***	-400.5***	-51.574**	-510.6***	-0.0366**	-0.1072	0.0737***	0.2203**
	(4.175)	(1.496)	(4.078)	(2.421)	(-2.612)	(-3.753)	(-2.396)	(-4.491)	(-2.459)	(-1.348)	(2.72)	(2.249)
*LERNER*GDPG*	-0.002***	-0.0101*	-0.024***	-0.2059**	4.445**	43.777**	3.72*	53.302***	0.0044***	0.011	-0.007***	-0.015
	(-3.939)	(-1.956)	(-3.629)	(-2.439)	(2.239)	(2.557)	(1.762)	(2.957)	(3.033)	(0.9156)	(-2.638)	(-0.8571)
GDPG	0.2714***	0.4862***	3.876***	9.319***	-289.05**	-1633***	-383.4***	-2094***	-0.0526	-0.2983	0.1062	0.4935
	(4.779)	(2.959)	(4.301)	(3.475)	(-2.226)	(-3.155)	(-2.698)	(-3.862)	(-0.5429)	(-0.8073)	(0.6501)	(1.154)
INF	0.0302	0.0392	0.3101	0.5468	-12.669	-80.312	-2.115	-85.619	0.0464	0.0344	0.0519	0.0585
	(1.184)	(1.301)	(0.5993)	(0.934)	(-0.1989)	(-1.035)	(-0.0271)	(-0.969)	(0.9946)	(0.4379)	(0.6172)	(0.6644)
LDR	-0.027***	-0.041***	-0.278***	-0.523***	26.493**	64.42**	39.511***	87.933***	0.0896***	0.0944***	-0.0399**	-0.0424
	(-3.815)	(-3.743)	(-3.227)	(-3.401)	(2.275)	(2.303)	(2.785)	(2.739)	(10.407)	(5.146)	(-2.417)	(-1.326)
LLR	-0.0245	0.0241	-0.18303	0.5327	-96.45***	-171.29*	-37.46	-116.15	-0.259***	-0.2621	0.1769***	0.1337
	(-1.374)	(0.7693)	(-0.8067)	(1.231)	(-3.417)	(-1.948)	(-1.312)	(-3.145)	(-12.463)	(-1.303)	(3.231)	(1.323)
LOANG	0.0019	0.0079**	0.0126	0.0863*	-6.606**	-10.218	-1.639	-0.2866	-0.013***	-0.0124*	-0.037***	-0.042***
	(1.484)	(2.169)	(0.8649)	(1.851)	(-2.208)	(-0.9816)	(-0.6023)	(-1.238)	(-6.029)	(-1.807)	(-8.326)	(-4.841)
OVERHEAD	0.0024	-0.0027	0.1521*	0.0296	-29.49***	-0.3674	-25.58***	11.975	0.0022	0.0074	-0.043***	-0.048***
	(0.6932)	(-0.5171)	(1.671)	(0.2556)	(-3.236)	(-0.0231)	(-2.771)	(0.6783)	(0.3281)	(0.4222)	(-3.598)	(-2.907)
SIZE	-0.002***	-0.00034	-0.038***	-0.0274	2.361	6.348*	6.718***	13.118***	-0.00062	0.00084	-0.0017	-0.0078
	(-4.209)	(-0.3008)	(-3.604)	(-1.513)	(1.471)	(1.723)	(2.792)	(3.186)	(-0.5404)	(0.4165)	(-0.5925)	(-1.459)
R-square	0.34	0.35	0.43	0.29	0.32	0.32	0.24	0.23	0.79	0.79	0.79	0.78
Hausman Test	133.34***	NA	44.57***	NA	35.04***	NA	38.753***	NA	473.03***	NA	189.89***	NA
J-statistic	NA	6.67	Na	10.18	NA	0.14	NA	0.0102	NA	2.04	NA	0.18
Number of Observation	1983	1983	1978	1978	1935	1935	1937	1937	1992	1992	1584	1584

Part II. Capitalization and bank performance: Lessons from Indonesia

Chapter 3

Liberalization, crisis and reforms in Indonesian banking[26]

Abstract

This chapter provides an overview of the Indonesian banking industry during the last two decades. It is shown that following financial deregulation and liberalization in the end of 1980s, the Indonesian economic indicators were at the best performance. At the same time, however, institutional problems and moral hazard emerged in banking. Such problems exacerbated the 1997 Asian currency crisis become the systemic banking crisis in 1998. In the aftermath of the crisis, Indonesian banking has experienced substantial improvements in terms of regulatory environments and financial performance. Nevertheless, bank inefficiency and financial intermediation remain a major challenge.

Keywords: Financial Liberalization, Crisis, Prudential Regulation, Indonesia

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[26] This chapter draws and expands [Prasetyantoko, A., Soedarmono, W., 2009. Balance-sheet effect of currency crisis: Evidence from Indonesia, In *Economics of Developing Country*, ed. Tiago N. Caldeira. Nova Publisher, USA, ISBN: 978-1-60456-924-7].

1. Introduction

For Indonesia, the impact of the 1997 crisis was very deep with recovery cost reaching more than 50% of GDP. Admittedly, such a huge impact was not only due to monetary shock or panic (Djiwandono, 2000). For instance, Indonesia have experienced a currency shock on January 1995 due to the Mexico crisis and hence, causing rapid depreciation in Rupiah. However, it was relatively easy for Bank Indonesia to stabilize such situation by spending almost USD 600 million, tightening of monetary stance, and widening intervention bands in a managed floating exchange rate. On July 1996, Indonesia suffered from another currency shock because of political turbulence when the Megawati Party's headquarter was ransacked[27]. Bank Indonesia injected another USD 700 million to the market. Again, no crisis or huge panic occurred from such a political turmoil.

Djiwandono (2000) further emphasizes that there should be a combination between external shocks and domestic institutional weakness, so that the 1997 Asian crisis was very devastating. From the political economy perspective, institutional weakness that soon acquired particular attention was "crony capitalism" from the Soeharto's regime[28]. Prasetyantoko and Soedarmono (2009) point out that despite achieving impressive economic growth over three decades before the 1997 crisis, crony capitalism dominated almost all sectors in Indonesia. Crony capitalism was mainly originated from politically-connected lending and bank concentration in the credit market, notably on real estate markets. Thus, over-guaranteed but undercapitalized (highly leveraged) banking industry was perceived as the most important endemic vulnerability in the Indonesian economy during the 1990s.

In the context of the 1997 Asian crisis, Krugman (1998) emphasizes on the links between moral hazard and over-investment in the presence of asymmetric information. He argues that government's implicit guarantees drive investors' moral hazard in lending policies, both in banking and corporate sector. Furman et al (1998) further notes premature financial sector liberalization within a weak institution becomes a main source of crisis in many Asian countries. Liberalization in financial sector is thus perceived as one of the most important factor to explain the financial crisis in Asian region.

This chapter provides the main story of the Indonesian banking evolution over the last two decades. The rest of this chapter is structured as follows. Section 2 describes the sequence of events in Indonesia following financial liberalization in the end of eighties which ended up

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[27] Megawati is the daughter of Soekarno, the first president of Indonesia. Her political party is Indonesian Democratic Party (or *Partai Demokrasi Indonesia*). Megawati also became the president from 2002-2004 due to movement in the period of political reform.

[28] Soeharto was the second president of Indonesia from 1966 to 1998.

in the 1998 banking crisis. Section 3 discusses several policy responses undertaken to overcome the 1998 banking crisis, while Section 4 highlights contemporary trend with regard to regulations and performance in the Indonesian banking industry. Section 5 concludes.

2. Financial liberalization and banking crisis
2.1. Financial liberalization and impressive economic performance

Financial system history in Indonesia was just started in 1966 when commercial banks were born. It can be said that before 1966 a financial system in Indonesia hardly existed, a fact commonly attributed to economic disruptions like the consecutive runs of fiscal deficit and hyperinflation under the Soekarno's administration[29.]

In the first wave of financial system development, Parliament of the Republic of Indonesia engaged with the legalization of banking system in Indonesia. Law 14/1967 on the Principles of Banking was legalized by the Parliament to stipulate the role of banks in order to improve access to credit. The law characterized the banking system was an instrument of national development to improve economic growth, equitable distribution of wealth, and national stability (Hofman et al, 2004). One year later, the Parliament issued Law no.13/1968 to authorize Bank Indonesia as a central bank.

Due to the sharp declines of oil revenues in the late of 1982 and again in 1986, liberalization policies in Indonesia have finally been implemented in the late 1980s. Some policies were undertaken to liberalize the financial system through several deregulation policies. International donor agencies including World Bank and International Monetary Fund (IMF) had also been proposing the possibilities for financial liberalization in Indonesia. World Bank proposed that the supply and cost of credit should not be increased sharply to impair high-priority investment and social programs through state banks as potential intermediaries at the time. Meanwhile, IMF supported the simplification of the subsidized credit schemes, but recommended moving away from credit ceilings and interest rate controls to more flexible controls over reserve money.

On June 1, 1983, the first banking deregulation package following the IMF recommendation was finally issued including (a) the lifting of credit ceiling for all banks that had been imposed in 1974, (b) the elimination of deposit interest rate controls on state banks, and (c) the phasing out of Bank Indonesia liquidity credit. The main impact of the banking

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[29] Soekarno is the first president of the Republic of Indonesia after its independence in August 17th, 1945, after having colonized by Dutch during 3.5 century. He was running his presidency until the succession of Soeharto as the second president in 1966.

reform was the increased freedom for banks to mobilize deposits in support of new lending. On October 27, 1988, Government of Indonesia again launched the second major policies package for banking deregulation called as *Pakto 88*. These reforms had the goal to enhance financial sector efficiency by encouraging competition and increasing the availability of long-term finance by promoting the development of capital market.

Financial deregulation in October 1988 was further followed by several aggressive policies undertaken in December 1988 and March 1989 with the main objective was to accelerate capital market development[30]. The reforms contributed to feed bubbles that created booms cycles in the Indonesian financial system. Domestic credit jumped from 3.9 trillion Rupiah in 1988 to 6.2 trillion in 1989 and 9.3 trillion in 1990 (up from just 1 billion Rupiah in 1984). Meanwhile, the number of banks increased significantly from 111 in 1988 to 171 in 1990 and 240 in 1994 (Sitorus and Srinivas, 2004).

During the financial liberalization periods, state bank raised both deposit and lending rates leading to a sharp rise in the average real interest rate from -5.0 to 8.2 percent. Meanwhile, as shown in Figure 4.1, in 1983-87, the balance of deposits at all commercial bank rose sharply by an annual average of 25 percent, and the balance of outstanding loans also increased by an annual average of 26 percent with the ratio of M2 to GDP growing to an average of 23 percent from 15 percent in the preceding period (Sato, 2005).

Figure 3.1 Real Interest Rate and Financial Deepening, 1968 - 94

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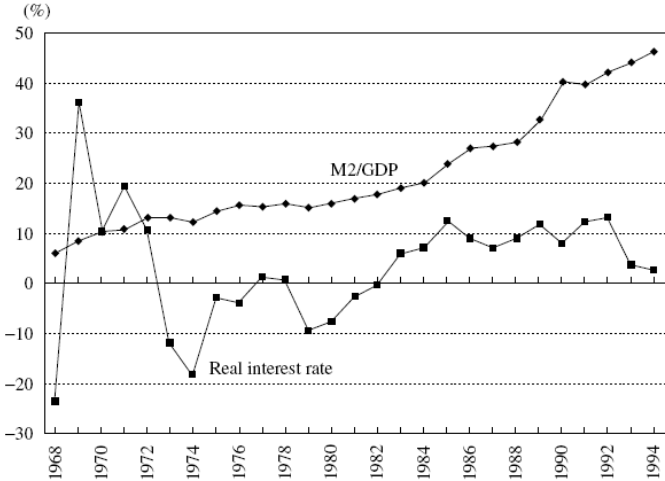
[30] Government basically relaxed the requirement for listing in Indonesian Capital Market. And therefore the number of listed companies rose from just 24 companies in 1988 to 306 in 1997

	Period (Average)			
	1968–73	1974–82	1983–87	1988–94
Real interest rate (%)	6.7	−5.0	8.2	8.5
M2/GDP (%)	10.3	15.3	23.4	39.0

Source: Sato (2005)

Note: Real interest rate is the average of one-year deposit interest rate at state banks deflated by inflation rate.

In the meantime, *Pakto 88* was also to ease minimum capital requirement for bank establishment which required only 10 billion Rupiah. Since the requirement to establish banking institution was relatively easy, the number of bank in Indonesia exploded tremendously[31]. This drastic increase was also due to the policy where a bank is free to open its branches in rural areas. This rapid banking sector development has made Indonesia belongs to one of the countries with the largest number of banks throughout Asia[32].

In parallel, foreign capital inflows increased two and one-half times from 1990 to 1994, reaching USD 14.7 billion and the average capital inflows was about 4 percent of GDP between 1990-96 (Nasution, 1999). This fact can be related to the success of second wave policy of deregulation in 1988, as capital market tap was firstly opened. Balance of payment, international reserves and inflation also looked at the best performance. Compared to deficits in Thailand and Malaysia, the deficit of current account of Indonesia in the 1990's averaged only 2.6 percent of GDP. Moreover, the deficit in the 1990-96 (second wave of deregulation) never exceeded the deficit over the period 1983-89 (first wave of deregulation). International reserves were also increasing, while the percentage of external debt to GDP was continuously declining and lower than during the period of the mid-eighties. For inflation, since the mid-eighties, inflation was managed within single digits and only reached 6 percent before the crisis hit (McLeod, 1999).

In terms of macroeconomic performance, during the period of financial deregulation and liberalization, economic growth averaged 7 percent between 1970 and 1989, while 8 percent between 1990 and 1996. This growth accompanied by substantial industrialization and structural change, where the agriculture's GDP share decreased to 19.4 percent in 1990 from 55 percent in 1965, while the manufacture's GDP share rose from 8 to 20 percent by

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[31] Total amount of private national banks prior to *Pacto 88* that was only 64 banks with total office of 512 at the end of 1996 increased to 240 banks with total operational offices of around 5,919. In addition, there were approximately 9,200 rural banks. And, the total assets of the banking system were equivalent to about 86 percent of GDP, where commercial banks held 84 percent of total assets and rural banks held about 2 percent.
[32] IBRA annual report, 2002

1990 (Jomo, 1997). By the late of 1980s, the Indonesian economy had become more trade-dependent where the share of total trade flows to GDP grew from 14 percent in 1965 to 54.7 percent in 1990. The implication of such development is that the share of national savings to GDP increased significantly from 7.9 percent in 1965 to 26.3 percent in the 1990 which means that the capacity of economy to mobilize savings was improved (Sharma, 2003).

The quality of life for people was also impressive as reflected by the improvement of per capita income from USD 75 in 1966 to USD 1,200 in 1996. For instance, during the 1976-1990 period income per person in the poorest quintile of Indonesia's peoples grew by 5.8 percent per year, while the average income of the entire population grew by 4.9 percent per year. Moreover, the official poverty rate decreased from 64 percent in 1970 to 11 percent in 1996 which was one of the largest poverty alleviation recorded anywhere in the world during that period (Sharma, 2003). The successful poverty alleviation programs resulted in the improvement of infant mortality rate which declined from 145 per 1,000 live births in 1970 to 53 per 1,000 live births in 1995[33].

2.2 Capital market development, crony capitalism and banking crisis

Despite the impressive macroeconomic performance, the Indonesian financial system was quite vulnerable after financial liberalization era. Theoretically, financial liberalization should soften financial constraints and improves risk-sharing, thereby fostering investment. This argument suggests a positive correlation between international financial liberalization and economic growth. However, it is also worth noting that a country with bad fundamentals will definitely suffer from a crisis and a country with good fundamental will not (Furman et al., 1998), as country with good institutional quality can overcome problems to prevent capital outflow.

In the Asian context, Furman et al (1998) document that net-private long-term capital inflow entering Indonesia, Malaysia, Philippines, and Thailand increased from 3.3 percent of GNP in 1990 to 8.3 percent of GNP in 1996. These were part of a wave of capital flows to developing countries which increased more than six-fold between 1990-1997: from 1.0 percent of developing country GNP to 4.1 percent. The swing of capital flow to Asian countries is based on the global context of capital market. In the early of 1990s, the economic downturn happened in US, Japan and European countries. The declining of the US interest

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[33] See Sharma (2003) for further discussions.

rate that reached the lowest level (since 1960s) in 1992 caused the capital flow to developing countries more attractive.

Basically, there are two principal transmissions of foreign capital inflow: debt and investment. Debt could be ordered by government (official foreign debt) and private sector (private foreign debt). Meanwhile, investment can be either in the form of Foreign Direct Investment (FDI) or portfolio investment in domestic capital market. Liberalization, in principle, is to open broadly the access of foreign capital to the domestic market, especially by private sectors.

Over the period 1990-1994, capital inflows in Indonesia increased almost two and one-half times reaching USD 14.7 billion (Nasution, 1999). By mid-1997, Indonesia's total debt outstanding in foreign commercial banks amounted to USD 59 billion, where the maturity structure of the foreign debt was the key of the Indonesian economic vulnerability (Radelet, 1999). By the end of June, 1997, out of USD 140 billion (about 60 percent of GDP) in external debt, USD 33 billion was short-term debt with maturity less than one year. Conversely, foreign exchange reserves in mid-1997 were only USD 20 billion. Thus, short term debts were around 1.75 times the size of Indonesia's total foreign exchange reserves (Radelet, 1999). The Indonesian economy was therefore quite vulnerable.

Moreover, economic vulnerability was also due to the utilization of foreign capital inflows. Despite being used to finance productive investment in the tradable sector such as agriculture, manufacturing, and heavy industries such as petrochemicals and automotive assembly; a significant proportion of foreign capital was found in the non-tradable sector, particularly in construction, property and real estate industry (Sharma, 2003). The huge injection of foreign capital inflows relative to the size of the equity market boosted equity prices in the non-tradable sector. Investment in real estate industry was indeed very promising due to political connection of these industries. Many of these projects were coordinated directly or indirectly by Soeharto's family and their cronies. Hence, investors assumed that the government implicitly will provide a guarantee if the projects failed.

In the meantime, the rapid growth of commercial banks in the post- deregulation periods has increased the degree of bank competition. In this regard, the implicit government guarantees might increase banks' moral hazard to preserve profitability. From these situations, it is clear that banking industry have also participated in aggravating economic vulnerability by granting loans excessively to the politically-connected industries, particularly

to the property and real estate companies[34]. Consequently, bank lending to property and real estate sector increased tremendously by roughly 40 percent from 1995 to 1996 (Djiwandono, 1999).

In 1992, Government of Indonesia has in fact enacted the Banking Act 7/1992 in order to restrict the aggregate amount of related-party lending. This regulation only allowed private banks to lend maximum 20% of the banks' capital to the related party companies. Under this regulation as well, some state-owned banks were privatized and allowed to allocate credit only to non-priority sectors. However, many private banks violated such regulation, since the "untouchable" business conglomerates were the dominant players in Indonesia and many of them also owned banks. This blurred distinction between the bank and its related companies were aggravated by internal agency problem between shareholders and manager.

The sources of banking sector vulnerability were likely to be identified. In 1995, Bank Indonesia raised reserve requirements from 2 percent to 3 percent, effective on February 1996. Capital adequacy ratio for commercial banks with foreign exchange licences was also raised from 8 to 12 percent, and the minimum capital requirement for this type of banks was tripled. A bank supervisory system called the CAMEL system (Capital, Asset Quality, Management, Earning, and Liquidity) and annual on-site banks supervision had been also established.

Nevertheless, many commercial banks violated again such prudential regulations. As of March 1997, many commercial banks remained undercapitalized. There were 15 banks with CAR lower than 8 percent, while 41 banks violated the legal lending limit and 12 out of the 77 licensed foreign exchange banks failed to meet the minimum capital requirement when opening their operation (Montgomery, 1997). Meanwhile, the bank's related-party lending to the property and real estate sector still grew although this industry had suffered large-scale losses in 1996. At the end of June 1997, Bank Indonesia further tightly restricted bank credit to real estate sectors, but it was too late. Endemic vulnerabilities, such as low bank capitalisation and undiversified bank loan portfolios in property and real estate sector finally exploded due to currency shock originated by the Thai Baht at the beginning of July, 1997. The Indonesian banking sector practically collapsed in a few months.

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[34] This trend was also due to the fact that the property and real estate companies were allowed to establish their own banks as business cashiers.

3. Banking crisis and policy responses

Since financial deregulation and liberalization, financial system has undergone through substantial structural change during the last decades. One of important change is due to the emergence of private commercial banks. Until the 1980s banking sector in Indonesia was basically state-owned banks. Furthermore, until the time of crisis, financial system in Indonesia was dominated by banking system, since capital market was not yet well developed.

After attacked by the Thai Baht depreciation against US Dollar on July 21, 1997, the Indonesian currency (Rupiah) had fallen by 7 percent against US Dollar. Consequently, Bank Indonesia increased the interest rate from 12 percent to 13 percent to avoid capital outflow from the financial system and to stabilize the Rupiah circulation as well as its value. On August 14, 1997, the Indonesian government reluctant to squander more foreign reserves that allowed Rupiah to float (Sharma, 2003).

The currency depreciation also affected the banking sector because the amount of Rupiah earned on their long-term loans to the property sector and other industries was insufficient to cover their liabilities due to short-term foreign borrowing. By this situation, the banking sector could no longer attract foreign deposits that might be used to repay their liabilities. Due to the lack of bank's deposits, Bank Indonesia raised tremendously the interest rate of short-term deposit in Rupiah (or the Overnight Jakarta Interbank Rupiah Rate, known as JIBOR). On August 11, 1997, JIBOR was 15.8 percent and it became 51.4 percent on August 18, 1997. Four days later JIBOR became 87.7 percent. However, this policy response failed to ameliorate the situation and Rupiah continuously depreciated. On August 29, 1997, Bank Indonesia limited the forward sales of dollars to non-residents to USD 5 million in order to avoid currency speculative attack.

On October – November, 1997, the banking sector could no longer resist due to currency depreciation. There were 34 banks that were finally claimed to be insolvent consisting of 2 state-owned banks, 6 regional development banks and 26 domestic private banks. On October 31, 1997, the government negotiated a bailout package of USD 43 billion with the International Monetary Fund (IMF) and bilateral donors. The agreement was widely believed to restore investor confidence and arrest the Rupiah's continuing plunge. The following expression of the IMF Managing Director, Michel Camdessus, illustrates this optimism:

"These measures should restore confidence in the Indonesian economy and contribute to the stabilization of financial market"[35].

In order to reform the banking system, based on the financial statement of 92 banks of 238 banks, representing 85 percent of total asset of the banking system, the resolution packages were issued. These include the closure of 16 small and insolvent private banks with total market share that reached only 2.5%, and the implementation of limited deposit insurance to small depositors. Less than 24 hours after reaching the agreement of the IMF Letter of Intent, Bank Indonesia liquidated 16 insolvent private banks including the banks owned by the family of former President Soeharto, such as Bank Andromeda, Bank Industri and Bank Jakarta (Sharma, 2003). Since there was no explicit deposit insurance in place, the bank liquidation policy generated depositor's panic that quickly became a huge bank runs aggravating financial turmoil.

Moreover, most of Indonesian private sectors as well as financial institutions, in fact, had already large foreign debt in their balance-sheet and hence, they could not repay from their earning in Rupiah, even for the institutions that were previously considered to be sound enough. By mid-December, 1997, 154 banks representing half of the total asset of the banking system faced some erosion of their deposit in varying degrees (Sharma, 2003).

On January 6, 1998, President Soeharto proposed the state budget totalled 133 trillion Rupiah to the Parliament in order to recover the economy. This amount was a 32.1 percent higher than the previous year's budget of 101 trillion Rupiah. This expansionary budget was in direct contravention of IMF requirement that forced the government to attain a 1 percent budget surplus. Since the expansionary budget was perceived as an "unrealistic" decision, the markets reacted negatively. The Rupiah exchange rate dropped from 5,450 per USD 1 on January 1, 1998 to the infamous "black Thursday" on January 8, 1998. Rupiah dropped below its "psychological threshold" of 10,000 Rupiah (reaching 14,000 Rupiah with some trades even at 17,000 Rupiah) to USD 1. On January 13, 1998, a problem further compounded by the bankruptcy of Peregrine, a Hong Kong-based investment bank, which was ruined by the huge loan loss reaching USD 236 million to PT. Steady Safe, a local taxi company in Jakarta whose business was connected with the political regime.

In responding such a situation, Bank Indonesia provided liquidity support called by BLBI (*Bantuan Likuiditas Bank Indonesia*) that increased from 24 trillion Rupiah at the end

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[35] IMF, « Camdessus Comments on Indonesia's Impressive Economic Policy Program », IMF Survey 26, 20, November 3, 1997.

of October 1997 (equals to 3.5 percent of GDP) to 34 trillion Rupiah (5 percent of GDP) during December, 1997. At the beginning of 1998, BI as the lender of last resort decided to continue providing huge recapitalisation to the banking industry with the total amount reaching 60 trillion Rupiah (7% of the 1997 GDP). However, this decision could not overcome Rupiah depreciation against US Dollar. These continuous uncertainties have affected banks' ability to meet demand for liquidity which in turn decreased investors' confidence. Deposit withdrawals known as "flight to safety" or "flight to quality" could not be prevented. In turn, systematic banking crisis was therefore inevitable.

To this end, we can summarize the government policies that made the banking crisis became contagiously devastating the whole economy. First, the bank liquidation policy caused shock of depositors and implied bank runs, since there was no deposit insurance scheme in the banking industry. People then no longer trusted on the Indonesian banking industry, and preferred holding liquid asset to saving it into the banks. All economic agents (bank, households, and corporation) needed liquidity and hence, the economy was in the liquidity trap problem. Second, in order to restore liquidity in Indonesian banks, BI increased to 65-70 percent of the interest rate, the highest interest rate in the history of Indonesian economy. Consequently, as the bank interest rate increased sharply, the credit interest rate also hiked significantly. Therefore, debtors' ability to meet their obligations became weaker and had made non-performing loans in the banking industry emerged until more than 50 percent of the total loan portfolios. On the other hand, economic sectors preferred to use their own financing, since borrowing from banks was very costly[36]. Third, many domestic private banks preferred to increase inter-bank borrowing from un-hedged foreign banks which exacerbated the currency fluctuation, since LIBOR (London Inter-Bank Offer Rate) and SIBOR (Singapore Inter-Bank Offer Rate) set the interest rate at 1-2 percent which was much lower than JIBOR.

4. Indonesian banking in the post-1998 banking crisis

In the aftermath of the 1997 financial crisis, Bank Indonesia adopted regulatory forbearance by lowering the minimum requirement of the capital adequacy ratio from 8 to 4 % to provide "breathing space" for banks and borrowers. Together with the International Monetary Fund (IMF), the Indonesian government then implemented the special surveillance's task which is similar to the 1991 US Federal Deposit Insurance Corporation

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[36] Agung et al (2000) reveal that there was indeed the credit crunch phenomenon in the aftermath of the 1997 crisis.

Improvement Act (FDICIA), a system of capital-based regulations based on prompt corrective action (PCA). Likewise, bank governance and risk management also became an important issue in Indonesian banking after the 1997 crisis besides capital regulation.

Aside from replacing the Acts of 1992 and 1998 by the Act of 2001 in order to raise capital requirement to 8 % again, Bank Indonesia issued various banking policies. Bank Indonesia regulation (*Peraturan Bank Indonesia* / PBI) No. 3/10/PBI/2001 about "Know Your Customer" mechanism was created in order to provide procedures that should be fulfilled by commercial banks to recognize and monitor their customers' banking activities.

In 2003, Bank Indonesia established PBI No. 5/25/PBI/2003 in order to provide a benchmark for bank controlling shareholders and senior managers to conduct banking activities. In the same year, regulation to take market risk into account in setting the minimum ratio of bank capital was also established by PBI No. 5/12/PBI/2003. Yet, a risk management framework was also implemented (PBI No. 5/8/PBI/2003) for commercial banks as of May 19, 2003. This framework was applied to all types of banks in order to prepare the banking industry to move forward toward Basel II, without explicitly distinguishing small banks from large banks.

On January 2004, Indonesian Banking Architecture (IBA) introduced strict regulation of bank capital. Banking market entry was tightened with a minimum required capital of 3 trillion Rupiah (US$335 million) while all types of banks, including banks established by regional governments were compelled to reach a minimum capital of 100 billion Rupiah by 2010. Still in 2004, PBI No. 6/25/PBI/2004 was stipulated where commercial banks are required to disclose their businesses plan in the middle-term and long-term.

In 2005, Bank Indonesia established PBI No. 7/3/PBI/2005 to limit the maximum amount of loans that can be granted by commercial banks. Again, PBI No. 7/8/2005 about the debtor information system was issued, where commercial banks are required to report all their borrowers' situation to credit information bureau. Financial innovations were also regulated through PBI No. 7/4/PBI/2005 that stipulates principles for asset securitization in commercial banks. Further attempt has also been made by Bank Indonesia to reinforce the IBA through the new consolidation policy on June 2005. Commercial banks should hold a minimum core capital of 100 billion Rupiah (US$11 million) by 2010 and 80 billion Rupiah by the end of 2007.

In parallel, Deposit Insurance Corporation (*Lembaga Penjaminan Deposito* / LPS) was created, where it started to operate as of September 25, 2005 in order to restore public confidence on the banking industry through the safety net program. The safety net program

consists of four elements, such as: (1) enhancing effective and independent supervision, (2) enforcing the role of Bank Indonesia as *lender of last resort*, (3) establishing explicit deposit insurance scheme; (4) enhancing effective crisis management.

In 2006, Bank Indonesia replaced the PBI No. 7/25/2005 by the PBI No. 8/9/PBI/2006 to improve risk management certification for bankers. In a similar vein, the principles of good corporate governance have been stipulated through PBI No. 8/14/2006. On August 2006, Bank Indonesia again launched the Single Presence Policy (SPP) due to the fact that commercial banks had still no initiative for performing their own mergers and acquisitions in order to follow the IBA that has been implemented in 2004. Indeed, we can see that there is a substantial reduction in the number of commercial banks in Indonesia after the 1998 banking crisis. In 1997, Indonesia had 238 commercial banks, while only 130 commercial banks in 2006. Nevertheless, there were no substantial changes as of 2004. In 2004, Indonesia had 133 commercial banks, where this number only declined to 130 commercial banks in 2006.

The SPP practically forbids a company or an individual to own more than one bank. Under the SPP, controlling shareholders who do not restructure their ownership would endure a prohibitive sanction preventing them from being a controlling shareholder or holding more than 10% of equity in any bank in Indonesia. They would also be listed in the *Not Pass List* during 5 years. For some investors who dominate the banking business in Indonesia, selling their stakes either fully or partially, is not considered as an ideal strategy. In fact, there are alternative solutions that can be taken by controlling shareholders as a response to the SPP, without necessarily loosing their stakes. Controlling shareholders can merge all their banks or establish a Bank Holding Company (BHC)[37]. However, the debate regarding the SPP implementation is still open regarding the consolidation of banks with different ownership types. In dealing with such a controversy, Bank Indonesia as a regulator needs a benchmark to assess whether consolidation through the SPP is really necessary and how it could operate for banks with different ownership structures.

In the meantime, performance in Indonesian banks also showed an upward trend. The banking system's total assets increased from 1,112.2 trillion Rupiah in 2002 to 1,720.9 trillion Rupiah in 2007. Total third party funds increased from 835.8 trillion Rupiah in 2002 to 1,305.9 trillion Rupiah in 2007, although bank credit did not increase so much, indicating the lack of financial intermediation activities in banking. There was only 455.31 trillion Rupiah

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[37] According to *Indonesian Banking Architecture* issued by BI in 2004, the number of commercial banks in Indonesia should be around 35-58 banks in 2010. Thus, if establishing a BHC is chosen by all controlling shareholders, the BI purpose for reducing the number of banks in 2010 cannot be achieved as well, since the creation of BHCs will add a new entity of banks in the financial system.

of bank loans in 2007 after 410.29 trillion Rupiah in 2002. Instead, the ratio of non-performing loans to total loans decreased from 8.1 % in 2002 to 6.5 % which could be due to the improvement of the capital adequacy ratio during the 2004-2007 periods (Prasetyantoko and Soedarmono, 2010).

Despite the healthiness of the Indonesian banking industry, bank inefficiency with regard to intermediation activities has also become a major problem in Indonesian banks. The *2010 Indonesian Banking Statistics* reports that the cost-to-income ratio, measured by the ratio of operating expenses to operating income, reached 89.5% in 2005 and 92.77 % at the beginning of 2010. In the Southeast Asian banking industry, Indonesian banks account for the highest cost-to-income ratio that is likely to increase the cost of intermediation for productive sectors. Financial intermediation becomes therefore a major issue in Indonesian banks.

During the 2005-2010 period, productive sectors are indeed still underdeveloped. In 2005, the *Indonesian Banking Statistics* revealed that the amount of loans to the tradable sector – such as mining, agriculture and manufacture – was only 170 billion Rupiah, while loans to the non-tradable sector including property and real estate reached 210 billion Rupiah. In 2010, the credit to tradable sector only attained 428 billion Rupiah, while the one allocated to the non-tradable sector reached 1,300 billion Rupiah. In terms of productivity and job creations, the tradable sector is considered as productive sector, and the structure of the Indonesian economy is based on the tradable sector.

5. Conclusion

In the end of eighties, the Indonesian financial system has experienced the radical phase of financial deregulation and capital market liberalization that spurs macroeconomic performance. In the mid-1990s, things began to go in to the opposite direction due to moral hazard in banking industry in channelling their loans into politically-connected firms that mainly were property and real estate companies. Due to the institutional weakness in the banking industry and corporate sector that hold a substantial part of short-term foreign debt, the Thai Baht depreciation in 1997 finally led to a systemic banking crisis in Indonesia in 1998.

In the meantime, policy makers have learned lessons from the banking crisis of 1998. Various prudential regulations are issued in order to enhance bank stability through better risk management and corporate governance. The direct consequence of this development is that the Indonesian banking performance in terms of bank stability can be restored. In contrast, despite the healthiness of the Indonesian banking industry, Indonesian banking still suffers

from inefficiency problems that impede financial intermediation to productive sectors, particularly to the tradable sector in this regard. Likewise, the rapid development of the non-tradable sector in the 21st century again highlights that financial fragility still lurks, as the non-tradable sector can trigger speculations from short-term investments in the financial market.

Chapter 4

Bank capital and self-interested managers: Evidence from Indonesia[38]

Abstract

Financial intermediation remains a major concern in Indonesian banks in the aftermath of the 1998 banking crisis. This chapter therefore attempts to better understand such problem through the relationship between capital ratios, the cost of intermediation and performance in Indonesian banking. Using a simultaneous equations model applied to monthly data over the 2004-2007 period for 99 Indonesian commercial banks, we find that a higher capital ratio is associated with an increase in the cost of intermediation and a decrease in risk and profitability. Hence, there is a strong presumption that bank managers are likely to be self interested. In other words, managers might be driving banks to become safer by holding greater capital ratio, but at the cost of a decline in profitability, since more risky but also more profitable loans could be bypassed. In this context, the presence of self-interested managers in Indonesian banks can partly explain why financial intermediation does not work as expected to enhance socially desirable sectors. Moreover, our results show that domestic private-owned banks are more likely to suffer from a managerial self-interest problem than state-owned banks, joint-venture banks, and foreign-owned banks. Our findings finally support the call for the implementation of the ownership consolidation policy to enhance shareholders' domination in Indonesian banks, notably in private-owned banks.

Keywords: Bank Capital, Bank Risk, Managerial Self-Interest, Financial Intermediation, Ownership Consolidation, Indonesia

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1. Introduction

In spite of a growing literature analyzing the link between capital requirements and bank risk, no consensus has been reached on the sign of the relationship between both dimensions. Both theoretical and empirical papers, ranging from portfolio theory-based approaches (Kahane, 1977; Koehn and Santomero, 1980; Kim and Santomero, 1988) to incentive-based approaches (Besanko and Kanatas, 1996; Blum, 1999; Milne, 2002; Blum, 2003; Jeitschko and Jeung, 2005) remain inconclusive.

In the context where a bank acts as a portfolio manager, higher capital requirements will directly alter the bank's leverage ratio. As a consequence, the bank will reshuffle its portfolio by selecting riskier assets (loans) to maintain its expected return on equity at an optimal level (Kahane, 1977; Koehn and Santomero, 1980). However, building on the same portfolio selection framework, Milne (2002) argues that this literature fails to "*treat banks as forward looking optimizers balancing the benefits of their lending decisions against the cost of regulatory breach*", where such behaviours depend on how shareholders and bankers manage banks' capital adequacy ratios and loan porfolios.

In line with this view, Bris and Cantale (2004) consider that the previous literature on bank capital requirements only views *the bank as a whole* and hence fails to consider agency conflicts among shareholders and bankers (managers). Moreover, Hughes and Mestler (1994) explicitly highlight that bank managers are *not* maximizing shareholders' value. While such agency conflicts are widely explored in the corporate finance literature, only a few papers deal with this issue regarding banking firms.

Gorton and Rosen (1995) are the first to model banks' portfolio management and internal agency conflicts to explain the continuous decline in U.S. banks' profitability during the 1980s. In their model, there are two types of managers who have private benefit to control, namely "good" managers and "bad" managers. In facing declining investment opportunities in the U.S. market, the good managers choose either "profitable" risky loans or "profitable" safe loans, while the bad managers choose either "unprofitable" risky loans (excessive risk taking) or "unprofitable" safe loans (excessive entrenchment). When banks have a large proportion of bad managers and bank shareholders can only imperfectly control them, the aggregate risk taking may be excessive, as long as deposit insurance exists and capital requirements are easily satisfied. Since their model does not consider the role played by the regulator to discipline banks' behaviour, there is no explicit external agency conflict between the banks' shareholders and the regulator.

Gorton and Rosen (1995) also show that such managerial entrenchment to take on excessive risk is due to the incentives that managers face when the fraction of the bank they own is large enough for them to make outside discipline costly, but not large enough for their interests to be aligned with those of outsiders. They further establish conditions in which the relationship between managerial ownership and risk taking can take the form of an inverse U-shape curve.

Jeitschko and Jeung (2005) build a model of banks' portfolio management where external agency conflicts (regulator-shareholder) exist and moral hazard can be constrained by the regulator's action. In their model, the regulator, bank shareholders and the manager have different "domination power" on bank portfolios. If the regulator (or the deposit insurance company) dominates, its objective is to minimize the option value of deposit insurance, i.e. bank default risk, which can only be achieved under a high level of the capital adequacy ratio. If shareholders dominate, their objective is to choose risk-taking strategies that maximize the expected value of bank equity. But if managers dominate, their objective is to manage risk to maximize the expected value of their private benefits of control. However, the impact of such managerial behaviour on bank default risk remains unclear.

Sullivan and Spong (2007) empirically highlight that managerial stock ownership boosts risk-taking strategies indicating that hired managers are more likely to have incentives in line with those of shareholders. However, Saunders et al. (1990) find that "entrenched-manager-controlled" banks are less risky than "shareholder-controlled" banks during the 1979-1982 period of relative deregulation. Some papers also find U-shaped relationships between managerial ownership and bank risk taking, which is also due to managerial entrenchments (Chen et al., 1998; Anderson et al., 2000). To deal with managerial entrenchments, John et al. (2000) are the first to build a theoretical model analyzing the optimal package of managerial compensation under capital requirement rules and deposit insurance. Unfortunately, in their model, regulation does not play any role regarding managerial entrenchments and, thus, it is somehow irrelevant.

Extending Saunders et al. (1990) and John et al. (2000), Bris and Cantale (2004) build a theoretical model that analyzes the implications of capital requirements on managerial self-interest and bank risk taking. Under asymmetric information between shareholders and managers, a higher capital requirement will drive self-interested managers to monitor bank loan portfolios and comply with the new requirement (increase the capital adequacy ratio). Self-interested managers will follow such a strategy to maximize their compensation, since bank failure or a decline in the capital adequacy ratio will lower managerial compensation. As

a consequence, to preserve their compensation, managers might target safer loan portfolios at the cost of an increase in inefficiency due to excessive monitoring costs. Hence, banks might become *too* safe and less profitable because more socially desirable risky loans (but also more profitable) are possibly bypassed. In this setting, bank shareholders should provide managers with a better compensation package that is compatible with managerial efforts in producing socially desirable risky loans to maintain shareholders' profitability. The optimum compensation package should be negatively related to the capital adequacy ratio and positively linked to risk taking.

In parallel, empirical papers on capital requirements mainly analyze the problem of bank capitalization and its impact on risk and profitability, without taking into account agency conflicts between shareholders and managers (see for example, Aggarwal and Jacques (2001), Rime (2001), Bischel and Blum (2004), Lin et al. (2005), Murinde (2006)). An exception is Altunbas et al. (2007) and Laeven and Levine (2009) who provide evidence which is somehow close to our objective in examining the managerial self-interest problem. In the case of European banks during the period 1992-2000, Altunbas et al. (2007) report that banks with more capital tend to be less efficient; but they also tend to take on excessive risk. Hence, there is no evidence that bank capital raises the managerial self-interest problems that drive bank portfolios to become safer but less profitable. Laeven and Levine (2009) analyze a large sample of 288 banks from 48 countries during the 1996-2001 period and show that capital requirements and more stringent bank activity restrictions are associated with higher risk in banks having a sufficiently powerful shareholder, but the opposite is true in widely-held banks when shareholders' domination is relatively weak. However, their work does not explicitly consider domination by self-interested managers which probably occurs in widely-held banks with weaker shareholders and that might boost the bank's safety and inefficiency at the same time.

To our best knowledge, there has been no attempt to empirically analyze the presence of self-interested managers through the link between bank capital ratios and risk taking. The present chapter aims to fulfil this gap. To assess these predictions, we focus on the Indonesian banking industry, where capitalization, governance and ownership have become major policy issues in the aftermath of the 1997 crisis (Pangestu, 2003). We work on monthly data for 99 commercial banks with four different ownership types (state-owned, private-owned, joint-

venture, and foreign-owned bank). Our study covers the 2004-2007 period when strict regulations were introduced on bank capital in Indonesia[39].

Our approach to assess this issue is related to Altunbas et al. (2007), Laeven and Levine (2009) and also, more generally, to the broad literature on bank ownership structure and risk taking (Saunders et al., 1990; Sullivan and Spong, 2007). However, instead of separating banks into two groups ("shareholder-controlled banks" and "manager-controlled banks") we capture the managerial domination problem by building on the work of Naceur and Kandil (2009) and Demirgüc-Kunt et al. (2004). Naceur and Kandil (2009) study the impact of capital requirements on the cost of intermediation and profitability in Egyptian banks during 1989-2004[40], while Demirgüc-Kunt et al. (2004) emphasize the use of the cost of intermediation and overhead costs to tackle bank inefficiency issues.

Because we use monthly data for a relatively short time period, standard measures of inefficiency such as efficiency scores or proxies such as the cost-to-income ratio are less likely to capture movements in monitoring costs and managers' decisions to raise or reduce interest margins to adjust their risk exposure. Specifically, in this chapter we construct a profitability-adjusted net interest margin measure as a proxy of the cost of intermediation which captures movements in the interest margin that are not linked to changes in profitability. As a result, our measure captures changes in price mark up (margin setting) behavior and in managers' risk tolerance and/or monitoring effort that are not associated with lower or higher profitability.

In Naceur and Kandil (2009), an increase in the cost of intermediation (*net interest margin*) due to a higher capital adequacy ratio is followed by an increase in bank profitability. In our setting, by accounting for possible governance issues, we consider that self-interested managers are more likely to exist in a bank, when an increase in the cost of intermediation is followed by *a decrease* in a bank's profitability. In this case, a rise in the cost of intermediation can be due to an excessive increase in monitoring costs borne by managers who dominate banks[41]. Therefore, following Demirgüc-Kunt and Huizinga (1999), and

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[39] Since January 2004, entry to the banking industry has been tightened with a minimum capital requirement of 3 trillion Rupiah (US$335 million) while all types of banks including banks established by regional governments should also reach a minimum capital of 100 billion Rupiah by 2010 and 80 billion Rupiah by the end of 2008. These regulations are well-known as the *Indonesian Banking Architecture* established on January, 2004.

[40] Bernanke (1983) defines the cost of intermediation as the cost of channelling funds from the ultimate savers/lenders into the hand of good borrowers, which includes screening, monitoring, accounting costs, and expected losses by bad borrowers.

[41] Coleman et al. (2006) consider that banks with superior monitoring efforts are able to charge a higher cost of intermediation. Chen et al. (2000) also highlight the positive link between monitoring activities and loan spreads in the U.S. branches of Japanese banks.

Demirgüc-Kunt et al. (2004) we consider the cost of intermediation, i.e. the bank's net interest margin, as a measure of bank inefficiency. However, to go further in our investigation we also construct profitability-adjusted interest margins.

In addition, our motivation to address the issue of managerial self-interest is driven by the implementation of the *Single Presence Policy* (SPP) in Indonesia as of August 2006. Under the SPP, bank shareholders are only allowed to become controlling shareholders in one single banking institution, which enhances ownership concentration. However, the SPP exempts: (1) a controlling shareholder in two banks that have different lines of businesses (for example a conventional commercial bank and an Islamic bank), (2) a controlling shareholder in two banks one of which is a joint-venture bank, (3) A Bank Holding Company (BHC) that is set up to circumvent the Central Bank regulation concerning the SPP and (4) Temporary stakes by the Indonesian Deposit Insurance Corporation in the framework of bank recovery policies.

In the meantime, Bank Indonesia as the regulator faces challenges in implementing the SPP in banks with different ownership types. The previous literature highlights that bank managers' decisions in terms of risk taking can be influenced by the ownership type of banks. State-owned banks usually tend to erode bank efficiency and to increase risk (Shleifer, 1998; Shleifer and Vishny, 1998). However, Hadad et al (2009) show that state-owned banks in Indonesia are the most efficient ones. Moreover, the presence of foreign ownership is perceived to increase the level of competition in the banking industry and hence to improve bank efficiency (Denizer, 2000; Lensink and Hermes, 2003). Because the impact of ownership type on bank performance remains unclear, we further examine the impact of bank capital on inefficiency, risk, and profitability with respect to bank ownership type. This allows to possibly infer the presence of self-interested managers in each bank ownership type.

Likewise, bank inefficiency with regard to intermediation activities has also become a major problem in Indonesian banks. The *2010 Indonesian Banking Statistics* reports that the cost-to-income ratio, measured by the ratio of operating expenses to operating income, reached 89.5% in 2005 and 92.77 % at the beginning of 2010. Surprisingly, there has yet been no formal analysis explaining such a trend. Through the process our chapter also contributes to better understanding this issue.

The rest of this chapter is organized as follows. Section 2 presents the institutional background. Section 3 describes our data, variables and descriptive statistics. Section 4 presents our hypotheses and econometric model. Section 5 discusses empirical results and section 6 provides robustness checks. Section 7 concludes.

2. Data, variables and descriptive statistics

2.1 Data

At the end of 2007, there are 104 commercial banks operating in Indonesia that consist of 5 state-owned banks, 71 private-owned banks, 18 joint-venture banks, and 11 foreign-owned banks. State-owned commercial banks are commercial banks whose shares are entirely owned by the government. Private-owned commercial banks are owned by private investors. Joint-venture commercial banks are commercial banks founded jointly by two parties: the first group consists of one or more commercial banks based in Indonesia and owned by Indonesian citizens and/or an Indonesian legal entity owned by Indonesian citizens; the second group consists of one or more banks that are domiciled outside the country. The maximum capital allowed for the second group is 85% of total capital in establishing a joint-venture bank. Foreign-owned commercial banks are fully owned by foreign investors.

In this study, we use monthly bank balance sheet and income statement data provided by the Central Bank of Indonesia, for 99 commercial banks covering the 2004-2007 period. Our sample consists of 5 state-owned banks, 65 private-owned banks, 18 joint-venture banks, and 11 foreign-owned banks, representing more than 96% of the total assets of Indonesian commercial banks. We also retrieve macroeconomic-level data from the Bureau of Statistics of Indonesia. Since we intend to analyze the interactions between capital ratios, inefficiency and risk taking, we consider that these variables are simultaneously determined.

Following Altunbas et al. (2007), we define the capital ratio (*EQTA*) as the ratio of equity to total assets. Since this measure is a standard measure of leverage, it allows us to directly deal with possible agency problems between shareholders and managers which can be due to an increase in equity.

Since our focus on bank inefficiency is associated with bank intermediation activities, we account for such inefficiency by two alternative proxies of the cost of intermediation (*INTCOST*). This is because, as argued above, we use monthly data for a relatively short time period and thus, standard measures of inefficiency such as efficiency scores or proxies such as the cost-to-income ratio or the overhead cost ratio are less likely to capture movements in monitoring costs and managers' decisions to raise or reduce interest margins to adjust their risk exposure. Demirgüc-Kunt et al. (2004) use the net interest margin (*NIM*) and the ratio of overhead costs to total assets as proxies of the cost of intermediation to study the impact of market structure, regulation, and institutions on the cost of intermediation. Demirgüc-Kunt and Huizinga (1999), and Dabla-Norris and Floerkemeier (2005) also use a similar approach

using the ratio of net interest income to total assets as the proxy of net interest margin[42]. In this chapter, we therefore focus on the two variables based on the net interest margin and the personnel costs ratio.

As a first step, we measure net interest margin (*NIM*) by computing the ratio of net interest income to total assets. However, an increase in bank net interest margin can also reflect a higher profitability and not necessarily an increase in bank intermediation cost. Therefore, as a second step, we construct a measure of profitability-adjusted bank intermediation cost. Specifically, we use the residual terms of a regression of *NIM* on bank profitability both measured by the return on assets *(ROA)* and the return on equity (*ROE*)[43]. This variable, *RNIM*, is expected to capture movements in the net interest margin that are not related to changes in bank profitability. As a result, our measure captures changes in margin setting behavior and in managers' risk tolerance and/or monitoring effort which are not linked with profitability motivation. For instance, an increase (decrease) in *RNIM* can be interpreted as a *per se* safer (riskier) behavior which is, by construction, uncorrelated with profitability. Identically, an increase in *RNIM* can be understood as more effort to monitor borrowers or more costly monitoring which is not directly motivated by a higher required profitability.

Meanwhile, for the personnel expenses variable, we use the ratio of personnel expenses to gross operating revenue (*PERSON*). *PERSON* reflects all personnel costs related to bank operations including loan monitoring activities. To sum up, the cost of intermediation measure (*INTCOST*) consists, alternately, of *RNIM* or *PERSON*.

Moreover, to capture bank performance (*PERFORM*), we use several alternative proxies associated with bank risk and profitability. To account for default risk, we use the Z-score that indicates the number of standard deviations that the bank's return on equity (*ROE*) has to drop below its expected value before equity is depleted. Thus, a higher Z-score is associated with a lower bank insolvency risk. The Z-score is defined as:

$$ZROE_{i,t} = \frac{1 + MROE_{i,t}}{SDROE_{i,t}}$$

where *SDROE* is the standard deviation of *ROE,* while *MROE* is the average value of *ROE*. Both *SDROE* and *MROE* are computed on the basis of observations of *ROE* from time *t* to *t* −

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[42] An unbiased measure of the pure intermediation margin would be the difference between the lending rate and the cost of deposits. However, such data are not available in the Indonesian banks' income statements. Our measure of the cost of intermediation implicitly assumes that the other interest revenues (e.g on securities) and interest expenses (e.g. on interbank borrowing) reflect competitive markets across banks. This assumption is also introduced by Claeys and Vennet (2008) due to data unavailability.

[43] *ROE* is the ratio of net income to total equity, while *ROA* is the ratio of net income to total assets.

5 (a six period-based rolling window). Alternatively, as a proxy of risk taking, we also consider *SDROE* as the dependent variable. Finally, in order to measure profitability, we draw the measures that are commonly used in the literature. These consist of the return on equity (*ROE*) and the return on assets (*ROA*). To sum up, *PERFORM* is either *ZROE*, *SDROE*, *ROE* or *ROA*.

2.2. The determinants of the capital ratio

We incorporate *INTCOST* as an endogenous regressor even though, as noted by Altunbas et al. (2007), the impact of bank efficiency on bank capital is ambiguous. Meanwhile, since the capital ratio is an indicator of the bank's safety, this ratio can be influenced by either bank risk or profitability. We thus consider bank performance measures (*PERFORM*) as an endogenous regressor.

Bank size can also matter in explaining bank capital management. To account for this dimension, we include the logarithm of bank total assets (*SIZE*) as an explanatory variable. Larger banks hold lower capital ratios due to their comparative advantage in terms of economies of scale in monitoring and screening activities as well as in terms of product diversification. Also, from a safety net perspective (systemic risk) larger banks can be viewed as 'Too-Big-To-Fail' (TBTF) or 'Too-Big-To-Discipline-Adequately' (TBTDA) (Kane 2000; Mishkin 2006)[44]. Thus, we expect a negative relationship between *SIZE* and the capital ratio.

Besides bank size, the capital ratio can also depend on the extent of loan activities in the balance sheet. We therefore include the ratio of loans to total asset (*LOAN*). *LOAN* is expected to have a positive effect on the bank's capital ratio, since more bank capital is needed to cover risk incurred by the loan activities (Jokipii et al., 2008; Ayuso et al., 2004).

In addition, some empirical papers shed light on the procyclicality issue of bank capital (Jokipii et al., 2008; Ayuso et al., 2004; Borio et al., 2001). Following Schaeck and Cihák (2007), we include the growth of gross domestic product (*GDPG*) as one of the determinants of bank capital ratios. *GDPG* is based on the quarterly data of real gross domestic product taken from the Bureau of Statistics of Indonesia.

Bank regulation may also play a crucial role in disciplining banks' behavior (Milne, 2002). Thus, we include a regulatory dummy variable to capture the implementation of the Indonesian Banking Architecture (*IBA*). This dummy variable takes the value of 1 as of June 2005 and 0 otherwise.

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[44] In Indonesia, a formal deposit insurance system was introduced in March 2007.

Finally, as the ownership type of banks can influence bank behaviour in managing their capital ratio (Memmel and Raupach, 2007), we also include four bank ownership dummy variables: state-owned banks (*SOB*), private-owned banks (*POB*), joint-venture banks (*JVB*) and foreign-owned banks (*FOB*), as explanatory variables[45].

2.3. The determinants of the cost of intermediation

Since we intend to analyze the relationship between the capital ratio and bank intermediation cost, we directly include the capital ratio (*EQTA*) as an endogenous regressor. Besides, we also incorporate bank performance (*PERFORM*) as an endogenous regressor, in order to build a simultaneous equations system. However, the expected sign may vary regarding the relationship between bank performance (risk and profitability) and the cost of intermediation. The sign will depend on the expertise of banks' managers to manage and monitor bank portfolios.

In the meantime, several papers show that bank concentration can influence the cost of intermediation (Demirgüc-Kunt and Huizinga, 1999; Demirgüc-Kunt et al., 2004; Naceur and Kandil, 2009, etc). A higher degree of concentration in the banking industry enables banks to increase their lending rate and hence the cost of intermediation. In our study, bank concentration (*CFIVE*) is measured by the total asset share of the five largest banks in the banking system. Market power is also a crucial determinant of the cost of intermediation. There are three hypotheses explaining the link between market structure and the cost of intermediation. First, the *structure-conduct-performance* (SCP) hypothesis emphasizes a positive relationship between a bank's market power and the cost of intermediation due to non-competitive pricing behaviour in a concentrated market. Second, the *relative-market* hypothesis highlights that only banks with higher product differentiation capacity can benefit from non-competitive pricing in a concentrated market (Berger, 1995). Third, the *efficient-structure* hypothesis suggests a negative relationship between operational efficiency and the cost of intermediation. To account for market power and efficiency, we introduce the bank's market share (*MPOW*), measured by the ratio of a bank's total assets to the overall assets of the banking system and the ratio of operating expenses to total assets (*OVERHEAD*) as control variables. The expected sign of *MPOW* is undetermined but the expected relationship

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[45] *SOB* is constructed by assigning a value of 1 when a bank is state-owned, and zero otherwise. *POB, JVB, FOB* are constructed analogically with a value of 1 when a bank is privately owned, joint-venture owned, and foreign owned, respectively, and zero otherwise.

between *OVERHEAD* and the cost of intermediation is positive according to the *efficient-structure* hypothesis (Naceur and Kandil, 2009).

Moreover, we also include the ratio of loans to deposits (*LDR*) as a liquidity measure, wherein deposits consist of demand deposits, saving and time deposits. Higher *LDR* denotes lower bank liquidity indicating that a bank faces the risk of not having sufficient cash reserves to cope with deposit withdrawals. Predictions vary regarding the impact of liquidity on the cost of intermediation. On the one hand, a higher *LDR* can force banks to reduce the cost of intermediation as they intend to reduce non-earning assets (increase loan activities) in order to maintain their profitability (Naceur and Kandil, 2009). The reduction in the cost of intermediation can be also due to competition in the deposit market (Demirgüc-Kunt et al., 2004). On the other hand, a higher *LDR* can encourage banks to increase the cost of intermediation in order to maintain profit when credit demand is limited due to tight conditions on the financial market. We also include the four ownership type dummy variables (*SOB*, *POB*, *JVB*, *FOB*), as bank ownership type may influence the capital ratio, the cost of intermediation, and risk. However, prediction varies with regard to these relationships, since they are empirical in nature.

2.4. The determinants of bank performance

We directly include the ratio of equity to total assets (*EQTA*) and the cost of intermediation measures (*INTCOST*) as endogenous regressors. We also include the ratio of total loans to total assets (*LOAN*). The expected link between *LOAN* and *PERFORM* is positive since loans are at the core of bank risk and profitability. However, this relationship could be negative. Following Bris and Cantale (2004), such a negative relationship can be due to the presence of self-interest managers, where risky but more profitable loans are bypassed by managers who dominate shareholders in bank portfolio allocation decisions. Moreover, we include the ratio of total deposits to total asset (*DTA*), wherein deposits consist of savings, demand deposits and time deposits. Since deposits are insured, a higher *DTA* potentially increases bank moral hazard to fund risky projects. Meanwhile, a higher *DTA* also reflects an increase in leverage risk. Thus, we expect a positive relationship between *DTA* and bank risk, but the link between *DTA* and bank profitability remains ambiguous. The ratio of loan loss provisions to total loans *(LLP)* is also considered as an explanatory variable in the *PERFORM* equation. Since *LLP* is a credit risk measure, we expect a positive relationship between *LLP* and bank risk, but how *LLP* affects bank profitability is undertermined. Finally, we also

incorporate *GDPG* to account for macroeconomic performance, and the four ownership type dummies (*SOB*, *POB*, *JVB*, *POB*), since ownership type may influence bank risk and returns.

2.5. Data selection

We impose several restrictions on our data to ensure that our work is conducted on a clean sample. First, we exclude all negative values of equity since there is no information on whether or not such negative values are related to the government's bailout policy. We have cross-checked these data with data from a different source, Bankscope, and have noticed that equity values provided by Bankscope for such banks are positive. Second, we eliminate the extreme bank/year observations (2.5% highest values) for the ratio of loans to deposits (*LDR*), since *LDR* has a right-skewed distribution. For the return on equity ratio (*ROE*) and the ratio of personnel expenses to gross operating revenue (*PERSON*), we exclude their 2.5% lowest and 2.5% highest values, since their distribution exhibits very long tails on both sides. Finally, we also exclude all values above 100% for the ratio of deposits to total assets (*DTA*).

2.6. Descriptive statistics

The descriptive statistics are reported in Table 1 while correlations are detailed in Table 2. The variables do not exhibit major colinearity issues, except for *MPOW* and *SIZE* or *DTA* and *ROE* which we do not concurrently use as regressors in our estimations.

Insert Table 1 and 2 here

3. Hypotheses and econometric specification

3.1. Hypotheses

The objective of this chapter is twofold. First, we examine if there might be a self-interested manager effect in Indonesian banks by scrutinizing the link between capital, the cost of intermediation, risk, and profitability; second, we seek to identify banks' ownership types which are more likely to suffer from a possible managerial self-interest problem.

Regarding the first objective, we test the following hypothesis based on the theoretical contribution of Bris and Cantale (2004):

Hypothesis 1: *Managers in Indonesian banks are likely to be self-interested; if so, a higher capital adequacy ratio would be associated with an increase in the cost of intermediation due*

to monitoring costs borne by bank managers who behave conservatively by increasing the safety of loan portfolios but by making them less profitable.

Hypothesis 1 is not rejected if a higher capital ratio is associated with an increase in the cost of intermediation but a decrease in risk and profitability. In such a case, we conclude that there is a strong presumption that managers are likely to be self-interested[46]. To examine Hypothesis 1, we construct the following simultaneous equations model.

$$
\begin{aligned}
EQTA_{i,t} &= \alpha_{0i} + \alpha_1 INCOST_{i,t} + \alpha_2 PERFORM_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LOAN_{i,t} \\
&\quad + \alpha_5 GDPG_t + \alpha_6 IBA_t + \alpha_7 SOB_i + \alpha_8 POB_i + \alpha_9 JVB_i + \alpha_{10} FOB_i + \gamma_{i,t} \\
INTCOST_{i,t} &= \beta_{0i} + \beta_1 EQTA_{i,t} + \beta_2 PERFORM_{i,t} + \beta_3 CFIVE_t + \beta_4 MPOW_{i,t} \\
&\quad + \beta_5 OVERHEAD_{i,t} + \beta_6 LDR_{i,t} + \beta_7 SOB_i \\
&\quad + \beta_8 POB_i + \beta_9 JVB_i + \beta_{10} FOB_i + \varepsilon_{i,t} \\
PERFORM_{i,t} &= \delta_{0i} + \delta_1 EQTA_{i,t} + \delta_2 INTCOST_{i,t} + \delta_3 LOAN_{i,t} + \delta_4 DTA_{i,t} \\
&\quad + \delta_5 LLP_{i,t} + \delta_6 GDPG + \delta_7 SOB_i + \delta_8 POB_i + \delta_9 JVB_i + \delta_{10} FOB_i + \omega_{i,t}
\end{aligned}
\tag{1}
$$

The set of exogenous regressors consists of *SIZE, LOAN, GDPG, IBA, SOB, POB, JVB, FOB, CFIVE, MPOW, OVERHEAD, LDR, DTA,* and *LLP.*

The simultaneous equations model in System (1) is comparable to prior models on bank capital, efficiency and risk (Altunbas et al., 2007; Kwan and Eisenbeis, 1997). Under Hypothesis 1, β_1 and δ_1 are expected to be positive and negative respectively. There are three structural equations in (1), where $\gamma_{i,t}$, $\varepsilon_{i,t}$ and $\omega_{i,t}$ are residual terms, and α_{0i}, β_{0i} and δ_{0i} are individual fixed effects. The variables *EQTA, INTCOST* and *PERFORM* are endogenously determined. The first equation (*EQTA)* contains the factors that are expected to influence banks' capital ratios. In the second equation (*INTCOST*), we attempt to examine whether a higher capital ratio (*EQTA*) is associated with an increase in the cost of intermediation. In the third equation (*PERFORM*), we examine whether a higher capital ratio is associated with a decrease in risk and profitability. If bank managers are more likely to be self-interested, we should find $\beta_1 > 0$ and $\delta_1 < 0$: a higher capital ratio is associated with an increase in the cost of intermediation, but a decrease in risk and profitability.

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[46] To cope with self-interested managers, Bris and Cantale (2004) set a condition in which bank shareholders need to offer managers an optimal compensation package to restore efficiency. This compensation package is a function of managers' efforts. However, this issue is beyond the scope of our chapter.

It is also well admitted that bank managerial decision and bank risk taking can be influenced by the ownership type and ownership structure of banks (Iannotta et al., 2007; Barry et al., 2011). Ownership types that received a particular attention in Indonesian commercial banks are state-owned banks (*SOB*), private-owned banks (*POB*), joint-venture banks (*JVB*), and foreign-owned banks (*FOB*). Our second objective is therefore to investigate whether such relationships depend on the ownership type of banks. For this purpose, we specify Hypothesis 2 as follows:

Hypothesis 2 : *The impact of a higher capital adequacy ratio on the cost of intermediation, risk and profitability is not similar for banks with different ownership types.*

Therefore, we attempt to reject the null:

$$H_0 : \begin{cases} \beta_{1S} = \beta_{1P} = \beta_{1JV} = \beta_{1F} \\ \text{and} \\ \delta_{1S} = \delta_{1P} = \delta_{1JV} = \delta_{1F} \end{cases}$$

in the following model (2) in which interaction variables are added to capture such differential effects:

$$
\begin{aligned}
EQTA_{i,t} &= \alpha_{0i} + \alpha_1 INTCOST_{i,t} + \alpha_2 PERFORM_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LOAN_{i,t} \\
&\quad + \alpha_5 GDPG_t + \alpha_6 IBA_t + \alpha_7 SOB_i + \alpha_8 POB_i + \alpha_9 JVB_i + \alpha_{10} FOB_i + \gamma_{i,t} \\
INTCOST_{i,t} &= \beta_{0i} + \beta_{1S} SOB_i * EQTA_{i,t} + \beta_{1P} POB_i * EQTA_{i,t} + \beta_{1JV} JVB_i * EQTA_{i,t} \\
&\quad + \beta_{1F} FOB_i * EQTA_{i,t} + \beta_5 PERFORM_{i,t} + \beta_6 CFIVE_t + \beta_7 MPOW_{i,t} \qquad (2) \\
&\quad + \beta_8 OVERHEAD_{i,t} + \beta_9 LDR_{i,t} + \varepsilon_{i,t} \\
PERFORM_{i,t} &= \delta_{0i} + \delta_{1S} SOB_i * EQTA_{i,t} + \delta_{1P} POB_i * EQTA_{i,t} + \delta_{1JV} JVB_i * EQTA_{i,t} \\
&\quad + \delta_{1F} FOB_i * EQTA_{i,t} + \delta_5 INTCOST_{i,t} + \delta_6 LOAN_{i,t} + \delta_7 DTA_{i,t} \\
&\quad + \delta_8 LLP_{i,t} + \delta_9 GDPG_t + \omega_{i,t}
\end{aligned}
$$

3.2. Econometric method

In estimating System (1), we attempt to overcome various econometric problems that may arise. First, we handle endogeneity issues regarding all our variables using the Generalized Method of Moments (GMM) for two reasons: this method is robust to the errors distribution and is considered as more efficient than Two-Stages Least Squares (2SLS) because it accounts for heteroskedasticity (Hall, 2005). Second, the right-hand side of each equation in System (1) comprises four time-invariant variables related to bank ownership type

(*SOB*, *POB*, *JVB*, and *FOB*). In this regard, individual fixed effects could not be taken directly into account in the GMM estimation. Meanwhile, correction for individual fixed effects is essential to tackle the problem of possible omitted variables. To deal with this problem, we follow Plumper and Troeger (2007)[47]. Third, and most probably, the three errors are cross – correlated in System (1). Therefore, we opt for a simultaneous equations approach in solving System (1) with a covariance matrix which accounts for cross equation errors correlation.

4. Empirical results

Tables 3 and 4 sum up the results of the GMM estimation of System (1) when we use respectively the profitability-adjusted net interest margin (*RNIM*) and the ratio of personnel expenses to operating income ratio (*PERSON*) as proxies for the cost of intermediation. In regressions 1 to 4 we alternately consider the four definitions of *PERFORM* that consist of risk and profitability proxies (*ZROE*, *SDROE*, *ROE* and *ROA*).

Insert Table 3 and Table 4 here

To assess Hypothesis 1, we proceed in two steps. First, we examine the relationship between *EQTA* and bank intermediation cost measured by both the profitability-adjusted net interest margin (*RNIM*) and the personnel expenses ratio (*PERSON*). Second, we examine the relationship between *EQTA* and bank risk (*ZROE* or *SDROE*) and profitability (*ROE* or *ROA*).

In the first step, Table 3 shows that a higher capital ratio is associated with an increase in the cost of intermediation. Such a relationship is shown by the positive significant coefficients associating *EQTA* and *RNIM* in Regression 1 to 3 at the 1% significance level. We also find a positive significant relationship between *EQTA* and the personnel expenses ratio (*PERSON*) at the 1% significance level, as shown in Regression 1, 2 and 4 in Table 4.

In the second step, we examine the link between the capital ratio and performance. Table 3 shows that a higher capital ratio is associated with a decrease in insolvency risk (*ZROE*), risk taking (*SDROE*), and profitability (*ROE* and *ROA*) as shown in Regressions 1 to 4. In Table 4, we also find similar relationships, although *EQTA* is not significant in the *ROA* equation.

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[47] As a first step all the variables are centred on their individual means, such that all time invariant regressors disappear. Then, we estimate individual fixed effects which are, in turn, regressed on time invariant regressors. We obtain the unexplained components of fixed effects which are, eventually, jointly reintroduced in the model with the full set of regressors (both time varying and non-time varying).

On the basis of these two procedures, Hypothesis 1 cannot be rejected and hence, according to our results, there is a strong presumption that bank managers are likely to be self-interested. In other words, bank managers might be driving banks to become safer but unfortunately less profitable, since more risky but also more profitable loans are bypassed.

To investigate whether the behaviour of managers is similar in banks with different ownership types, we consider the results obtained by estimating System (2). The interaction terms associating *EQTA* and the four ownership dummies are the key variables for this purpose. Tables 5 and 6 summarize results with *RNIM* and *PERSON* as proxies of the intermediation cost respectively.

Insert Table 5 and Table 6 here

In state-owned banks, a higher capital ratio is associated with an increase in the cost of intermediation measured by the profitability-adjusted net interest margin (*RNIM*) and the personnel expense ratio (*PERSON*) as shown in Tables 5 and 6, respectively. However, there is no significant impact of the capital ratio on risk and profitability of state-owned banks. Such findings may highlight that state-owned banks exhibit greater intermediation cost when the capital ratio increases. However, there is no presumption regarding the possible presence of self-interested managers in state-owned banks.

In private-owned banks, a higher capital ratio is associated with an increase in the cost of intermediation, as measured by either *RNIM* (Table 5 – Regressions 1) or *PERSON* (Table 6 – Regressions 2 and 3). A higher capital ratio is also associated with a decrease in risk, measured by either *ZROE* (Table 5 – Regressions 1; and Table 6 – Regression 1) or *SDROE* (Table 5 – Regression 2). Moreover, there is also a negative relationship between the capital ratio and bank profitability as shown in both Table 5 (Regressions 3 and 4) and Table 6 (Regression 3). Therefore, for private-owned banks Hypothesis 1 is not rejected and hence, we can suspect the presence of self-interested managers in such institutions.

For joint-venture banks, the capital ratio is significantly and positively linked to the profitability-adjusted net interest margin, as shown in Table 5 (Regressions 1, 3 and 4), but negatively related to the personnel expense ratio as shown in Table 6 (Regressions 1, 3, and 4). From Table 5 (Regressions 1 and 2), an increase in the capital ratio positively affects insolvency risk and risk taking. Meanwhile, there is a weak negative relationship between the capital ratio and bank profitability (Table 5 – Regression 3; and Table 6 – Regression 3).

These relationships indicate that the managerial self-interest problems are less likely to exist in joint-venture banks.

Finally, for foreign-owned banks, Table 6 (Regressions 1 and 3) shows that a higher capital ratio is associated with an increase in the personnel expense ratio. Meanwhile, there is a positive relationship between the capital ratio and insolvency risk (Table 5 – Regression 1). Similarly to joint-venture banks, the positive link between bank capital and risk also holds for foreign-owned banks as shown in Table 6 (Regression 2). In addition, a higher capital ratio is also associated with an increase in profitability (Table 5 - Regression 4, and Table 6 - Regression 3). Similarly to joint-venture banks, the managerial self-interest problems are less likely to exist in foreign-owned banks.

On the whole, our findings show that there is at least one ownership type (private-owned banks) in which the presence of self-interest managers can be suspected. Hypothesis 2 therefore holds as the null (H_0) is rejected. Such commercial banks are dominant in Indonesia (71 banks out of a total of 104 commercial banks) and in our sample (65 banks out of a total of 99 banks).

5. Robustness checks

Beyond the use of various measures of inefficiency, risk and profitability to ensure the robustness of our results, we also consider alternative estimation methods and other specifications for the simultaneous equations model. First, instead of using the GMM method to estimate (2) and (5), we use the two stages least squares (2SLS) method and the three stage least squares (3SLS) method. Our main results remain identical. Second, we introduce four ownership dummies (*SOB*, *POB*, *JVB*, and *FOB*) into each structural equation in System (2). Hence, System (2) has to be estimated by using the method of Plumper and Troeger (2007). Here again, our main results remain unchanged.

Moreover, we change our proxy of bank risk following Boyd et al. (2006) which allow the *Z-score* to be volatile in each period. However, we use *ROE* instead of drawing the ratio of net income to total assets (*ROA*) used by Boyd et al. (2006). Formally let *i* be a bank index and *t* be a period index, then the alternative *Z-score* is defined as

$$ZROE^{*}_{i,t} = \frac{1 + ROE_{i,t}}{ADROE_{i,t}},$$

where $ADROE_{i,t} = \left| ROE_{i,t} - \frac{1}{T}\sum_{t} ROE_{i,t} \right|$ is bank i time specific absolute deviation of the return on equity (*ROE*). The average of *ROE* is computed for the full sample period and a

different value of *ADROE* is assigned for each period. Besides *ZROE**, we examine another risk measure defined as the logarithm of the absolute deviation of the return on equity (*LNADROE*) in a bank for each period. A higher value of *LNADROE* is associated with an increase in asset risk due to risk-taking strategies that increase income volatility. Using these alternative risk measures and performing the GMM estimations for System (1) and (2), our main results discussed in Section 5 remain consistent.

Finally, we consider *NIM* (the ratio of net interest income to total assets) as another proxy of the cost of intermediation. This procedure is consistent with Demirgüç-Kunt et al (2004). By conducting the GMM, 2SLS, and 3SLS for System (1) and (2), our main findings are not altered.

6. Conclusion

This chapter provides empirical evidence on the link between bank capital and performance under the managerial self-interest hypothesis which, to our knowledge, has not been empirically explored in the literature. In order to capture the presence of self-interested managers, we consider that a higher cost of intermediation or higher inefficiency due to an excessive reliance on monitoring following an increase in capital leading to lower profitability could be associated with a higher degree of managerial self-interest.

Our GMM estimations applied on monthly Indonesian data for the 2004-2007 period show that managers in Indonesian banks are likely to be self-interested. A deeper investigation shows that among the different bank ownership categories, private-owned banks are the ones which actually suffer from the presence of self-interested managers. Therefore, in the case of Indonesia any policy aiming to enforce shareholder domination, for instance through the *Single Presence Policy*, should take private-owned banks into very close consideration. Such a policy should mitigate inefficiency problems in private-owned banks due to the presence of self-interested managers but also aim to enhance the bank ownership consolidation process, since most of Indonesian banks are private-owned banks.

Table 1. Descriptive statistics for the overall period of study

Variables	Definition	Mean	Median	Maximum	Minimum	Standard Deviation
SIZE	The logarithm of bank's total asset (total asset is expressed in billion Rupiah)	14.543	14.413	19.531	9.466	1.982
EQTA	The ratio of equity to total asset	0.1572	0.1218	0.9961	0.000068	0.1266
ROE	The ratio of net income to equity	0.0126	0.0098	0.1895	-0.0653	0.0233
ZROE	The Z-score based on ROE	243.65	144.52	5078.34	6.69	303.55
SDROE	The standard deviation of ROE based on the six months rolling windows.	0.0129	0.0069	0.1583	0.0002	0.0157
ROA	The ratio of net income to total asset	0.0019	0.0017	0.2068	-0.1327	0.0071
NIM	The ratio of net interest income to total asset	0.0043	0.0042	0.1489	-0.1007	0.0054
PERSON	The ratio of personnel expense to operating revenue	0.3668	0.3423	1.298	0.00064	0.1852
LDR	The ratio of total loan to total deposit	1.5191	1.2536	9.0103	0.00099	1.0764
CFIVE	The total asset share of the five biggest banks in the banking industry	0.5668	0.5575	0.6081	0.5419	0.0191
MPOW	The bank's asset share in the banking industry	0.0103	0.0014	0.2258	0.000011	0.0272
OVERHEAD	The ratio of operating expense to total asset	0.0084	0.0079	0.1248	0.00054	0.0049
GDPG	The quarterly growth of the real gross domestic product	0.0463	0.0534	0.0708	0.0035	0.0223
LOAN	The ratio of total loan to total asset	0.5499	0.5795	0.9831	0.00033	0.1943
DTA	The ratio of total deposits to total asset	0.6742	0.7436	0.9191	0.6327	0.1943
LLP	The ratio of loan loss provision to total loan	0.0462	0.0251	0.8073	0.00074	0.2042
IBA	The Indonesian Banking Architecture dummy takes 1 after June 2005.	0.6458	1	1	0	0.4783
SOB	The state-owned bank dummy	0.0505	0	1	0	0.219
POB	The private-owned bank dummy	0.6566	1	1	0	0.4749
JVB	The joint-venture bank dummy	0.1818	0	1	0	0.3857
FOB	The foreign-owned bank dummy	0.1111	0	1	0	0.3143

Table 2. Pairwise Correlations

	SIZE	EQTA	ROE	ZROE	SDROE	ROA	NIM	PERSON	LDR	CFIVE	MPOW	OVERHEAD	GDPG	LOAN	DTA	LLP	IBA
SIZE	1																
EQTA	-0.4120	1.0000															
ROE	0.2403	-0.1815	1.0000														
ZROE	-0.0122	0.0746	-0.0174	1.0000													
SDROE	0.0504	-0.1385	0.3248	-0.2861	1.0000												
ROA	0.0800	0.0325	0.5644	0.0155	0.1731	1.0000											
NIM	-0.1875	0.1392	0.1076	-0.0017	0.0184	0.1139	1.0000										
PERSON	-0.2555	0.0376	-0.2712	-0.0265	0.0945	-0.2854	0.0686	1.0000									
LDR	-0.0141	-0.1695	0.0143	-0.0049	0.0482	-0.0492	-0.0895	0.1224	1.0000								
CFIVE	-0.0864	0.0124	0.0970	0.0035	0.0525	0.0244	0.0521	0.1010	0.0607	1.0000							
MPOW	0.6388	-0.1595	0.0877	-0.0089	-0.0090	0.0211	-0.1212	-0.0591	0.0982	-0.0014	1.0000						
OVERHEAD	-0.1941	-0.0221	-0.0782	-0.0394	0.1243	-0.1310	0.1321	0.2287	-0.0351	-0.0895	-0.0846	1.0000					
GDPG	-0.0289	0.0014	0.0104	-0.0069	-0.0244	-0.0056	0.0101	-0.0031	0.0048	0.0406	-0.0048	-0.0459	1.0000				
LOAN	-0.0716	-0.0893	-0.0386	-0.0218	-0.0981	-0.0152	0.1701	-0.1068	-0.5484	-0.0457	-0.1711	0.1662	0.0107	1.0000			
DTA	0.1465	-0.5074	0.0402	-0.0564	0.0092	-0.0965	-0.0107	0.0805	0.3382	0.0373	0.1304	0.1631	0.0154	0.0895	1.0000		
LLP	-0.0015	0.1773	0.0158	0.0100	0.0454	0.0399	-0.0544	0.1117	0.0525	0.1952	0.0887	-0.0842	0.0377	-0.2187	-0.2199	1.0000	
IBA	0.0862	-0.0142	-0.0995	-0.0068	-0.0286	-0.0215	-0.0571	-0.1109	-0.0618	-0.8628	0.0040	0.1184	-0.0719	0.0475	-0.0331	-0.1894	1.0000

Table 3. Regression outputs with *RNIM* as the measure of the cost of intermediation

The models are estimated using *Generalized Method of Moments* (GMM) in a simultaneous equations system with individual fixed effects. (***), (**) and (*) indicate significance at the 1 %, 5% and 10% levels, respectively. The *t-statistics* are reported in parentheses. Endogenous variables are the capital ratio (*EQTA*), the profitability-adjusted net interest margin measure (*RNIM*), insolvency risk (*ZROE*), risk-taking (*SDROE*) and profitability (*ROE* and *ROA*). The bold fonts are introduced to assess Hypothesis 1: *a higher capital ratio is associated with an increase in the cost of intermediation, but a decrease in risk and profitability*. Regression 1 uses *ZROE* as the dependent variable in the *PERFORM* equation as shown in (1), while Regressions 2, 3, and 4 respectively use *SDROE, ROE*, and *ROA* .

Variables	Regression 1			Regression 2			Regression 3			Regression 4		
	EQTA	RNIM	ZROE	EQTA	RNIM	SDROE	EQTA	RNIM	ROE	EQTA	RNIM	ROA
RNIM	75.773***		-32131***	44.901***		1.619***	40.957***		4.441***	31.211**		0.3791***
	(9.129)		(-3.937)	(7.362)		(6.113)	(4.556)		(5.475)	(2.461)		(3.489)
SIZE	-0.021***			-0.092***			-0.029***			-0.038***		
	(-3.835)			(-15.512)			(-6.318)			(-6.766)		
GDPG	-0.0145		-46.001	-0.1011		0.0047	-0.1721		0.0049	0.2209		0.0012
	(-0.2083)		(-0.3146)	(-0.9349)		(0.8651)	(-1.306)		(0.3308)	(1.231)		(0.4292)
IBA	0.0256***			0.0314***			0.0277*			-0.0229		
	(2.875)			(5.523)			(1.808)			(-1.577)		
ZROE	0.0006***	-6.1E-06**										
	(5.148)	(-2.571)										
SDROE				-18.03***	0.2131**							
				(-11.049)	(2.059)							
ROE							-3.869***	0.2055**				
							(-2.23)	(2.044)				
ROA										-128.9***	-0.947***	
										(-6.616)	(-3.405)	
EQTA		**0.0067***	**666.18***		**0.0061***	**-0.019***		**0.0235***	**-0.108***		-0.00069	**-0.023***
		(4.898)	(3.819)		(5.004)	(-3.793)		(3.457)	(-8.607)		(-0.6933)	(-7.784)
CFIVE		0.0044*			0.0048			-0.0082			0.0193***	
		(1.826)			(0.6973)			(-0.6351)			(5.439)	
MPOW		-0.0177***			-0.015***			0.0028			-0.008***	
		(-8.029)			(-4.449)			(0.9486)			(-4.117)	
OVERHEAD		-0.0147			-0.1013			-0.0932**			-0.187***	
		(-0.5291)			(-1.251)			(-2.242)			(-4.849)	

Continued

LDR		-0.0003***			-0.001***			-4E-04***			-0.001***	
		(-5.618)			(-3.385)			(-2.643)			(-7.327)	
LOAN	-0.329***		184.85***	-0.307***		-0.012***	-0.167***		-0.023***	0.0667		-0.006***
	(-8.618)		(2.771)	(-8.373)		(-5.426)	(-3.919)		(-4.694)	(0.8693)		(-5.767)
LLP			-63.815			0.0109***			0.0135**			-0.005***
			(-0.9593)			(5.56)			(2.567)			(-3.754)
DTA			22.966			0.0056***			-0.034***			-0.008***
			(0.4981)			(3.227)			(-9.231)			(-9.462)
SOB	0.7196***	-0.0024	-36.781	2.285***	-0.0058*	0.0218***	0.9137***	-0.0035	0.0732***	1.117***	-0.008***	0.0142***
	(6.673)	(-1.55)	(-0.3597)	(19.088)	(-1.823)	(6.336)	(14.484)	(-0.7009)	(9.513)	(14.031)	(-5.386)	(8.394)
POB	0.4569***	-0.0011	52.434	1.795***	-0.0037	0.016***	0.6817***	0.0008	0.0636***	0.8083***	-0.007***	0.0137***
	(4.916)	(-0.6564)	(0.5801)	(19.027)	(-0.9919)	(5.291)	(13.716)	(0.1413)	(9.362)	(12.132)	(-4.326)	(8.692)
JVB	0.5999***	-0.0023	-46.611	1.955***	-0.0053	0.0194***	0.8119***	-0.0025	0.0683***	1.056***	-0.007***	0.0153***
	(6.563)	(-1.541)	(-0.4712)	(19.757)	(-1.569)	(5.891)	(15.939)	(-0.4943)	(9.12)	(13.289)	(-4.871)	(8.802)
FOB	0.5381***	-0.0024*	-36.781	2.262***	-0.009***	0.0389***	0.7077***	-0.0013	0.0902***	0.8577***	-0.008***	0.011***
	(6.641)	(-1.67)	(-1.454)	(17.789)	(-3.869)	(14.058)	(12.704)	(-0.2849)	(12.73)	(11.01)	(-4.891)	(8.539)
J-Statistic	0.0072	0.0072	0.0072	0.0102	0.0102	0.0102	0.0034	0.0034	0.0034	0.0075	0.0075	0.0075
N	3488	3488	3488	3488	3488	3488	3906	3906	3906	3906	3906	3906

Table 4. Regression outputs with *PERSON* as the measure of the cost of intermediation

The models are estimated using *Generalized Method of Moments* (GMM) in a simultaneous equations system with individual fixed effects. (***), (**) and (*) indicate significance at the 1 %, 5% and 10% levels, respectively. The *t-statistics* are reported in parentheses. Endogenous variables are capital ratio (*EQTA*), personnel expenses ratio (*PERSON*), insolvency measure (*ZROE*), risk-taking measure (*SDROE*) and profitability measure (*ROE* and *ROA*). The bold fonts are introduced to assess Hypothesis 1: *a higher capital ratio is associated with an increase in the cost of intermediation, but a decrease in risk and profitability*. Regression 1 uses *ZROE* as the dependent variable in the *PERFORM* equation shown in (1), while Regressions 2, 3, and 4 respectively use *SDROE, ROE*, and *ROA* .

Variables	Regression 1			Regression 2			Regression 3			Regression 4		
	EQTA	PERSON	ZROE	EQTA	PERSON	SDROE	EQTA	PERSON	ROE	EQTA	PERSON	ROA
PERSON	1.132		-461.33***	-0.0042		0.0387***	-0.879***		0.1127***	-0.805***		0.0138***
	(0.9777)		(-5.691)	(-0.0639)		(12.344)	(-16.227)		(5.777)	(-6.335)		(5.227)
SIZE	0.0232			-0.129***			-0.15***			-0.109***		
	(0.2259)			(-16.187)			(-20.485)			(-7.377)		
GDPG	-0.2511		-34.859	-0.1426*		0.0031**	-0.419***		0.0205	-0.1503		-0.0035
	(-0.475)		(-0.4877)	(-1.874)		(2.429)	(-4.127)		(1.079)	(-1.622)		(-0.8979)
IBA	-0.0073			0.00603			0.0133*			0.0153**		
	(-0.897)			(1.424)			(1.832)			(2.085)		
ZROE	0.0018	-0.0013***										
	(1.174)	(-7.95)										
SDROE				-18.96***	18.159***							
				(-11.308)	(4.285)							
ROE							0.2505	-13.82***				
							(0.2272)	(-10.679)				
ROA										15.74*	-12.61*	
										(1.693)	(-1.759)	
EQTA		**0.6353***	**518.49***		**0.2776***	**-0.0173***		**-0.0109**	**-0.126***		**0.3954***	**2.18E-05**
		(5.761)	(4.714)		(3.443)	(-4.096)		(-0.1386)	(-9.239)		(5.781)	(0.008)
CFIVE		0.5893***			0.4263***			2.577***			1.155***	
		(5.714)			(3.191)			(12.3)			(7.869)	
MPOW		-1.286***			-0.3822*			-2.739***			-2.725***	
		(-5.769)			(-1.748)			(-6.863)			(-8.984)	
OVERHEAD		-0.3309			2.675*			-1.559			2.291**	
		(-0.7285)			(1.888)			(-0.7533)			(2.217)	

Continued

	1	2	3	4	5	6	7	8	9	10	11	12
LDR		-0.0019			-0.023***			-0.024***			0.0128***	
		(-0.5202)			(-2.912)			(-2.919)			(4.079)	
LOAN	0.049		71.876**	-0.103***		-0.0061***	-0.0044		-0.025***	0.1087**		-0.005***
	(0.1586)		(1.982)	(-5.684)		(-6.337)	(-0.2422)		(-7.277)	(2.469)		(-4.961)
LLP			56.557			0.0017**			-0.035***			0.0012
			(1.212)			(2.358)			(-3.339)			(0.4708)
DTA			47.484**			0.0015			-0.069***			-0.0076***
			(2.196)			(0.9817)			(-8.192)			(-6.559)
SOB	-1.076	0.3221***	244.59***	2.782***	-0.162***	0.0054***	3.159***	-0.655***	0.0548***	2.291***	-0.1794*	0.0043***
	(-0.438)	(5.403)	(6.563)	(18.213)	(-2.692)	(3.275)	(24.583)	(-6.228)	(12.91)	(7.562)	(-1.706)	(6.442)
POB	-1.118	0.3233***	294.27***	2.235***	-0.0844	0.0011	2.607***	-0.868***	0.052***	1.896***	-0.341***	0.0046***
	(-0.523)	(5.097)	(7.644)	(18.227)	(-1.396)	(0.7112)	(24.835)	(-8.401)	(12.781)	(7.643)	(-3.782)	(6.41)
JVB	-0.894	0.1313**	178.91***	2.397***	-0.203***	0.0063***	2.716***	-0.963***	0.0593***	1.957***	-0.435***	0.0057***
	(-0.439)	(2.177)	(5.219)	(18.727)	(-3.579)	(3.828)	(25.451)	(-9.604)	(13.534)	(7.496)	(-5.236)	(7.456)
FOB	-0.8689	0.1153**	157.29***	2.762***	-0.429***	0.0204***	2.679***	-0.2592**	0.0704***	1.983***	-0.277***	0.0039***
	(-0.413)	(2.065)	(4.893)	(17.611)	(-6.581)	(13.19)	(26.303)	(-2.502)	(15.696)	(7.062)	(-3.376)	(6.851)
J-Statistic	0.00203	0.00203	0.00203	0.0039	0.0039	0.0039	0.0146	0.0146	0.0146	0.0095	0.0095	0.0095
N	3528	3528	3528	3528	3528	3528	3873	3873	3873	4001	4001	4001

Table 5. Regression outputs to analyze the influence of banks ownership type when *RNIM* is used as the measure of the cost of intermediation

The models are estimated using *Generalized Method of Moments* (GMM) in a simultaneous equations system with individual fixed effects. (***), (**) and (*) indicate significance at the 1 %, 5% and 10% levels, respectively. The *t-statistics* are reported in parentheses. Endogenous variables are capital ratio (*EQTA*), the profitability-adjusted net interest margin (*RNIM*), insolvency measure (*ZROE*), risk-taking measure (*SDROE*) and profitability (*ROE* and *ROA*). The bold fonts are introduced to assess Hypothesis 2: *There is a different impact of a higher capital ratio on the cost of intermediation, risk and profitability among banks with a different ownership type.* Regression 1 uses *ZROE* as the dependent variable in the *PERFORM* equation shown in System (1), while Regressions 2, 3, and 4 respectively use *SDROE, ROE*, and *ROA* .

	Regression 1			Regression 2			Regression 3			Regression 4		
Variables	EQTA	RNIM	ZROE	EQTA	RNIM	SDROE	EQTA	RNIM	ROE	EQTA	RNIM	ROA
RNIM	40.051***		14323.63	20.549*		-0.6759	41.852***		3.839**	40.602***		0.0917
	(3.949)		(0.7045)	(1.679)		(-0.7349)	(4.429)		(2.442)	(4.088)		(0.3561)
SIZE	-0.0323**			-0.097***			-0.0412**			-0.0220		
	(-2.151)			(-5.343)			(-2.537)			(-1.065)		
GDPG	-0.0599		0.8819	-0.0528		0.00047	-0.2851**		-0.0119	-0.192		-0.0036
	(-0.4350)		(0.0041)	(-0.4172)		(0.0491)	(-1.978)		(-0.6819)	(-1.569)		(-1.141)
IBA	0.0106			0.0133			0.0538***			0.0337***		
	(0.8273)			(1.393)			(3.591)			(2.753)		
ZROE	0.0012***	-3.5E-05***										
	(4.759)	(-3.505)										
SDROE				-18.31***	0.0473							
				(-5.319)	(0.1939)							
ROE							0.5889	0.1779***				
							(0.2428)	(2.737)				
ROA										-17.119	0.6319**	
										(-1.264)	(2.384)	
*EQTA*SOB*		0.1164	5373.82		0.2814	0.0517		0.1893**	-0.1647		0.3255**	-0.0159
		(0.6522)	(0.9837)		(0.9949)	(0.2048)		(2.013)	(-0.4468)		(2.435)	(-0.3138)
*EQTA*POB*		0.0148**	4843.47***		0.0017	-0.174***		-0.00301	-0.1934*		0.0076	-0.053***
		(2.387)	(3.576)		(0.1186)	(-2.608)		(-0.6910)	(-1.668)		(1.456)	(-2.919)
*EQTA*JVB*		0.0199***	-1087.63**		0.0054	0.0849***		0.0222***	-0.0901*		0.0157***	-0.0025
		(3.285)	(-2.103)		(0.3285)	(2.819)		(4.416)	(-1.947)		(3.767)	(-0.2835)
*EQTA*FOB*		-0.1453	-27947**		0.1401	0.9369		0.1834	1.076		0.2599	0.3936**
		(-0.7854)	(-1.963)		(0.2728)	(1.442)		(1.568)	(1.085)		(1.683)	(2.509)

Continued												
CFIVE		-0.0094			0.0032			-0.0086			0.0035	
		(-0.9017)			(0.279)			(-0.9073)			(0.4955)	
MPOW		-0.0053			0.0821			0.0598**			0.1036**	
		(-0.0924)			(0.6266)			(2.017)			(2.033)	
OVERHEAD		-0.0629			0.0671			0.0043			0.0158	
		(-0.9238)			(0.5087)			(0.2262)			(0.7826)	
LDR		-0.0007***			-0.00045			-0.00013			-0.00014	
		(-2.743)			(-0.4364)			(-0.6303)			(-0.5983)	
LOAN			50.748	-0.1846***		-0.0066	-0.0955**		-0.0083	-0.0774		0.00026
			(0.5505)	(-3.554)		(-1.425)	(-2.136)		(-1.245)	(-1.596)		(0.1869)
LLP			-800.92***			0.0428***			0.0317*			0.0045
			(-3.282)			(3.329)			(1.659)			(1.225)
DTA			740.91**			-0.0119			-0.0434*			-0.0086**
			(2.085)			(-0.7272)			(-1.667)			(-2.067)
J-statistic	0.007	0.007	0.007	0.009	0.009	0.009	0.0153	0.0154	0.0155	0.0158	0.0158	0.0158
N	3488	3488	3488	3489	3490	3491	3906	3907	3908	3906	3907	3908

Table 6. Regression outputs to analyze the influence of banks ownership type with *PERSON* as the measure of the cost of intermediation

The models are estimated using *Generalized Method of Moments* (GMM) in a simultaneous equations system with individual fixed effects. (***), (**) and (*) indicate significance at the 1 %, 5% and 10% levels, respectively. The *t-statistics* are reported in parentheses. Endogenous variables are capital ratio (*EQTA*), the personnel expenses ratio (*PERSON*), insolvency measure (*ZROE*), risk-taking measure (*SDROE*) and profitability (*ROE* and *ROA*). The bold fonts are introduced to assess Hypothesis 2: *There is a different impact of a higher capital ratio on the cost of intermediation, risk and profitability among banks with a different ownership type.* Regression 1 uses *ZROE* as the dependent variable in the *PERFORM* equation shown in System (1), while Regressions 2, 3, and 4 respectively use *SDROE*, *ROE*, and *ROA*.

Variables	Regression 1			Regression 2			Regression 3			Regression 4		
	EQTA	*PERSON*	*ZROE*	*EQTA*	*PERSON*	*SDROE*	*EQTA*	*PERSON*	*ROE*	*EQTA*	*PERSON*	*ROA*
PERSON	2.148		-288.35	-0.1982		0.0417***	-1.191***		0.0809**	-0.4877**		0.0205***
	(1.018)		(-1.458)	(-0.5128)		(5.127)	(-4.454)		(2.107)	(-2.279)		(3.511)
SIZE	0.1331			-0.124***			-0.148***			-0.0453**		
	(0.7324)			(-5.6)			(-7.987)			(-2.138)		
GDPG	0.7577		-156.85	-0.1931*		-0.00018	-0.3129**		0.0174	-0.051		
	(0.9388)		(-0.8062)	(-1.794)		(-0.0381)	(-2.238)		(0.8102)	(-0.3773)		
IBA	0.0110			-0.0035			-0.012			0.0122		
	(0.3956)			(-0.3277)			(-0.608)			(1.594)		
ZROE	0.0035*	0.0014										
	(1.918)	(0.8333)										
SDROE				-20.23***	30.946***							
				(-4.882)	(3.385)							
ROE							-1.605	-6.983				
							(-0.5773)	(-1.495)				
ROA										27.744***	40.698	
										(6.159)	(1.177)	
EQTA*SOB		25.326	2326.72		2.187	0.296503		21.945**	-0.1108		2.586	-0.0426
		(1.479)	(0.9512)		(0.3461)	(1.987)		(2.557)	(-0.4317)		(0.1324)	(-0.7131)
EQTA*POB		0.8407	727.9*		0.2858	0.0428		0.6462**	-0.1667**		-0.6655	0.0183
		(1.443)	(1.601)		(1.055)	(1.613)		(2.433)	(-2.041)		(-0.8951)	(1.448)
EQTA*JVB		-2.749*	334.83		0.1735	-0.0256		-1.741***	-0.1705*		-2.25***	-0.0013
		(-1.745)	(0.7815)		(0.3061)	(-1.111)		(-3.627)	(-1.867)		(-2.668)	(-0.0788)
EQTA*FOB		72.545**	-2848.06		-9.579	-0.6889**		30.447***	1.782**		31.554**	0.0898
		(2.216)	(-0.6052)		(-0.7332)	(-1.972)		(2.665)	(2.371)		(1.978)	(0.9294)

Continued

CFIVE		-0.3752			0.0538			0.8102			-0.5896	
		(-0.4129)			(0.1301)			(0.9519)			(-0.4991)	
MPOW		13.758*			0.3163			6.071**			3.134	
		(1.889)			(0.1264)			(2.163)			(0.5377)	
OVERHEAD		6.999			-1.308			0.9428			2.921	
		(1.345)			(-0.5727)			(0.4039)			(1.391)	
LDR		0.0845*			-0.0709**			0.0338*			0.0338	
		(1.816)			(-2.042)			(1.709)			(1.589)	
LOAN	-0.4409		91.089	-0.1035		-0.011***	0.0287		-0.0142*	0.0299		-0.0018
	(-1.319)		(1.427)	(-1.518)		(-2.897)	(0.5372)		(-1.733)	(0.5501)		(-1.257)
LLP			-61.212			-0.0138			-0.0124			-0.0045
			(-0.3688)			(-1.558)			(-0.349)			(-0.9243)
DTA			85.286			0.0191***			-0.088***			-0.0066**
			(0.7481)			(2.855)			(-5.767)			(-2.337)
J-statistic	0.00071	0.00071	0.00071	0.0052	0.0052	0.0052	0.0122	0.0122	0.0122	0.0085	0.0085	0.0085
N	3528	3528	3528	3528	3528	3528	3873	3873	3873	4001	4001	4001

97

Part III

Boosting economic growth in emergent economies:

Rethinking the role of financial intermediation

Chapter 5

Financial intermediary and economic growth: An evolution in the making

Abstract

This chapter provides a brief overview of theoretical foundation on the nexus between financial intermediation and economic growth. First, we draw the Schumpeter's conception on "innovation" as essential enigma to understand the role of entrepreneurship and banking in economic development. Nevertheless, agents' willingness to innovate can not be separated from their own expectation toward the future. In this regard, Keynes's (1936) contribution on "expectation" and "uncertainty" plays a prominent role to complement the Schumpeter's conception. Consequently, the different nature of agents' liquidity preference to deal with uncertainty can be well captured. Hence, the finance-growth nexus should accommodate this aspect by taking into account the different behaviour vis-à-vis risk between entrepreneur and non-entrepreneur– a hypothesis that has never been taken into close consideration in the previous literature. Several caveats on the theoretical model of the finance-growth nexus in emergent economies are also discussed.

1. Introduction

Financial crises are not new phenomenon. They have become a norm that cannot be separated from the history of mankind. Over the decades crises always come with a sudden and spread rapidly to various countries. Financial development might be one of the triggers as it could encourage excessive banks' risk taking that may result in financial fragility. However, it is also well accepted that financial development promotes economic growth, so that financial development that encourage savings and investments becomes necessary.

Chapter 2 has already shown that greater economic growth is necessary to neutralize banks' moral hazard in less competitive market because economic growth helps such banks to reduce risk taking that in turn enhances bank stability. Due to the importance of economic growth in emergent economies with less competitive banking system as observed in several Asian countries, we now provide a brief review of economic thoughts beyond the finance-growth nexus in order to better understand the role of banking sector in economic development. Furthermore, we also establish new hypotheses that may be relevant to capture obstacles in emergent economies, as banking sector can fail to enhance economic growth.

As a matter of fact, the link between financial development and economic growth cannot be separated from the business cycle theory that has been established by Schumpeter (1912). The business cycle theory suggests that the role of banking as financial intermediary is to boost innovation and hence, production. In principle, innovation processes depend on agents' behaviour to consume and invest. In this context, the Keynesian view (Keynes, 1936) on *expectation* and *uncertainty* plays an important role in order to explain agents' incentive to consume or to invest in productive assets. Consequently, liquidity preferences among economic agents that affect agents' incentives to boost productive investments might be well captured.

Building on these two fundamental contributions, the rest of this chapter is structured as follows. Section 2 provides a brief review of the Schumpeterian conception on the role of entrepreneurship and banking sector in economic development. Section 3 discusses the Keynesian conception on *expectation* and *uncertainty* that may affect agents' liquidity preference and that determines agents' investment behaviour. Section 4

presents the basic role of financial intermediary as liquidity provider that accommodates agents' liquidity preferences. Section 5 presents the basic growth model in which savings and investments become the main determinant of economic growth. Section 6 establishes several hypotheses to reformulate the finance-growth nexus that takes into account agents' liquidity preferences and that is likely to be relevant for the case of emergent economies. Section 7 concludes the chapter.

2. Entrepreneurship and financial intermediation: Schumpeter's enigma

"The Theory of Economic Development (1912)" and "Capitalism, Socialism and Democracy (1942)" are the main foundations of the business cycle theory established by Joseph A Schumpeter. The business cycle theory attempts to understand economic dynamics in a capitalist economic system during a long-run period that may contain **boom** and **bust** cycle. This section attempts to shed light on: (1) the link between innovation and business cycle, and (2) how capital and financial intermediary play a role in affecting such a relationship.

With regards to these two aspects, Schumpeter (1912) is the first who emphasizes that a capitalist economic system is endogenously unstable. Instability can come from agents' innovation as a part of capitalist economic system itself. In order to boost productive innovations, agents need capital and hence, capital circulation is at the heart of a capitalist economic system. In this context, the role of banking credit that spurs capital supply is essential. Hence, capital and financial system need to be considered as endogenous entities that arise from a capitalist economic system. This endogenous principle of innovation and money supply are the main enigma of the Schumpeterian perspective as expressed in the following quotation:

> *"A nation's monetary order is a reflection of everything that a nation wants, does, suffers and is; and at the same time a nation's monetary order has a considerable influence on the way it acts and on its very fate." (Schumpeter, 1912)*

The quotation above expresses the non-neutrality of money (or capital), where the amount of capital will indeed affect significantly macroeconomic dynamic. Unlike the

Neoclassical mainstream that emphasizes on the role of money as accelerator in goods and services market, the Schumpeterian view considers that money market development does not necessarily represent goods and service market development. However, money can indeed affect goods and service market if it fulfils several criterions. An aspect that received a particular attention is the role of money in the form of bank credit. Bertocco (2007) emphasizes on three important elements that need to be fulfilled on the relation between finance and entrepreneurships. These include:

1. Individual property rights to own physical capital to realize production needs to be respected.
2. Individual have rights to take profit, but they need to be aware of risks they may face.
3. Bank becomes a payment system provider and serves as financial intermediary to accommodate agents' needs in the economy.

Likewise, Schumpeter (1912) emphasizes that banking as financial intermediary exists only to support productive innovations coming from entrepreneurship activities. From this mechanism, capital entering into productive sectors will create a cycle in the long-run period. If innovation processes are not yet fruitful, the economy will fall into a recession (***bust***). Conversely, the economy will move into a ***boom*** period when productive innovations succeed.

As a matter of fact, the Schumpeter's view on ***innovation*** only refers to productive innovations (particularly in manufacturing industries at the time), where financial sector only acts as ***the monetary complement of innovation***. Nevertheless, over the last two decades, ***innovation*** has also been translated to develop financial sectors. During the nineties, Alan Greenspan as the US Federal Reserve governor used the innovation conception to boost financial market development, notably to develop derivative market in responding the 1987 US stock market crash (Carlson, 2007). It is perceived that financial product innovations will create ***the New Economy*** which will be very promising and accordingly, government interventions to regulate financial innovations in derivative market – such as regulations proposal from Commodity Futures

Trading Commission (CFTC) and the Glass – Steagall Act 1933 – would be unnecessary[48].

For instance, the replacement of the Glass – Steagall Act 1933 by the Gramm-Leach-Bliley (GLB) Act 1999 (also known as the Financial Services Modernization Act) has marked a new era of financial innovations, not only in derivative market but also in banking market. By the repeal of Glass – Steagall Act, the US banking industry is allowed to enter securities and insurance markets. The share of non-interest income to net revenue in US banks then grew rapidly from 20% in 1980 to 42% in 2004, where it also raised the contributions of non-interest income to net revenues to more than 40% (Stiroh, 2004). The similar financial innovations spirit has developed throughout the world. In 1992, the EU Single Market Program authorized for a universal banking. In 1999, Japan removed the separation between commercial and investment banking through its "Big Bang" reforms.

With regards to the dark side of financial development, Schumpeter (1912) has already pointed out two possible consequences of the presence of banking in a capitalist economic system. On the one hand, after loans have been granted to entrepreneurs, capital is instantly used to spur productive innovations. On the other hand, havoc may also happen if banks grant too much loans as observed in the 2008 credit crisis where US banks had the huge amount of sub-prime mortgage lending products in their balance-sheet. Under this condition capital circulations in the form of bank credit can create economic agents' speculative behaviour in taking advantage of such loans availability. Phrased differently, economic agents can use inappropriately loans for purposes other than spurring productive investments. Therefore, it is clear that the former leads to higher economic performance (upturn cycle) while the latter creates an economic stagnation that leads to lower economic performance (downturn cycle). During the downturn cycle economic agents can speculate even more in order to overcome such condition. Speculation may be therefore procyclical that worsens economic downturn become a deeper economic recession.

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[48] The latter is well-known as a regulation to separate commercial banks' and investment banks' activities.

3. Expectation and uncertainty in the Keynesian economy: Invest or speculate?

While the role of bank as financial intermediary is important, that does not mean that bank can always spur entrepreneurships and productive investments,. In "*The General Theory of Employment, Money and Interest* (1936)", Keynes mainly emphasizes that the future is uncertain. Due to its uncertainty, agents' behaviour to invest or consume is also determined by a psychological factor in which Keynes refers to as **animal spirit**. This psychological factor then creates **the state of confidence** as endogenous factor that affects agents' decision to be entrepreneur and non-entrepreneur. Keynes explicitly explains as follows:

> *"The state of long-term expectation, upon which our decisions are based…..also depends on the "confidence" with which we make this forecast—on how highly we rate the likelihood of our best forecast turning out quite wrong. If we expect large changes but are very uncertain as to what precise form these changes will take, then our confidence will be weak" (Keynes, 1936, page 108).*

Consistent with Schumpeter (1912), Keynes also sheds light on the endogenous principle of money that can influence agents' decisions to invest or to speculate. If Schumpeter mainly considers that money is a central element of the capitalist system, Keynes extends that money is a bridge between the past and the present, as well as between the present and the future. Moreover, unlike the Neo-classical mainstream emphasizing on the neutrality of money in affecting macroeconomic fluctuations, Keynes considers that money is an important factor that influences agents' incentives and decisions which in turn may drive economic condition become uncertain, as expressed below:

> *Money plays a part of its own and affects motives and decisions and is, in short, one of the operative factors in the situation, so that the course of events cannot be predicted, either in the long period or in the short, without a knowledge of the behaviour of money between the first state and the last' (Keynes, 1936)*

In this context, the Keynesian view on the non-neutrality of money is identical to the Schumpeter's conception.

The Keynesian conception in the finance-growth nexus, particularly in the "non-neutrality of money" conception, has a unique feature. More precisely, money creation

should be determined by credit demand and each credit granted should be driven to support productions. Higher credit expansion in turn enhances production capacities, job creations and national income that improves economic performance. This view is well-known as *the principle of effective demand*. The term of effective demand refers to as a condition by which national production outputs can be improved, but such improvements are not determined by the amount of goods or services offered to society.

Aside from emphasizing on the non-neutrality of money, Keynes further accentuates on the role of expectation in each economic decision including investment. Investment is an economic decision determined by expectation to get profit. Successful investments yield profits that help boosting other productive investments in the future, while unsuccessful ones can be impediment for future investments. In this regard, investment also becomes an important engine that determines the *boom* and *bust* cycle. Hence, the Keynesian conception on investment is identical with the Schumpetarian conception, where the business cycles come from endogenous forces such as investments.

Another important puzzle that distinguishes the Keynesian approach from its Neo-classical counterpart is in the conception on *uncertainty*. Minsky (1975) expresses it as follows

"Keynes without uncertainty is something like Hamlet without the Prince" (Minsky, 1975)

Indeed, *uncertainty* becomes a main stylized feature of the Keynesian conception to explain macroeconomic fluctuations. The Neo-classical approach considers that economic agents are perfectly rational and that market always provides complete information. In this regard, economic agents can predict accurately the future by using their perfect rationality and complete information. On the contrary, the Keynesian approach mainly highlights that the future is unpredictable and hence, economic agents always suffer from uncertainty risks in making any investment decisions. Simon (1948) supports the Keynesian conception through *the bounded rationality theory* showing that agents' rationality is *not* unlimited. *Bounded rationality* is the idea that in decision making, rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make decisions.

In Keynes's *General Theory* (1936), the impact of expectation and confidence on investment behaviour under uncertainty is particularly analysed. According to Keynes, expectation to invest depends on the level of confidence hold by agents. Keynes distinguishes between **short-term** expectations – relative to the proceeds obtainable by the employment of the existing stock of capital (Keynes, 1936, pp. 46, 148) – and **long-term** expectations that are concerned with investment and the value of capital assets for all their residual life (Keynes, 1936, pp. 47, 147-148, 246).

Meanwhile, the development of economic units crucially depends on long-term expectations rather than on short-term expectations**.** The basic feature of long-term expectations formation is that the agents will not project the current trends into the future, unless they have good reasons to anticipate a change (e.g., Keynes, 1936). They are therefore aware that, by following this hypothesis, they are prone to systematic mistakes that will emerge afterward. However, their behaviour is not irrational since they do not know exactly in which direction the future will change.

With regard to the relation between confidence, expectation and uncertainty, Keynes points out that the degree of self-confidence will determine the agents' liquidity preference as shown in his following argument:

> *Our desire to hold money as a store of wealth is a barometer of the degree of our distrust of our own calculations and conventions concerning the future. . . .The possession of money lulls our disquietude; and the liquidity premium which we require to make us part with money [or which we implicitly attribute to money] is the measure of the degree of our disquietude'. Thus, fluctuations in the degree of confidence are capable of . . . modifying not the amount that is actually hoarded, but the amount of the premium which has to be offered to induce people not to hoard' (Keynes, 1937, p. 116)*

This perspective is what so-called as **the principle of liquidity premia**. One of the main implications of liquidity premia is that agents can react differently in facing uncertainty. These differences can be due to the different level of tolerance towards uncertainty. Higher agents' tolerance level in facing uncertainty tends to decrease agents' needs to minimize their doubt by holding liquidity. If this is the case, long-term investors

can be considered as risk-neutral agents, while short-term ones are risk-averse. More specifically, short-term investors may have higher liquidity needs than long-term investors.

According to Sordi and Vercelli (2010), this point can be recalled by a metaphor used by Descartes in his **Discourse on the Method** (1637, pp. 24-25) to express an illuminating general maxim:

"a traveller (…) upon finding himself lost in a forest, should not wander about turning this way and that (…) but should keep walking as straight as he can in one direction, never changing it for slight reasons; for in this way (…) he will at least end up in a place where he is likely to be better off than in the middle of the forest"

Sordi and Vercelli (2010) point out that "*this prescription clearly assumes strong economic uncertainty (on the characteristics of the forest) and shows that under these circumstances it is rational to stick to a rigid rule of conduct*".

Long-term investors who are risk-neutral have a capacity or sufficient resources to cross a forest of unknown size and dimension to reach a desired destination. For them, such decision is not irrational to minimize the risk of getting lost inside the forest. These investors then expect that the distance from his initial position will progressively increase according to a principle of **extrapolative expectations**. Probably, such decisions will bring them into a better situation due to their willingness to continue their journey.

For short-term investors, as risk-averse agents, they need to take into account that their food reserves are limited so that their confidence to pursue such a strategy is less than the long-term investors' confidence. They will pursue the long-term investors' strategy only up to a well defined threshold (Sordi and Vercelli, 2010). Sordi and Vercelli (2010) further mention that *"...below that threshold, a rational agent would go back following the same path in the reverse because they do not know how far they are from the border of the forest. Thus, they abandon the pursuit of the original goal since they have to focus on mere survival by consuming their food reserves"*. In this regard, the short-term investors will then anticipate a progressive reduction of the distance from the initial position following a principle of **regressive expectations**.

4. Liquidity preference and financial intermediary: A theoretical framework

If economic agents – long-term and short-term investors in this regard – have different liquidity preference, how does financial intermediary (or bank) optimally accommodate both types of economic agents? The contribution of Diamond and Dybvig (1983) and reshaped by Diamond (2007) is thus essential. This section reviews Diamond (2007) to explain why short-term investors demand more liquidity than long-term investors and how financial intermediary can accommodate both of them.

Initially, it is already known that an asset becomes illiquid if the values available from physical liquidation or a sale on some date are less than the present value of its payoff on some future date. In the extreme case, a totally illiquid asset is worthless on some date but has a positive value on a later date. Under a three-period-lived economy, let T be time period. If agents invest at $T = 0$, they will receive r_1 or r_2 at either $T = 1$ or r_2 at $T = 2$, respectively, where $r_1 < r_2$. The lower $\dfrac{r_1}{r_2}$ is (holding constant market discount rates), the less liquid is the asset.

4.1 Uncertainty in investors' time horizon

To capture the future uncertainty, let assume that at $T = 0$ investors do not know at which date they need to consume. Hence, investors face an uncertain time horizon to hold the asset. Each investor has 1 unit of asset that need to be invested at $T = 0$. There is no direct insurance sold to fulfil the investor's liquidity need, since this need is private information. However, contracts can be designed to indirectly provide this insurance. For instance, liquid asset can be an indirect insurance, since it can be liquidated early with a smaller loss. Therefore, in order to anticipate risks, a representative (risk-averse) investor can save and liquidate the liquid asset if needed. This type of investor is represented as Type 1, while the risk-neutral investor is represented as Type 2. Type 1 will liquidate the liquid asset at $T = 1$, while Type 2 will wait until $T = 2$.

At $T = 0$, a representative investor does not know whether he or she will choose to be Type 1 or Type 2. To this end, such investor has a probability t to be a Type 1 and $1 - t$ to be a Type 2. Accordingly, there will be t fraction of investors of Type 1 and $1 - t$

fraction of investors of Type 2. An investor of Type 1 who consumes c_1 units of consumption goods at $T = 1$ has a utility function $U(c_1)$. Likewise, an investor of Type 2 who consumes c_2 units of consumption goods at $T = 2$ has a utility function $U(c_2)$. Due to the fact that investors do not know their type at $T = 0$ and that they face uncertainty in time horizon, they only have expected utility function at the beginning of the period as follows

$$tU(c_1) + (1-t)U(c_2) \Leftrightarrow tU(r_1) + (1-t)U(r_2)$$

4.2 Preference on liquid asset or illiquid asset

In order to highlight the characteristics between liquid asset and illiquid asset, a numerical example from the contribution of Diamond and Dybvig (1983) will be necessary. This will also allow us to understand why some investors prefer liquid asset to illiquid asset, while some other investors do not.

Assume that only 1 unit of asset invested at $T = 0$. The illiquid asset will yield $r_1 = 1$ if it is liquidated at $T = 1$; and $r_2 = R$ if it is liquidated at $T = 2$. The liquid asset will yield $r_1 > 1$ if it is liquidated at $T = 1$; and $r_2 < R$ if it is liquidated at $T = 2$. Let $t = 0.25$ and the illiquid asset yields $r_1 = 1$ and $r_2 = R = 2$. To be consistent with the nature of liquid asset, assume that the liquid asset yields $r_1 = 1.28$ and $r_2 = 1.813$. Under the hypothetical condition $U(c) = 1 - \dfrac{1}{c}$ (investors are risk-averse), the expected utility from holding the illiquid asset is

$$0.25U(1) + 0.75U(2) = 0.375$$

Similarly, the expected utility from holding the liquid asset is

$$0.25U(1.28) + 0.75U(1.813) = 0.391 > 0.375$$

Therefore, each risk-averse investor will prefer the liquid asset to the illiquid one, since the illiquid asset yields smoother pattern of returns; and holding the illiquid asset is risky due to a low amount obtained if the illiquid asset is liquidated early on $T = 1$.

If investors are *not* risk averse, they will prefer illiquid asset to liquid asset. Let $U(c) = c$, then the expected utility from holding the illiquid asset will be

$$0.25U(1) + 0.75U(2) = 1.75$$

Meanwhile, the expected utility from holding the liquid asset will be

$$0.25 U(1.28) + 0.75 U(1.813) = 1.68 < 1.75$$

To summarize, although the expected utility from holding the liquid asset is smaller than the illiquid asset, sufficiently risk-averse agents are willing to give up some expected return in order to get a more liquid asset. Such agents choose to liquidate their asset to obtain more consumption goods when consumption is highly valuable to them to survive. This behaviour represents ***short-term*** investors' behaviour that is also related to a principle of ***regressive expectations***. On the contrary, less risk-averse agents prefer illiquid asset to liquid asset because illiquid asset yields higher return than liquid asset. In this context, less risk-averse agents are long-term investors that follow a principle of ***extrapolative expectation*** – they do not face any liquidity constraints that prevent them to continue the journey to find *"a place where he is likely to be better off than in the middle of the forest"* (Descartes, 1637).

4.3 Entrepreneurial demand for liquidity

In the short-run, long-term investors have indeed less liquidity needs than the short-term ones. Conversely, in the long-run, it is no longer the case as long-term investors become entrepreneurs who need capital to finance their projects. Entrepreneurship can be therefore considered as a long-term project.

However, at the same time, entrepreneurs are the ones who need liquid asset if they need to finance high return projects early (at $T = 1$) before their investments are fruitful at $T = 2$. Suppose that with probability t the entrepreneur will be able to fund the high quality project which gives a return $\Psi > R$ per unit invested. With probability $1 - t$, the entrepreneur does not have opportunity to run this project and hence, the entrepreneur has access only to storage. In other words, one unit of goods invested at $T = 1$ will return one unit at $T = 2$. The availability of the high return is private information.

Consider also an asset that costs 1 at date 0 and offers either r_1 at date 1 or $r_2 > r_1$ at date 2, then the entrepreneur will not liquidate the asset early when he or she has access only to storage. However, the entrepreneur can liquidate the asset if $\Psi > \dfrac{r_2}{r_1}$, the rate of

return from continuing to hold the asset. Therefore, as of date $T = 0$, the asset value that can be liquidated is shown as:

$$t\, r_1 \Psi + (1-t)\, r_2, \text{ if } \Psi > \frac{r_2}{r_1}, \text{ or}$$

$$t\, r_1 + (1-t)\, r_2, \text{ if } \Psi \le \frac{r_2}{r_1}$$

In this case, entrepreneurs (long-term investors) can be considered as risk-averse agents. If the high return project has decreasing returns to scale, entrepreneurs will be more risk averse and hence, the liquidity demand of entrepreneurs is quite similar to that of short-term investors.

Nevertheless, Baumol (1990) emphasizes that the nature of entrepreneurship that is less likely to be risk-averse. According to this perspective, the productive contribution of the society's entrepreneurial activities varies much more than the supply of entrepreneurial activities. The possible reason is that entrepreneurial activities can be unproductive, such as rent seeking through excessive risk taking or organized crime. In the Keynes's (1936) perspective, entrepreneurship is about agent's expectation and confidence to invest. Hence, entrepreneurs are willing to hold less liquidity and hence, they should be less risk averse than non-entrepreneurs in order to pursue profits. Hobsbawm (1969) expresses this idea as follows

It is often assumed that an economy of private enterprises has an automatic bias towards innovation, but this is not so. It has a bias only towards profit (Hobsbawm, 1969, p. 40).

It is also worth noting that entrepreneurs are also investors like non-entrepreneurs, in which entrepreneurs are long-term investors, and non-entrepreneurs are short-term investors. If entrepreneurs need additional financing to run their projects, then entrepreneurs should be considered only as borrower, while non-entrepreneurs only as investor. In this case, Diamond and Rajan (2001) build a theoretical perspective that liquidity problems between borrowers and investors in the financial market can be solved by the presence of bank as financial intermediary. Bank can enable investors to withdraw at low cost, as well as buffer borrowers from the liquidity needs of investors. However,

bank also faces capital structure fragility and the risk of bank runs when performing this function.

4.4 Bank as liquidity provider

This section shows that a bank can provide the more liquid asset by offering demand deposits, although the bank invests in illiquid asset. The simplest way to explain bank as liquidity provider is again through a numerical example.

Consider that illiquid asset yields $r_1 = 1$ and $r_2 = 2$, and assume that such bank does not have equity (purely for a tractability reason). On the other hand, to be consistent with the nature of liquid asset, the bank offers to pay each unit deposit at $T = 0$ with $r_1 = 1.28$ if investors withdraw it at $T = 1$, and $r_2 = 1.813$ if investors withdraw it at $T = 2$. If the bank receives \$1 from each of the 100 investors, the bank receives \$100 in term of deposits at $T = 0$. If the bank decides to invest in illiquid assets, at $T = 1$ the bank needs to liquidate a part of illiquid assets to pay $r_1 = 1.28$, a return paid for short-term investors.

At $T = 1$, the bank's asset is worth \$100. Suppose that there are 25 investors who withdraw at $T = 1$, then the bank should liquidate 25(1.28) = \$32. In other words, 32% of the bank's portfolio needs to be liquidated. Therefore, only 68% of the bank's portfolio remains until $T = 2$. For 75 other investors, each will receive $\dfrac{(68)2}{75} = 1.813 = r_2$.

To capture the function of bank as liquidity provider, we consider the case in which investors prefer the more liquid to the illiquid assets. In this case, a bank can ensure liquidity by providing the more liquid deposit which has a smaller loss from early liquidation. The most important feature is that the bank can create liquidity, when it can offer the more liquid deposits and invests them in the illiquid assets. This situation creates a *Nash* equilibrium for 25 depositors to withdraw at $T = 1$, because when *all* investors expect that 25 investors withdraw at $T = 1$, then only the 25 type 1 investors will withdraw at $T = 1$. Meanwhile, the 75 type 2 investors will prefer to withdraw at $T = 2$ with $r_2 = 1.813$.

If assets are illiquid and risk-averse investors do not know when they need liquidity, then the presence of bank is crucial. The bank can create liqudity which allows investors to share the risk of liquidation losses. The bank must ensure a fraction t of the type 1

investors with r_1 at $T = 1$, and a fraction $1-t$ of the type 2 investors with $r_2 = \dfrac{(1 - t\, r_1)R}{1 - t}$

at $T = 2$. Note that for the case of illiquid asset $r_1 = 1$ and $r_2 = R$.

5. Savings, investments and economic growth

In Section 4, it is already shown that liquidity provision becomes one of the important functions of bank. Meanwhile, the literature on the link between financial intermediation and economic growth consider that saving is the main parameter of long-run economic growth. This idea is initially formalized by the Harrod-Domar growth model. However, the main critic of the Harrod-Domar growth model is that the model can not explain the possible endogeneity of saving rate. Likewise, the Harrod-Domar growth model focuses only on physical capital as a factor of production.

Building on the Harrod-Domar model, the Solow growth model or the Neo-classical growth model was born with three additional features (Solow, 1956). First, the Neo-classical growth model takes into account labour as a production factor besides physical capital. Second, it requires *diminishing returns* to labour and physical capital separately, and *constant returns to scale* for both factors combined[49]. Third, it also introduces a time-varying technological variable distinct from physical capital and labour.

The Neo-classical growth theory specifically highlights that saving and population growth help to determine the steady-state level of income per capita. With regards to saving in particular, higher saving rate improves steady state output by more than its direct impact on investment, since the increase in income enhances saving, which in turn leads to a further increase in investment. In fact, each investment is also about liquidity preference. Entrepreneurs who wish to invest in long-term productive activities are less likely to have higher liquidity needs than non-entrepreneurs. This is comparable to what so-called *long-term* expectations *à la* Keynes (1936).

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[49] *Return to scale* refers to as a technical property of production that influences output changes subsequent to a proportional change in all inputs, where inputs increase by a constant factor. When output increases by the same proportional change in inputs, then there are *constant returns to scale* (CRTS), or simply referred to as return to scale. When output increases by either less or more than the proportional change in inputs, there are *decreasing returns to scale* (DRS) or *increasing returns to scale* (IRS), respectively.

To this end, we briefly review the Solow growth model in order to build a framework before entrepreneurship and bank are introduced in the economic growth model. Let K, L, and A be the stock of physical capital, labour hours, and the level of technology, respectively. There are two inputs for producing output. These include physical capital and labour. In the meantime, the Neo-classical growth model has several assumptions in the production function that guarantee the stability of the dynamic path of physical capital. These assumptions are referred to as the **Inada** conditions which consist of six elements as follows:

1. The function has the value 0 at point 0,
2. The function is continuously differentiable
3. The function is strictly increasing in k,
4. The function is concave,
5. The limit value of its derivative towards 0 is positive infinity,
6. The limit of the derivative towards positive infinity is 0.

These conditions are fulfilled if the production function is the Cobb-Douglas function (Barelli and Pessoa, 2003). By assuming that output is produced according to the Cobb-Douglas production function with constant **returns to scale**, then output at time T can be defined as follows

$$Y_t = K_t^{\alpha} \left(A_t L_t \right)^{1-\alpha} \tag{1}$$

where $0 < \alpha < 1$, and Y is output. Suppose that L and A grow at rates n and g, respectively, then

$$L_t = L_0 e^{nt} \text{ and } A_t = A_0 e^{gt}$$

Hence, the number of effective units of labour, $A_t L_t$, grows at rate $n + g$. Suppose also that saving rate (s), population growth (n), technological progress (g), and depreciation (δ) are exogenous. Let k be the stock of physical capital per effective unit of labour and y be output per effective unit of labour, and then Equation (1) can be simplified to form

$$y_t = k_t^{\alpha} \tag{2}$$

In this case, k grows according to

$$\dot{k}_t = s\, y_t - (n + g + \delta)k_t$$
$$\quad\quad = s\, k_t^{\alpha} - (n + g + \delta)k_t \tag{3}$$

Since income equals to output, then s can be expressed as a fraction of output. By setting the left-hand side of Equation (3) equal to zero, in the long-run, k converges to

$$k^* = \left[\frac{s}{n + g + \delta}\right]^{\frac{1}{1-\alpha}} \tag{4}$$

Moreover, steady-state income per worker can be calculated by substituting (4) into (2), and $Y/(AL)$ for y. Steady-state income per worker can be thus defined as

$$\ln\left[\frac{Y_t}{L_t}\right] = \ln(A_0) + gt + \frac{\alpha}{1-\alpha}\left[\ln(s) - \ln(n + g + \delta)\right] \tag{5}$$

Considering only the direct impact of higher saving on output, and ignoring the additional rise given to investment because of higher output, the coefficient on logarithm $\ln(s)$ is only α. The additional positive effect of saving on output comes from the impact of higher output on investment.

Eventually, the Neo-classical growth model has several policy implications. In the **short-run**, tax cuts or investment subsidies can improve the steady state level of output, even though such policies do not have any significant effect on the steady state level of output in the long-run. As the economy converges to the steady state level of output in the long-run, then growth is affected only in the short-run. The rate of economic growth is determined by the rate of capital accumulation. The savings rate and the rate of capital depreciation determine capital accumulation. In the **long-run**, the rate of economic growth is determined by factors outside of the model. More specifically, the long-run steady state rate of growth of an economy is determined only by the rate of technological progress and the rate of labour force growth. Nevertheless, the origin of saving rate and the rate of technological progress remains unexplained in the Neo-classical growth model.

In the eighties, the Endogenous growth theory was born to overcome this shortcoming by building a microeconomic foundation for the economic growth model. Households will maximize utility subject to budget constraints, and firms will maximize profits. The particular feature of the Endogenous growth model is captured by the role of

human capital and the way how technological innovation is endogenously produced. In the Endogenous growth model, the marginal productivity of capital at the aggregate level is assumed to be constant, or in some cases, the limit of the marginal product of capital does not converge to zero. Consequently, in the long-run, the Endogenous growth model can yield higher growth rate than the Neo-classical growth model.

For the link between saving, financial intermediation and economic growth, Bencivenga and Smith (1991) is the first to establish a theoretical model for such relations under the Endogenous growth framework. This model builds on the contribution of Diamond and Dybvig (1983), where financial intermediary becomes liquidity provider for different types of investors. It is shown that long-term investment is better than short-term venture in order to increase economic growth. However, the traditional activity of bank (deposits funded investments) can not be well captured, since the optimal fraction of long-term investment is not a function of savings. Specifically, the value of optimal fraction of long-term investment is constant.

6. Stylized features for emergent economies: Some new hypotheses

Indeed, the introduction of financial intermediary to the economic growth model will influence agents' behaviour to invest and consume. The main idea is as follows. Based on Solow (1956), if higher saving rate promotes real growth rates, then a financial intermediation industry permits an economy to rearrange the composition of its savings by minimizing the fraction held in the form of unproductive liquid asset, and by maximizing the fraction held in illiquid asset.

This mechanism prevents misallocations of invested capital due to liquidity needs. Such a perspective has been modelled by Bencivenga and Smith (1991) under the Endogenous growth model. However, Bencivenga and Smith (1991) fail to acknowledge the main activity of bank (saving and investment), since the optimal fraction of long-term investment is *not* a function of saving. This implies that the equilibrium rate of output growth becomes constant. To re-evaluate such perspectives, this section offers some stylized features in the finance-growth nexus which can be applicable to emergent economies.

First, the Schumpeter's (1912) conception on ***creative destruction*** that boosts entrepreneurship should be considered as a main determinant of economic growth. In this regard, the presence of bank should be only addressed to support innovations coming from long-term productive activities rather than to boost financial innovation through short-term ventures.

Second, the Keynes's (1936) contribution on ***expectation*** and ***uncertainty*** needs to be taken into account to capture the different nature of investors' consumption profile. The different expectation in facing uncertainty will determine the investors' liquidity preference and hence, it influences the investors' expected utility. More precisely, Keynes emphasizes that non-entrepreneurs tend to have higher liquidity needs than entrepreneurs. Consequently, the behaviour *vis-à-vis* risk between non-entrepreneurs and entrepreneurs also needs to be adjusted. Therefore, non-entrepreneurs should be considered as risk-averse agents but entrepreneurs are risk-neutral agents. The risk neutrality of entrepreneurs is compatible to the ***creative destruction*** aspect initiated by Schumpeter (1912) or the contribution of Baumol (1990). Admittedly, entrepreneurships are risky and those who decide to be entrepreneurs should be *less* risk-averse enough. On the contrary, non-entrepreneurs who decide to consume their asset, and not to invest in long-term productive activities, are the ones who need to maximize their consumption goods. Therefore, non-entrepreneurs are more likely to be risk-averse.

Third, aside from enhancing long-term investments, financial intermediary should perform its basic function (deposits funded investments). Differently phrased, the optimal share of long-term investment produced by the bank should be itself a function of its deposits, the case that fails to be captured in Bencivenga and Smith (1991).

Fourth, as emerging countries are the main concern for the finance-growth nexus, the use of the Endogenous growth framework is somehow irrelevant to capture appropriately the finance-growth nexus. Externalities coming from human capital and technological innovation seem relatively underdeveloped in emerging economies. Thus, they might not play a significant role in enhancing economic growth. Nevertheless, in an open economy, there is indeed externality *a la* Romer (1986) related to technological spill over coming from foreign countries that may influence domestic macroeconomic performance.

Fifth, liquidity constraint – which is related to a principle of *regressive expectation* – is a common phenomenon in emerging countries that needs to be acknowledged, since it impedes agents to invest in productive activities. In turn, the growth effect of financial development is ambiguous at low levels of developments, a condition in which liquidity constraints are more likely to exist (e.g. Obstfeld, 1994; Devereux and Smith, 1994; Jappelli and Pagano, 1994). For instance, Jappelli and Pagano (1994) show that financial development may affect adversely economic growth, if it affects negatively the agents' propensity to save. If this is the case, there should be a threshold effect in which financial development can not improve economic growth.

Sixth, it is not clear whether our stylized features alter the comparative advantage of bank-based system compared to the market-based system in enhancing economic growth in emerging economies. Our theoretical formulation of the finance-growth nexus in the next chapter therefore embraces this aspect by comparing both financial systems.

7. Conclusion

This chapter lays down a foundation established by Schumpeter (1912) and Keynes (1936) in order to reformulate the link between financial development and economic growth. Several critical features in the finance-growth nexus in the previous literature are highlighted. Besides focusing on the basic role of banking as financial intermediary that receives savings and boosts productive investments, the future theoretical model should embrace these following particular aspects.

First, the existing theoretical model on the finance-growth nexus treats agents equally. Despite separating agents into entrepreneurs and non-entrepreneurs, the different liquidity preference between entrepreneurs and non-entrepreneurs that may affect the nature of their expected utility function is neglected. In other words, the expected agents' utility function is homogenous for both types of agent. Second, the presence of externalities in the production function is somehow irrelevant in the context of emergent economies, since externalities related to human capital and technological innovation are still sub-optimal to enhance macroeconomic performance. Third, liquidity constraints need to be captured in the finance-growth nexus, particularly in emergent economies, because such problem can hinder savings and investments which in turn affect adversely

economic growth. Finally, it is also worthy to highlight whether financial intermediary is still better than financial autarky (or financial market) in enhancing economic growth despite caveats in previous study on the link between financial intermediation and economic growth.

Chapter 6

Threshold effect and financial intermediation in economic development[50]

Abstract

This chapter re-evaluate the finance-growth nexus in the case of emergent economies. Using the Neoclassical growth framework, our contribution is threefold. First, we show that entrepreneurship is always a growth-enhancing factor in both financial intermediary and financial market equilibrium. Second, we show that agent's saving is a determinant of the optimal share of investments and hence, we characterize the role of bank as financial intermediary (deposits funded investments). Third, our model is characterized by the existence of multiple steady states equilibrium with threshold effect that impedes the economy to reach a higher long-run steady state equilibrium. Finally, we show that financial intermediary is better than financial market in order to reduce threshold effect, and to ensure the existence and uniqueness of a higher long-run steady state equilibrium of capital stock by promoting long-term investment.
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Keywords: Threshold Effect, Financial Intermediation, Economic Growth, Developing Countries

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[50] This chapter draws the contribution of [Augier, L. and Soedarmono, W. 2011. Threshold effect and financial intermediation in economic development. *Economics Bulletin* 31(1), 342-357]. The French version of the present chapter is accepted for publication in *Revue Economique*, entitled « *Intermédiation financière, croissance économique et effet de seuil* ».

1. Introduction

During the last two decades, studies on the nexus between financial development and economic growth have emerged, but the findings are still subject to relevant debate[51]. In the context of developing countries, financial development is often associated with banking sector development, since financial market is relatively underdeveloped. However, at the end of 1990s, the growing importance of stock markets in both developing and developed countries has again opened a new avenue of research into the relationship between financial development and economic growth, which focuses on the effects of stock market development. Using time-series data collected from five developed economies, Arestis et al (2001) examine the relationship between stock market development and economic growth. In particular, their results support the view that banks are more powerful than stock market to promote economic growth. In a similar vein, Rioja and Valev (2004) have found that in the countries with very low levels of financial development, additional improvements in financial markets have an uncertain effect on growth.

In spite of the importance of banking sector to promote economic growth, the literature also suggests that the role of financial market can not be neglected. Levine and Servos (1998) show that stock market liquidity leads to faster rate of growth, productivity improvement, and capital accumulation in both developed and developing countries. Levine (1991) and Bencivenga et al (1995) argue that stock market liquidity facilitates long-term investment, since investors can easily sell their stake in the project if they need liquidity before their project matures. Enhanced liquidity and long-term investment, therefore, increase higher-return projects that boost productivity growth.

In the meantime, it is also well accepted that financial market tends to suffer from asymmetric information and thus, financial liberalization fostering stock market liquidity is often blamed for macroeconomic downturn, as well as banking vulnerability and crisis (Bhide, 1993; Demirgüç-Kunt and Detagriache, 1999). This argument supports the presence of banks as delegated monitor to reduce information.

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[51]In empirical study, see King and Levine (1993a, 1993b), Levine (1998); Rajan and Zingales (1998) at the country level study, and Fisman and Love (2002) at the industry level; or recently Demirgüç-Kunt and Maksimovic (2002) at the firm level. In theoretical study, see Bencivenga and Smith (1991), or recently Hung and Cothren (2002). Levine (2005) provides a comprehensive literature review.

Recently, both empirical and theoretical studies have further questioned the positive link between financial development and economic growth. In the empirical literature, Deidda and Fattouh (2002) report that there is no significant impact of financial development on economic growth in low-income countries, although in high-income countries, there is a positive link between financial development and economic growth. Mihci (2006) also highlights that the relationship between finance and growth is not necessarily positive when substantial variations across different periods and country groups are taken into account. Meslier-Crouzille et al (2011) further indicate the presence of threshold effect on the link between rural bank development and regional growth in the Philippines.

In the theoretical literature, Deidda and Fattouh (2002) theoretically show a non-linear relationship between financial intermediation and endogenous growth. The effect of financial intermediation on economic growth remains ambiguous at low initial levels of banking sector development. This is because risk-averse agents always prefer to incur financial transaction costs even though the expected return on their savings is lower than under financial autarky. Such condition holds because financial intermediation can fully perform in risk diversification process. As a result, the economic growth rate under banking sector is lower than under financial autarky. At high levels of the banking sector development, the relationship between banking sector development and economic growth is always positive, where the level of banking sector development depends on the initial level of real per capita income.

Moreover, Aghion et al (2004) and Caballé et al (2006) also develop models where instability occurs at intermediate levels of financial development and, thus, these models provide support to the evidence that emerging markets are quite vulnerable. Similarly, Townsend and Ueda (2006) propose a coherent unified approach to the study of the linkages among economic growth, financial structure, and inequality. In particular, their model displays transitional growth with financial deepening and increasing inequality.

With regards to the particular role of banking as financial intermediary, most of theoretical models depart from the contribution of Diamond and Dybvig (1983) on the liquidity provision function of banks. Through this channel, banks exist to mobilize

agents' savings into more profitable long-term investments. Under this framework, Bencivenga and Smith (1991) are the first to show that financial intermediary is better than financial autarky (financial market) in order to spur productive long-term (illiquid) investments rather than short-term (liquid) venture. Consequently, higher long-term investments enhance economic growth. However, the optimal portion of long-term investment in Bencivenga and Smith (1991) is decreasing in the income of long-term investment, although it is increasing in the fraction of entrepreneurs. Hence, although the income of long-term investment is higher than that of short-term ventures, it does not always provide incentives for agents to be entrepreneur. When incentives matter, their model needs to consider the presence of asymmetric information and agency conflicts. Moreover, it is also irrelevant that the optimal portion of long-term investment under the financial intermediary equilibrium is increasing in the income of short-term ventures.

As Bencivenga and Smith (1991) is one of the major literatures on financial intermediation, the aim of this chapter is thus to reevaluate their finance-growth nexus. We modify several hypotheses used by Bencivenga and Smith (1991). First, since our motivation is to set up an appropriate model for developing countries, we consider that externalities changes due to technological innovation may be less likely to play a significant role in boosting economic growth. Thus, we use the Neo-classical growth hypothesis without externalities in an overlapping generation (OLG) model with three periods instead of drawing endogenous growth model, as used by Bencivenga and Smith (1991), or Deidda and Fattouh (2002). Second, we distinguish the behaviour *vis-à-vis* of risk between non-entrepreneur and entrepreneur. More precisely, entrepreneurs are supposed to be risk neutral[52]. This hypothesis allows us to consider that entrepreneurs' behaviour may be the source of costly overinvestment which reduces long-term economic growth. Likewise, Baumol (1990) emphasizes that entrepreneurship activity may be unproductive or even destructive. In this regard, entrepreneurial activities can be riskier than the non-entrepreneurial activities.

Using these stylized facts, our contribution is threefold. First, we show that entrepreneurship is always growth enhancing in both financial intermediary equilibrium

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[52] Azariadis and Smith (1998) also use such hypothesis for a different framework of model

and financial market equilibrium[53]. Second, we acknowledge that agents' saving is a determinant of the optimal proportion of long-term investment, where in Bencivenga and Smith (1991), financial intermediary does not consider agents' saving as input and thus, it is somehow irrelevant. In our model, we characterize the traditional role of bank as financial intermediary (deposits and investments). Third, our model is characterized by the existence of multiple steady states equilibrium with threshold effect. In this regard, financial intermediary is better than financial market, as the threshold level of financial intermediary equilibrium is lower than that of financial market equilibrium. As well, financial intermediary yields a higher transition of capital stock than financial autarky.

The rest of this chapter is organized as follows. Section 2 describes the model set-up. Section 3 constructs the financial market equilibrium. Section 4 lays out the financial intermediary equilibrium. Section 5 compares the dynamic path of capital stock and threshold effect under both financial market and financial intermediary. Section 6 concludes.

2. The set-up

The framework we use is one of overlapping generations (OLG) model with three periods and a unique good. The framework we use is one of overlapping generations (OLG) model with three periods and a unique good. As in Bencivenga and Smith (1991), we also consider a bank without liquidity risk that invests more efficiently by pooling all economic resources. On the contrary, we modify two aspects in the Bencivenga-Smith's economy. First, we assume that the entrepreneurs are risk neutral following Azariadis and Smith (1998). Second, we consider the existence of a technology in developing countries but without the types of externality considered by Romer (1986).

We assume that there is no population growth in the economy and each generation consists of a continuum of agents with size $N_t = N = 1$. Each agent may live for two or three periods. Let t be the time index, where the young and middle-age generations are endowed with an initial per firm capital stock of k_0 units at $t = 0$ and k_1

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[53] The optimal portion of long-term investment is increasing in the fraction of entrepreneurs, the income of long-term investment, and the agent's savings rate

124

units at $t = 1$, respectively. Moreover, each young agent supplies inelastically one unit of labour in the first period.

In the first period, all agents of a generation are identical. At the beginning of the second period, the agents learn whether they will be either non-entrepreneurs (two-period-lived agents) or entrepreneurs (three-period-lived agents) with probability $(1 - \pi)$ and π, respectively. Thus, there are $(1 - \pi)N$ agents who will be non-entrepreneur at the end of the second period and πN agents who will be entrepreneur in the third period. All young agents save entirely their labour income in the first period.

Non-entrepreneurs consume their second-period incomes, c_{1t}, while entrepreneurs only consume the profit of production realized in the third period c_{2t}. Thus, agents have different liquidity needs in which non-entrepreneurs have higher liquidity need than entrepreneurs, since non-entrepreneurs only live for two periods. Meanwhile, the young agents have incentive to be entrepreneur if the profit of long-term investment is relatively higher than the return of non-entrepreneurs' saving.

We also assume that entrepreneurs are risk-neutral following Azariadis and Smith (1998) and thus, we can define the agent's preferences by the following expected utility function.

$$U(c_{1t}, c_{2t}) = \frac{(1 - \pi)}{-\gamma}(c_{1t})^{-\gamma} + \pi \phi c_{2t}, \qquad \text{where } c_{0t} = 0 \qquad (1)$$

We define c_{it} as the period i consumption of an agent who is born at t. The constant relative risk aversion is denoted by $\gamma > -1$. The variable ϕ stands for the individual specific random variable realized at the beginning of period 2. Thus, the value of ϕ is equal to 0 with probability $1 - \pi$, or 1 with probability π.

To build a link between saving and economic growth, we characterize the production function in the third period. Specifically, the entrepreneur's production y_t is realized by physical capital k_t and units of labour L_t. We follow the Cobb-Douglas production function as follows

$$y_t = A k_t^{\theta} L_t^{1-\theta} \qquad (2)$$

where $\theta \in [0,1]$ is the part of production that uses k_t and A is an arbitrary coefficient. For simplification, we assume that capital depreciates completely at the end of period. Furthermore, there is no endowment of capital at period $t > 0$ except for the initial old generation and middle-age generation. For entrepreneurs (the old generation), they do not need endowment, as they already have resources to realize production that generates profit.

The entrepreneur's profit Π_t is the difference between the production and the cost of quantity units of labour defined as $\Pi_t(k_t, L_t) = Ak_t^{\theta} L_t^{1-\theta} - w_t L_t$. At the equilibrium of labour market, labour demand L_t is equal to labour supply, $N_t = N$, which is obtained by maximizing the entrepreneur's profit subject to L_t. Thus, we have $w_t = A(1-\theta)k_t^{\theta}\pi^{\theta}$ and the maximized profit function at each period t as much as

$$\Pi_t = A\theta\psi k_t^{\theta}, \text{ with } \psi = L_t^{1-\theta} = \pi^{\theta-1} \tag{3}$$

3. Financial market

This system refers to an economy without the presence of bank as financial intermediary. In the first period, the agents divide their savings s_t between liquid and illiquid assets. Liquid assets are considered as inventory of consumption goods. One unit invested in liquid asset at t directly yields $n > 0$ units of consumption goods at both $t+1$ and $t+2$. On the other hand, one unit invested in the illiquid asset yields R units of capital goods at $t+2$. If illiquid asset is liquidated at $t+1$, then the agents receive the "scrap value" of x units of consumption goods, where $0 < x < n$.

In order to establish the agents' budget constraint, we define z_t^m and q_t^m as the proportion of liquid asset and illiquid asset invested at t, respectively. The superscript m stands for the financial market. Hence, we have

$$z_t^m + q_t^m = 1, \text{ where } z_t^m \geq 0, \ q_t^m \geq 0 \tag{4}$$

At the first period, the agents' saving is equal to labour income, $s_t = w_t$, and is divided into $z_t^m s_t$ units of liquid asset and $q_t^m s_t$ units of illiquid asset. Let i_L, i_{IL}, i_S be the interest

rate of the liquid asset, illiquid asset, and "scrap" value, respectively. In the second period, let ω_{1t} be the income of non-entrepreneur after one period, then

$$\omega_{1t} = (nz_t^m + xq_t^m)w_t, \text{ where } n = 1 + i_L \text{ and } x = (1 + i_s) \tag{5}$$

On the contrary, by the hypothesis, if the agents are entrepreneur, then their consumption in the second period is equal to zero. At the beginning of the third period, entrepreneurs sell their illiquid assets and reinvests them in the physical capital, so that $(1 + i_{IL})q_t^m s_t = k_{t+2}$. This situation corresponds to the financial autarky case in which entrepreneurs sell illiquid assets by themselves. At the end of the third period, let ω_{2t} be the income received by entrepreneur after selling out their illiquid assets, but before the production is realized. Specifically, we have

$$\omega_{2t} = nz_t^m w_t + Rq_t^m w_t, \text{ where } R = 1 + i_{IL}, 0 < x < n < R \tag{6.a}$$

We use (6.a) to construct the dynamics of capital stock as follows

$$k_{t+2} = Rq_t^m w_t \tag{6.b}$$

Using the profit function (3) and the budget constraints in the equation (4), (5) and (6.b), the agent's expected utility function, whatever their types, is as follows.

$$U(q_t^m) = \frac{-(1-\pi)}{\gamma}\left(xq_t^m w_t + n(1-q_t^m)w_t\right)^{-\gamma} + \pi\left(A\theta\psi(Rq_t^m w_t)^\theta + (1-q_t^m)nw_t\right)$$

Meanwhile, the agents' optimization program is defined as $\arg\max_{0 \leq q_t^m \leq 0}\{U(q_t^m)\}$. From the first order condition, we obtain the optimal proportion of illiquid asset ($\bar{q}_t^m$) as follows.

$$\bar{q}_t^m = \bar{q}_t^m(w_t) = \frac{n}{(n-x)} - \frac{(B(w_t))^{\frac{1}{-1-\gamma}}}{w_t(n-x)} \tag{7}$$

where $B(w_t) \equiv \frac{\pi}{\pi-1}\left(\frac{nw_t - AR^\theta w_t^\theta \theta^2 \psi}{w_t(n-x)}\right)$

The optimal proportion of illiquid investment $\bar{q}_t^m$ depends on the labour income w_t[54]. Moreover, the existence of $\bar{q}_t^m$ in which $0 \leq \bar{q}_t^m \leq 1$ can be examined by the limit value of $\bar{q}_t^m$ when $w_t \to 0^+$ and $w_t \to \infty^+$. From (7), it is straightforward to obtain

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[54] In Bencivenga and Smith (1991), the optimal proportion of illiquid investment is constant.

$\lim_{w_t \to 0^+} q_t^m = -\infty$ and $\lim_{w_t \to \infty^+} q_t^m = 1$, if $AR^\theta w_t^\theta \theta^2 \psi > nw_t$. Hence, there is a value of

w_t which implies $\bar{q}_t^m = 0$. Moreover, we use (6.a), (6.b) and (7) to construct the dynamic of capital stock as follows:

$$k_{t+2} = Rq_t^m(k_t)w_t(k_t) \equiv \varphi_m(k_t) \qquad (8)$$

In other words, we have an equation that describes the evolution of capital stock over time.

4. Financial intermediary

In this section, we consider the presence of banks as financial intermediary that decides agent's financial decisions. In this section, We assume that bank is a coalition of young agents who can be either non-entrepreneur or entrepreneur. Let z_t and q_t^b be the proportion of liquid and illiquid investment realized by banks, respectively. Thus, we have

$$z_t^b + q_t^b = 1 \qquad (9)$$

Banks ensure non-entrepreneur to receive R_{1t}^b units of consumption goods at $t+1$ from each unit invested at t as following

$$(1 - \pi)R_{1t}^b = \alpha_{1t} z_t^b n + \alpha_2 q_t^b x \qquad (10)$$

where α_{1t} and α_{2t} are the part of liquid and illiquid asset liquidated at the second period, respectively. The bank chooses the values of α_{1t} and α_{2t}. On the other hand, banks also ensure entrepreneurs to receive R_{2t}^b units of capital goods at $t+2$ from each unit of time t illiquid investment and $\tilde{R}_{2t}^b$ units of time $t+1$ consumption goods from each unit liquid asset invested at t. For the withdrawal after two periods, there are π entrepreneurs who must receive R_{2t}^b units of capital goods from each unit of illiquid investment. Thus, πR_{2t}^b factor must be equal to the rest of illiquid asset $(1 - \alpha_{2t})$ multiplied by the income of investment Rq_t^b. Thus, the bank must provide capital goods for entrepreneurs as much as

$$\pi R_{2t}^b = (1 - \alpha_{2t})Rq_t^b \qquad (11)$$

In addition, entrepreneurs must also receive $\tilde{R}^b_{2t}$ units of consumption goods for each unit of liquid investment at t. The constraint $\pi\tilde{R}^b_{2t}$ must be equal to the rest of consumption goods $(1-\alpha_{1t})$ multiplied by $z^b_t n$. Thus, banks must provide consumption goods for entrepreneurs as much as

$$\pi\tilde{R}^b_{2t} = (1-\alpha_{1t})z^b_t n \tag{12}$$

In the next step, we define the program of financial intermediation for both non-entrepreneurs and entrepreneurs. First, if there are $(1-\pi)$ non-entrepreneurs who will liquidate their investment at $t + 1$, bank must hold $R^b_{1t} w_t$ units of consumption goods to be distributed at $t + 1$. Second, as there are also π entrepreneurs who will liquidate their investment at the beginning of $t + 2$, bank must hold $R^b_{2t} w_t$ units of capital goods and $\tilde{R}^b_{2t} w_t$ units of consumption goods to be distributed at $t + 2$. Using budget constraints in the equation (10), (11), and (12) we define the financial intermediary program in the following relation[55]

$$U(c_{1t}, c_{2t}) = \frac{-(1-\pi)}{\gamma}(R^b_{1t} w_t)^{-\gamma} + \pi(A\theta\psi(R^b_{2t} w_t)^\theta + \tilde{R}^b_{2t} w_t) \tag{13}$$

To simplify (13), we assume that the bank should provide the liquidity at $t + 1$, since none of the capital assets is liquidated "prematurely". As well, bank should fulfil the following liquidity constraint

$$A\theta\psi R > n \tag{14}$$

By this assumption, we can reduce some variables as follows. In the third period $(t + 2)$, bank will only consider the existence of π entrepreneur. As a matter of fact, entrepreneur runs the production to get profit. Thus, their profit should be superior to all income of liquid investments. Such condition provides incentive for agents to become entrepreneur. In other words, $A\theta\psi R > n$, and

$$A\theta\psi\left((1-\alpha_{2t})(R/\pi)q^b_t w_t\right) > \left((n/\pi)q^b_t w_t\right) \tag{15.a}$$

Equation (15.b) is fulfilled if and only if the bank set

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[55] Note that in the third period $(t+2)$, entrepreneurs will use their income of investment to finance physical capital and use it in the production. Hence, we have $R^b_{2t} w_t = k_{t+2}$.

$$\alpha_{2t} = 0 \tag{15.b}$$

Meanwhile, bank also maximizes the expected utility of non-entrepreneurs. Hence, bank will reallocate non-entrepreneur's illiquid assets into liquid assets at the beginning of $t+1$. For realizing this strategy, bank will therefore set

$$\alpha_{1t} = 1 \tag{15.c}$$

Using (15.b) and (15.c), we simplify (10), (11) and (12) respectively to be

$$R_{1t}^b = \frac{z_t^b}{1-\pi} n \tag{16}$$

$$R_{2t}^b = \frac{R}{\pi} q_t^b \tag{17}$$

$$\tilde{R}_{2t}^b = 0 \tag{18}$$

Using (16), (17), and (18), and the budget constraint (9) we establish the program of financial intermediaries as follows

$$U(q_t^b) = \frac{-(1-\pi)}{\gamma} \left(\frac{1-q_t^b}{1-\pi} n w_t \right)^{-\gamma} + \pi \left(A\theta\psi \left(\frac{R q_t^b w_t}{\pi} \right)^{\theta} \right)$$

Hence, bank will choose q_t^b to maximize $U(q_t^b)$. From the first-order condition, we obtain the optimal proportion of illiquid asset ($\bar{q}_t^b$) as follows

$$\bar{q}_t^b = \bar{q}_t^b(w_t) = 1 - \frac{(1-\pi)(B_1)^{\frac{1}{-1-\gamma}}}{n w_t} \tag{19}$$

where $B_1 = \dfrac{A\pi \left(\dfrac{R}{\pi} \right)^{\theta} w_t^{\theta} \theta^2 \psi}{n w_t}$.

Combining (11) and (19), we obtain

$$k_{t+2}^b = (1/\pi) R q_t^b(k_t) w_t(k_t) \equiv \varphi_b(k_t) \tag{20}$$

This equation describes the relationship between the current and the future capital stock.

From (19), we also notice that the optimal portion of long-term investment (19) is decreasing in the income of short-term ventures. This situation is relevant, since higher income from short-term ventures should positively affect short-term investments. As

short-term investments increase, long-term investments decrease following (9). This condition does not hold in Bencivenga and Smith (1991).

5. Capital stock accumulation and threshold effect

In comparing the level of steady state equilibrium of capital stock under the financial market and financial intermediary model, it is sufficient to analyze through Proposition 1 and 2 as follows.

Proposition 1

For $x = 0$ we show that the optimal value of illiquid investment under financial intermediary is higher than the optimal value of illiquid investment under financial market. In other words, we have $\bar{q}_t^b > \bar{q}_t^m$.

Proof:

From (7) and (19), we show that $(1-\pi)(B_1)^{\frac{1}{-1-\gamma}} / nw_t < (B)^{\frac{1}{-1-\gamma}} / nw_t$. Thus, we examine whether $B_1 < B$. From B_1 and B, we only examine if

$$(1-\pi)\left(A\pi\left(R/\pi\right)^\theta w_t^\theta \theta^2 \psi \right)^{\frac{1}{-1-\gamma}} < \left(\frac{\pi}{1-\pi}(AR^\theta w_t^\theta \theta^2 \psi - nw_t) \right)^{\frac{1}{-1-\gamma}}. \qquad (21.a)$$

Equation (21.a) can be rewritten as

$$(1-\pi)^{\frac{\gamma}{-1-\gamma}} < \left(\pi^\theta - \frac{nw_t \pi}{AR^\theta w_t^\theta \theta^2} \right)^{\frac{1}{-1-\gamma}} \qquad (21.b)$$

For $\gamma > -1$ the inequality is verified if the left hand side is less than one, while the right hand side is greater than one. By definition the value of the left hand side is less than one. For the right hand side, we proceed as follows

$$\left(\pi^\theta - \frac{nw_t \pi}{AR^\theta w_t^\theta \theta^2} \right)^{\frac{1}{1+\gamma}} < 1 \iff AR^\theta w_t^\theta \theta^2 \pi^\theta < AR^\theta w_t^\theta \theta^2 + nw_t \pi.$$

Since $\pi^\theta < 1$, we verify that $AR^\theta w_t^\theta \theta^2 \pi^\theta < AR^\theta w_t^\theta \theta^2$. As discussed above, Proposition 1 is laid down for $x = 0$. This condition can be interpreted as the best case in which

financial market is efficient, since there is no premature liquidation to fulfil the liquidity needs of two-period-lived agents (non-entrepreneurs). Proposition 1 explicitly shows that although the financial market is at the best condition, the illiquid investment of the financial market equilibrium is always lower than that of the financial intermediary equilibrium. To illustrate Proposition 1, we perform a numerical simulation by taking $R = 1.9$, $\pi = 0.4$, $\theta = 0.75$, $\gamma = 100$, $n = 0.5$, $x = 0$, and $A = 1$ in which the condition $A\theta\psi R > n$ is fulfilled. Figure 7.1 shows that the optimal illiquid investment of the financial intermediary equilibrium than that of the financial market equilibrium.
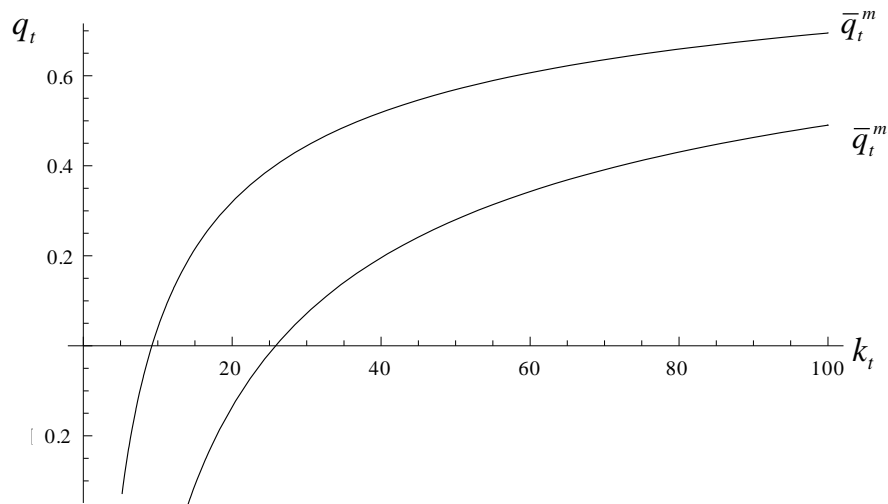

Figure 7.1. The Illiquid Investment in the Financial Market and Financial Intermediary Equilibrium

From Proposition 1, we further lay out Proposition 2 as a consequence of Proposition 1.

Proposition 2

The existence of banks in an economy enhances economic growth more significantly than the absence of banks.

Proof:

In the financial intermediary equilibrium, economic growth is determined by the value of $k_{t+2} = \varphi_b(k_t)$. Meanwhile, in the financial market equilibrium, economic growth is determined by the value of of $k_{t+2} = \varphi_m(k_t)$. From Proposition 1, it is straightforward to find $\mu_b > \mu_m$, where $\mu_b = \dfrac{\varphi_b(k_t)}{k_t}$ and $\mu_m = \dfrac{\varphi_m(k_t)}{k_t}$ are the change of capital stock in the financial intermediary and financial market equilibrium, respectively. Proposition 2 is thus proved.

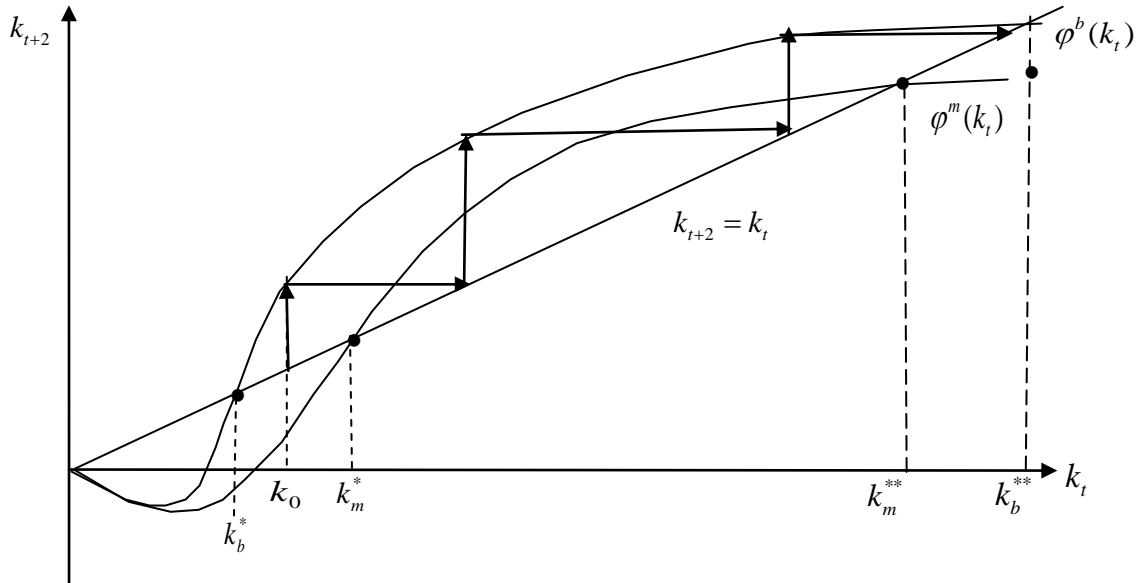From (8) and (14), we illustrate the dynamics of capital accumulation in each case as follows.

Figure 7.2. The Dynamic Path of Capital Stock

In Figure 7.2, we observe the existence of threshold effects at the stationary states k_b^* and k_m^* for the financial intermediary and financial market equilibriums, respectively. Threshold effect is defined as follows

Definition 1. *Threshold effect is a low level equilibrium trap or local underdevelopment trap when the initial capital stock is very low, so that financial intermediary and financial market can not enhance long-term economic growth.*

133

From Figure 7.1, we observe that there are three stationary states in both the financial intermediary and the financial market equilibrium: (i) the trivial steady state at $k = 0$, (ii) the low level equilibrium trap (k^*), and (iii) the high level steady state equilibrium (k^{**}). Moreover, we observe that the financial intermediary model is more accurate than the financial market model to reduce the threshold effect. We verify this property in the next Proposition.

Proposition 3

(i) In the financial intermediary and financial market equilibrium, the economy converges to a higher long-term steady state equilibrium if initial capital stock exceeds a threshold level, and (ii) threshold levels in the financial intermediary equilibrium is lower than the ones in the financial market equilibrium.

Proof:

To prove Proposition 3, we verify the existence of threshold effect in both the financial intermediary and financial market equilibriums. Then, we compare both of them.

(i) The financial intermediary equilibrium

At the stationary states, we have $k = \varphi_b(k)$. As a matter of fact, it is difficult to solve algebraically the stationary capital stock (k). From Figure (1) we observe that $k = \varphi_b(k)$ has two roots k_b^* and k_b^{**}. Alternatively, we derive $\varphi_b(k_t)$ in order to obtain the first-order condition as follows

$$\frac{d\,\varphi_b(k_t)}{d\,k_t} = -\frac{R(-1+\theta)\theta\left(\dfrac{\Omega}{n}\right)^{\frac{-1}{1+\gamma}}}{k_t\,n\pi(1+\gamma)}\left(-1+\pi+Ak_t^\theta n\pi^\theta(1+\gamma)\left(\dfrac{\Omega}{n}\right)^{\frac{1}{1+\gamma}}\right) \qquad (22.a)$$

where $\Omega \equiv \left(\dfrac{A}{n}\left(\dfrac{R}{\pi}\right)^\theta \pi(-Ak_t^\theta \pi^\theta(-1+\theta)^{-1+\theta}\theta^2\psi)\right)^{\frac{-1}{1+\gamma}}$.

134

To show the existence of threshold effect k_b^*, we examine if there is k_t in which

$\dfrac{d\,\varphi_b(k_t)}{d\,k_t} > 1$. In other words, $\dfrac{d\,\varphi_b(k_t)}{d\,k_t} - 1 > 0$ and $\varphi_b(k_t)$ intersects $k_{t+2} = k_t$ at k_b^* as

shown at Figure 2. In order to simplify (22.a), we assume that $\pi \to 1$ and hence, $\psi \to 1$. Under this condition, we simply obtain

$$\lim_{\pi \to 1} \frac{d\varphi_b(k_t)}{d\,k_t} - 1 = -\frac{k_t + A k_t^\theta R(\theta - 1)\theta}{k_t}. \tag{22.b}$$

Despite assuming that $\pi \to 1$, we do not change the properties of the financial intermediary model. Since our purpose is to formalize the role of financial intermediation in enhancing entrepreneurship through long-term investment, the absence of non-entrepreneurs does not affect the change of capital stock. This is because economic growth should not be relied on non-entrepreneurs but entrepreneurs. From (22.b), we examine if there is k_t in which the right hand side becomes positive. In other words,

$$-\frac{k_t + A k_t^\theta R(\theta - 1)\theta}{k_t} > 0$$

$$\Leftrightarrow S = \left\{ k_t \Big| k_t < \infty \wedge k_t > \left(\frac{1}{A R(1 - \theta)\theta} \right)^{\frac{1}{\theta - 1}} \right\} \tag{23}$$

Since $A, R > 0$ and $0 < \theta < 1$, then $\left(\dfrac{1}{A R(1 - \theta)\theta} \right)^{\frac{1}{\theta - 1}} > 0$ and we obtain

$$k_b^* = \left(\frac{1}{A R(1 - \theta)\theta} \right)^{\frac{1}{\theta - 1}} \tag{24}$$

Equation (24) is simply defined as the threshold level of the financial intermediary equilibrium, since for each k_0 where $k_b^* < k_0 < +\infty$, we have $\dfrac{d\,\varphi_b(k_t)}{d\,k_t} > 1$. The existence of threshold effect in the financial intermediary equilibrium is therefore confirmed.

(ii) The financial market equilibrium

To prove the existence of threshold effect under the financial market system, we use the same characterization of the bank-based economy. Assume that $\pi \to 1$ and $\psi \to 1$. This means that financial market only exists for responding the entrepreneur's needs. By solving the first-order condition for $\varphi_m(k_t)$ and its limit for $\pi \to 1$, we obtain

$$\lim_{\pi \to 1} \frac{d\,\varphi_m(k_t)}{d\,k_t} - 1 = \frac{A k_t^{\theta-1}\, n\, R(1-\theta)\theta}{n-x} - 1 \qquad (25)$$

The threshold effect k_m^* exists, if and only if there is $k_t > 0$ in which $\dfrac{d\,\varphi_m(k_t)}{d\,k_t} > 1$ or

$\dfrac{d\,\varphi_m(k_t)}{d\,k_t} - 1 > 0$. From (25), we have

$$k_m^* = \left(\frac{AnR\theta}{n-x} - \frac{AnR\theta^2}{n-x} \right)^{\frac{1}{\theta-1}} \qquad (26)$$

Since $0 < \theta < 1$, then it is straightforward to denote that $k_m^* > 0$. Hence, the existence of threshold effect in the financial market equilibrium is confirmed.

(iii). Financial intermediary vs. financial market

From (24) and (26), we verify that the threshold level of the financial intermediary equilibrium is lower than that of the financial market equilibrium by proving that

$$\frac{AnR\theta}{n-x}(1-\theta) < \frac{1}{AR(1-\theta)\theta} \qquad (27)$$

As $\theta \to 1$, the left hand side tends to 0, but the right hand side tends to infinity. Similarly, as $\theta \to 0$, the left hand side tends to 0 and the right hand side tends to infinity. By these results, Proposition 3 is proved.

Threshold effect in the finance-growth nexus is one of important contributions in this chapter. This finding is relevant for developing countries to promote banking sector development. For instance, let k_0 be an initial capital stock that lies below the threshold

level of the financial market equilibrium (k_m^*) as shown in Figure 7.1. In order to reach the long-run steady state equilibrium of capital stock, k_0 should be iterated by the $\varphi_b(k_t)$ curve. Such a situation can drive the economy to converge to k_b^{**}. Conversely, if k_0 is iterated by the $\varphi_m(k_t)$ curve, the economy may disappear because the steady state equilibrium of capital stock tends to zero. In this case, we denote that the financial intermediary equilibrium is better than the financial market equilibrium in order to ensure the existence and uniqueness of long-run steady state capital stock, and to reduce the threshold effect of the economy. Hence, long-term economic growth can be well achieved as long-term productive investments increase and short-term ventures decline. By extension, the potential source of speculations from short-term ventures can be therefore reduced.

Nevertheless, if the initial capital stock is too low, as it lies below the threshold level of the financial intermediary equilibrium ($k_0 < k_b^*$) shown in Figure 7.2, the steady state equilibrium of capital stock can approach to zero, even financial intermediary exists. In such a case, there is no more positive link between financial development and economic growth in developing countries with the low level of initial capital stock.

6. Conclusion

In this chapter, we reevaluate the finance-growth nexus *à la* Bencivenga and Smith (1991). Our stylized feature is twofold. First, we use the Neo-classical growth framework instead of drawing endogenous growth as developed by Bencivenga and Smith (1991). Second, we distinguish the behavior vis-à-vis of risk between non-entrepreneur and entrepreneur, as both agents have different liquidity needs.

By these features, we provide three original contributions. First, we show that entrepreneurship is always a growth-enhancing factor in both financial market and financial intermediary equilibriums. Second, we characterize the role of bank as financial intermediary in the process of savings and investments. Third, we show that financial intermediary is better than financial market in order to ensure the existence and uniqueness of the long-run steady state equilibrium of capital stock. Thus, financial intermediary is better than financial market in enhancing long-run economic growth. In

this regard as well, we highlight that although threshold effect exists in the finance-growth nexus, the presence of banks as financial intermediary reduces such threshold effect. Threshold effect is important in the finance-growth nexus, since it shows the difficulty of developing countries to raise initial capital stocks. This situation may in turn impede production, physical capital accumulation and hence, long-run economic growth. Accordingly, threshold effect should be taken into account in the future research in the finance-growth nexus, notably in developing countries, where externalities due to human capital and technological innovations are not yet well-developed.

General Conclusion

A few years before the occurrence of the credit crisis of 2008, the Chief Economist of the IMF at the time, Raghuram Rajan, wrote an interesting paper entitled: "Has financial development made the world riskier?" This paper received criticisms, as some have thought that the paper is intended to hinder financial development that has been perceived as growth-enhancing factor. Rajan argued that financial development has indeed made the world riskier. Financial development that was marked by financial deregulation has removed artificial barriers preventing entry, competition between banking products, institutions, markets, and jurisdictions. This trend has also created the new landscape of financial sector due to the raise of private equities, hedge funds, as well as new political, legal, and regulatory arrangements. Consequently, these changes altered the nature of financial transactions within banking that is also strongly related to financial market. As financial market has expanded and become deeper, risks has also widely spread affecting the whole economy.

The Rajan's paper is in fact strongly linked to Keeley (1990) who argued that financial deregulation during the nineties has increased the degree of competition in the US banking industry that in turn exacerbate financial fragility due to the decline in the charter value of US banks. Both Keeley and Rajan saw from the perspective of developed countries. While Keeley focuses on the US, Rajan's analysis embraces European countries along with the US. It seems clear that the link between deregulation, bank competition and financial stability do not much change in the case of developed countries during the last two decades. How about the less developed countries? Udhe and Heimeshoff (2009) initiate the analysis by considering developing countries in Eastern Europe and conclude that greater competition in banking market leads to financial stability. To our best knowledge, there are no previous studies examining Asian countries. In this direction, therefore, Part I of this dissertation contributes to better understand such a lively debate by focusing on the Asian context.

Our analysis in Part I (Chapter 1 and 2) suggests a complex pattern between bank competition and financial stability. The negative impact on financial stability of higher

139

market power in banking market is not purely the competition-stability nexus but is also affected by the way how banks manage their capital ratios to offset risk taking. In Chapter 1, we further emphasize that the Asian financial crisis of 1997 also influences the link between bank competition, capitalization and financial stability. As financial crisis leads to a decline in the systematic risk of banks, higher market power in banking during the 1997 Asian crisis period is less likely to exacerbate moral hazard that may deteriorate financial stability. Chapter 2 then attempts to relate the competition-stability nexus with economic growth. Our empirical findings suggest the positive relationship between market power in banking and financial stability in countries with greater economic growth. Economic growth therefore neutralizes the impact of market power in banking on bank moral hazard in this regard.

If Part I is assessed through a cross-country setting, Part II (Chapter 3 and 4) is devoted to focus on Indonesian banking in order to highlight that too much bank capital has an adverse impact on financial intermediation, despite the fact that the insufficient level of bank capital ratio affects financial stability as discussed in Part I. Chapter 3 begins with the description of the Indonesian banking evolution during the last two decades. In the aftermath of the 1997 Asian crisis, particularly, Indonesian banking has experienced substantial changes in terms of regulations that lead to financial stability. However, Indonesian banks still need to struggle with inefficiency problems and financial disintermediation. In Chapter 4, we seek explanation why inefficiency and financial disintermediation becomes a crucial problem in Indonesian banks. Specifically, we analyze the link between capitalization, intermediation costs, risk and profitability in Indonesian banks. Our empirical results highlight that greater capital ratio increases the cost of intermediation, but reduces risk and profitability of banks. In this regard, there is a strong presumption that managers in Indonesian banks are likely to be self-interested, where they tend to hold higher capital ratio to comply with strict regulation on bank capital by targeting safer loan portfolios, albeit not profitable, at the cost of an increase in monitoring costs that in turn impedes financial intermediations due to higher intermediation costs. The presence of self-interested managers may thus explain financial disintermediation problems in Indonesian banks. Our study further highlights that

private-owned banks are more likely to suffer from a managerial self-interest problem than state-owned, joint-venture, and foreign-owned banks.

High intermediation costs as discussed in Chapter 4 can also be due to weak institutional development that is likely to occur in emergent economies. Recalling Chapter 2, moreover, economic growth indeed neutralizes bank moral hazard in less competitive market, while financial intermediation that spurs long-term investments has been perceived to boost economic growth. To the extent that high intermediation costs hinder financial intermediation, then the nexus between financial development and economic growth is not always positive, particularly in emergent economies where institutional development is rather weak.

Part III is then dedicated to re-evaluate the theoretical nexus between financial intermediation and economic growth in emergent economies. Chapter 5 begins with a brief overview of economic thoughts beyond the finance-growth nexus. It particularly highlights the role of financial intermediary as liquidity provider that accommodates liquidity preferences amongst economic agents. Furthermore, it also highlights several caveats in the existing literature on the finance-growth nexus. One of the important features is that the previous literatures do not distinguish agents based on their liquidity preferences. Chapter 6 therefore reformulate the finance-growth nexus by considering agents' liquidity preference. We work on the framework of the Neo-classical economic growth that eliminates the role of externalities related to human capital and technological development, as such externalities are relatively underdeveloped in emergent economies and hence, they may not play a significant role in economic development. One of our important findings is the existence of threshold effect in the finance-growth nexus that may explain to what extent financial intermediary can or cannot boost capital accumulation and hence, economic growth. Specifically, there is no positive impact of financial development on economic growth unless the initial levels of physical capital stock of an economy exceed a threshold level.

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