

**BANKING COMPETITION AND ITS RELATIONSHIP
WITH BANKING STABILITY:
EVIDENCE FROM INDONESIA**

1980 - 2010

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ABSTRACT

A competitive banking industry is essential to enhance financial system efficiency. An efficient financial system contributes to accelerated economic growth through its role in payment service delivery, macroeconomic policy transmission and safeguarding of financial stability. This thesis estimates competition in Indonesian banking covering all commercial banks in the recent three decades by using the recent refinement of the Panzar-Rosse method by Bikker, Shaffer and Spierdijk (2011). Furthermore, this study examines the determinants of competitive banking based on the contestable theory of Baumol (1982) by investigating the impact of state intervention, comparing the competitive behaviour of banks across different sizes and ownerships and researching the role of foreign penetration, market concentration and the macroeconomic environment. This thesis also studies the relationship between competitive banking and banking stability. The impact of competitive banking on banking stability has been recently discussed extensively both in the academic literature and media following the international banking and financial crises.

The empirical estimation of Fixed Effect panel data shows that Indonesian banking worked in a monopolistically competitive market. The yearly estimations of H-statistics of the Panzar-Rosse method reveal that the industry was very competitive during the periods of banking reforms and liberalization between 1988 and 1994. The estimation of the impact of structural changes on competition presents evidences that the introduction of reforms in 1983 and 1988 and banking liberalization in 1988 and 1992 created a contestable market because the industry was open for new entrants and had less restrictions and controls. The estimation of the competitive behaviour of banks across different sizes and ownerships demonstrates that small banks, private banks and *de novo* banks are the main drivers of competition in the Indonesian banking industry. Whereas, the estimation of competitive behaviour of large banks indicates that market power facilitates collusion between large banks. The estimation of a Vector Error Correction Model (VECM) in chapter five suggests that the larger access of foreign firms to the market, the lower market concentration and a favorable macroeconomic environment promoted competition in the banking industry. Regarding to the relationship between competitive banking and stability, the estimations based on the Generalized Method of Moment (GMM) methodology suggest that competitive banking promotes banking stability

by lowering insolvency risk in the Indonesian banking industry. In a competitive environment, banks are more efficient and better capitalized to enable them in generating higher profits.

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Chapter One

Introduction

1.1. The Nature of this Study

This thesis is an empirical examination of competition in the Indonesian banking industry. It examines five specific issues relating to the determinants and implications of the level of banking competition in the banking industry for the wellbeing of the Indonesian economy: competition in the Indonesian banking industry between 1980 and 2010, the impact of policies (deregulation, liberalization, crisis management, and consolidation) on banking competition, the competitive behaviour of banks across different sizes and ownership, the determinants of competitive banking, and the relationship between competition and stability.

A feature of this research is that it is a single country study (of Indonesian banking) based on extensive and comprehensive panel data of banks between 1980 and 2010. In order to examine competition in the banking industry, this thesis begins with a discussion of proper and valid methods to assess the competition. It relies on the recent refinements of the Panzar-Rosse method developed by Bikker, Shaffer and Spierdijk (2011) to measure competition in the Indonesian banking industry. The study focuses on the most recent three decades of history as it has been a period of structural change, not only for the Indonesian banking sector, but for the economy as a whole. Prior to the banking reforms in the 1980s, the Indonesian banking industry was highly regulated and the business environment was restrictive. Banking reforms in 1983, 1988 and 1992 removed barriers to enter the industry and provided a more business-friendly environment. Indonesian banking was hit by a crisis in the 1997 economic crisis. Following the economic crisis, the banking industry was consolidated. In the present century, banks must comply with higher capital requirements, more prudent risk management and a single presence policy for banks under the same shareholders.

This thesis discusses five distinct research studies on four related issues – the measurement of the level of banking competition, policy changes and competition, the determinant of competitive banking and the relationship between competitive banking and stability. Even though these topics are related, the literature framework and methodological framework are different. Therefore, there is no separate literature review or methodological chapter. As an

alternative, each of the five chapters contains its own literature review and methodological section.

1.2. Significance of the Issue

Indonesia is an emerging country in East Asia with an average growth of Gross Domestic Product (GDP) of 6 per cent in the last ten years and the aim is to be one of the ten largest economies by 2025. In the late 1980s and in the beginning of the 1990s, the Indonesian economy benefited from the oil boom. The economy (GDP) grew 8 per cent on average between 1988 and 1996 (World Bank 2011). Nevertheless, the Indonesian economy suffered a crisis in 1997 which was started by the sharp depreciation of the local currency (Rupiah) to U.S Dollar. The crisis spread to the banking sector in 1998; the tight monetary policy induced an increase of inter-bank interest rates and one month time deposits to 64.67 per cent and 49.14 per cent respectively. Some studies estimated that the net cost of the banking restructuring of the 1997 crisis was around 40 per cent of the 1998 GDP (Fane & McLeod 2002) or 33 per cent of the 2001 GDP or 495 trillion Rupiah (Pangestu 2003). The expense of banking restructuring was the difference between the amounts of government bonds that used to recapitalize banks and the face value of banks assets (Pangestu 2003, p. 20).

The recovery process took at least four years before growth resumed in 2001 by 3.64 per cent from minus 13.13 per cent in 1998. The macroeconomics in the 2000s has shown an improvement even though the growth rate of GDP has not achieved the prior-crisis level. The exchange rate was relatively stable at 8,000 to 10,000 per U.S dollar compared to 15,000 per U.S dollar in June 1998 (Bank Indonesia). The poverty rate also lowered in the last ten years and reached 13.3 per cent in 2010 (de Mello 2008). The inflation rate declined 11.5 per cent in 2001 from 58.4 per cent in 1998 (World Bank 2011). However, inflation is still a problem in the economy. Inflation reached the highest level in 2005 of 17.1 per cent after the removal of some parts of the oil subsidies. The price increase was manageable in 2009 with an inflation rate of 2.8 per cent. Nevertheless, in 2010 the inflation rose by 4.2 per cent to 7 per cent (de Mello 2008).

In 1999, Indonesia began the process of decentralization to empower local governments to manage the development in their regions although the impact of decentralization on the economy is still questionable. The study by Lewis (2005) presented evidence that local

governments still relied on national government through the transfer of funds. Local government has contributed only 7 per cent to their own-source revenue. Yet, local government fiscal policy is perceived as being more aggressive through the introduction of various types of tax and retribution to finance routine overhead budgets of local government (Lewis 2005).

The banking industry was perceived as liquid and solvent and the loans to deposits ratio constantly grew from 40 per cent in 2004 to 80 per cent in 2010 and the capital adequacy ratio improved to 20 per cent since 2004 (Rosengard & Prasetyantoko 2011). Small and medium enterprises (SMEs) are the primary contributors to economy growth and employment. SMEs represent more than 99 per cent of total enterprises. Moreover, SMEs provide 97 per cent of employment (OECD 2012).

Access to finance in Indonesia is heavily reliant on the lending activities of the banks. More than 86 per cent of the assets of the financial industry is owned by banks (Pradiptyo et al. 2011). Thus, the economy mostly depends on the banking industry to access loans. The contribution of loans from the banking industry was more than 50 per cent of Gross Domestic Product (GDP) in the last twenty years (World Bank 2011). The literature acknowledges the importance of banking in the economy as a sound banking and financial system are substantial elements of monetary and macroeconomic management (Enoch, Garcia & Sundararajan 1997). In addition, an efficient financial sector contributes to economic growth (Cooray 2009). Efficient banking produces a lower interest spread that boosts loans disbursement for investment activities. Efficient banking also enhances payment service delivery, policy transmission and has a role in maintaining financial stability (Bikker, Shaffer & Spierdijk 2011). A competitive banking environment is a substantial input to an efficient banking industry. In a competitive environment, banks will produce an efficient outcome including a normal profit as price equals marginal cost. This thesis examines the competition in the Indonesian banking industry between 1980 and 2010 and the source of competitive banking. The New Industrial Organization paradigm, particularly contestable market theory, is employed as the theoretical framework.

The estimation of the extent of competition in the Indonesian banking industry should recognize the nature of the banking industry. This industry is heterogeneous because banks do not supply identical products (Alhadeff 1967). Furthermore, the market for banking is

segmented and based on customer's preferences and geographical differences (Alhadeff 1967). The literature based on the Panzar-Rosse method also underlines the importance of the consideration of size differences in the banking industry (Bikker & Haaf 2002; Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000). The coexistence of banks of different size in the market will cause market disequilibrium and create constant average cost (Bikker, Shaffer & Spierdijk 2011). In addition to the estimation at the aggregate level of the banking industry, the present study conducted sub-group analysis through the estimation of competition across banks with different sizes and ownership. Some studies suggest that the behaviour of large and small banks is different (Berger, Kashyap & Scalise 1995; Berger & Udell 1995; Cole, Goldberg & White 1999; Cole, Goldberg & White 2004; Keeton 1995; Levonian & Soller 1996; Nakamura 1993; Stein 2002; Strahan & Weston 1996). In regards to banks with different ownership, the study by McLeod (1999) of Indonesian banking reveals that government-owned banks behave differently compared to private banks. The present research aims to capture the different behaviour of banks of different sizes and ownership by conducting an analysis of competition by sub-groups.

In many countries, including Indonesia, the State intervenes in the operation of the banking industry by the introduction of regulations and policies. State intervention is intended to provide strong prudential supervision, to ensure healthy competition, and to enhance financial infrastructure and financial stability (World Bank 2013). All of these are important for the wellbeing of the economy as a whole. In the case of the Indonesian banking industry, prior to banking reforms in the late 1980s the banking industry was highly regulated. The controls were removed through a series of banking reforms in 1988 and in the early 1990s. Following the banking crisis in 1997, the State¹ consolidated the banking industry through the introduction of the Indonesian Banking Architecture (API) and the new risk management policies of BASEL II². According to the API, banks must comply with a higher capital requirement and a single presence policy for banks under the same shareholders. Furthermore, entry to the banking industry has been restricted apart from foreign banks that enter through

¹ Since the 1990s, the Central Bank of Indonesia has had the responsibility for managing and supervising the Indonesian banking industry. Previously, the regulatory and supervisory capacity was shared with the Ministry of Finance.

² The Central Bank of Indonesia started to introduce the Basel II in 2007. In 2010, banks were required to meet the first, second and third pillar of Basel II. Under Basel II banks must have at least 8 per cent of risk assets ratio (which is the ratio of capital to weighted risk assets). In addition to Basel I and its amendment in 1996, the first pillar of Basel II required banks to add operational risk as a weight so banks must add their capital (Heffernan 2005). Furthermore, the second and third pillars of Basel II obliged banks to develop internal methods to assess capital and disclose their method for computing capital adequacy, and how they assess risks and techniques of risk mitigation. Currently Basel III is now being negotiated.

the acquisition of local existing banks (Rosengard & Prasetyantoko 2011). Regarding the role of the state in the banking industry, this thesis examines the impact of policies of banking reforms (deregulation and liberalization) between 1988 and 1996, the banking crisis between 1997 and 2000, and banking consolidation in the 2000s.

Currently, authorities face the challenge of balancing an interest in a competitive banking industry and stability of the financial system³. The literature provides inconclusive findings. On the one hand, some studies of the competition-fragility hypothesis suggest that a competitive banking industry impairs banking and financial stability (Beck, De Jonghe & Schepens 2013; Davis 1995; Jiménez, Lopez & Saurina 2007; Keeley 1990; Matutes & Vives 2000). On the other hand, some studies show that competitive banking enhances banking and financial stability (Boyd, De Nicolò & Jalal 2006; Boyd, De Nicoló & Smith 2004; Caminal & Matutes 2002; Demirgüç-Kunt, Laeven & Levine 2004; Fane & McLeod 2002; Mishkin 1996; Schaeck & Cihak 2007; Schaeck, Cihak & Wolfe 2006; Soedarmono, Machrouh & Tarazi 2011). This thesis examines the possible trade-off between competition and stability in the Indonesian banking industry.

1.3. Literature Review Framework

This thesis employs two literature review frameworks. The first framework is used as the basis of chapters two, three, four and five. The second framework provides the foundation for the discussion in Chapter six. There are two frameworks because Chapter six extends the analyses of banking competition by discussing the possible trade-off of competitive banking and banking stability. The first framework begins with the literature that emphasizes the role of a sound and efficient banking system for the economy. Next, the theory of market structure is used to determine the structure of markets that produces the most efficient outcome. The differences between the Structural paradigm and the Non-Structural paradigm are discussed. Finally, this research employs the Non-structural paradigm as a basis of the estimation of the degree of competition in the Indonesian banking industry.

³There has been an active and high profile debate in the media following the banking crisis of 2008 in some advanced economies. The Economist (2011) joined the debate by asking readers their opinion of whether more competition is more dangerous for banking. Surprisingly, 70 per cent of the participants did not agree with the statement. Bloomberg (2013) publicized the article titled "Too big to fail rules hurting too small to compete banks". The article argued that banking crises created massive burdens for the economy. Governments in the U.K., U.S. and some European countries spent more than US\$600 billion in capital to save banks and the economy in the last five years. The crisis occurred when banks were consolidating and becoming bigger. This fact triggers some analyst to question the trade-off between competition and stability.

The second framework shows the growing body of literature on the trade-off between competitive banking and banking stability. There are two competing hypotheses which are the competition – fragility and competition – stability hypothesis. The first hypothesis argues that there is an adverse effect of competitive banking on stability. Competitive banking increases the risk of banking instability. In contrast, the second hypothesis emphasizes the role of competitive banking to preserve and enhance stability in the banking industry. The empirical model for chapter six is designed to examine which hypothesis better explains the relationship between competition and stability in the Indonesian banking industry.

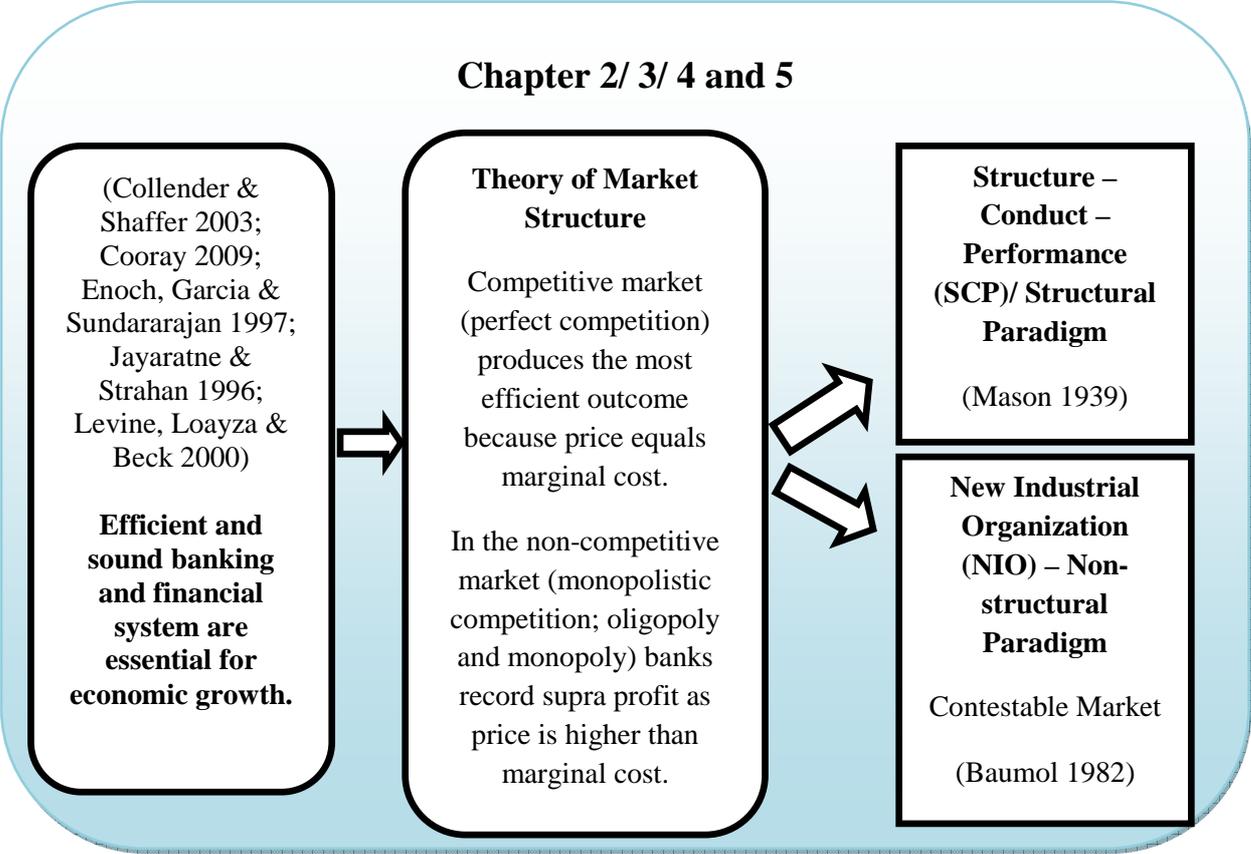


Figure 1.3-1 First Literature Review Framework

Chapter 6

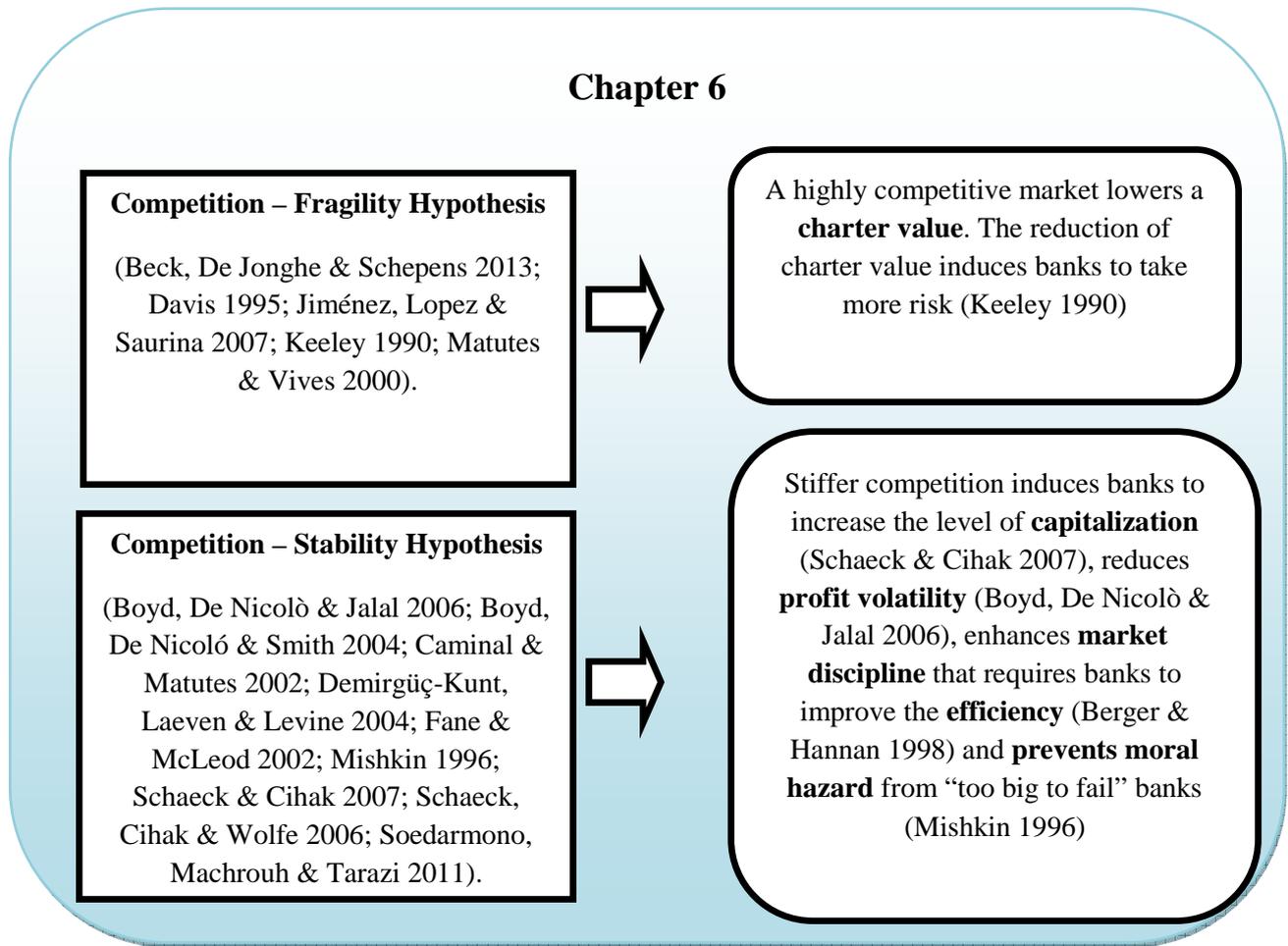


Figure 1.3-2 Second Literature Review Framework

1.4. Contribution to the Literature

The first contribution of this thesis to the literature is on the application of the New Industrial Organization (NIO) within the non-structural paradigm to empirically study the market structure of the Indonesian banking industry. The previous studies of the Indonesian banking industry mostly depend on the structural paradigm that uses market concentration as a measure of market structure (Ardianty & Viverita 2011; Ariyanto 2004; Cho 1990; McLeod 1999; Rosengard & Prasetyantoko 2011; Susanto & Rokhim 2011). The second contribution of this thesis is to add to the study of competition in the banking industry in emerging economies. It is important to conduct a study in the emerging countries because their nature and characteristics are different compared to the advanced economies. Other studies of banking competition in emerging economies depend on cross-countries observation to capture

the difference in the level of economy, business environment and regulation (Claessens & Laeven 2004; Gelos & Roldos 2002; Yeyati & Micco 2007). This present research is a single-country (Indonesia) study of the banking industry which covers the most recent three decades from 1980 to 2010 in Indonesian banking. By focusing on Indonesian banking, this thesis provides a comprehensive analysis which is based on all commercial banks in Indonesia (286 banks) for thirty-one years. Indonesian banking between 1980 and 2010 provides rich information because the industry experienced substantial changes from regulation and restriction to a less-regulated and open environment. Changing regulations contributed to the changes in the business environment. Thus, the Indonesian banking industry is also an appropriate landscape to empirically test the relevance of the contestable market theory of Baumol (1982) in the banking industry. By examining the possible adverse effect of chartering policy on competition, this thesis adds to the literature on the impact of a range of government policies on competition from deregulation, liberalization, crisis management to consolidation. The empirical examination of the contestable theory of Baumol (1982) is also conducted to investigate the source of competitive banking. This thesis, particularly Chapter five, focuses on assessing the role of market concentration, foreign penetration and government banks, on banking competition.

The third contribution of this research comes from the methodological approach. This research is the first to employ the recent refinement of the Panzar-Rosse method based on Bikker, Shaffer and Spierdijk (2011) for an empirical study of Indonesian banking. The recent refinement of the Panzar-Rosse method produces reliable and valid measures of the degree of competition in the banking industry. In addition to the analysis of the aggregate level of competition in Indonesian banking, this research firstly examined the competitive behaviour of large banks, medium-sized banks and small banks. This thesis also adds to the literature on the behaviour of foreign banks in the Indonesian banking industry. The contribution to the literature is particularly on the role of modes of entry of foreign banks and their impact on competition in the local banking market. This thesis analyses the behaviour of *de novo* banks and foreign acquired banks. Previous studies by Cho (1990) and Hadad et al. (2004) only covered the *de novo* banks as the representation of foreign banks. Another study by Susanto and Rokhim (2011) covered both *de novo* banks and foreign acquired banks, however their study did not provide a separate analysis for each of the type of foreign banks.

Finally, this thesis contributes to the literature of the possible trade-off between competitive banking and financial stability particularly in the context of developing countries. The literature in the area show inconclusive findings that divide into two contrasting hypotheses; the competition-fragility hypothesis and the competition-stability hypothesis. It is important to conduct a study on this issue in the Indonesian banking as a representation of the emerging market where capital markets are relatively underdeveloped and banks represent the main providers of credit to the economy. In addition, the Indonesian banking industry experienced structural changes; from being a regulated and restrictive industry to an open and less regulated industry and, at least twice, experienced financial turmoil. Furthermore, this thesis adds to the literature by covering longer periods of observation in order to capture the two financial instability periods of the early 1990s and of 1997. The previous studies by Soedarmono, Machrouh and Tarazi (2011) and Liu, Molyneux and Wilson (2013) relied on the observation period of 1998 to 2007. Thus, their studies do not cover the crises in the Indonesian banking industry.

1.5. Research Question

The aim of this thesis is to examine the level of competition in the Indonesian banking industry, the determinants of competitive banking, the implication of policy changes for competition and the trade-off between competition and stability in the banking industry. This thesis focuses on the following research questions:

Chapter Two: What happened to competition in Indonesian banking between 1980 and 2010?

Chapter Three: What was the impact of deregulation in 1988, liberalization in 1992, the banking and economic crisis in 1997, and consolidation in 2000s, on banking competition?

Chapter Four: Was there any difference in the level of competition among banks with different sizes and ownerships?

Chapter Five: What are the determinants of a competitive banking industry?

Chapter Six: Did a highly competitive banking industry contribute to banking instability?

1.6. Methodological Framework

The methodological framework establishes the linkage between the empirical model and the econometric model. The empirical models are derived from the literature review framework and the econometric models are designed based on the properties of the empirical models.

There are three methodological frameworks. The first methodological framework provides direction for the empirical analyses in chapters two, three and four. This framework is based on the New Industrial Organization approach under the Non-structural paradigm. The New Industrial Organization conducts direct observation of the competitive behaviour of banks. This thesis employs the recent refinement of the Panzar-Rosse method to examine the banks' behaviour. As the observation relies on individual bank-level data across thirty-one years, a panel data approach is preferred to estimate the degree of competition in the Indonesian banking industry. The static panel data is employed after considering whether the market is in equilibrium in the long-run.

The second methodological framework is developed for the empirical analysis of Chapter five. In terms of method, Chapter five is different from the other chapters. Chapter five uses a time-series approach rather than a panel data approach. This chapter examines the relationship of the evolution of banking competition, market concentration and the trend of foreign penetration. Particularly, this chapter concentrates on the industry-level data rather than individual bank-level data. Thus, the time series approach with Indonesian banking as a unit of analysis is more suitable for the empirical analysis in Chapter five. The literature indicates the existence of an endogeneity problem in the relationship between banking competition and market concentration. Thus, a Vector Error Correction Model (VECM) was selected to estimate the empirical model of Chapter five.

The empirical analysis in Chapter six is based on the third framework. It aims to examine which hypothesis is suitable for explaining the possible trade-off between competition and stability in the Indonesian banking industry. The empirical model also considers the possible endogeneity between the measure of competition and the measure of a banks' stability as suggested by the literature. The econometric model is designed based on the nature of data and the empirical model. Firstly, the unit of analysis of the data is individual bank-level data across thirty-one years. Secondly, there is a possible endogeneity as discussed above. Thus, the econometric model in Chapter six uses the dynamic panel data, particularly the System Generalized Method of Moment (GMM).

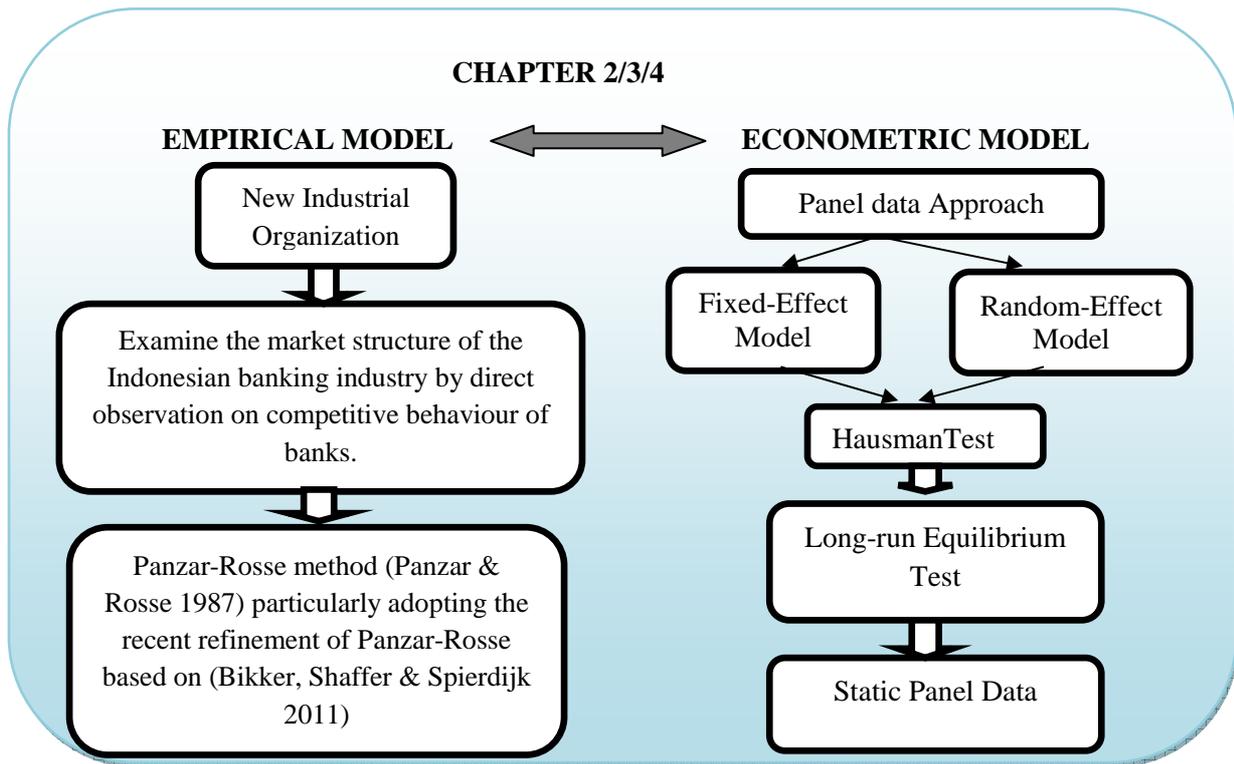


Figure 1.6-1 First Methodological Framework

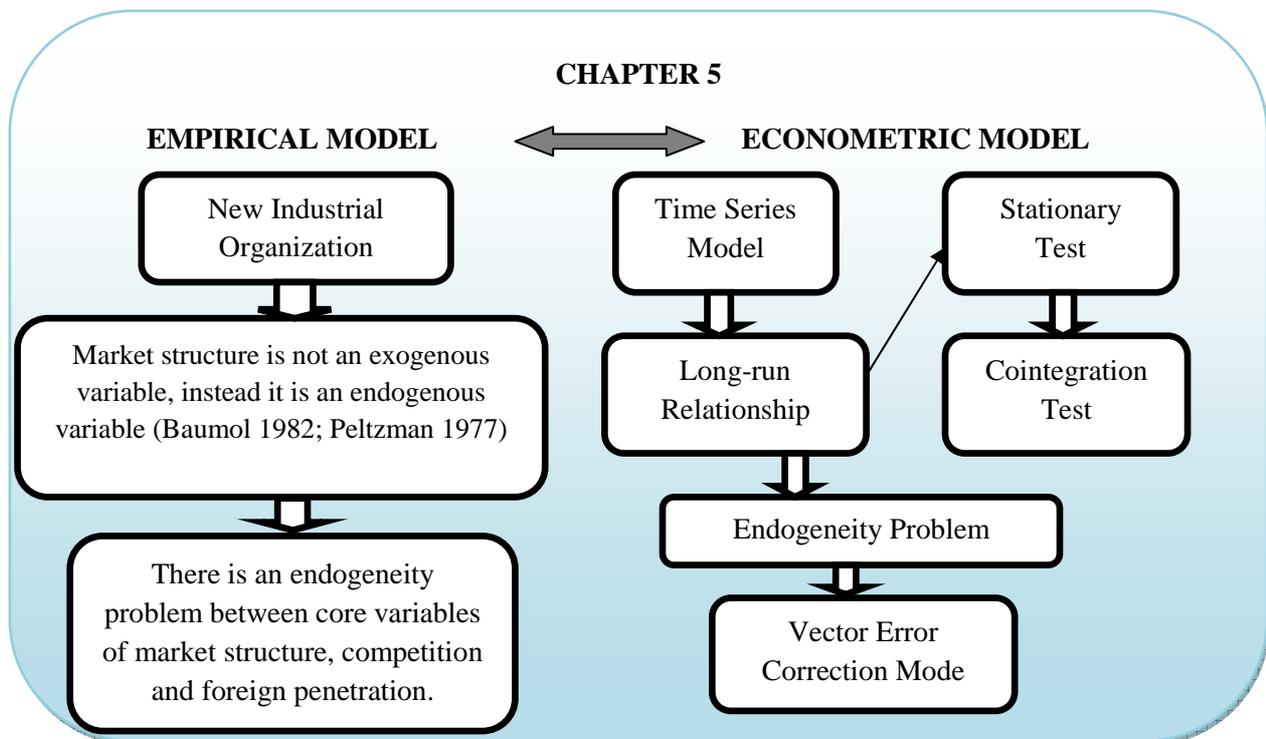


Figure 1.6-2 Second Methodological Framework

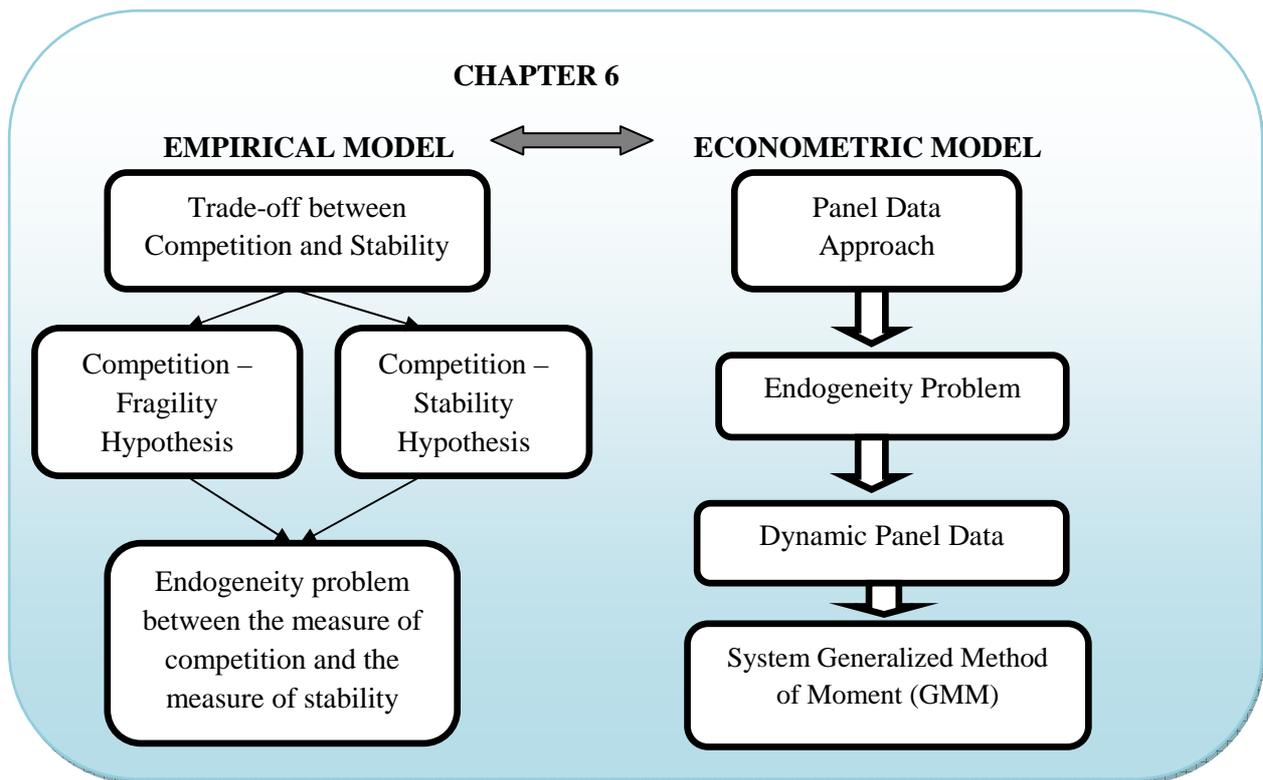


Figure 1.6-3 Third Methodological Framework

1.7. Organization of the Thesis

This thesis is organized as follows. Chapter two describes the competition in the Indonesian banking industry by comparing the three different specifications under the Panzar-Rosse method. The three specifications are the price specification, the scaled-revenue specification, and the un-scaled revenue specification. Based on Bikker, Shaffer and Spierdijk (2011), Chapter two relies on the superior specification using un-scaled revenue. In addition, Chapter two estimates the evolution of competition in the Indonesian banking industry following computation of the yearly estimates of H-statistics.

Chapter three evaluates the impacts of four different policies on banking competition. The first policy is related to banking deregulation between 1988 and 1991. The second policy is banking liberalization between 1992 and 1996. Banking deregulation and banking liberalization can also be seen as one set of banking reforms. The third policy is the management of the banking crisis in 1997. The fourth policy is banking consolidation in the 2000s.

Chapter four considers a sub-group analysis of competition in the Indonesian banking industry. There are two sets of studies in Chapter four. First is the sub-group analysis of banks across different sizes; large banks, medium-sized banks, and small banks. The categorization of banks is based on their assets and the number of employee. Second is the sub-group analysis of banks across different ownership types. Within the second sub-group analysis, this study ran two contrasting empirical analyses. Firstly, it contrasted the competitive behaviour of government banks and private banks. Secondly, this study contrasted the competitive behaviour of local banks and foreign banks.

Chapter five is different in the nature of data compared to the other chapters. Chapters two, three, four, and six discusses the panel data with individual banks as the unit of analysis between 1980 and 2010. Chapter five relies on time-series data for the same period of 1980 to 2010. The time series design was chosen as the core objective for examining the relationship between the evolution of competition, the evolution of concentration and the trend of foreign participation in Indonesian banking between 1980 and 2010.

Chapter six extends the discussion on banking competition by examining the trade-off with banking instability. Particularly, Chapter six considers which hypothesis, competition – fragility versus competition – stability, is more suitable for the Indonesian banking. The endogeneity issue between the measure of competition and the measure of banking stability is considered. The endogeneity problem is managed by using the Generalized Method of Moment (GMM).

Chapter seven concludes the main findings that are generated from the empirical chapters. In addition, Chapter seven provides a discussion of policy implications, the identification of study limitations, and recommendations for the future research.

Chapter Two

Competitive Environment Test in the Banking Industry

2.1. Introduction

Chapter two begins a discussion about banking competition by assessing the degree of competition in the Indonesian banking industry. A recent refinement of the Panzar-Rosse method by Bikker, Shaffer and Spierdijk (2011) was employed to estimate the elasticity of changes in the input prices on bank revenue. The H-statistics estimated by using the Panzar-Rosse method is used to determine the market structure of Indonesian banking. Following the discussion of the degree of competition in the Indonesian banking industry, chapters three, four and five examine the determinants of banking competition and Chapter six focuses on the influence of competitive banking on banking instability.

A number of studies underline the importance of financial intermediation for economic growth (Greenwood & Jovanovic 1990; McKinnon 1994; Pagano 1993; Shaw 1973). Financial intermediation contributes to the process of economic growth through a higher rate of savings, control on the fraction of saving that are channelled to investment, and the level of marginal productivity of the investment (Pagano 1993, p. 621). The contribution of financial intermediation on growth is stronger if the financial intermediation or banking system is efficient (Collender & Shaffer 2003; Cooray 2009; Jayaratne & Strahan 1996; Levine, Loayza & Beck 2000). As a lubricant, efficient banking allows the engine of growth to run faster (Jayaratne & Strahan 1996, p. 640). Under a less efficient banking system, a wider spread of interest is charged by the banking system. It implies that interest rates paid to savers are lower under a less efficient banking system. Assuming that the saving rates rise with the higher interest rates, an inefficient banking system lowers the accumulation of savings, reduces the investment level and lowers economic growth (Pagano 1993). Furthermore, an efficient banking industry will benefit the whole economy through loans provision, payment system delivery, monetary policy transmission, and its role in maintaining financial stability (Bikker, Shaffer & Spierdijk 2011).

A degree of competition in the banking industry is essential to ensure that the market produces efficiently; otherwise inefficient banks could not survive and exit from the market. Competition acts as a market discipline for banks to sustain and improve the efficiency level

(Berger & Hannan 1998). Further, competition facilitates the emergence of innovations and drives financial institutions to deliver a highest quality product. The discussion on the competition in Indonesian banking is important because its financial system is a banking-oriented system. As discussed in Chapter 1, assets of the banking industry accounted for around 86 per cent of the Indonesian financial industry between 2006 and 2010 (Pradiptyo et al. 2011). The contribution of loans from the banking industry was more than 50 per cent of the Gross Domestic Product during the last twenty years (World Bank 2011). As observed in the 1997 economic crisis, any shock occurring in the banking industry will spread to the financial system and the whole economy. The degree of competition in the banking industry will determine the efficiency level of the Indonesian economy. Furthermore, a stable banking industry plays an important role in sustaining stability in the overall financial system.

This is possibly the first study to examine competition in the Indonesian banking system for the whole period from 1980 to 2010. It is a significant contribution of this thesis because during this period the Indonesian banking industry experienced structural changes from deregulation and liberalization to consolidation. The policy changes altered the industry from a closed and restrictive one that is open, less restrictive and consolidated. On the one hand, the deregulations from the 1980s to the mid-1990s invited new entrants to participate in the Indonesian banking industry. On the other hand, the banking and economic crisis in 1997 followed by consolidation in the 2000s reduced the number of banks in the industry.

The more recent studies in the banking industry include the discussion of firm behaviour in understanding market competition as suggested by the non-structural approach. It is different from the structural approach which concludes that market structure, measured by market concentration, is the main determinant of firm behaviour and market performance. There are at least three important methods developed under the non-structural approach: the Iwata model (Iwata 1974), the Bresnahan model (Bresnahan 1982), and the Panzar-Rosse (P-R) model (Panzar & Rosse 1987). The present study employed the P-R model introduced by Panzar and Rosse (1987). This approach has been used extensively in empirical studies on banking competition. Most studies were conducted in developed countries; for example U.S.A banking (Shaffer 1982, 1994), European banking (Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000; Molyneux, Lloyd-Williams & Thornton 1994), in Finland (Vesala 1995), in Greece, Latvia and Spain (Delis, Staikouras & Varlagas 2008). A smaller number of studies have been conducted in emerging countries; for example in Latin American, Asian

and Central European countries (Gelos & Roldos 2002), Latin American countries (Yeyati & Micco 2007) and cross-countries studies (Bikker, Shaffer & Spierdijk 2011; Claessens & Laeven 2004).

The P-R model allows us to calculate the sum of elasticity of the reduced form of revenues with respect to factor prices. The joint elasticity is known as H-statistics and it allows us to distinguish empirically between common imperfect competition theories of price formation; whether it is monopoly, perfect collusion, monopolistic competition or perfect competition (Vesala 1995). Recent developments occurred in the empirical application of Panzar-Rosse comparing the estimations of the reduced-form revenue function of three specifications: price, scaled revenue, and un-scaled revenue (Bikker, Shaffer & Spierdijk 2011). Most studies about banking competition employed either the price specification or scaled-revenue specification. However, Bikker, Shaffer and Spierdijk (2011) proved that the price and scaled revenue produce over-estimated values of H-statistics in the case of imperfect market structure.

Bikker, Shaffer and Spierdijk (2011) and Bikker, Spierdijk and Finnie (2006) estimated competition in Indonesian banking by using the un-scaled revenue specification. Claessens and Laeven (2004) employed the price specification. As shown in Table 2.1-1, the three studies covered almost the same time period (shorter than the present study) however the results are different. The study by Claessens and Laeven (2004) found that between 1994 and 2001, Indonesian banking worked under monopolistic competition with an H-statistic of 0.62. Bikker, Spierdijk and Finnie (2006) rejected the perfect competition structure for Indonesian banking between 1986 and 2005 because the study found that the H-statistic was close to zero, (0.016). Further, Bikker, Shaffer and Spierdijk (2011) found that the H-statistic for Indonesian banking was 0.288 and it was much smaller than that found by Claessens and Laeven (2004). The different specification of the P-R method may underline the difference in the estimation of competition in the Indonesian banking industry. Thus, the present study aims to estimate the degree of competition in the Indonesian banking industry by comparing three specifications to generate a more accurate estimation of the level of competition.

Table 2.1-1 Summary of Studies on Competition in Indonesian Banking

No	Study	Period Covered	Specification of Panzar-Rosse Method	H-statistics
1	Claessens and Laeven (2004)	1994 - 2001	Price specification	0.62
2	Bikker, Spierdijk and Finnie (2006)	1986 - 2005	Un-scaled revenue specification	0.016
3	Bikker, Shaffer and Spierdijk (2011)	1994 - 2004	Un-scaled revenue specification	0.288

This chapter will focus on two research questions:

1. What happened to competition in the Indonesian banking sector between 1980 and 2010?
2. What are the results of competitive environment tests of three specifications: price, scaled-revenue, and un-scaled revenue?

2.2. Literature Review of the Non-Structural Approach

The long-established theory describing market structure is the Structure-Conduct-Performance (SCP) model, firstly proposed by Mason in 1939. The study argues that there is a linear relationship between market structure and the presence of economic profits. Economic profits are defined as an excess of price over marginal cost ($P > MC$). The theory claims that market structure is an exogenous variable that comes from outside the model. The structure of the market is very important because it determines firm behaviour and market performance. Most studies under the structural approach assume that market structure is determined by the level of concentration of output in a few firms (Bain 1951; Berger & Hannan 1989; Bikker & Haaf 2002; Neumark & Sharpe 1992). A concentrated market leads to less competitive behaviour and creates excess profit for firms. On the contrary, a less concentrated market enhances competition and produces better market performance because it lowers profits and price.

Under the Non-structuralist paradigm, economists look beyond the number of firms and market concentration in an industry in determining the characteristics likely to promote a competitive industry and keep economic profit low. They argue that a competitive industry

may also exist even when only a small number of firms operate in the industry, or in the case of a concentrated market. The main critique of the Non-structural approach is about the position of market structure or market concentration as a sole determinant of firm behaviour and market performance. The earlier studies under the non-structural approach argue that market structure is an endogenous variable. They argue that the efficiency level and the existence of a contestable market determines the structure of the market (Demsetz 1973; Peltzman 1977; Smirlock 1985; Smirlock, Gilligan & William 1984). The arguments are in contrast to the existing structural approach which perceives that collusion among firms is the sole determinant of market structure. According to the structural approach, in a market where collusion exists, the structure will be less competitive or even close to monopoly.

The studies by Demsetz (1973) and Peltzman (1977) argue that the level of efficiency determines the structure of the market. Both studies are the foundation of the Efficiency-Market-Hypothesis (EMH) under the non-structural approach. Demsetz (1973) argues that the concentration of an industry's output in a few firms could derive from superiority in producing and marketing products rather than collusion among firms. The study tested the argument by looking at the relationship between market concentration, efficiency and collusion. If efficiency is the underlying determinant of a firm's ability to gain share in the market that further increases concentration, the relationship between concentration and efficiency is positive. Alternatively, if concentration is explained by collusion, the relationship between concentration and collusion is positive. The empirical study by Demsetz (1973) using data of rates of return to US firms in 1963 confirmed that comparative advantage of production enables firms to obtain a market share. Thus, Demsetz (1973) concluded that efficiency, rather than collusion, is the source of concentration. Consistent with Demsetz (1973), the study by Peltzman (1977) showed that the positive relationship between market concentration and profitability is determined by efficiency. The level of efficiency is measured by the firm's ability to lower its cost. By measuring the cost effect and price effect of market concentration in the US manufacturing industry between 1947 and 1967, the study found that a cost-reducing process may explain market expansion.

Following the emergence of the Efficiency-Market-Hypothesis (EMH), Smirlock (1985) conducted a study of 2,700 unit banks in the US banking industry under the jurisdiction of the Federal Reserve Bank of Kansas City for the years 1973 and 1978. The study tested the EMH by introducing market share as a proxy for efficiency. It assumed that more efficient banks

have a larger share of the market. The study found that profitability has a positive relationship with market share. On the contrary, profitability has a negative relationship with market concentration. Therefore, it supported the EHM and argued that efficiency is the main factor contributing to the increase in market concentration. The study by Smirlock, Gilligan and William (1984) combined the financial market data and accounting data to measure firms' rents. Tobins' q was employed to measure firms' rent. Tobins' q is defined as the ratio of the market value to the replacement cost of the firm (Smirlock, Gilligan & William 1984, p. 1051). The study had a similar methodology to Smirlock (1985) by estimating the relationship between the market shares and market concentration on rents or profits. In other words, they estimated the effect of market share and market concentration (independent variables) on rents or profits (dependent variable). The findings indicated that if the market share is properly considered, market concentration has no effect on banks' profitability.

One criticism of the EMH came from Berger (1995). This study argued that rather than employ market share as the measure of market efficiency, X-efficiencies and scale efficiencies should be used because they are a direct measure of market efficiency. In addition, the study claimed that without controlling for efficiency it is difficult to distinguish whether the relationship between profit and market share is determined by superior management or greater market power. By using X-efficiencies and scale efficiencies to measure efficiency in US banking, the study found that efficiency and market power variables explain relatively little in the variance of profitability. Market concentration did not significantly explain the movement of profitability. Further, the coefficients of the profitability equations suggest that very large increases in efficiency and market share would be needed to raise expected profits significantly. Therefore, there may be other variables (rather than efficiency, market share and market concentration) that may explain the movement in profitability.

Another significant study within the non-structural approach is that of Baumol (1982). The study suggests that the existence of market contestability determines the degree of market competition. The main contribution of the contestable market hypothesis is to highlight the importance of removing barriers to enter or exit the market to boost competition. Opening access to enter and exit the market puts pressure on the incumbent firms to be efficient because any excess profit will attract new entrants. The contestable market may exist in perfect competition or under imperfect competition including monopolistic competition. The

most important characteristic of a contestable market is the freedom of entry and exit from the market. Entry and exit are argued to be costless by assuming that the entrants suffer no disadvantage in term of production technique or perceived product quality relative to the incumbent. In addition, the potential entrants find it appropriate to evaluate the profitability of entry in terms of the incumbent firm's pre-entry prices. The study further showed that under a contestable market, firms have zero profit and sell at prices equal to marginal cost. If incumbents generate profit it will attract new entrants. It implies that inefficiencies do not exist in contestable markets. Furthermore, Baumol (1982) suggests that a smaller numbers of firms in the market may produce efficient performance given that entry and exit are costless. The study by Baumol (1982) highlights the important role of public policies in determining competition in the banking industry. The introduction of deregulation, liberalization or consolidation may affect banking competition because they affect the degree of openness in the banking industry.

The literature on the non-structural approach provides evidence that market structure is an endogenous rather than exogenous variable. Referring Baumol's contestability theory (1982), the structure of markets is determined by the freedom of entry and exit into the market. Thus, a degree of market concentration is not solely determined by market structure. If the market is contestable, which means that there are no barriers to entry and exit, the concentrated market may produce normal profits with price equal to marginal costs. Based on the non-structural approach, the recent studies directly analysed firms' behaviours rather than market concentration to determine the level of competition (Bresnahan 1982; Iwata 1974; Panzar & Rosse 1987). The development of the non-structural approach promoted the development of methods to assess the competitive conduct of banks directly "without using the explicit information about the structure of the market" (Bikker & Haaf 2002, p. 2192).

There were at least three important methods under the non-structural approach developed which are the Iwata model (1974), the Breshanan model (1982), and the Panzar-Rosse (P-R) model (1987). The Iwata model estimates market power by measuring the conjectural variation values for individual banks supplying a homogeneous product in an oligopolistic market (Bikker & Bos 2008). "Conjectural variation refers to the assumptions a firm makes about the reactions it expects from its rivals in response to its own action" (Lipezynski, Wilson & Goddard 2005, p. 118). The application of this model to estimate competition is rare because of technical issues. Bikker and Bos (2008) explained that the profitability

determinants in the Iwata model are interrelated or hard to observe in practice. Further, Bikker and Bos (2008) also underline the complexity of estimating the Iwata model in empirical studies. The model is difficult to employ for empirical research if data about cost and production structure is unavailable.

The second model under the non-structuralist paradigm is the Bresnahan model. It was developed by Bresnahan (1982) and Lau (1982) by assuming that all banks are equal and identical. Based on this assumption, they measured an aggregate analysis of the industry (Bikker & Bos 2008). Assuming that banks are intermediation institutions that produce one output using various input factors, Bresnahan (1982) and Lau (1982) developed a short-run empirical model for the market power of an average bank. The model determines the value of conjectural variation by simultaneous estimations of market demand and supply curves (Bikker & Bos 2008). The values of conjectural variation range from zero to one. The result is one if the market is perfectly competitive. In a perfect competitive market, an increase of output by one firm must lead to an analogous decrease of output by remaining firms (Bikker & Bos 2008).

The third model was developed by Panzar and Rosse (1987). This approach has been used extensively in empirical studies on banking competition because of the modest data requirement compared to the Bresnahan and Iwata approaches. It calculates the sum of elasticity of the reduced form revenues with respect to changes in factor prices. The joint elasticity is known as the H-statistic and it allows us to distinguish empirically between perfect competition and imperfect competition (whether monopoly, perfect collusion or monopolistic competition (Vesala 1995)). This model is discussed in more detail below.

2.2.1. The Empirical Studies of Banking Competition Using the Panzar - Rosse method

We suppose that the level of development may influence the degree of competition in the banking industry. Banking industries in the developed countries have mature markets compared to the banking industry in emerging economies. Developed countries may also have a higher degree of financial deepening. It implies that the penetration of the banking industry in developed countries can be deeper and wider than in developing countries. In developed countries, the banking industry exposure to non-interest based activities is larger than it is in

developing countries. As banks have more diverse business, the level of competition may be reduced. Also, the different types of the financial system may contribute to the different degrees of competition in the banking industry. In the banking-oriented system, the financial system is dominated by banking. On the contrary, other countries prefer to develop their capital market. Under a banking-oriented system, banking competition may be lower compared to the countries where the capital market is developed. A banking-oriented system is less likely to provide competitive pressure from other parts of the financial industry and capital market. The discussion of the empirical studies of banking competition will notify whether the studies were taking part in the context of developed or developing countries.

There are a large number of empirical studies examining competition in banking in developed countries (for example, in the U.S. by Shaffer (1982) and Shaffer (1994), in Europe by Molyneux, Lloyd-Williams and Thornton (1994), Vesala (1995) and De Bandt and Davis (2000) and the banking industries of twenty-three developed countries by Bikker and Haaf (2002)). Fewer studies have been conducted in emerging countries, for example Latin American, Asian and Central European countries (Gelos & Roldos 2002), Latin American countries (Yeyati & Micco 2007) and cross-countries studies (Bikker, Shaffer & Spierdijk 2011; Claessens & Laeven 2004). Most of the studies focus on observing the degree of competition in the banking industry during a consolidation period. The wave mergers in the US banking industry were observed between 1985 and 1992 with the consolidation rate four times larger than during the previous decade (Shaffer 1994). In the case of European countries, the consolidation was marked by the introduction of the European Single Market (EMU) in the 1990s. The banking consolidation in emerging economies mostly took place after banking crises. In Latin American and Asian countries, mergers were observed in the late 1990s and 2000s. Some studies begin the analysis of banking competition by measuring market concentration. The information on the degree of market concentration is useful to understand competition in the banking industry.

Banking consolidation has a different impact across countries. A series of studies by Gelos and Roldos (2002), Claessens and Laeven (2004) and Yeyati and Micco (2007) shows that banking consolidation increased concentration in the emerging markets of Latin American countries. In the Latin American countries, consolidation was firstly initiated by governments; however, it was further driven by market forces. Even more in the case of Brazil where consolidation was started by the three largest banks in order to sustain their competitiveness

(Gelos & Roldos 2002). In addition, the five largest private banks in Argentina gained substantial market share through the combination of organic growth and acquisitions. In Latin American countries, consolidation created a concentrated market; however, it did not lead to a less competitive situation (Gelos & Roldos 2002; Yeyati & Micco 2007). The contestable market principle might be helpful in explaining this situation. Competition in the concentrated market of the Latin American banking industries might be sustained by lessening entry barriers into the market. The removal of the restriction on entry to the market, particularly for foreign penetration, effectively preserved the competitive environment (Claessens & Laeven 2004).

More evidence of the existence of contestable markets is provided by Molyneux, Lloyd-Williams and Thornton (1994). Their empirical study focussed on the role of the removal of barriers to entry in the European banking industry. The introduction of the European Single Market (EMU) in the 1980s, including the financial services market, provided access to enter markets of the other member countries of the European Union (Molyneux, Lloyd-Williams & Thornton 1994). Based on the observation of bank behaviour between 1986 and 1989, the relatively free access to the banking systems of the member countries within the European Union created a contestable market. During the first stage of the introduction of the European Single Market in the late 1980s, the competitive environment in the banking industry was well sustained. Monopolistic competition was established in countries such as Germany, the United Kingdom, France and Spain. However, the banking market in Italy performed under a monopoly.

Banking consolidation in the mature market of U.S. banking also created a more concentrated market. Banking consolidation in the U.S. began in the late 1980s. There were a large number of mergers and acquisitions in U.S. banking after the deregulation of deposit interest rates in the 1980s (Shaffer 1994). A more competitive environment motivated banks to merge in order to improve banks diversification, efficiency or to increase banks' market power. By using samples from banks in some states in the United States between 1979 and 1980, Shaffer (1982) showed that the banking market was competitive even in a highly concentrated market because the market was contestable. The study estimated the joint elasticity of changes of input price to bank revenue by employing the Panzar-Rosse method. If the value of the joint elasticity is negative, there was market power. The negative value of the elasticity shows the negative relationship between the changes in input prices and bank revenue. Therefore in such

markets, firms behave as monopolies. The introduction of the deposits interest rate deregulation induced banks to compete. Thus, as found by Shaffer (1982), the increase in market concentration did not reduce competition in three of the five markets of their studies.

As described in the introduction (section 2.1), there are three papers covering the Indonesian banking industry as part of cross-countries studies (Bikker, Shaffer and Spierdijk (2011); Bikker, Spierdijk and Finnie (2006); Claessens and Laeven (2004). Claessens and Laeven (2004) estimated the degree of competition using the P-R method for the period 1994 to 2001 and employed price (ratio of bank revenue to total assets) as the dependent variable. The H-statistic was 0.62 thus it was concluded that the market was working under monopolistic competition. The other two studies of Bikker, Shaffer and Spierdijk (2011) and Bikker, Spierdijk and Finnie (2006) employed bank revenue as the dependent variable and this resulted in lower values for the H-statistics. Bikker, Spierdijk and Finnie (2006) estimated that the H-statistic for Indonesian banking between 1986 and 2005 was just 0.016. The hypothesis testing shows that the H-statistics rejected perfect competition. Even though the value of H-statistic was close to zero, the study did not report the hypothesis testing result of the existence of a monopoly market. Bikker, Shaffer and Spierdijk (2011) estimated that between 1994 and 2004, the H-statistic of Indonesian banking was 0.288. Similar to Bikker, Spierdijk and Finnie (2006), the study by Bikker, Shaffer and Spierdijk (2011) did not report the hypothesis testing of the existence of a monopoly market. As discussed in the introduction, the three studies covered almost the same time period, however, the results were different. The use of different measures of bank revenue may explain the difference in estimated banking competition.

Some studies also considered the different behaviour of banks of different sizes and with different type of ownership. De Bandt and Davis (2000) measured the level of competition across different groups, large, medium and small banks, during the period 1992 to 1996. According to their study, the large banks in Germany and France were working under monopolistic competition, while the smaller banks were acting as a monopoly. Regarding Italy, both the small and large bank categories were working under a monopoly market. The small banks were operating mainly in local markets therefore they might enjoy some degree of market power (Bikker & Haaf 2002; De Bandt & Davis 2000). A study by Sun (2011) also compared the competition between large and small banks and between foreign and local banks. There were no common findings on the level of competition between the groups of

small and large banks. In some countries large banks were more competitive, however, in other countries, for example the U.S. and the U.K., smaller banks had a more competitive environment. The findings also show that the nature of competition in local bank groups in most countries was different to the competition for foreign banks. The study suggests that local banks were more competitive than foreign banks. Nevertheless, in the case of the European banking industry, the difference in the level of competition between the local bank market and foreign bank market after the European Single Market was small and was not significant.

2.3. Research Methodology

2.3.1 Panzar-Rosse Method

The discussion of the Panzar-Rosse method consists of three components. First, there is an elaboration of the use of the Panzar-Rosse method with comparison to other measures of banking competition. Secondly, there is a general description of how the Panzar-Rosse method determines the market structure of the banking industry. Finally, assumptions that are required to be fulfilled in order to use the method are described.

In regards to the first component, we first contrast the Panzar-Rosse method with the measure of banking concentration under the structural approach. Secondly, the Panzar-Rosse method is compared to other measures of banking competition under the non-structural approach (for example the Bresnahan method and Iwata model). According to the non-structural approach, we cannot rely on market structure information to determine the competition level in the banking market. It might be misleading to depend on the information about market structure as some studies show a non-linear relationship between market structure, competition and market performance (Baumol 1982; Berger 1995; Demsetz 1973; Peltzman 1977; Smirlock 1985; Smirlock, Gilligan & William 1984). In addition, a study by Bikker and Haaf (2002) suggest that concentration indices used to determine market structure by the structural approach, for example the Concentration Ratio (CR_k) and the Herfindahl-Hirschman Index (HHI), are dependent on the number of banks. The concentration ratio (CR_k) takes the market share of the k largest banks in the market and “ignore the remaining banks in the market” (Bikker & Haaf 2002, p. 2206). The second index, HHI provides a more comprehensive measure of banking concentration by incorporating all banks in the industry. It takes the market share as weights thus larger banks will assign larger weights to proxy their importance

in the industry. Comparing the values of CR_k and HHI across twenty-three developed countries, Bikker and Haaf (2002) found evidence that the countries with a smaller number of banks have a higher concentration level (for example Finland, Australia, Greece, New Zealand, Sweden and Norway) compared to countries with a large number of banks (France, Germany, Italy, Luxembourg, and U.S.). The concentration indexes cover the distribution of market share, however they do not capture other relevant factors that might influence the nature of market structure. Therefore, relying only on the concentration indices may produce unreliable measures of banking competition.

This paragraph compares the Panzar-Rosse method with other methods under the non-structural approach which are the Bresnahan method and Iwata model. The Bresnahan model aggregates the banking industry by assuming that all banks are equal and identical. On the contrary, the Panzar-Rosse method uses each bank as a unit of analysis because it assumes that each bank has a different behaviour. This chapter argues that the assumption under the Panzar-Rosse method is closer to the actual behaviour of banks when competing with their counterparts. In regards to the Iwata model, Bikker and Bos (2008) underline the technical issue of the model. First, the Iwata model relates to the profitability determinants that are interrelated and hard to observe in practice. In addition, Bikker and Bos (2008) emphasized the complexity of estimating the Iwata model in empirical studies. The model is hard to employ for empirical research if data on cost and production structure is unavailable.

The following provides a general description of the Panzar-Rosse method in determining the market structure. The Panzar-Rosse method directly assesses the competitive behaviour of banks to define the market structure. It is based on properties of reduced form revenue equations at the bank level, the data on revenues, and factor prices. Generally, the Panzar-Rosse method calculates the sum of the elasticity of the reduced form revenues with respect to changes of factor prices. The sum of the elasticities is given by the H-statistics. The value of the elasticity will provide information about banks' competitive behaviours, and furthermore it determines the structure of the market. The assumption underlying this method is that the market power of banks is measured by the extent to which changes in factor prices (unit costs) are reflected in revenue earned (Vesala 1995). If the industry is competitive the elasticity will be high; otherwise the elasticity will be low, or even negative in the case of monopoly and collusive oligopoly. The properties of H-statistics allow us to distinguish empirically between common imperfect competition theories of price formation as characterizations of the

competitive behaviour of Indonesia banks - whether monopoly or perfect collusion in the oligopoly market, monopolistic competition or perfect competition (Vesala 1995).

Next, we will provide a more comprehensive description of the method. The Panzar-Rosse empirical model assumes that banks have a log-linear marginal cost (MC) and marginal revenue (MR) function (Bikker & Haaf 2002). The marginal cost and marginal revenue functions are available in equation 2.3-1 and 2.3-2, where *OUT* is output, *i* is the number of banks, $j \rightarrow m$ is the number of input prices, $k \rightarrow q$ is the other variables affecting bank revenue and cost function, and *FIP* denotes factor input prices. *EX_{i,rev}* and *EX_{i,cost}* are other variables affecting bank revenue and cost functions, respectively. The empirical application of the Panzar and Rosse approach assumes a log-linear marginal cost function, where dropping subscripts referring to bank *i* (Bikker & Haaf 2002).

$$\ln(\text{MC}) = \alpha_0 + \alpha_1 \ln(\text{OUT}) + \sum_{j=1}^m \beta_j \ln(\text{FIP}_{ij}) + \sum_{k=1}^q \gamma_k \ln(\text{EX}_{\text{cost},ik}) \quad 2.3-1$$

$$\ln(\text{MR}) = \delta_0 + \delta_1 \ln(\text{OUT}) + \sum_{k=1}^q \varphi_k \ln(\text{EX}_{\text{revenue},ik}) \quad 2.3-2$$

Further, the Panzar-Rosse model assumes profit maximizing individual banks, from which it derives a first order condition for profit maximization. The profit maximizing banks produce at the level where marginal cost equals marginal revenue. The equilibrium value for output is available in equation 2.3-3.

$$\ln(\text{OUT}) = \left(\alpha_0 - \delta_0 + \sum_{i=1}^m \beta_j \ln(\text{FIP}_{ij}) + \sum_{k=1}^q \gamma_k \ln(\text{EX}_{\text{cost},ik}) - \sum_{k=1}^q \varphi_k \ln(\text{EX}_{\text{revenue},ik}) \right) 1/(\delta_1 - \alpha_1) \quad 2.3-3$$

In the empirical analysis, the following operationalisation of the reduced-form revenue equation is used. According to Bikker and Haaf (2002, p. 2196) “the reduced-form equation of bank *i* is the product of the equilibrium values of output of bank *i* and the common price level, determined by the inverse demand equation, which reads, in logarithms, as $\ln p = \xi + \eta \ln(\sum_i \text{OUT}_i^*)$ ”. Refer to equation 2.3-4 for the operationalisation of the reduced-form revenue equation.

$$\ln \text{TR} = \alpha + \sum_{i=1}^m \beta_j \ln w_{ji} + \sum_{k=1}^q \gamma_k \ln \text{BSF}_{ki} + \delta \ln \text{OI}_i + \varepsilon \quad 2.3-4$$

Where, TR is the bank revenue, w refers to three input prices which are the funding rate, the wage rate or personnel expenses and the capital price or capital expenditure, BSF is bank-specific exogenous factors, such as the risk component and differences in the deposit mix and OI is the contribution of non-interest income (Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000; Yeyati & Micco 2007). The reduced-form revenue in equation 2.3-4 is the standard specification. Some studies modify the specification. For example Shaffer (1982); Nathan and Neave (1989); Molyneux, Lloyd-Williams and Thornton (1994); Bikker and Haaf (2002) and Gelos and Roldos (2002) added total assets as one of the explanatory variables to represent scale. Total asset is also used as the denominator of bank revenue in the left-hand side of the model representing bank revenue for each value of assets or price (Bikker & Haaf 2002; De Bandt & Davis 2000; Molyneux, Lloyd-Williams & Thornton 1994). Other studies, for example Vesala (1995) and De Bandt and Davis (2000), added equity as a scale variable.

Based on equation 2.3-3, this study estimates the joint elasticity of the reduced-form revenue function with respect to factor prices or the H-statistics. i is the bank, $j \rightarrow m$ is the input prices.

$$H = \sum_{j=1}^m \frac{\partial R_i}{\partial FIP_{i,j}} \frac{\partial FIP_{i,j}}{\partial R_i} \quad 2.3-5$$

The value of H-statistics represents the market structure, whether monopoly or perfect collusion, monopolistic competition or perfect competition. Equation 2.3-6, below is a formula to calculate H. It is the sum of the elasticities in equation 2.3-4, which consists of the elasticity of revenue with regard to the changes of funding cost (β_1), elasticity of revenue with regard to changes in human resource expenditure (β_2), and elasticity of revenue with regard to capital price changes (β_3).

$$H = \sum_{i=1}^3 \beta_i \quad 2.3-6$$

The following is a discussion on the implied value of H-statistics across perfect competition and imperfect competition.

Panzar-Rosse in the Imperfect Market (Monopoly and Oligopoly)

Total revenue is given by $p_o q_o$. Equiproportionate increases in all input prices pushes the AC curve up and the MC curve up to the left. Since the monopoly acts on the elastic part of the demand curve, the rise in MC will result in a lower production than q_o and a higher price than

p_0 . As the price elasticity of demand is greater than unity, total revenue declines and hence $H < 0$ (Matthews & Thompson 2008).

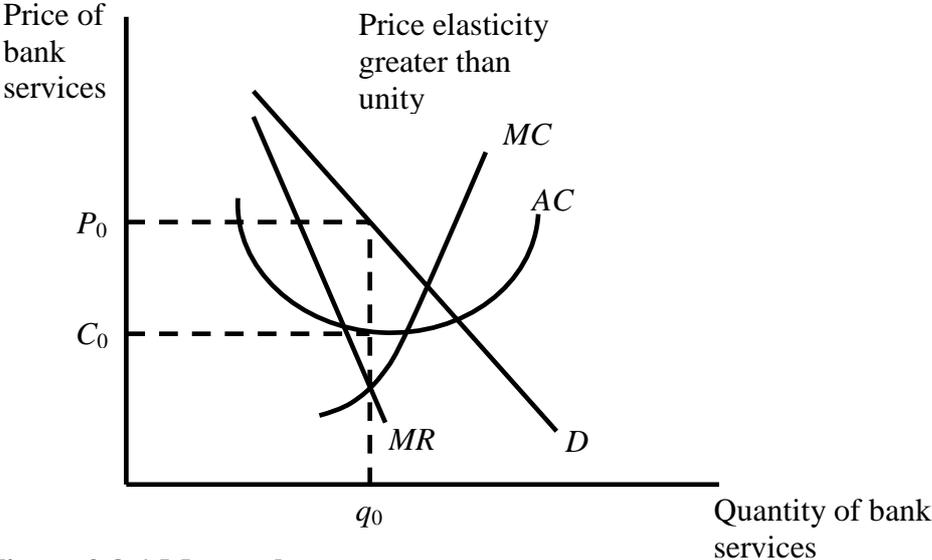


Figure 2.3-1 Monopoly

The studies of banking competition conclude that non-positive values of H are consistent with monopoly or other forms of imperfect competition (Bikker & Haaf 2002; Bikker, Shaffer & Spierdijk 2011; Vesala 1995). In addition to monopoly and oligopoly, the non-positive value of H is also found in monopolistic competition without the threat of entry, i.e. with a fixed number of banks. The market consists of some banks; however, there are barriers to enter the market and therefore the number of banks is unchanged. Vesala (1995) shows that in such markets H is negative, similar to the Panzar-Rosse findings on monopoly markets. In an oligopoly market, the value of H may also be positive where there are strategic interactions among fixed numbers of banks (Bikker & Haaf 2002). However, in the case of perfect collusion in an oligopoly, the Panzar-Rosse method produces a negative value for H , similar to the monopoly model.

Panzar-Rosse in the Perfectly Competitive Market and Monopolistic Competition

Market

In analysing monopolistic competition, the Panzar-Rosse approach is based on the comparative statics properties of the monopolistic competition Chamberlinian equilibrium model (Bikker & Haaf 2002). In the limit case of the monopolistic competition model, where bank products are regarded as perfect substitutes of one another; “the Chamberlinian model produces the perfectly competitive solution, as demand elasticity approaches infinity“ (Bikker & Haaf 2002, p. 2195). As illustrated in figure 2.3-2, in a perfectly competitive market, increasing input prices will increase average cost proportionally (from AC_0 to AC_1). Exit of any banks from the market increases the demand faced by each of the remaining banks, leading to increases in prices (from P_0 to P_1) and revenues equivalent to the rise in costs (Bikker & Haaf 2002). Finally, the value of H in perfectly competitive markets is equal to one.

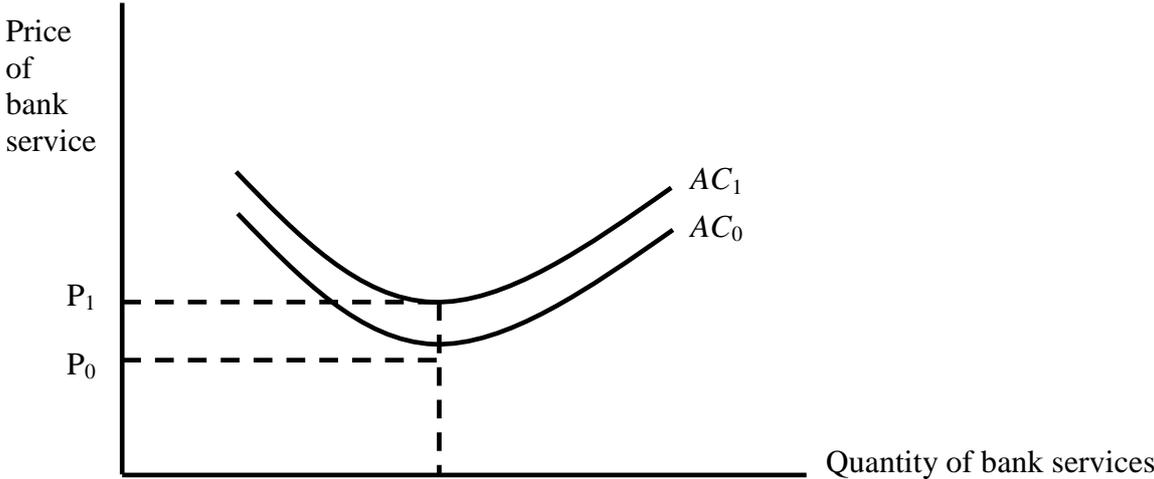


Figure 2.3-2 H in perfect competition and monopolistic competition with perfect product substitutes

In the case of monopolistic competition which recognizes product differentiation, the value of H is positive but less than one. As shown in figure 2.3-3, monopolistic competition is an intermediate case between monopoly and perfect competition. Monopolistic competition produces ‘excess capacity’ where q_1 is produced at average cost (point A) higher than minimum average cost (point B). In addition, price P_1 exceeds marginal cost (MC), compared to the competitive solution P_C (Vesala 1995).

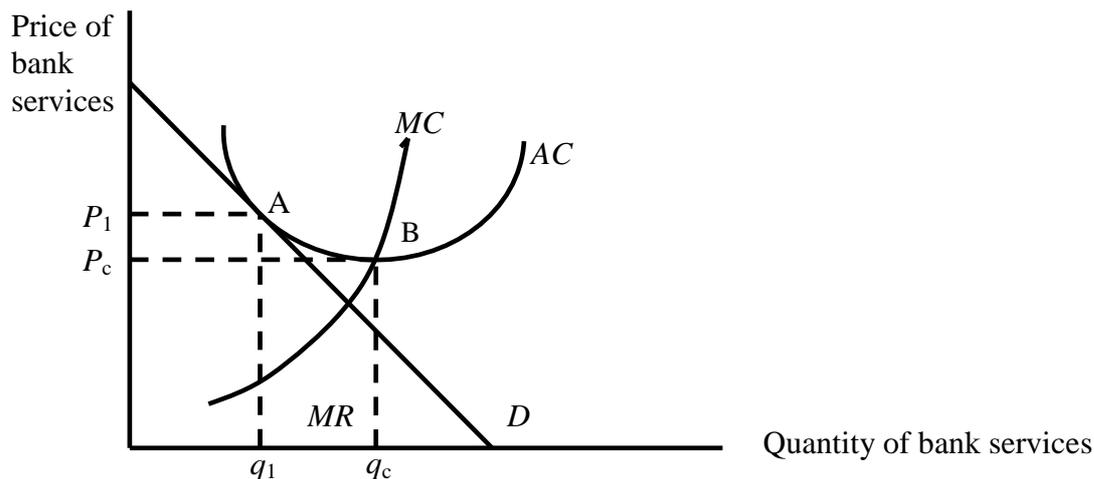


Figure 2.3-3 Monopolistic Free Entry (Chamberlinian) equilibrium

Banks in Chamberlinian equilibrium do have some market power but they cannot receive supra-normal profits since banks price at average cost (Vesala 1995). Therefore, the value of H-statistics in this condition is positive but less than one. It means that the changes to input prices positively affect revenue but they are less than one ($0 < H < 1$). This model is more consistent with the observation that “banks tend to differentiate themselves by various product quality variables and advertising, although the core services provided by them are fairly homogenous” (Vesala 1995, p. 50). Product differentiation is important in order to create less elastic demand (Tirole 1988). As the product is more differentiated, more market power is exercised and the value of H will be lower. High switching costs are also the source of market power in the banking industry. The account holders of the banks bear high switching costs to move from one bank to others. If customers plan to switch their supplier then they must create a new account number. It implies a lot of paperwork. In addition, the customer must inform their partners about the changes to their banks account (Canoy et al. 2001).

Table 2.3-1 provides a summary of the discriminatory power of H based on some studies on banking competition. The value of H-statistics determines the structure of the market under observation.

Table 2.3-1 Summary of Discriminatory Power of H-statistics

Values of H	Competitive environment
$H \leq 0$	<ul style="list-style-type: none"> - Monopoly equilibrium: each bank operates independently as under monopoly profit maximisation conditions. - Perfect cartel (collusive oligopoly)ⁱ - Monopolistic competition without the threat of entryⁱⁱ
$0 < H < 1$	<ul style="list-style-type: none"> - Monopolistic competition with free entry equilibrium. - Strategic interactions among a fixed number of banks in oligopoly marketⁱⁱⁱ
$H = 1$	<ul style="list-style-type: none"> - Perfect competition. - Free entry equilibrium with full efficient capacity utilisation. - Monopolistic competition where banks products are regarded as perfect substitutes of one anotherⁱⁱⁱ

Source: Panzar and Rosse (1987); Vesala (1995); Bikker and Haaf (2002, p. 2195); Bikker, Shaffer and Spierdijk (2011).

Note: i Panzar and Rosse (1987) and Vesala (1995)
 ii Vesala (1995)
 iii Bikker and Haaf (2002)

In the empirical study, there are five assumptions under the Panzar-Rosse method. First, banks are treated as single product firms that act as financial intermediaries. As financial intermediaries, bank output is interest revenue. Banks have three types of inputs which are intermediate funds, labour and capital (De Bandt & Davis 2000). By using the three inputs, banks offer loans and other interest-based activities to customers to generate interest income. Banks are also assumed to produce a single product which is an interest-based product such as loans. Indonesian banking is close to meeting the first assumption because banks rely on interest-based activities to generate their income. The data shows that between 1980 and 2010, on average the contribution of interest-based activities was almost 80 percent of total bank revenue.

The second assumption is that the market is in equilibrium in the long run. It implies that under long-run equilibrium, the risk-adjusted rates of return will be equalised across banks in the competitive capital market. It means that the bank return rates will not be correlated with input prices (Bikker & Haaf 2002, p. 2200). The equilibrium test can be performed by recalculating Panzar-Rosse’s H-statistics by replacing the dependent variable total revenue

with the return on assets (Delis, Staikouras & Varlagas 2008, pp. 8-9). The null hypothesis is that the H-statistics equal zero reflecting a market in long-run equilibrium (De Bandt & Davis 2000). Otherwise, we can indicate that the market is in disequilibrium. The formal test of the long-run equilibrium is available in section 2.4. Third, we have to assume that higher input prices are not associated with higher quality services that generate higher revenues because if the correlation exists there might be bias in interpreting H (Gelos & Roldos 2002). The fourth and fifth assumptions are considering banks as profit maximization institutions and that they have normally shaped revenue and cost functions (Gelos & Roldos 2002, pp. 13-4).

2.3.2. Source of Data

The present study relied on the data of annual financial reports between 1980 and 2010. The data was collected from Banking Statistics published by the Bank of Indonesia. The commercial banks annual financial reports prior to the year of 2000 are available in book format. Those books can be accessed from the library of the Bank of Indonesia in Jakarta. Banks annual financial reports after the year 2000 are available electronically at the website of the Bank of Indonesia. Data of all variables are collected from the annual banks' balance sheets and income statement.

This study aims to cover all commercial banks in the industry based on the database of banks' annual financial reports published by the Bank Indonesia. This study had successfully compiled the unbalanced panel data of all 286 commercial banks between 1980 and 2010. The total number of observations was almost 3,636. Hence, on average, the sample includes more than 13 observations for each commercial bank. The average number of observations for each commercial bank was less than the number of years captured by this study due to a lack of data (bank mergers, bank entries and bank exits) for those banks during the sample period.

Mergers were treated differently depending on the type of merger. In the case of acquisition, the acquired bank was assumed to exit from the market. There are two types of merger in Indonesian banking. Some banks were merged by the government in 1997 and 1998 in order to resolve the banking and economic crisis that began in 1997. In the process of merger, the government determined one anchor bank among the merging banks. The anchor banks led the merger process. In this type of merger, this study maintained the anchor banks and assumed that the other remaining merging banks exited from the market. The second type of merger was in the case of the state-owned bank, Bank Mandiri, the largest bank in the industry. Bank

Mandiri was formed in 1998 through the merger of four state banks, Bank Bumi Daya, Bank Dagang Negara, Bank Ekspor Impor and Bank Pembangunan Indonesia. None of these banks was selected as the anchor bank. In this case, the government decided to close the four state banks and create a new bank. It was therefore considered that the four state banks which formed Bank Mandiri exited from the market in 1998 and Bank Mandiri entered the market in 1998. Finally, the data of merging banks prior to the mergers were kept separately. Those banks were different entities until the merger had occurred (Bikker, Shaffer & Spierdijk 2011).

This study covers banks across different ownerships. Based on the banks categorization of Bank of Indonesia, the commercial banks consisted of five categories based on their ownership. They are state-owned banks, local private banks, joint venture banks, foreign banks and regional banks. State banks are owned at least partially by the central government. Currently, some state banks are listed on the stock market and have become public companies. However, the government is still the majority shareholding. Local private banks were originally formed by local people. Since 1992, the authority permitted local private banks to list on the stock market. Foreign participation in local private banks was also allowed in 1992 as long as foreign investors did not become the majority shareholders. The current Banking Law Number 10 of 1998 and the Government Regulation Number 29 of 1999 permit foreigners including banks, entities and individuals, to have up to 99 per cent of shares in local commercial banks. Therefore, there may be foreign shares in local private banks. Joint venture banks were formed through the partnership of local banks and foreign banks. They were established after the banking deregulation in 1988. Foreign banks are branches of overseas banks. Finally, regional banks are owned by the local or provincial governments.

2.3.3. Empirical Methodology: Panel Data for Competitive and Equilibrium Tests

There are at least two approaches that are suitable to estimate the elasticity of bank revenue on the changes of input prices under the Panzar-Rosse method. The earlier studies in the area of banking competition relied on the individual cross-section approach to estimate the banking competition for each individual year. The more recent studies employed a panel data approach. Panel data refers to pooling of observations on a cross-section of banks over several years (Baltagi 2005). There are at least four advantages of panel data in comparison to individual cross-section. First, the individual cross-section is unable to capture the differences

in factor markets over time (De Bandt & Davis 2000). The application of a cross-section regression implicitly assumes that all banks have access to the same factor markets therefore they only differ in terms of the scale of operation. In contrast, the application of panel data allows for difference in the factor markets because it observes each bank across different points of time.

Secondly, panel data estimation produces a more reliable estimate of the H-statistics compared to individual cross-section because it examines the behaviour of banks over time. This is particularly important if we require comparison of the degree of competition across time. Relying on the estimation of individual-cross section makes it difficult to infer whether the changes of competition over time are statistically significant (Vesala 1995; Yeyati & Micco 2003). Thirdly, panel data produces more efficient estimators compared to individual cross-section. Panel data has a greater number of observations compared to individual cross-section because it pools the time series data of all banks during the observation period. As the number of observation grows larger, the distribution of the OLS estimator declines. The panel data approach has a higher possibility of producing efficient estimators than individual cross-section. A decline in the distribution of the OLS estimator will subsequently lower the variance of the estimators.

The fourth benefit of the implementation of pooled regression methods relies on its ability to capture the non-time-varying determinants of bank revenue. The application of the Fixed-Effect Model allows the inclusion of bank Fixed-Effects that can be used to control for the heterogeneity between banks that are not captured in the model. The Fixed-Effect Model will treat the heterogeneity of the non-time-varying determinants of revenues by entering cross-section dummies (for each bank). Therefore, the model will introduce different intercepts capturing the bank-specific characteristics that are not explicitly addressed in the regression specification (De Bandt & Davis 2000). Controlling for the heterogeneity of the non-time-varying determinants of bank revenue will result a consistent measures of the estimators.

Using the panel data approach there are at least three models that should be considered to estimate the competition in Indonesian banking between 1980 and 2010. They are the Least Squares Dummy Variable (LSDV), the Fixed-Effect (FE) and the Random-Effect (RE). Unlike the pooled least-squares (PLS), all models incorporate the heterogeneity between banks. Therefore, this study did not consider employing pooled least-squares (PLS) to

estimate the banking competition. The difference between the LSDV, FE and RE models relies on the way they estimate the heterogeneity of the non-time-varying determinants of revenues between banks. LSDV applies dummy variables to every cross-section units to capture bank's heterogeneity. It leads to a much larger number of parameters being estimated. It implies that using LSDV is costly in term of degrees of freedom.

In comparing FE and RE we must consider the basic assumption under RE. It assumes that there is no correlation between heterogeneity effects and the other explanatory variables. FE eliminates the unobserved effect or the heterogeneity effect by transforming the variable into differences because it assumes that there is a correlation between the heterogeneity effect and other explanatory variables. Thus, in the case that the heterogeneity effect is correlated with the other explanatory variables, the FE estimator is consistent but the RE estimator is not consistent. If the assumption of the absence of correlation between the heterogeneity effect and other explanatory variables is fulfilled then RE produces more efficient estimators. RE employs the Generalized Least-Squares (GLS) transformation to estimate the panel data. GLS transform the model using a scalar θ . The GLS transformation will only cost two extra degrees of freedom rather than N degrees of freedom if we employ FE. The Hausman test (1978) was used to examine which specification is more appropriate for estimating Indonesian banking competition. The null hypothesis of the Hausman test is that there is no correlation between the heterogeneity effect and other explanatory variables. If the test fails to reject the null hypothesis it implies that RE is more appropriate than FE. If the test rejects the null hypothesis, FE is more appropriate than RE. The econometric program STATA version 12 was used to run these panel data estimations.

The next sections present the empirical exercises on the equilibrium test and the competitive environment test of Indonesian banking between 1980 and 2010. The discussion of the empirical results will begin with the equilibrium test to find out whether the Indonesian banking industry reached its long-run equilibrium. It is important to examine the long-run equilibrium because it is the crucial assumption that should be met before proceeding to the competitive environment test. The next section of 2.4 discusses the empirical results market equilibrium test in Indonesian banking between 1980 and 2010. It is followed by a discussion of the estimation results of banking competition for Indonesian banking between 1980 and 2010 (in the section 2.5). Finally, section 2.6 estimates the evolution of the degree of competition in the Indonesian banking industry between 1980 and 2010. The estimation is

conducted by measuring the yearly H-statistics. The evolution of the H-statistics is important for examination of the changes of the degree of competition in the Indonesian banking industry. This information will be used as a basis of the upcoming chapter on the determinants of competitive banking.

2.4 Equilibrium Test

2.4.1. Econometric Model of Equilibrium test

One of the assumptions under the Panzar-Rosse method is that the market is in long-run equilibrium (Claessens & Laeven 2004). Referring to some studies, the market equilibrium test validates whether the Panzar-Rosse statistics can deliver reliable results or not (De Bandt & Davis 2000). If the market is in long-run equilibrium, the risk-adjusted rates of return will be equalised across banks as in the competitive capital market. As explained by De Bandt and Davis (2000), under long-run equilibrium, bank return rates will not be correlated with input prices. It is required to examine whether the Indonesian banking industry between 1980 and 2010 was in long-run equilibrium. In order to test the existence of long-run market equilibrium, some studies suggest testing whether the input prices are related to the industry return. The same model specification as 2.3-4 is employed with a modification on the dependent variable. Here, we replace the dependent variable of bank revenue with the ratio of net income to total assets (ROA) or the ratio of net income to equity (ROE) as an endogenous variable (Bikker & Haaf 2002; Claessens & Laeven 2004; De Bandt & Davis 2000; Molyneux, Lloyd-Williams & Thornton 1994).

$$\ln ROA_{it} = \alpha_1 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \delta \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + \sigma_i + \varepsilon_{it} \quad 2.4.1-1$$

In some years we find that the values of bank returns are negative, especially in the crisis period between 1997 and 1998. Following Claessens and Laeven (2004) and Delis, Staikouras and Varlagas (2008) the measures of return on assets (ROA) and return on equity (ROE) are adjusted to $\ln(1+ROA)$ or $\ln(1+ROE)$ to produce positive values of the measures. By adjusting the measures of ROA and ROE to $\ln(1+ROA)$ or $\ln(1+ROE)$ we will be able to generate all values of ROA and ROE in all times even though banks experienced loss. Ln is the natural logarithm.

As explained in section 2.3.1, equilibrium is defined as a condition where the value of equilibrium E-statistics is zero. The E-statistic is defined as the summation of β coefficients on the input prices. Further, an F-test is employed to verify the statistical significance of the test of whether E equals zero (Claessens & Laeven 2004).

The definitions and proxies used to measure independent variables are available in Table 2.4.1-1.

Table 2.4.1-1 Specification of Variables of the Competitive Environment Test

Variable	Variable Specification
I	is the index for bank
T	is the index for year between 1980 and 2010
J	is the index for three input price variables which are w_1, w_2, w_3
TR _{it}	is bank revenue measured by the values of total revenue or interest income of banks i and time t
TA _{it}	is the value of total assets of bank i and time t
ROA _{it}	is return on assets measure by the ratio of net income to total assets of bank i at time t .
w_{1it}	is funding rate measured by the ratio of annual interest expenses to total deposits of bank i and time t
w_{2it}	is wage rate/ personnel expenses measured by the ratio of annual wage and salary expenses to total deposits plus total loans of bank i and time t
w_{3it}	is capital rate measure by the ratio of other expenses to fixed assets of bank i and time t
OI _{it}	is the proportion of non-interest income measured by the ratio of non interest income to interest income of bank i and time t
EQ _{it}	is capital risk measured by the ratio of equity to total assets of bank i and time t
DEP _{it}	is deposit mix measured by the ratio of total deposits on total assets of bank i and time t
DDC _{it}	is deposits mix measured by the ratio of demand deposits to total deposit of bank i and time t
σ	is the bank Fixed-Effect (unobserved heterogeneity)
ε	is a white-noise error term that includes errors in the competition measure.

2.4.2. Empirical Results of the Equilibrium test

The Hausman test (1978) was performed to examine which approach is more suitable to test the long-run market equilibrium of Indonesian banking between 1980 and 2010. The Hausman test shows that the χ^2 value is 254.46. The probability value indicates that the χ^2 value is significantly different from zero. It implies that the test failed to reject the null hypothesis of no correlation between the heterogeneity effect and other explanatory variables. Thus, we rely on the FE model to test the long-run equilibrium in the Indonesian banking market. The results of the equilibrium test are displayed in table 2.4.1-2. Hypothesis testing was conducted to find out whether the joint coefficient of input prices equals zero or not. Two regression models were used; the first model did not incorporate the time dummies and the second model incorporated time dummies. The F-test was employed to test the joint coefficient. The joint coefficient of the input prices variables (w_1, w_2, w_3) is -0.006 for the first model and -0.00147 for the second model. The values of the F-test of both models show that the joint coefficients of input prices or E-statistics are not significantly different from zero⁴.

The result of hypothesis testing of the equilibrium estimation implies that the market reached its equilibrium in the long-run. The input prices variables did not relate to the industry return. Long-run equilibrium is a critical assumption under the Panzar-Rosse method. The result of the equilibrium test shows that this study can employ the Panzar-Rosse method to test the competitive environment because the Indonesian banking market between 1980 and 2010 was in long-run equilibrium.

⁴An equilibrium test using return on equity (ROE) as banks return was also tried. The result is similar where the market reached its long-run equilibrium. The joint coefficient of the estimation employing time dummies shows that input prices variables (w_1, w_2, w_3) was 0.022. The value of F-test shows that the joint coefficient of input prices or E-statistics was not significantly different from zero.

Table 2.4.1-2 Equilibrium Test of the Competition Model of Indonesian Banking between 1980 and 2010 (Return on Assets as Dependent Variable)

Explanatory Variables	All banks (FE Estimate) Without time dummies		All banks (FE Estimate) With time dummies	
w_1	-0.002 (0.0023)		0.0014 (0.003)	
w_2	-0.0008 (0.003)		-0.0017 (0.003)	
w_3	-0.003 (0.001)	**	-0.0019 (0.0014)	
OI	0.001 (0.001)		0.001 (0.001)	
EQ	0.01 (0.002)	***	0.012 (0.002)	***
DEP	-0.001 (0.003)		0.0007 (0.003)	
DDC	0.0003 (0.001)		0.000 (0.001)	
Number of observation	3,636		3,636	
R ² within	0.052		0.077	
Joint Coefficients of input prices or E-Statistics	-0.006^a (0.003)		-0.00147^b (0.004)	
Equilibrium test				
F test	2.33		0.33	
ρ (1,286)	0.128		0.5649	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed-Effect estimates. Figures in parentheses are t ratios. Clustered standard errors have been used to deal with general heteroskedasticity and cross-sectional correlation in the model error (Baum, 2006)

a) $H=0$ cannot be rejected (level of confidence 99%)

b) $H=0$ cannot be rejected (level of confidence 99%)

2.5 Competitive Environment Test

2.5.1. Econometric Model of Competitive test

In assessing competition in the Indonesia banking market between 1980 and 2010, the reduced-form revenue equation 2.3-4 is used as a basis of estimation. There are some different econometrics specifications using the Panzar-Rosse method found in studies about banking competition. Bikker, Shaffer and Spierdijk (2011) summarized and divided them into three groups. The first group employed the price specification. The second group used the revenue specification with a scale variable. The third group relied on the revenue specification alone. The following is the standard specification to assess competition in the banking industry based on the study conducted by Bikker and Haaf (2002).

$$\ln TR_{it} = \alpha + \sum_{j=1}^3 \beta_j \ln w_{jit} + \sum_{j=1}^J \gamma_j \ln BSF_{jit} + \delta \ln OI_{it} + \vartheta \ln TA_{it} + \varepsilon_{it} \quad 2.5-1$$

The difference between the three specifications is in the measure of bank revenue (TR). Bank revenue (TR) is the dependent variable in the competitive environment test. The price specification measures bank revenue as the log of revenues (total revenues or interest revenues) divided by total assets. As it includes total assets as a denominator, some authors argue that the dependent variable represents price as it calculates the revenue generated by a unit of assets. The revenue specification measures bank revenue as the log of total bank revenue or the banks interest revenue. Some studies employed a scale variable by including log of total assets (TA) to capture a firm-specific control variable in the revenue specification. It forms the revenue specification with a scale variable (Bikker & Haaf 2002).

As suggested by Bikker, Shaffer and Spierdijk (2011), the present study prefers to depend on the third specification (the revenue specification) rather than the first or the second specification. According to Bikker, Shaffer and Spierdijk (2011) the price specification (first specification) is miss-specified because it cannot distinguish between perfect and imperfect competition. The article demonstrates this proposition by beginning with the assumptions under the Panzar-Rosse method (Panzar & Rosse 1987, p. 452). It shows that the basic property of marginal cost, like total cost, is homogeneous of degree 1 in all input prices for all input j and input prices w_j .

$$\sum_{i=1}^n \partial \log MC = \partial \log w_j = 1 \quad 2.5-2$$

Thus, “the summed revenue elasticity of input prices must equal the elasticity of revenue with respect to marginal cost” (Bikker, Shaffer & Spierdijk 2011, p. 8). That is we have

$$\frac{\partial \log TR}{\partial \log MC} = \sum_{i=1}^n \frac{\partial TR / \partial \log w_i}{\partial \log MC / \partial \log w_i} = \sum_{i=1}^n \frac{\partial \log TR}{\partial \log w_i} = H^r \quad 2.5-3$$

H^r refers to the elasticities of input prices resulting from the revenue specification.

The H statistics obtained from the Panzar-Rosse price specification is as follow

$$\frac{\partial \log P}{\partial \log w_i} = \frac{\partial \log \left(\frac{TR}{TA} \right)}{\partial \log w_i} = \frac{\partial \log TR}{\partial \log w_i} - \frac{\partial \log TA}{\partial \log w_i} \quad 2.5-4$$

In the case of long-run equilibrium with U-shaped average costs, with or without log total assets (TA) as a control variable ($\frac{\partial \log TA}{\partial \log w_i} = 0$), the H statistics of the price specification (H^P) is the same as the revenue specification (H^r).

$$\frac{\partial \log P}{\partial \log w_i} = \frac{\partial \log TR}{\partial \log w_i} = H^r = H^P \quad 2.5-5$$

In contrast, in the case of monopoly where the monopoly price ($\frac{\partial P}{\partial MC} > 0$) is an increasing function of marginal cost, the H-statistics of the price specification (H^P) is larger than 0 (it has a positive value).

$$\frac{\partial \log P}{\partial \log MC} = \sum_i \frac{\partial \log P}{\partial \log w_i} = H^P > 0 \quad 2.5-6$$

The above result shows that the price specification produces positive values of the elasticity in the case of a monopoly market. It implies that the specification fails to differentiate whether the market is monopoly or monopolistic competition.

Further, the study of Bikker, Shaffer and Spierdijk (2011) also examined the problem of the revenue specification if it controls scale by imposing total assets (TA) as one of the explanatory variables. The main problem arises in the case of an imperfectly competitive market where the joint elasticity of input prices is negative. In the monopoly market it assumes that the monopolist has the capacity to adjust the quantity in response to changes in input prices (Bikker, Shaffer & Spierdijk 2011). However, in the case of an inelastic demand function, there would be no quantity adjustment. Therefore, total revenue would move in the same direction as price (P) and marginal cost (MC). Hence, we would get a value of H larger than zero or positive. The revenue specification with the control on scale will also be miss-specified if the demand function is elastic; where $MR = MC > 0$. “By imposing the log of

total assets (TA) as a control variable, the output quantity will be constant” (Bikker, Shaffer & Spierdijk 2011). Further, the value of the input prices elasticity (H) will represent the change in price times fixed input. Hence, the estimates will yield $H > 0$ for any monopoly.

Bikker, Shaffer and Spierdijk (2011) argue for employing the revenue specification without controlling for scale in order to generate a more accurate estimation of banking competition. This present study employed the three specifications and compared the values of elasticity of input prices estimated from each specification. A comparison of the results will highlight the implications for policy of choice of estimation methods. After comparing the estimates of three specifications of Indonesian banking competition, as suggested by Bikker, Shaffer and Spierdijk (2011) the remaining estimates relied on the revenue specification (3rd specification) to assess the impact of structural breaks on banking competition (in Chapter three) and competition across sub groups (Chapter four).

The following are the empirical models to estimate the competitive environment in the Indonesian banking industry between 1980 and 2010. These empirical models refer to Bikker, Shaffer and Spierdijk (2011).

First Specification - Price Specification

$$\ln(\text{TR}/\text{TA}_{it}) = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln \text{EQ}_{it} + \gamma_2 \ln \text{DEP}_{it} + \gamma_3 \ln \text{OI}_{it} + \gamma_4 \ln \text{DDC}_{it} + \sigma_i + \varepsilon_{it} \quad 2.5-7$$

Second Specification – Scaled Revenue Specification

$$\ln \text{TR}_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln \text{EQ}_{it} + \gamma_2 \ln \text{DEP}_{it} + \gamma_3 \ln \text{OI}_{it} + \gamma_4 \ln \text{DDC}_{it} + \gamma_5 \ln \text{TA}_{it} + \sigma_i + \varepsilon_{it} \quad 2.5-8$$

Third Specification – Unscaled Revenue Specification

$$\ln \text{TR}_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln \text{EQ}_{it} + \gamma_2 \ln \text{DEP}_{it} + \gamma_3 \ln \text{OI}_{it} + \gamma_4 \ln \text{DDC}_{it} + \sigma_i + \varepsilon_{it} \quad 2.5-9$$

The definitions of the variables used for the competitive environment test are provided in table 2.4.1-1. The following extends the discussion of the variables and the approach used to

define each variable. As explained in section 2.3.1, this study assumes that banks are treated as intermediary institutions (Bikker & Haaf 2002; Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000; Yeyati & Micco 2007). Under this assumption, banks' production functions use labour and physical capital to attract deposits. In order to generate profits, banks employ deposits to fund loans and other earning assets (Bikker, Shaffer & Spierdijk 2011). As an intermediary institution, we assume that banks require three inputs: funding, personnel (human resources), and capital. Based on the input requirement, banks have to fund three types of input: the funding rate (w_1), personnel costs (w_2), and the capital price (w_3). The funding rate is measured by the ratio of annual interest expenses to total deposits of banks (Bikker & Haaf 2002; Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000; Molyneux, Lloyd-Williams & Thornton 1994; Yeyati & Micco 2007). In regard to the second input price, personnel costs, some studies recommend employing the ratio of wage expenses to the number of employees. Other studies used the ratio of annual wage and salary expenses to total deposits and loans. This study employed the later measurement as data on the number of employees are not available, especially prior 1995. By assuming that the value of loans and deposits represents the size of labour employed by banks, the ratio of salary expenses to total deposits and loans provides an approximation of personnel costs. The third input price, the capital price, is measured by the ratio of other expenses to fixed assets. Fixed assets consist of assets owned by banks for at least one year and are used to support a bank's operation, for example land and building.

Regarding the measure of bank revenue, the previous studies recommend using either total revenue or interest income (Bikker & Haaf 2002; Bikker, Shaffer & Spierdijk 2011; De Bandt & Davis 2000; Molyneux, Lloyd-Williams & Thornton 1994; Yeyati & Micco 2007). If the banking industry relies on interest-based activities for revenue generating, we can employ either interest income or total revenue as a measure of bank revenue. If banks expand their business into non-interest based activities, we should employ total revenue. This aims to capture revenue generating from both interest-based and non-interest based activities. The data of bank revenue shows that between 1980 and 2010, on average the contribution of interest-based activities was almost 80 percent of total bank revenue. For that reason, both measurements of bank revenue deliver similar information. The estimation of the competitive environment test will report the estimation results from both measurements. Thus, this study used two estimation results for each specification; the first estimation uses interest income as

a measure of bank revenue (table 2.5-4) and the second estimation employs total revenue as a measure of bank revenue (table 2.5-5).

In order to reflect bank behaviour and profile, this study also employed some bank specific factors; the contribution of other income, banks risk, and deposits mix. The proportion of non-interest income to interest income captures the off-balance sheet activities. If bank total revenue capturing the interest income and non-interest income is used as the dependent variable, higher off-balance sheet activities increase bank revenue. Bank risk is measured by the ratio of equity to total assets. If banks spend more of their resource as reserves of capital, a bank’s capacity to generate revenue is lower. Therefore, bank risk has a negative relationship with bank revenue. Deposit mix is represented by two variables, the proportion of deposits in total assets and the proportion of demand deposits in total deposits. A higher proportion of deposit to total asset increases a bank’s capacity to generate revenue. Deposits are also a cheap source of funds compared to borrowing and inter-loans. Thus, the relationship between deposits and bank revenue is expected to be positive. Deposit mix is also measured by the ratio of demand deposits to total deposits. The relationship between the deposit mix variable with bank revenue is negative because a higher proportion of demand deposits reduces the bank’s capacity to fund long-term loans.

2.5.2. Empirical Result of Competitive test

Before conducting the competitive environment test by comparing the three specifications, we began with the Hausman test (1978) for each specification. Table 2.5-1 shows that by using a 99 per cent level of confidence, the FE model is more appropriate to examine the competition of the Indonesian banking for all specifications.

Table 2.5-1 The Hausman test of Panzar-Rosse Model of the Three Specifications

Specification	χ^2	Probability	Result*
1 st specification (Price)	47.48	0.000	FE is more suitable
2 nd specification (Scaled-Revenue)	55.35	0.000	FE is more suitable
3 rd specification (Unscaled-Revenue)	439.98	0.000	FE is more suitable

*FE means Fixed-Effect model

Next, Table 2.5-2 provides relevant sample statistics for the dependent variables, input prices and control variables. The data for total revenue, interest income and total assets are expressed in units of millions of Rupiah (in real value after deflating with GDP deflator). The other variables are stated in ratio form. The reported means, minimum and maximum values of each variable demonstrate that the size of banks varies significantly. As measured by revenues and assets, data confirm that there is significant variation in banks' capacities.

Table 2.5-2 Descriptive Statistics of Dependent and Independent Variables

Variable	Symbol	Means	Minimum Value	Maximum Value
Dependent Variable				
Ratio of Interest Income to Total assets	TIR1	0.14	0.0002	1.3
Ratio of Total revenue to Total Assets	TIR2	0.16	-0.058 ^a	2.4
Interest Income in real value (in real value after deflation with GDP deflator)	TIR3	6,001	0.45	273,678
Total Revenue in real value (in real value after deflation with GDP deflator)	TIR4	7,269	-278 ^a	341,000
Independent Variable				
Fund Price	w ₁	0.2	0.0008	107 ^b
Personnel Cost	w ₂	0.018	0.00002	6.6 ^b
Capital Price	w ₃	3.03	-15.91 ^c	539 ^d
Ratio of Non-interest Income to Interest Income	OI	0.18	-1.5 ^a	17 ^e
Ratio of Equity to total assets	EQ	0.12	-4.6 ^f	1.3
Ratio of Deposits to total assets	DEP	0.66	0.0002	4.1 ^g
Ratio of Demand deposits to total deposits	DDC	0.3	0.0001	1.0
Total Assets in real value (in real value after deflation with GDP deflator)	TA	55,996	13.6	2,698,795

Source: the Annual Financial Report of Banks, published by the Central Bank of Indonesia (1980-2010).

Note:

- a) The negative values recorded from 1999 data. Some banks had negative values for their non-interest income in 1999 which originated from the foreign exchange transactions.
- b) The values of fund price and personnel cost are >1. It is recorded by Bank Barclay in 2010. It experienced financial difficulty where the costs were much higher than the values of the assets.
- c) The negative values recorded in 1998-1999 which originated from the other operational costs.
- d) The value of capital price is >1. Some banks experienced financial difficulty in the banking crisis, particularly in 1998. During crisis, the value non-operational expenses were exploded because there was a substantial reduction in the values of productive assets.
- e) In some years, banks had higher non-interest income than their interest income. It was contributed by the spot and derivatives investment.
- f) The negative values recorded in 1998-1999 because some banks experienced negative equity as the impact of economic and banking crisis in 1997-1998.

g) *The value is >1 because the value of deposits of Bank Tamara in 1998 was higher than the value of bank's assets. In addition, the value of equity was negative.*

Table 2.5-4, 2.5-5 and 2.5-6 present the results of the competitive environment test in Indonesian banking between 1980 and 2010. Each table reports the coefficient value of the competitive coefficient (H-Statistics) and the corresponding standard errors in the bracket. We first compared the value of H-statistics from three specifications: price, scaled revenue, and un-scaled revenue, in which bank revenue is measured by interest income (Table 2.5-4). Next in table 2.5-5 we compare the H-statistics of the estimation generated by three specifications in which bank revenue is measured by total revenue (interest income and non-interest income). Table 2.5-6 demonstrates the estimations of banking competition from the three specifications by incorporating total revenue as a measure of bank revenue and the time effect dummies.

The findings of this study confirm the study by Bikker, Shaffer and Spierdijk (2011). Regardless of the different measure of bank revenue, H-statistics of the price and scaled revenue (1st and 2nd specification) are identical. However, the value of H-statistics generated from the unscaled-revenue (3rd specification) is lower. The estimations in table 2.5-5, 2.5-6 and 2.5-7 show that by controlling the assets, the coefficient of the personnel cost (w_2) became positive. It may occur because the inclusion of the total assets either in the left-hand side or the right-hand side of the reduced-form revenue equation distorted the assessment of the level of competition (Bikker, Spierdijk & Finnie 2006). Table 2.5-3 presents the comparison of the values of H-statistics across specifications. In the first column, bank revenue is measured by interest income and the specification does not incorporate time effect dummies. The H-statistic of the price and scaled-revenue specifications is 0.84. However, the value of the H-statistic generated from the third specification is smaller at 0.28. A similar outcome is presented in the second and third columns. In the second column, bank revenue is measured by total income and without incorporating time dummies effect. The value of the H-statistic of the price and scaled-revenue specification is 0.88. The H-statistic of the unscaled-revenue specification is 0.35. Similar with the second column, bank revenue in the third column is measured by total income; however, this specification employs the time dummies effect. The values of H-statistics of the first, second and third specification are 0.84, 0.84, and 0.67 respectively. The following paragraphs discuss in detail the H-statistics estimated by different specifications.

Table 2.5-3 Summary of H-statistics of Price; Scaled-Revenue and Unscaled-Revenue Specifications

Specification	H-statistics(Joint Coefficient of Input Price)		
	Interest income as a measure of Bank revenue	Total income as a measure of Bank revenue	Total income as a measure of Bank revenue, time effect dummies
1st : Price Specification	0.84	0.88	0.84
2nd : Scaled-Revenue Specification	0.84	0.88	0.84
3rd :Unscaled-Revenue Specification	0.28	0.35	0.67

In order to determine the structure of the market, this study conducted hypothesis testing. Each value of the joint coefficient of input prices was tested. The first test was whether the joint coefficients are significantly different from zero or not. It aimed to determine whether the market is a monopoly or not. Secondly, the coefficients were tested to see whether they are significantly different from one. The second test aimed to conclude whether the market can be considered as perfectly competitive. The tests of joint coefficients of the estimates in table 2.5-4 show that the H-statistics of price and scaled-revenue specifications reject perfect competition and monopoly at the 99 per cent level of confidence. It implies that Indonesian banking between 1980 and 2010 was working under monopolistic competition. By using the same level of confidence, the joint coefficients test on H-statistics of the unscaled-revenue specification rejects perfect competition however, it does not reject monopoly. By using the lower level of confidence of 95 per cent, the test of joint coefficients of the unscaled-revenue specification leads to similar conclusions as the first and the second specifications. It rejects perfect competition and monopoly.

The H-statistics generated from estimates in table 2.5-5 display similar information on competition in Indonesian banking between 1980 and 2010. The hypothesis test on joint coefficients implies that the H-statistics of the price and scaled-revenue specifications reject both perfect competition and monopoly markets. Even though the value of H-statistics generated from the un-scaled revenue specification is lower than the value of H-statistics from others specifications, the test of joint coefficients suggests the same conclusion. Statistically, the joint coefficient of input prices from the third specification is significantly different from one and zero. Therefore, similar to the estimations using interest income as a measure of bank revenue, the price, scaled-revenue, and unscaled-revenue specifications conclude that the

Indonesian banking industry between 1980 and 2010 was working under monopolistic competition.

The result of this study confirms the findings of Bikker, Shaffer and Spierdijk (2011). By using Fixed-Effects (within estimates) and total revenue as the dependent variables for Indonesian banking between 1994 and 2004, they found that the H-statistic of price specification and scaled-revenue specification was 0.83. Both specifications produced higher H-statistics than the un-scaled revenue specification which has an H-statistic of 0.288⁵. The result of this study can also be compared to Claessens and Laeven (2004). They reported the average value of H-statistics estimated by using the price specification with total assets as the scale variable and running pooled least squares and Fixed-Effects with and without time effect dummies. They concluded that the Indonesian banking industry between 1994 and 2001 was working under monopolistic competition with an H-statistic of 0.62. The conclusion of Claessens and Laeven (2004) is similar to the finding from the present study -that based on the test of the joint coefficients on input prices, the price specification without time effects, the Indonesian banking industry was working under monopolistic competition.

As suggested by Bikker, Shaffer and Spierdijk (2011), this study relied on the third specification or un-scaled revenue test. Based on the discussion at the beginning of the method section, both price and scaled revenue specifications have the caveat that they fail to differentiate the type of market structure under particular situations. The price specification is miss-specified because it produces positive values of the elasticity in the case of a monopoly market. The scaled revenue specification is misleading in assessing competition in the case of a monopoly market where the demand function is either inelastic or elastic. In the case an imperfectly competitive market where the demand function is inelastic (so there would be no quantity adjustment) the H-statistics is larger than zero or positive. Further, if the demand function is elastic, the scaled revenue specification will treat output constant (Bikker, Shaffer & Spierdijk 2011, p. 10). Thus, the estimates will yield $H > 0$ for any monopoly.

⁵⁵The study by Bikker, Shaffer & Spierdijk (2011) did not report the result of hypothesis testing of H-statistic as significantly different from zero or one. Therefore, we may not be able to determine the nature of competition in Indonesian banking between 1994 and 2004 - whether Indonesian banking was working under perfect competition or imperfect competition.

Table 2.5-4 Competitive Environment Test on the Indonesian Banking between 1980 and 2010 (Interest Income as a measure of Bank Revenue)

Explanatory Variables	1 st Specification ^h (Price) FE Estimate		2 nd Specification ⁱ (Scaled Revenue) FE Estimate		3 rd Specification ^j (Unscaled Revenue) FE Estimate	
w_1	0.56 (0.016)	***	0.56 (0.016)	***	0.63 (0.06)	***
w_2	0.22 (0.021)	***	0.22 (0.023)	***	-0.43 (0.1)	***
w_3	0.064 (0.009)	***	0.063 (0.009)	***	0.08 (0.04)	**
OI	-0.059 (0.006)	***	-0.06 (0.006)	***	0.04 (0.03)	
EQ	0.09 (0.01)	***	0.09 (0.01)	***	-0.16 (0.07)	**
DEP	0.72 (0.024)	***	0.72 (0.023)	***	0.85 (0.1)	***
DDC	0.011 (0.0078)		0.014 (0.008)	*	-0.35 (0.063)	***
ASS			1.099 (0.008)	***		
Number of observation	3,639		3,639		3,639	
R ² within	0.83		0.97		0.35	
Joint Coefficients of input prices or H-Statistics	0.84^k (0.0008)		0.84^l (0.0009)		0.28^m (0.06)	
Hypothesis testing (H₀=0)						
F test	998.06		932.04		4.80	
ρ (1,286)	0.000		0.000		0.03	
Hypothesis testing (H₀=1)						
F test	34.25		29.54		32.01	
ρ (1,286)	0.000		0.000		0.000	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed-Effect estimates. Figures in parentheses are *t* ratios. Clustered standard errors have been used to deal with general heteroskedasticity and cross-sectional correlation in the model error (Baum, 2006)

h) Price (the ratio of interest income to total assets) as dependent variable

i) Interest income as dependent variable and scale variable imposed as explanatory variable

j) Interest income as dependent variable

k) H₀=0 and H₀=1 rejected (both in level of confidence 99%)

l) H₀=0 and H₀=1 rejected (both in level of confidence 99%)

m) H₀=0 cannot be rejected while H₀=1 rejected (both in level of confidence 99%); H₀=0 and H₀=1 can be rejected (both in level confidence 95%)

Table 2.5-5 Competitive Environment Test on the Indonesian Banking between 1980 and 2010 (Total revenue as a measure of Bank Revenue)

Explanatory Variables	1 st Specification ⁿ (Price)		2 nd Specification ^o (Scaled Revenue)		3 rd Specification ^p (Unscaled Revenue)	
	FE Estimate		FE Estimate		FE Estimate	
w_1	0.54 (0.018)	***	0.54 (0.018)	***	0.60 (0.059)	***
w_2	0.24 (0.021)	***	0.24 (0.022)	***	-0.41 (0.1)	***
w_3	0.098 (0.009)	****	0.098 (0.008)	***	0.12 (0.04)	***
OI	0.045 (0.007)	****	0.044 (0.07)	***	0.15 (0.03)	***
EQ	0.09 (0.013)	***	0.09 (0.014)	***	-0.16 (0.07)	**
DEP	0.70 (0.021)	***	0.7 (0.021)	***	0.83 (0.14)	***
DDC	0.017 (0.008)	**	0.019 (0.009)	**	-0.35 (0.06)	***
ASS			1.004 (0.008)	***		
Number of observation	3,639		3,639		3,639	
R ² -within	0.80		0.97		0.35	
Joint Coefficients of input prices or H-Statistics	0.88^q (0.0007)		0.88^r (0.0007)		0.31^s (0.05)	
Hypothesis testing (H₀=0)						
F test	1,245		1,163		6.11	
ρ (1,286)	0.000		0.000		0.01	
Hypothesis testing (H₀=1)						
F test	25.56		23.72		30.08	
ρ (1,286)	0.000		0.000		0.000	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed-Effect estimates. Figures in parentheses are *t* ratios. Clustered standard errors have been used to deal with general heteroskedasticity and cross-sectional correlation in the model error (Baum, 2006).

- n) Price (the ratio of total revenue to total assets) as dependent variable
- o) Total Revenue as dependent variable and scale variable imposed as explanatory variable
- p) Total Revenue as dependent variable
- q) H₀=0 and H₀=1 rejected (both in level of confidence 99%)
- r) H₀=0 and H₀=1 rejected (both in level of confidence 99%)
- s) H₀=0 and H₀=1 rejected (both in level of confidence 99%)

This study also estimated the competitive environment by incorporating time effect dummies as control variables. Table 2.5-6 demonstrates that the F-test of joint coefficients of time effects is significantly different from zero. Thus, time effect dummies should be included as control variables in the competitive banking environment test. Time dummies will capture changes of the regulation environment, the macroeconomic environment and other general effects that vary over time, for example technological change. The estimation of H-statistics from the models that incorporate time effect dummies also demonstrates that the price and scaled-revenue specifications are higher than the un-scaled revenue specification. The H-statistics from the price and scaled revenue specifications are identical at 0.84. The un-scaled revenue specification has a lower H-statistic of 0.67. Compared to the previous estimates which do not employing time effect dummies, the difference between the H-statistics of the three specifications is smaller. Further, the tests on joint coefficients of input prices generate similar outcomes. The H-statistics for all three specifications are different from zero as well as different from one using the 99 per cent level of confidence. They imply that the three specifications confirm that the Indonesian banking industry was working under monopolistic competition. The discussion of the competitive conditions in Indonesian banking relies on the empirical findings from the latest specification that employed time dummies. As explained above, the time dummies are important to control the changes for the regulation, macroeconomic environment and technology.

Based on the data of annual financial reports of Indonesian banking published by the Bank of Indonesia, we found a significant increase in the number of banks in 1988. There were twenty-seven regional banks added in the database. However, they did not actually enter the market in 1988. They existed some years before 1988 and each regional bank entered the industry at different times. It probably occurred because the Bank of Indonesia officially covered the regional banks in the database from 1988 onwards. In order to avoid the bias that may occur because of the incorporation of regional banks in 1988, the competitive test was conducted by dropping the twenty-seven regional banks from the database. We focused on the third specification as implied by Bikker, Shaffer and Spierdijk (2011) as the most appropriate specification for the competitive test. The FE model with time dummies shows that the H-statistic is 0.70. The joint F-test of the coefficient of input prices shows that it is significantly different from zero as well as different from one. Thus, we can be certain that the incorporation of twenty-seven regional banks in 1988 does not produce bias in the estimation of the extent of competition.

The competitive environment test capturing all banks in the industry confirms that the increase of input prices positively affected revenue but was less than one. It implies that banks were working in a monopolistically competitive industry with free entry. Monopolistic competition produces 'excess capacity' where output is produced at average cost which is higher than minimum average cost. In addition, price under monopolistic competition exceeds marginal cost (MC), compared to the competitive solution. As a result, banks in monopolistic competition enjoy an excess profit above normal profit. However, in the long run banks in monopolistically competitive markets cannot receive supra-normal profits assuming freedom of entry to the industry. Excess profit attracts new entrants and shifts the market demand curve downward (Pindyck & Rubinfeld 2009). Thus, in the long run banks operate in their average cost curve (Vesala 1995) and generate zero profit.

The excess profit in monopolistic competition is generated by product differentiation and selling cost. In regards to product differentiation, banks try to differentiate themselves by various product quality variables because their core services are actually fairly homogeneous (Vesala 1995). In addition, banks expend some of their budget to create and increase selling, for example through advertising and the establishment of sales departments. Product differentiation also exists in the form of the variation of the term of time deposits offered to their customers. Some endowment characteristics of banks also contribute to create product differentiation. First, banks have locational characteristics (Allen & Gale 2004). Banks located in particular area are not a perfect substitution for banks located in other locations. A second feature is related to banks possession of specialized knowledge (Allen & Gale 2004). Banks have a knowledge advantage compared to their customers. Allen and Gale (2004) argue that the customers may have incomplete information about the services and prices of competing banks. Product differentiation is also created through advertising. By advertising their product and their companies, banks spread knowledge about their products and their brands. Advertising activities create a new market or expand their existing market. Another feature that contributes to the monopolistic competition is a lock-in-effect where the account holders of the banks bear high switching costs to move from one bank to others. This effect may explain the possession of the market power of banks in the Indonesian banking industry.

Two of the four explanatory variables reflecting bank risk and behaviour significantly influence bank revenue. The relationship between bank revenue and the first deposit mix variable was positive and significant at the confidence level of 99 per cent. The higher

proportion of deposits in bank assets increases bank revenue because deposits are a cheaper source of funds compared to borrowing and interbank loans. A higher level of deposits also enhances a bank's capacity to disburse loans and have other investment activities to generate income. The second variable of deposits mix also strongly influences bank revenue. A higher proportion of demand deposits in total deposits reduce bank revenue. It is significant at the 95 per cent confidence level. Demand deposits are short-term deposits compared to savings and time deposits. Thus, banks cannot utilize them to finance long-term credit. The influence of bank equity on bank revenue is negative but it is not significant. As banks put more into reserve capital, it reduces their revenue. A higher level of capital requirement reduces a bank's capacity to provide loans. A lower proportion of deposits to assets limit a bank's capacity to exploit revenue. Off-balance sheet activities positively affect bank revenue; however, the influence was not statistically significant.

Table 2.5-6 Competitive Environment Test on for the Indonesian Banking between 1980 and 2010 (Total Revenue as proxy of Bank Revenue and Time Effect Dummies)

Explanatory Variables	1 st		2 nd		3 rd	
	Specification ^t		Specification ^u		Specification ^v	
	(Price)		(Scaled Revenue)		(Unscaled Revenue)	
	FE Estimate		FE Estimate		FE Estimate	
w ₁	0.50	***	0.50	***	0.72	***
	(0.025)		(0.024)		(0.058)	
w ₂	0.24	***	0.25	***	-0.30	**
	(0.022)		(0.02)		(0.07)	
w ₃	0.095	****	0.094	***	0.25	***
	(0.01)		(0.01)		(0.03)	
OI	0.042	****	0.042	***	0.025	
	(0.007)		(0.007)		(0.02)	
EQ	0.09	****	0.09	***	-0.03	
	(0.021)		(0.01)		(0.05)	
DEP	0.67	****	0.66	***	0.63	***
	(0.024)		(0.024)		(0.12)	
DDC	0.006		0.007		-0.09	**
	(0.008)		(0.008)		(0.037)	
TA			1.001	***		
			(0.013)			
Time Effect Dummies	11.12 ^w		11.62 ^x		36.56 ^y	
(F statistics of joint test)						
Number of observation	3,639		3,639		3,639	
R ² within	0.82		0.97		0.74	
Joint Coefficients of input prices or H-Statistics	0.84^z		0.84^{aa}		0.67^{bb}	
	(0.001)		(0.001)		(0.01)	
Hypothesis testing (H₀=0)						
F test	835.03		820.60		45.54	
ρ (1,286)	0.000		0.000		0.000	
Hypothesis testing (H₀=1)						
F test	34.77		33.28		10.67	
ρ (1,286)	0.000		0.000		0.000	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed-Effect estimates. Figures in parentheses are t ratios. Clustered standard errors have been used to deal with general heteroskedasticity and cross-sectional correlation in the model error (Baum, 2006).

- t) Price (the ratio of total revenue to total assets) as dependent variable
- u) Total Revenue as dependent variable and scale variable imposed as explanatory variable
- v) Total Revenue as dependent variable
- w) H₀=0 rejected (level of confidence 99%)
- x) H₀=0 rejected (level of confidence 99%)
- y) H₀=0 rejected (level of confidence 99%)
- z) H₀=0 and H₀=1 rejected (both in level of confidence 99%)
- aa) H₀=0 and H₀=1 rejected (both in level of confidence 99%)
- bb) H₀=0 and H₀=1 rejected (both in level of confidence 99%)

2.6 Measuring Yearly Estimation on Banking Competition

The objective of having yearly estimates of H-statistics is showing the evolution of the competition parameter (Gelos & Roldos 2002; Yeyati & Micco 2007). The yearly estimates of H-statistics are computed in order to examine the changes in the competition in the Indonesian banking industry over the observation period from 1980 to 2010. The evolution of competition is estimated by using a panel data approach, particularly a Fixed-Effect model, rather than cross-section estimation for each individual year. This section also employs panel data in measuring competition as in the previous section “in order to maximize the precision of the estimates without imposing undue restrictions on the way the competition index evolves over time” (Yeyati & Micco 2007, p. 1637).

As discussed in section 2.5, the un-scaled revenue specification is considered as more appropriate compared to the scaled-revenue and price specification in estimating the degree of competition using the reduced-form revenue equation of the Panzar-Rosse method. Therefore, the third specification or un-scaled revenue was employed to estimate the degree of competition across sub-groups independently. This allows the specification to have time-varying H-statistics (Gelos & Roldos 2002). The input prices variables were interacted with a year dummy to form the interaction variables. The interaction variables show the evolution of the elasticity of the reduced form of revenues with respect to factor prices.

Below is the econometric model to assess competition across times.

Third Specification – Unscaled-Revenue Specification with Time-Varying H-statistics

$$\begin{aligned} \text{LnTR}_{it} = & \alpha_0 + (\sum_{j=1}^3 \beta_j \ln(w_{jit} \mid \text{with t E year} = 1 \mid)) + \gamma_1 \ln\text{EQ}_{it} + \gamma_2 \ln\text{DEP}_{it} + \\ & \gamma_3 \ln\text{OI}_{it} + \gamma_4 \ln\text{DDC}_{it} + \sigma_i + \varepsilon_{i,t} \\ \ln(w_{jit} \mid \text{with t E year} = 1 \mid) = & \ln(w_{jit}) \text{ if t is in year} = 1, \\ \text{otherwise} = & 0 \end{aligned} \tag{2.6-1}$$

The information of the specification for each of the variables is available in table 2.4.1-1.

In estimating the evolution of the competition index, if equation 2.6-1 uses the whole panel from 1980 and 2010, there is a concern about the number of parameters to be estimated. If the number of parameters to be estimated is too large, they reduce the degrees of freedom.

Another consideration is related to the uneven number of observations in the panel of thirty-one years, from 1980 and 2010, because of entry, exit or unavailability of the data. This creates unbalanced panel data. Due to this limitation, first we divided the panel based on the break in the number of banks. This means that this section attempted to have as balanced a panel as possible by breaking the panel based on the year where there is a significant change in the number of banks entering the market. Second, we also attempted to divide the panel into four, based on the structural changes: prior deregulation, deregulation/liberalization, banking and economic crisis, and consolidation, assuming that each period of the structural changes had the same competitive environment. Thirdly we divided the panel to cover one period for one decade. The number of panels is three and the number of years is ten, except for the last period which has eleven years for observation.

Conducting the panel split based on the break in the number of banks has a number of advantages. Firstly, this split method creates a more balanced panel. Secondly, the break of the number of banks is aligned with the structural changes in the banking industry because policy changes alter the competitive environment. During the deregulation and liberalization period, banks faced fewer barriers and constraints compared to the period during the crisis or under consolidation. Therefore, there are more observations under the deregulation and the liberalization period than in other periods (prior to deregulation, economic and banking crisis and consolidation).

The first break is 1989 when eighteen new local private and nine joint venture banks were established. In the second break of 1993, there were eighty-six new entrants, consisting of seventy-five local private banks and eleven joint ventures. The third break is in the crisis period when thirty-three banks exited from the market in 1998 through closure or merger. The fourth break was also another reduction in the number of banks in 2000 by twenty-one banks. Figure 2.6-1 shows the evolution of the number of banks and the break years. Table 2.6-1 provides information on the number of panels with the number of banks and total observations for each panel.

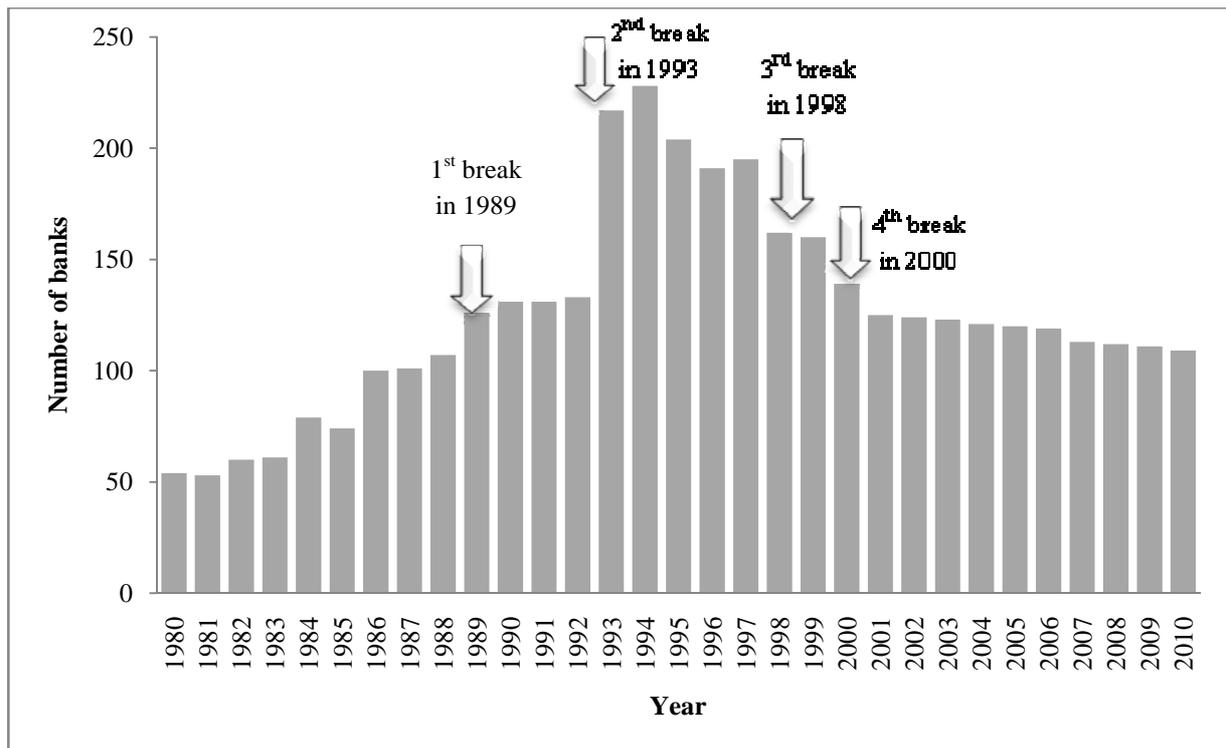


Figure 2.6-1 The Breaks in the Number of Banks between 1980 and 2010

Source: the Annual Financial Report of Banks (1980 – 2010), published by the Central Bank of Indonesia

* *The increase in the number of banks in 1986 occurred as the Central Bank officially incorporated the data of 27 Development Banks owned by the regional government. Those banks actually entered the industry before 1986 and they may have entered at various times. Considering this fact, this study does not consider 1986 as a break year even though 27 development banks appeared in the database.*

Further, the present study estimated the evolution of banking competition based on model 2.6-1. The panel data, particularly the Fixed-Effect model, was employed. The evolution of elasticity of the reduced form of revenues with respect to factor prices was calculated by summing the coefficients of the interaction variables. As discussed, the interaction variables are the multiplication of input prices variables and year dummy. Based on the discussion of the Panzar-Rosse method, the elasticity of bank revenue with respect to changes of input prices is calculated by summing the coefficient of three input prices. The first input price (w_1) is the funding rate. The second input price (w_2) is the wage rate and the third input price (w_3) is the capital rate. Regarding the H-statistics, higher values imply a higher level of competition.

Table 2.6-1 The Five Panels Based on the Break in Number of Banks

Panel	Period	Total number of banks within the observation period	Number of observation
1 st panel	1980 – 1988	120	668
2 nd panel	1989 – 1992	287*	3,689
3 rd panel	1993 – 1997	287*	3,688
4 th panel	1998 – 1999	287*	3,684
5 th panel	2000 – 2010	145	1,242

** The number of observations is the same for the 2nd, 3rd and 4th panels because they cover the total number of banks within the observation period. This study divided them into three panels rather than collapse them to one panel because there were significant break in the number of observation in 1989, 1993 and 1998.*

Table 2.6-2 provides the value of H-statistics for each year calculated by using the break of number of banks as a basis of cut off. As explained in the earlier part of this section, this study also considered breaking the panel based on the structural changes and equally split the panel into three. Figure 2.6-2 shows that the evolution of banking competition by using the above two methods does not differ from the proposed method based on the break in the number of banks. This implies that the measure of evolution of banking competition is robust using the three methods. The degree of competition, as represented by the H-statistic 0.84, reached the highest level in 1988. It is interesting that this is 10 years before the 1997 crisis. The second highest level of competition was observed in 2000 (H-statistic 0.46). The third highest level of competition was in 1992 (H-statistic 0.41). The annual estimates fluctuate considerably.

Table 2.6-2 The Evolution of Competition in the Indonesian Banking Industry (Break of Number of Banks as a Cut-off)

Year	w₁ (Funding Rate)	w₂ (Wage Rate)	w₃ (Capital Rate)	H-statistics Banking Competition
1980	0.619697	-0.33078	0.114356	0.40327
1981	0.533976	-0.33	0.163157	0.367138
1982	0.679889	-0.4469	0.114354	0.34734
1983	0.715845	-0.52204	0.118363	0.312167
1984	0.561902	-0.47297	0.077674	0.166604
1985	0.611468	-0.53214	-0.00986	0.069474
1986	0.486528	-0.53088	0.053136	0.008786
1987	0.600041	-0.59573	0.022608	0.026914
1988	0.655336	-0.64006	0.042572	0.057844
1989	0.785956	-0.24132	0.300292	0.844933
1990	0.625853	-0.26081	-0.0645	0.300542
1991	0.15879	-0.04785	-0.00328	0.107661
1992	0.622009	-0.27532	0.060656	0.407348
1993	0.629374	-0.31438	0.068634	0.383625
1994	0.608639	-0.33388	-0.02655	0.248211
1995	0.439822	-0.28247	0.013542	0.170897
1996	0.639091	-0.39981	-0.06445	0.174838
1997	0.515036	-0.40031	-0.00136	0.113366
1998	0.362822	-0.26285	0.047721	0.147692
1999	0.382767	-0.21192	-0.05434	0.116507
2000	0.69249	-0.37675	0.145992	0.461734
2001	0.595486	-0.37004	0.167903	0.393354
2002	0.496665	-0.33973	0.155376	0.312308
2003	0.626424	-0.44011	0.182897	0.369208
2004	0.426361	-0.33212	0.184522	0.278762
2005	0.621873	-0.45327	0.122787	0.291392
2006	0.415632	-0.3466	0.264718	0.333747
2007	0.356235	-0.32071	0.183616	0.219145
2008	0.18874	-0.21803	0.205184	0.175897
2009	0.289849	-0.29107	0.106494	0.105269
2010	0.409157	-0.38042	0.236493	0.265226

In order to provide a better description of the evolution of the degree of competition in the Indonesian banking industry, figure 2.6-2 demonstrates the changes in the values of H-statistics during the observation period. Three different methods of the panel splits generate similar information about the evolution of competition in the Indonesian banking. The competition was weak prior 1988 and the industry became very competitive between the period 1988 and 1992. It implies that the banking industry became very competitive during the introduction of banking reform in 1988 and banking liberalization in 1992. The Indonesian banking industry still remained more competitive in the 1990s compared to the 1980s. However, following the 1997 economic and banking crisis the degree of competition shrank; particularly between 1997 and 2000. The 1997 crisis management affected competition in the banking industry. Furthermore, during the consolidation period, banking competition slightly improved but it has not yet reached the level it was during the deregulation and liberalization period between 1988 and 1992. This yearly estimates of H-statistics will be used as the basis of the discussion of the determinant of competitive banking in Chapter five.

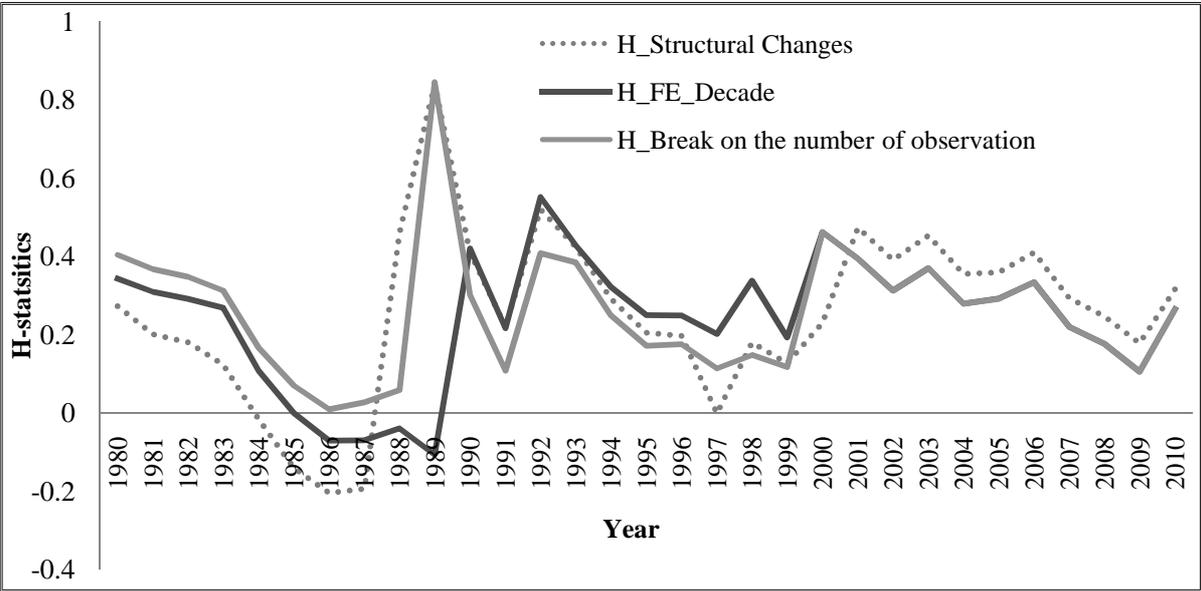


Figure 2.6-2 The Competition Evolution using Three Different Methods

2.7 Conclusion

This chapter contributes to knowledge development by estimating banking competition in Indonesia by using observations of all commercial banks in the industry in the last three decades. It adds to the literature on the level of banking competition in emerging economies. Another contribution of this paper to the banking literature is by applying the three specifications based on the Panzar-Rosse method as suggested by the recent study by Bikker, Shaffer and Spierdijk (2011). The three specifications are price, scaled-revenue, and un-scaled revenue. It is important to compare the estimation of banking competition by using the three specifications so as to produce an accurate estimation. The comparison shows that the H-statistics estimated by using the price and scaled revenue specifications are higher than those estimated by using the un-scaled revenue specification. Based on Bikker, Shaffer and Spierdijk (2011), the price and scaled-revenue specification produce overestimated values of H-statistics thus they are not reliable estimates of the competitive conditions in the banking industry. Hence, this study prefers to rely on the H-statistics estimated by the un-scaled revenue specification.

In order to estimate banking competition using the Panzar-Rosse method, a Fixed-Effect (FE) model of panel data was chosen. Panel data produces more efficient estimates compared to a cross section approach. In addition, FE takes into account the heterogeneity between banks and the difference in the input factor market. As discussed, the findings of this chapter support Bikker, Shaffer and Spierdijk (2011); the price and scaled revenue specifications produced higher estimates of H-statistics compared to the un-scaled revenue specification. Even though the values of the H-statistics from the three specifications that incorporate time dummies are quite varied, the hypothesis testings of H-statistics confirms that the Indonesian banking industry between 1980 and 2010 was operating under a monopolistic competition structure. This finding is consistent with the nature of the banking industry where banks as supplier tend to differentiate their products in order to meet with consumers' preferences and geographical differences (Alhadeff 1967). In addition, product differentiation is important because banks, as intermediary institutions, actually offer similar services which collect the excess funds from depositors and disburse loans to borrowers who need additional funds or capital. Further this finding is also consistent considering high switching costs in the banking industry, the locational characteristics and banks possession of specialized knowledge (Allen & Gale 2004). Those factors further contribute to create a less elastic demand curve.

In interpreting the findings, we consider some assumptions that should hold in the Panzar-Rosse method. There are at least four main assumptions underlining the model as explained in the method section. The first assumption is that banks are treated as single product firms with interest-based activities as the main business. Regarding Indonesian banking, this assumption is possibly met as the data shows that interest income contributed on average up to 80 per cent of total income between 1980 and 2010. This assumption may also more easily apply to smaller banks rather than larger banks. Small banks depend more on interest based activities where up to 93 per cent of revenue on average was contributed by interest income between 1980 and 2010. Large banks have less dependency on interest-based activities with 82 per cent of revenues contributed on average by interest income between 1980 and 2010. Regarding the assumption of market equilibrium in the long-run, the test shows that the joint-coefficient of input prices did not correlate with bank return rates. Therefore, this study is able to assume that in the long-run the Indonesian banking industry is in equilibrium because the risk-adjusted rates of return will be equalised across banks in the competitive capital market.

The next assumption required is that banks are profit maximising institutions and have normally shaped revenue and cost functions. In terms of number of banks, the Indonesian banking industry is dominated by private banks. Private banks are perceived as working under profit maximization rather than any other objectives. A slight bias may occur among government banks as they may work to serve the interest of government rather than to maximize profits.

The last assumption regards the association between the input price and quality. The model assumes that higher input prices are not associated with higher quality services that generate higher revenue. If this condition does not hold the H-statistics may be biased towards a positive value (Molyneux, Thornton & Llyod-Williams 1996). In other words, the positive value of H-statistics is reflecting the competition in the banking industry rather than the positive association between the input price and the service quality. Moreover, the positive value of H-statistics reflects the market contestability or perfect competition. In the case of Indonesian banking, the estimation of yearly H-statistics shows that H-statistics was positive and close to one during the banking reforms in the late 1980s and in the beginning of the 1990s. It means that the positive value of H-statistics reflects market contestability as a result of free entry to the Indonesian banking industry. Other positive values of H-statistics were observed in the 2000s, however on average the H-statistics were lower than for the previous

periods during banking reforms. The lower values of H-statistics in the 2000s was the result of a failure of cost conditions to comply with the assumption of free entry under the contestability concept (Molyneux, Thornton & Llyod-Williams 1996). In the 2000s, Indonesian banking was restricted to the entry of the newly established banks (Rosengard & Prasetyantoko 2011). Hence, we can be confident that the positive value of H-statistics represents the competition rather than a positive association between input prices and service quality.

The findings presented in this paper show that there is room to increase competition in the Indonesian banking industry. Some previous studies conducted by Bikker, Spierdijk and Finnie (2006) and Bikker, Shaffer and Spierdijk (2011) which cover the estimation of banking competition both in developing and developed countries also confirm that the competition in the Indonesian banking should be enhanced. Some examples of estimated H-statistics among developing countries are available at table 2.7-1. Both earlier studies used unscaled-revenue specification therefore it is believed that the studies can be used as an appropriate comparison with this study. Both studies confirm that Indonesian banking was less competitive compared to other developing countries. Among the Asian countries, the H-statistic of Indonesian banking was the lowest (0.016) based on Bikker, Spierdijk and Finnie (2006) and 0.288 according to Bikker, Shaffer and Spierdijk (2011). Other East Asian countries, for example Malaysia, Philippine and Thailand, had H-statistics above 0.5. If we compare with other developing countries in the Latin American region, the competition level in Indonesian banking is also the lowest.

Table 2.7-1 The Studies on Banking Competition in the Developing Countries

Country	Bikker, Spierdijk and Finnie (2006) ^a	Bikker, Shaffer and Spierdijk (2011) ^b	This study(2013) ^c
Indonesia	0.016 (0.127)	0.288 (0.070)	0.67 (0.01)
Malaysia	0.727 (0.130)	0.620 (0.070)	na
Thailand	0.528 (0.145)	0.296 (0.118)	na
Philippine	0.660 (0.093)	0.724 (0.126)	na
India	0.450 (0.114)	0.849 (0.088)	na
Brazil	0.370 (0.103)	0.521 (0.055)	na
Colombia	0.540 (0.238)	0.379 (0.125)	na
Mexico	0.805 (0.319)	0.603 (0.182)	na
Venezuela	0.790 (0.219)	0.320 (0.099)	na

a) Total revenue as dependent variable, Pooled Least Squares⁶ with heteroskedasticity robust standard errors, between 1986 and 2005.

b) Total revenue as dependent variable, within estimators (Fixed-Effect model with clustered standard errors) between 1994 and 2004.

c) Total revenue as dependent variable, within estimators (Fixed-Effect model with clustered standard errors and time dummies) between 1980 and 2010.

* Values in the bracket are standard error of joint coefficients of input prices

The estimation of the yearly H-statistics in section 2.6 assists this study in the investigation of the determinants of competitive banking. The Indonesian banking industry was not competitive in the early 1980s. During the banking reforms in 1988 and 1992, the banking industry was very competitive. This implies that in a monopolistic competitive market, opening the market by reforming the industry can create a contestable market. New entrants can shift the demand curve of individual incumbent banks to the left. In this model, banks will produce at the tangent of their cost curve so price equals cost. Further, it will wipe out excess profits of banks in the monopolistic competition market (Chamberlain 1962). During the banking reform, the Indonesian banking industry was open to the penetration of new entrants. Both new local private banks and joint venture banks, which are formed by a partnership between local and foreign banks, were established. The banking and economic crisis in 1997

⁶ The study employed other methods, for example Fixed-Effect and Random-Effect however, the results do not show any significance differences.

prohibited access to new banks and some banks were closed during the crisis. Entry was reopened in the 2000s, particularly for foreign banks and entities. However, the penetration of foreigners did not take the form of establishing *de novo* operation of branches of foreign banks or joint venture banks, but they entered through acquiring local existing banks. Newly established *de novo* operations are perceived to deliver stronger competitive pressure than the penetration of foreign banks through acquisition of local existing banks (Claeys & Hainz 2006; Jeon, Olivero & Wu 2011; Martinez Peria & Mody 2004).

By using the findings in Chapter two, the next chapters three, four and five aim to examine the determinants of competitive banking. Chapter three focuses on the role of the state through policy changes concerning competition. Chapter four investigates whether the competitive behaviours of banks across sizes and ownership are different. Chapter five focuses on the role of market concentration and foreign penetration on competition in the Indonesian banking industry.

Chapter Three

Analysis of the Impact of Structural Changes on Banking Competition: *Deregulation, Liberalization, Banking Crisis and Consolidation in the Indonesian Banking Sector between 1980 and 2010*

3.1. Introduction

This chapter expands on the discussion about competition in the banking industry by examining the impact of state intervention on competition and market structure. As the main component in the financial system, banking is a highly-regulated industry compared to other industries. State intervention in the banking system is justified by the presumption that banks are treated as a public matter even though banks work for the profit motive (Spong 2000). In addition, there is the possibility of market failure through asymmetric information and externalities. Thus, in order to protect public interest the state provides prudential supervision to enhance monetary and financial stability, ensure healthy competition to enhance banking efficiency, and to encourage financial infrastructure to provide better services for depositors and customers (Spong 2000; World Bank 2013).

As discussed in Chapter one, the Indonesia financial industry is a banking-oriented system because more than half of financial assets is owned by the banking industry (Pradiptyo et al. 2011). Banking is a main instrument in the financial intermediary process, the main transmitter of monetary policies and a significant element of financial stability. As a financial intermediary, it channels the excess of households' resources to more productive activities and determines the allocation of capital. In regards to its role as a financial intermediary, the banking industry has a major contribution to improve the competitiveness of the manufacturing and service sectors. The banking industry also has a major role in transmitting monetary policy, especially in the case of Indonesia where the banking industry is the main source of lending. Data from the World Bank shows that lending from the banking industry accounted for 39 per cent of Gross Domestic Product on average between 1980 and 2010 (World Bank 2011). Bank contributions to lending reached a peak in 1999 at 62 per cent of the GDP. The core position of the banking industry in the economy has implications because of the dependency of the economy on banking stability. Banking instability spreads into the rest of the economy as experienced by Indonesia in 1997 – 1998. Furthermore, instability in

the economy impairs the performance of the banking industry and may lead to a collapse of the economy as it did in Indonesia during the 1997 crisis.

This chapter discusses the impact of regulation changes on market structure in creating a contestable market and increasing competition in the Indonesian banking industry in the thirty-one years spanning from 1980 to 2010. During this period the authorities imposed a range of different policies which brought structural changes to the banking industry. The banking deregulations of the 1980s to the mid-1990s invited new entrants to participate in the Indonesian banking industry. In contrast, the banking and economic crisis of 1997 was followed by banking consolidation in the 2000s which reduced the number of banks in the industry. The changes in the regulations transformed Indonesian banking from a highly regulated industry to a less regulated and liberalized industry. Furthermore, the regulation changes affected the business environment and competition in the Indonesian banking industry. The estimation of the yearly H-statistics in Chapter two suggests that the H-statistics changed. The value of H-statistics was low prior 1989 and reached its highest level between 1989 and 1992 (see Figure 2.6-2). Following the economic and banking crisis of 1997, the values of H-statistics did not reach the level of the period from 1989 to 1992. This implies that the degree of competition in the Indonesian banking industry was changing. The industry was least competitive in the early 1980s and became very competitive between 1989 and 1992. However, in the late 1990s and during the 2000s, the industry has not been as competitive as it was between 1989 and 1992.

The structure of this chapter is as follow. Firstly it discusses the literature. This is followed by a description of the policy changes in the banking industry from banking deregulation, liberalization and consolidation in the past thirty-one years. The description of policy changes is substantial and provides important background for assessing the impact of structural changes on competition. Secondly, this chapter proposes empirical models to measure the impact of the structural changes of deregulation, liberalization, the banking crisis and consolidation on banking competition. The empirical models are based on the Panzar-Rosse method by incorporating dummy variables capturing structural changes. Finally, this chapter discusses the empirical findings and the conclusion.

This chapter focuses on four research questions:

1. What was the impact of deregulation in 1988 on banking competition?
2. What was the impact of liberalization in 1992 on banking competition?
3. What was the impact of banking and economic crisis management in 1997 on banking competition?
4. What was the impact of consolidation in the 2000s on banking competition?

3.2. Literature Review

The findings in Chapter two show that Indonesian banking was working under an imperfect competition market of monopolistic competition. Unlike perfect competition, where banks record normal profit, banks in a monopolistic competition market record an economic profit. As shown in Figure 2.3-3, the economic profit in a monopolistically competitive market is generated from the difference between price and marginal cost. Market power explains the existence of profits for banks in the monopolistic competition industry. Market power in the banking industry is created by product differentiation, high switching costs to move from one bank to others, locational characteristics, banks' possession of specialized knowledge and segmented customers (Alhadeff 1967; Berger 1995).

From the welfare point of view, a monopolistically competitive market produces inefficient outcomes with higher prices than marginal cost at the quantity less than quantity that would be produced under perfect competition. The literature suggests that the most efficient market is one with perfect competition where banks produce at their marginal cost; thus there is no economic profit. Nevertheless, creating a contestable market is argued to be more realistic than the goal of creating a perfect competitive market (Baumol 1982). Perfect competition is rare. Under perfect competition, the number of banks must be large enough (or infinite) in order to assure that none of the banks has influential power over price. In addition, banks have to offer homogenous products where the qualities and the features of the products do not vary across banks. This is inapplicable to the banking industry where customers are segmented and there are geographical differences among different markets.

Furthermore, Baumol (1982) argues that contestable markets produce a more optimal equilibrium solution that is close to the perfect competition market. It means that in the

contestable market, banks behave efficiently because banks have to offer service at the marginal cost even though banks operate in the imperfect competitive market. Regardless of the market structure of the banking industry, banks must perform efficiently by offering the best services to their customers with the price equal to the marginal cost. The incumbents are inefficient so they create an economic profit; the new entrants will enter the market. The new entrants, who are assumed to be more efficient, will be able to offer the services at a lower price. The potential entrants or potential competitors are the main instrument of market discipline. With the presumption that there are potential entrants, the incumbents have to produce at an efficient level in order to prevent any new entrant. Having efficient banks in the market means that there is no inefficiency found in the industry, particularly in the long-run (Baumol 1982). Finally, a contestable market is perceived to be powerful because no product will be sold at a price that is less than the marginal cost (Baumol 1982). Incumbents generate profits by charging lower prices than the marginal cost; there is an invitation for the new entrants to undercut the incumbents. The new entrants will also charge a slightly lower than marginal cost and make a profit of it. It shows that in the contestable markets, banks will not practice predatory pricing in order to prevent the entry of potential competitors.

Under contestable markets, banks can just earn normal profits where price equals marginal cost if the market provides freedom of entry and exit. Freedom of entry implies that it is costless for entrants to enter the market by assuming “the entrants suffer no disadvantage in term of production technique or perceived product quality relative to the incumbent and the potential entrants find it appropriate to evaluate the profitability of entry in terms of the incumbent firms’ pre-entry prices” (Baumol 1982, p. 3). In regard to freedom of exit, Baumol (1982, p. 4) assumes that “any bank or firm can leave without impediment, and in the process of departure can recoup any cost incurred in the entry process”. In the case of the banking industry, this assumption requires regulation that allows the timely exit of insolvent banks (World Bank 2013). However, in many cases state or regulators hold-up the process of a bank’s exit in order to prevent a systemic crisis. The State sometimes provides implicit guarantees to bail out banks and thus permit insolvent and inefficient banks to survive (Pangestu 2003; World Bank 2013). In the case of Indonesian banking, prior to the crisis of 1997 the government and the central banks preferred to bail-out the insolvent banks rather than let them fail (Pangestu 2003).

The existence of barriers to enter the market in most of the banking systems in the world is determined by the state. The state, for instance the government and the central bank, can be a regulator by granting the license to open banks. The state regulates chartering in the banking industry because banking is commonly treated as a public matter, particularly in a bank-oriented system. In addition to chartering, the barriers to enter the market are also determined by the state regulation of the branching laws, limitations on the scope of business, and the overall cost of complying with other banking regulations (Spong 2000). According to Spong (2000), chartering has at least two aims. The first is to assure that only capable, honest people or companies with adequate resources are granted a license to open banks. The second aim is to prevent over-banking where the number of banks is more than what the customers' need. The two studies by Spong (2000) and World Bank (2013) underline the possible adverse effect of chartering policies on competition. Chartering creates barriers to enter the market by increasing the cost of entry that further add to the cost of intermediation. Furthermore, chartering limits the probability of potential competitors entering the market. Thus, chartering lowers competitive pressure on existing banks and hampers the creation of contestable markets. In addition to chartering, the state regulates the ownership and business expansion of banks. The regulation on ownership is intended to protect the public interest by preventing wealth concentration with particular people or groups. Regarding business expansion, the rules cover the restrictions on the expansion of the scope of business, and geographical expansion of branches. The introduction of rules related to ownership and bank business expansion also contribute to lowering competitive pressure from potential competitors.

There are a large number of empirical studies that examined the impact of state intervention on banking systems (Angelini & Cetorelli 2003; Berger & Mester 2003; Bikker & Haaf 2002; Claessens, Demirgüç-Kunt & Huizinga 1998; Claessens & Laeven 2004; Gelos & Roldos 2002; Jeon, Olivero & Wu 2011; McLeod 1999; Molyneux, Lloyd-Williams & Thornton 1994; Yeyati & Micco 2007). The literature can be classified into three groups. The first group focuses on examining the impact of deregulation on competition. The second group covers the recent trend of banking consolidation on competition, and the third group concentrates on studying the possible role of penetration of foreign banks on competition in the local banking market.

The literature suggests that banking deregulation removes barriers to enter the market and contributes to enhanced competition in the banking industry. A study by McLeod (1999)

discussed the banking deregulation in Indonesia between 1983 and 1992. During that period “there was removal of control of interest rates, lending and expansion of branch networks and of barriers to entry” (McLeod 1999, p. 258). As a result there was a shift from less efficient state banks to more aggressive private banks.

In the case of European banks, the first deregulation started in the 1970s through the introduction of the First Directive to ensure the equal treatment of banks of member states that enter the domestic markets of other countries (Molyneux, Lloyd-Williams & Thornton 1994). A study by Molyneux, Lloyd-Williams and Thornton (1994) examined the impact of banking deregulation in the European banking industry between 1986 and 1989 after the introduction of the First Banking Directive of the European Single Market (EMU). The study found that deregulation did not lead to change in the behaviour of banks. The deregulation was not effective in facilitating a fully integrated European banking industry. The introduction of the Second Banking Directive was more effective in enhancing competition in the European banking industry. A study by Angelini and Cetorelli (2003) confirmed that the Italian banks were more competitive after the introduction of the Second Banking Directive. This Banking Directive introduced in 1989, has provided full freedom of banking services across European Countries⁷. The relaxation of control and the removal of barriers to enter other markets within the European Union facilitated opportunities for banks to expand their business. Another study by Berger and Mester (2003) investigated the effects of technological change, deregulation and dynamic changes in competition on the performance of US banks. The study reveals that between 1991 and 1997, US banks provided additional or higher quality services that raised costs but also raised revenues by more than the cost increases. Briefly, some studies found that relaxing control and removing barriers through deregulation facilitated expansion of their business and provide the same level playing field for every bank in the industry.

Banking consolidation through mergers of banks has been studied in some developed countries (both in Europe and non-Europe), and developing countries in Central Europe, Asia

⁷According to Molyneux, Llyod-Williams & Thornton (1994), the Second Banking Directive has also provided regulation on the minimum capital requirements, the monitoring and venting of bodies that have substantial bank shareholdings, controls over bank long-term participation in non-financial companies, and the establishment of a single banking ‘passport’ to permit activity anywhere within the European Union countries. Furthermore, the Second Banking Directive provided the harmonisation of the supervisory arrangements, for example the definition of capital and the Solvency Ratio Directive. The Second Banking Directive also harmonised accounting regulations for foreign branches, the reorganisation and winding up procedures, and deposits insurance.

and Latin American (Bikker & Haaf 2002; Gelos & Roldos 2002; Yeyati & Micco 2007). Consolidation creates a concentrated market because mergers reduce the number of banks and grant merging banks larger market shares. A study by Bikker and Haaf (2002) observed increased market concentration in twenty-three developed countries of Europe and non-Europe between 1988 and 1998 as a result of banks mergers. The study found that a concentrated market was associated with a less competitive environment. The banking industry was less competitive because consolidation created few large banks with substantial market power. The possession of market power of large banks restricted competition in the banking industry. The concentrated market with a large number of small banks was also found to be less competitive because a large number of small banks are unable to influence the market and competition.

In the case of developing countries in Central Europe and Latin America, two studies by Gelos and Roldos (2002) and Yeyati and Micco (2007) reached the same conclusion; that consolidation increased market concentration without endangering competition. In the emerging countries, consolidation has been accompanied by increased foreign penetration (Gelos & Roldos 2002). The freedom of entry to the banking industry provides pressure on the existing banks to behave competitively. However, Yeyati and Micco (2007) argue that the competitive environment in Latin American countries was not improved by larger foreign penetration. The study suggests that foreign banks are not a perfect substitute for local banks because foreign banks offer a different range of products. In addition, foreign banks have others benefits related to the value of their brand name and perception of implicit insurance provided by their parent banks. Thus, a more intense foreign penetration increased the degree of product differentiation and reduced competition (Yeyati & Micco 2007).

Some studies of the effects of foreign penetration on the local banking market confirm that foreign banks entry and fewer activity restrictions are associated with a more competitive market. Foreign bank entry contributes to create contestable markets. A study by Claessens, Demirgüç-Kunt and Huizinga (1998) found that a greater foreign banks penetration contributed to lower both profits and overhead expenses of domestic banks. Another study by Claessens and Laeven (2004) strengthens the previous study of Claessens, Demirgüç-Kunt and Huizinga (1998). In the banking systems with greater foreign bank entry and fewer entry and activity restrictions, the markets were more competitive (Claessens & Laeven 2004). A freedom of access (in this context for foreign banks) and the reduction of activity restrictions

are effective in enhancing competition (Claessens & Laeven 2004). Another study by Jeon, Olivero and Wu (2011) identified the source of the positive link between foreign penetration and competition in the emerging markets of countries in Asia and Latin American between 1997 and 2008. The contribution of foreign banks in enhancing competition in the host market was related to a spillover effect from the foreign banks to the domestic banks. A spillover is particularly strong under three conditions. Firstly, foreign banks are more efficient and less risky. Secondly, the host market is less concentrated. Thirdly, foreign banks enter in the form of *de novo* banks rather than foreign acquired banks⁸.

The literature provides a theoretical basis for the role of state intervention in determining the level of competition in the banking industry. This chapter particularly relies on the contestable theory of Baumol (1982) in examining the impact of state regulation on bank behaviour. The state regulations consist of deregulation or reforms, liberalization by widening access for foreign banks, crisis management, and consolidation. The state regulations establish the degree of freedom of entry and exit in the banking industry, the restriction for business and activity expansion, and determine the overall cost to comply with the banking regulation. The freedom of entry and exit, less restrictions for banks to expand their business and the lower cost to comply with the regulations creates a contestable market. In a contestable market, the potential entrants discipline the behaviour of the existing banks. The incumbents behave efficiently by selling products at or near marginal cost to prevent the entry of potential competitors.

3.3. The Structural Changes in the Indonesian Banking

This section discusses the changes of policies in the Indonesian banking industry for the last thirty years. The discussion is divided into four sections based on the time sequence. The first section focuses on the existence of both quantitative and qualitative controls, chartering regulation that created barriers to enter the market, and the subsidised loans in the banking industry prior to deregulation in 1983. Before 1983, the government imposed controls by determining the level of interest rates for lending and time deposits. The chartering policy

⁸*De novo* banks are defined as either penetrating through the establishment of branches or the formation of subsidiaries of foreign banks in local banking (Clarke et al. 2001). The foreign banks can also be penetrated by acquiring the local existing banks. This penetration will change the ownership composition of the local banks. If foreign banks own more than 50 per cent of shares of the acquired banks, the local banks will change into foreign acquired banks. Chapter four and five will discuss further the possible role of different modes of entry of foreign banks on competition in the Indonesian banking industry.

restricted the industry for private banks; both domestic and foreign. The restriction was also applied to business expansion. The regulation restricted the opening of new branches. In addition, the intermediary cost was high because banks were required to meet a high reserve-requirement.

The second section discusses a series of deregulations and liberalization between 1983 and 1992. Within this period the authorities reformed the banking industry. In terms of chartering, government removed the barriers to entry by allowing new entrants (domestic private banks and foreign banks) to participate in the Indonesian banking industry. Foreign banks are allowed to penetrate the local market by the setting up of joint venture banks with local partners. The chartering also eased entry by lowering the capital requirements to enter the industry. Deregulation also removed the restriction on business expansion by cutting down the requirement to open new branches. Banks were also free to introduce saving deposit products of their own design. The intermediary cost also reduced as the reforms lowered the reserve requirement from 15 per cent to 2 per cent. In addition, banking deregulation removed control on interest rates, lending limit, and interbank borrowing limits. Finally, the banking reforms removed subsidised loans.

The third section examines the economic and banking crisis in 1997. This section focuses on the impact of crisis management policies (for example changes of exchange rate policy from a managed float to a free floating system, tight monetary policy, bank closures, bank mergers and banking recapitalization) on competition in the Indonesian banking industry. The fourth section discusses the implementation of banking consolidation in the 2000s. There were at least two policies under the Indonesian Banking Architecture that affect market structure. The first was the stipulation of the minimum capital requirement that should be fulfilled by 2010. The second was the implementation of the single presence policy which requires banks under the same shareholder to consolidate. In addition, the fourth section demonstrates the increased penetration of foreign banks in the local banking industry.

3.3.1. Prior to Deregulation in 1983: Barriers to Enter the Market and Government Controls

Prior to the 1980s, the Indonesian government used banking as one of the main instrument implement monetary policy. In order to control the growth of the money supply, the government conducted its own credit operation and directed the lending of the state commercial banks through government directives (Grenville 1977). The government also controlled the interest rates of the state commercial banks. The control intensified under the Old Order Government as The Minister of Central Banking Affairs and Governor of Bank of Indonesia, Jusuf Muda Dalam merged the state banks and the Central Bank into a single conglomerate bank (Grenville 1977). The single conglomerate bank acted as the circulation bank which was responsible for releasing and managing the circulation of money, and functioned as the central bank as well as a commercial bank (Bank Indonesia 2008a). Even though the merger was revoked as the Old Order Government lost power in 1966, the Central Bank still had power to give direction about loans made by the banking sector. The controls restricted the intermediation operation and business expansion. Directed lending lowered the loans disbursement and contributed to dampen the growth of lending. The data on the portfolio of Indonesian banks at the beginning of the 1980s shows banks kept their assets in the form of cash rather than credit. In the early 1980s, cash dominated the bank portfolios by two-thirds of banking assets (Grenville 1977).

Prior to deregulation, the chartering policy restricted the entry of local private banks as the government reduced the number of banks and did not issue licenses for new local private banks during two periods; 1959-1964 and 1971-72. The policy effectively reduced the number of banks from 129 banks in 1971 to seventy-seven banks in 1980 (Bank Indonesia 2008b). Regarding the penetration of foreign banks, foreign banks were allowed only in the form of branches of foreign banks. In terms of operation, the branches of foreign banks were only permitted to operate in the capital city and were limited to two offices (McLeod 1999). Banking Law Number 14 of 1967 permitted the establishment of another type of foreign bank which were the joint venture banks between foreign banks and their local partners. However, the license was only granted for joint venture banks in 1988 through the stipulation of the first banking reform. Prior to the banking reforms, the number of branches of foreign banks was relatively constant at eleven banks up to 1985.

Banking Law Number 14 in 1967 restricted the scope of business of the banks by segmenting the market. There were three types of banks based on the scope of business⁹, which were commercial banks, savings banks and development banks. The Law clearly assigned the types of products that banks could offer. The commercial banks were eligible to offer short-term credit and accept deposits from the public; both demand deposits and time deposits. They were also permitted to offer medium-term and long-term credit after receiving an approval from the central bank. Savings banks were only eligible to offer savings accounts and generate income from disbursing loans and trading commercial paper. The development banks focused on providing medium and long-term loans to development projects and selling medium and long-term commercial paper. In addition, the government segmented the market of state commercial banks based on the type of sector served by the banks. Bank Negara Indonesia (BNI) focused on providing loans for industry, Bank Rakyat Indonesia (BRI) provided loans to farmers, fishermen, and co-operatives, Bank Bumi Daya (BBD) provided loans to plantations and forestry, Bank Ekspor-Impor (EXIM) to foreign trade and Bank Dagang Negara (BDN) to mining.

A shift in the monetary paradigm had a substantial impact on the development of the banking industry. The new ruling government which came to power in 1966, the New Order, had a more market oriented paradigm for managing the money supply. The previous government relied on direct control of money creation to manage the money supply. Starting in 1966, the New Order government decided to control the money supply indirectly. Indirect control was conducted by introducing a very high level of the minimum reserve requirement for banks (Grenville 1977). The authorities required banks to hold a high minimum reserve requirement of 30 per cent. This policy existed until the 1970's as Indonesia experienced a hike in the bank reserves. The leap in reserves occurred because of the rapid increase in foreign exchange in 1971-73 and the oil bonanza period of 1974-79. In order to manage the money supply the authorities decided to apply lending limits concurrently with the reserve requirement policy. The high level of reserve requirement and lending limits restricted business expansion and added to the intermediary cost for banks.

Another government intervention in the industry was the stipulation of refinancing policies by providing subsidized loans to a particular sector. It aimed to develop the economy by

⁹*Banking Act Number 14 Year 1967 (Indonesia).*

generating discounted loans to targeted sectors. During this period the government received windfall profits from the increase of oil prices in the international market. The period between 1974 and 1979 was known as the oil boom. Under the refinancing policy, the authorities asked the banking sector to direct the discounted loans to targeted sectors; for example BIMAS (Bimbingan Masal Swasembada Bahan Makanan or mass guidance for food self-sufficiency) and Medium Term Investment programs (Arndt 1979). The favourable sectors received cheap loans. The targeted sector, agriculture, received loans for activities related to the supply and distribution of rice and paddies, production, import and distribution of fertilizers, the provision of salt, wheat and flour and the export and import of food. In addition, subsidised loans were also allocated to the manufacture of sugar stock and to contractor activities both for the public and private sectors (McLeod 1999).

During the 1970's the Central Bank also imposed qualitative controls on banks. The qualitative controls consisted of the introduction of differential rates on loans, differential credit ceilings and interest rates subsidies. Under the first control, the commercial banks had to disburse credit at prescribed differential concession rates of interest to prescribed categories and sub-categories of priority borrowers. According to the second control, the authority imposed differential credit ceilings on various categories and sub-categories of borrowers (Arndt 1979). Finally, qualitative controls took the form of subsidies. There were at least six types of subsidies allocated to the state-owned banks in the 1970's: refinancing by the central bank on concessional terms, a subsidy on interest rates of long-term time deposits (which was introduced in 1974), budget allocations for capital participation of government (which could be further supplemented by periodic conversion of part of the state banks debts to the central bank interest-free non-repayable capital), tax exemption of all deposit interest income on the new long-term deposits introduced in 1974, and interest rates paid by the central bank on excess reserves held by banks (Arndt 1979, p. 120). In general, qualitative controls distorted the credit allocations. The lending was misallocated because it was not disbursed to the more efficient sectors; rather it was allocated to the preferred sectors. Loan subsidies created a dead weight loss triangle because the cost of the subsidy exceeds the gain from it. Therefore, the government intervention through the introduction of qualitative controls creates distortion and enlarges inefficiency in the banking industry.

The series of interventions and restrictions explained above show that prior to deregulation banking had been used as the main instruments to manage the money supply and drive the

economy. As a result, the money supply and inflation rate during the 1970s was manageable even during the oil boom in 1974 and 1975. However, the contribution of the banking industry to the economy came with a cost. The interventions and controls slashed the incentives of banks to compete with one another for business (Arndt 1979). Under the restrictive business environment, banks could not perform as dynamic financial intermediaries. Barriers to enter the market, both for private domestic banks and foreign banks, deterred the creation of a contestable market. The inability of potential competitors to enter local banking granted market power to the existing banks and removed the discipline required for existing banks to operate efficiently. Control on interest rates restricted banks determination of their own rates suited to their business plan. In addition, the interventions, particularly the credit refinancing policy, restricted banks' opportunities to exercise their capability in allocating credit (Arndt 1979). Finally, banks were incapable of expanding their lending and boosting revenue.

3.3.2. Banking Deregulation and Liberalization

Banking reform was initiated following the sharp decline in crude oil prices in the international market in the early 1980's. The Indonesian government was trying to reduce the dependency on oil as the main contributor to government revenue. Deregulation of the banking industry was part of a restructuring program for the Indonesian economy. The policy aimed to increase the role of banks as an intermediary institution accumulating capital from savers and disbursing loans to the public and business. By opening the industry to the new entrants and removing controls in the industry, banks enhanced the accumulation of third party funds and the lending disbursement. In addition, the reform was also intended to remove the restrictions in the industry which, in many cases, were causes of market failure. Another motivation for banking reform was removal of the ineffective refinancing program because it had become a primary focus of undesirable rent-seeking activity. McLeod (1999) argued that the conglomerates were formerly the recipients of the subsidized loans that largely hidden. Further, the refinancing program did not generate a substantial impact on development.

3.3.2.1. The First Banking Reform in 1983

The first banking reform was marked by the introduction of a banking deregulation package in May and June 1983. The first reform was known as PAKJUN 1983. There were two phases of the first reform. The first phase began in May 1983 when the authority removed interest

rate controls on state-owned bank six month time deposits. The second began in June 1983 when the authority removed all remaining time deposit interest rate controls on state-owned banks. Further, the second phase of the first banking reform also discontinued most loans programs relying on heavily subsidised funds from the central bank and removed the control on lending of all banks (McLeod 1999). The first banking reform was directed to improve the performance of state-owned banks. By removing most of the loans programs, credit limit regulation and control on interest rates, the state banks had to face true competition from their private counterparts. Under the first reform, “the state banks were urged to modernise and become more efficient and enhance the services to customers” (Low 1997, p. 54).

The first reform was effective in giving an opportunity for banks to expand their business. It removed the refinancing program and limitations for business expansion, for example the interest rates control and lending limit. Removal of controls and interventions eliminated market failure and allowed banks to expand their business. Despite some contributions of the reform to the development of the banking industry, the reform was not able to boost the performance of state-owned banks. McLeod (1999) showed that after the first banking reform, the state banks dominance of the industry was gradually replaced by their private counterparts. There were two main factors explaining the shift from state-owned bank dominance to their private counterparts. First, it was related to the improper response of the state-owned banks to the removal of interest rate control on time deposits. After the removal of interest rate controls, state-owned banks increased the interest rates of time deposits. The aim was to secure the source of funds as authorities withdrew most of the funds which were previously allocated for the refinancing program. However, the state commercial banks were reluctant to increase the interest rates on loans. Therefore, they set the rates much lower than the private banks and finally the interest spread was much lower than the interest spread for the private banks (McLeod 1999). McLeod (1999) argued that the lack of a significant spread between deposit rates and loan rates would hamper the banks’ ability to generate profit. Secondly, without any significant improvement of the services of state-owned banks, the borrowers preferred to take loans from the private banks. It shows that the share of loans of the state banks declined from 70 per cent to 62 per cent of the total in the four years from June 1983 (McLeod 1999, p. 267). The increase of rates of time deposits in the state-owned banks without the increase of the interest rates of loans had affected the private banks. They experienced a shortage of funds and were becoming dependent on the interbank market to finance their loans applications (McLeod 1999). This was not an ideal situation where the

expensive source of funding was utilized to finance a lower return on investment. In regard to the state-owned banks, they still relied on other state enterprises as their source of deposits rather than expanding the market into the retail end (McLeod 1999).

3.3.2.2. The Second Banking Reform in 1988

The second banking reform was introduced in October 1988 and was known as PAKTO 88. This reform was an extension of the first deregulation in 1983. The deregulation aimed to accelerate the development process by mobilizing local funds through the banks. PAKTO 88 opened access for new entrants to the industry after the long-periods of restriction to new entrants in 1971. The chartering policy was changed to ease the entry to the banking industry. PAKTO 88 also facilitated the opening of new banks by lowering the minimum capital requirement. In addition, the industry was also open to foreign penetration by allowing the foreign banks to establish joint ventures with local partners.

Furthermore, the reforms removed restrictions on business scope and business expansion. Deregulation reduced the proportion of the reserve requirement from 15 per cent to 2 per cent (McLeod 1999). The PAKTO 88 eliminated the limit on interbank borrowing and permitted banks to introduce savings deposits products of their own design. Finally, the reform reduced requirements for existing banks to expand their market through opening new branches and upgrading their services coverage to include foreign exchange transactions. The deregulation was expected to boost bank capacity to provide loans for the economy. In addition, the reform improved the prudential supervision by stipulating the lending limits, particularly to affiliated parties (Low 1997). It restricted loans disbursement up to 20 per cent of bank capital for single borrowers and a maximum of 50 per cent of banks capital to affiliated parties. Further, regulation introduced a detailed limit on the affiliated parties based on the close relationship with the banks. The borrowers who have a closer affiliation with the banks are eligible to lower lending rates. This aims to lower the risk by limiting the connected lending.

There were two more reforms following PAKTO 88. The December package in 1988, known as PAKDES, focused on accelerating the development of the capital market and other financial institutions. In order to treat financial products similarly, the authorities imposed a 15 per cent withholding tax for domestic deposits (Low 1997). The rate was the same as the tax levied on dividend payments. Further, the reform also expanded new opportunities to establish multi-finance companies. The business opportunities for multi-finance companies

ranged from leasing, factoring, venture capital, credit card operations and consumer credit. The reform also granted the same business opportunities for banks as applied to multi-finance companies. The last deregulation introduced in the 1980's was the March package in 1989. It removed the ceiling for offshore borrowing by foreign exchange banks on condition that they lent domestically in foreign exchange (Low 1997, p. 55).

The peak of banking deregulation took place under Banking Law Number 7 in 1992. The Law removed some restrictions in the market. Market segmentation was lifted and industry was only served by two types of banks, commercial banks and rural banks. The business scope of both the state owned banks and private banks are not restricted to particular segments of the market. Banks are eligible to offer any type of loans and all types of deposits and saving accounts.

3.3.2.3. Banking Liberalization: Opening the Market for Foreign Penetration

As discussed previously, the license for joint venture banks was only granted after the second banking reform of PAKTO 88. It implies that prior to the banking deregulation in 1988 foreign banks were only eligible to enter the market by opening their own branches. In terms of the scope of business, before the introduction of PAKTO 88 the branches of foreign banks were limited to operate as development banks. In addition, branches of foreign banks were only eligible to open branches in the capital city of provinces with a maximum of two branches (Hadad et al. 2004; McLeod 1999). The banking reform in 1988 granted improved access for foreign banks to participate in the local banking market by establishing joint venture banks. Unlike the branches of foreign banks, joint ventures banks set up through partnerships with local banks. Thus, joint venture banks are local legal entities that are separated from their headquarter banks (Hadad et al. 2004). The joint venture banks are also treated similarly to local banks and do not have a geographical restriction to expand their business.

The access of foreign penetration was widened in 1992 by the introduction of Banking Law Number 7 in 1992. The Law facilitated a wider participation of foreign investors in the banking industry. In addition to opening the branches of foreign banks and establishing joint venture banks, foreign banks and investors were allowed to purchase shares of listed banks through the stock market. Article 26 of the Banking Law 1992 stated that the local

commercial banks were allowed to list on the stock market. Foreign individuals or entities were permitted to buy shares as long as they did not become the majority shareholders. Foreign penetration of state commercial banks was also feasible because the Law permitted the state banks to list on the stock exchange. The trading of shares was officially permitted as long as the government was still the main shareholder.

Opening the market for foreign investment increased the contribution of foreign banks in Indonesian banking industry. Table 3.3-1 shows the market share of foreign banks and local banks regarding the value of assets, deposits and loans. Foreign banks refer to branches of foreign banks and joint venture banks. Prior to the second banking reform in 1988, the shares of foreign banks was relatively low - between six and eight per cent. The data also shows that the second banking reform increased foreign penetration gradually. The penetration reached its peak in 1994 as shown by the increase of shares of foreign banks from 4 per cent in 1988 to 10 per cent in terms of assets and loans. Further in 1998, the shares of foreign banks rose to 20 per cent in terms of assets.

Table 3.3-1 The Market Share of Foreign and Local Banks according to the value of Assets, Deposits and Loans 1980 - 1998

Year	Local Banks (State banks, Regional Banks and Local Private Banks)			Foreign Banks (Joint venture and Branches of Foreign Banks)		
	Assets (per cent)	Deposits (per cent)	Loans (per cent)	Assets (per cent)	Deposits (per cent)	Loans (per cent)
1980	94	94	94	6	6	6
1981	94	94	94	6	6	6
1982	93	92	95	7	8	5
1983	97	96	97	3	4	3
1984	93	92	95	7	8	5
1985	94	94	95	6	6	5
1986	96	97	97	4	3	3
1987	95	96	97	5	4	3
1988	96	97	96	4	3	4
1989	95	97	96	5	3	4
1990	94	96	96	6	4	4
1991	93	94	93	7	6	7
1992	95	97	96	5	3	4
1993	92	95	91	8	5	9
1994	90	94	90	10	6	10
1995	91	94	90	9	6	10
1996	91	94	90	9	6	10
1997	87	89	87	13	11	13
1998	80	85	79	20	15	21

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

3.3.3. The Banking Crisis in the 1990s

3.3.3.1. The Banking Distress

Following deregulation, the first banking distress in the Indonesian banking industry occurred in the early 1990s (Rosser 2002, pp. 70-5). The term distress is preferred because during that time several banks experienced financial difficulties that may have led to insolvencies (Sundararajan & Balino 1991). The public was familiar with the financial difficulties that were experienced by eight banks: Bank Duta, Bank Summa, Bank Panin, Bank Sampoerna, Bank Continental, Bank Yama, Bank Pacific and Bank Bapindo. There were seven private commercial banks and the latter was a state commercial bank. Bank Duta experienced a loss of over \$US400 million in foreign exchange in their derivatives transactions in 1992 (Rosser 2002). Bank Duta was able to cover the loss by transferring some of the losses to clients accounts (Rosser 2002). The former Vice President of Bank Duta, Mr. Dicky Iskandar Di

Nata was punished for his responsibility in investing the funds in foreign exchange trading which led the banks to collapse.

In the early 1990s, Bank Summa experienced a liquidity problem. Bank Summa was established following the relaxation of barriers to entry to the banking industry in 1988. It was one of the major banks in the industry owned by the wealthy owner of a conglomerate business named Edward Suryawidjaya. Excessive investment in high-risk property generated a liquidity problem for Bank Summa. Furthermore, the loans to the high-risk industry were financed by an expensive source of funds from time deposits. As property prices fell, banks experienced difficulty in repaying the deposits (McLeod 1999). In addition, Rosser (2002) revealed that intra-group loans also contributed to the fall of Bank Summa. The bank allocated Rp. 1.2 trillion from Rp. 1.6 trillion of loans to other companies within the Summa Group. The crisis within the Summa group escalated the amount of bad debts of Bank Summa to around \$US350-500 million.

There were at least five more private banks and one state-owned bank experiencing crisis in the early 1990s because of the intra-group loans practice. Bank Panin allocated more than 40 per cent of its loans to companies linked to the bank. The intra-group loans contributed more than 60 per cent of Bank Panin's non-performing loans (Rosser 2002). Further, Bank Sampoerna in October 1992 failed and was taken over by Bank Danamon. The crisis occurred as PT HM Sampoerna, the parent company, was not able to repay its loans to Bank Sampoerna. The bank allocated a loan of around Rp. 40 billion to PT HM Sampoerna (Rosser 2002). The list of banks involved in intra-group lending was getting longer. Bank Continental, Bank Yama and Bank Pacific almost collapsed in the early 1990s. Bank Continental had a financial problem after loans to other companies within the same group were not paid. Bank Yama, which was owned by one of the children of the Indonesia president at that time, also suffered a crisis because of concentrated lending. Bank Pacific also experienced a financial problem because of concentrated lending (Rosser 2002). In 1994, Bank Bapindo experienced financial difficulty. It had made very large loans to companies known collectively as the Golden Key Group, owned by Edy Tansil. There was a problem related to imprudent lending practice. The credit allocation was not based on a proper credit analysis because "the loans disbursement was influenced by the former Minister Sudomo and JB Sumarlin that put pressure on Bapindo" (McLeod 1999, p. 280).

The series of deregulation policies in the 1980s and early 1992 was followed by the financial difficulties of at least eight banks. Was there any contribution from banking deregulation to an increasing number of bank failures? The literature from other countries considered the link between banking deregulation and bank failures. For example, Davis (1995) argued that banking deregulation in Australia increased the bank failures in the 1990s. Deregulation reduced constraints on management. However, without sufficient improvement in corporate governance or market discipline the benefits of increased competition were offset by banks' failure caused by inadequate monitoring and control of banks management (Davis 1995). The lack of corporate governance may explain the imprudent lending behaviour by some Indonesian banks in the early 1990s. Through a member of its board of directors Bank Duta was investing too much money in derivatives transactions. The director's imprudent decision generated losses for the bank that exceeded its equity. Bank Bapindo also conducted imprudent lending because of the intervention of a high ranking government official. As Bapindo was a state commercial bank, the government was the owner and it was open for intervention from government officials. The intervention forced managers to allocate loans without proper assessment (McLeod 1999).

Imprudent lending behaviour also contributed to increasing intra-group loans. An agency problem presents with conflicting interests between depositors, managers of banks' and shareholders. The literature explain that the agency problem is common in the banking industry as the principal cannot observe, nor have perfect information about, the agents' decisions (Heffernan 2005, p. 6; Stiglitz 2010). The bank's manager and shareholders directed the lending to the companies in their group without prudent credit analysis. The intra-group loans rose as many banks were created to finance the expansion of the companies in their group. Conglomerates were a common phenomenon in the Indonesian economy in the early 1990s where the groups consisted of some companies working in a wide range of activities from manufacturing to banking. Claessens, Djankov and Lang (1999) showed that based on the capitalization data of the Indonesian stock exchange, the assets of twenty top conglomerates reached 67.3 per cent of total Indonesia market capitalization in 1997. Within the banking industry there were at least twenty banks where the owners also had other businesses under their groups (Rosser 2002). Further, fifty-six local private banks breached the legal limit of intra-loans regulations at the end of 1995 (Rosser 2002). Nasution (2000) presented a higher figure of the number of banks which did not meet the legal lending limit. Sixty-five banks poured credit into the companies within the same group, higher than the limit

set by the regulation (Nasution 2000). Chapter six outlines an empirical study of the relationship between competitive banking and financial instability risks.

3.3.3.2. The Second Banking Crisis

In mid 1997, Indonesia suffered a deep economic and banking crisis. This was more extreme than the earlier banking distress. The 1997 shock was considered as crisis because some banks were insolvent, experienced bank runs and there was intervention by the supervisory authority to resolve the crisis (Sundararajan & Balino 1991). The crisis began with an exchange rate depreciation that was driven by a contagion effect of currency pressure from neighborhood countries for example Thailand and large private loans in foreign currency. In regards to overseas loans, both the private and public sectors were free to borrow cheap funds from overseas (Bank Indonesia 2008d). As the Indonesian currency Rupiah depreciated, the cost of repaying the debt significantly increased. The situation became more difficult because of the practice in the past of the business sector using short term overseas loans to finance long term domestic projects. In addition, the loans were not hedged thus as the exchange rate depreciated, the value of loans grew.

The depreciation of the Rupiah became unmanageable. In 1997 it fell from 2,419 to 8,325 Rupiah per US Dollar. The depreciation reached its peak of 300 per cent in 1998 compared to 1996. Before the 1997 economic crisis, Indonesia adopted a managed floating exchange rate regime assisted by market intervention by the central bank to manage the value of the Rupiah. As the currency depreciated, the Central Bank of Indonesia was not capable of maintaining its currency value. Thus, on 14 August 1997, the Government decided to completely float the Rupiah (Laeven 2011). This policy produced a major shock for Indonesian business (Djiwandono 2005). They began to buy US Dollars heavily and the depreciation became severe (Djiwandono 2005). In order to reduce the currency depreciation, the government introduced a tight money policy through the combination of an expenditure reduction by government and administrative intervention. The interest rate of Bank of Indonesia certificates (SBI) rose significantly to 52.8 per cent for one month BI Notes (Bank Indonesia 2008d). In August 1997, the average interbank rate rose from 20 per cent to 90 per cent annually (Djiwandono 2005). Following the increase in the interest rates of SBI, the interest rates of one month deposits rose by 28.34 per cent in 1997 and 49.14 per cent in 1998.

Table 3.3-2 Average of Interest Rates 1996 - 1998

Interest rates	1996	1997	1998
		(per cent)	
BI Notes – One month	13.16	17.4	52.82
Interbank interest rates	13.7	47.02	64.67
Time deposits			
1 month	16.67	28.34	49.14
3 months	17.09	22.15	42.19
6 months	16.79	16.31	30.17
12 months	16.66	16.79	24.31
24 months	15.79	15.68	16.16
Loan/ credit			
Working capital	17.67	22.16	31.77
Investment	15.20	17.34	23.10

Source: Bank Indonesia (2008d)

The high interest rates generated liquidity problems for banks. Table 3.3-2 shows the interbank interest rates increased significantly from 13.16 per cent in 1996 to 64.67 per cent in 1998. The high rates of interbank loans imposed substantial pressure for banks in fulfilling their liquidity need. The pressure on liquidity became severe because as part of tight money policy, the central banks stopped the practice of purchasing short-term certificates from commercial banks. Furthermore, table 3.3-2 also shows that the interest rates for time deposits were higher than the rates applied to loans in 1997 and 1998. The negative spread generated a significant impact on banks' financial capacity. The interest cost that should be paid by banks was higher than the value of income generated from credit disbursement. The mounting interest cost was also affected by the shifting type of deposits from demand and saving deposits to time deposits because the interest rates of time deposits multiplied (please see table 3.3-3). Compared to 1997, the proportion of time deposits from all third parties deposits increased 55 per cent in 1997 to 66 per cent in 1998.

Table 3.3-3 The Contribution of saving; demand deposits and time deposits 1996 - 1998

Year	Demand Deposits	Saving Deposits	Time Deposits
1996	21%	23%	56%
1997	25%	20%	55%
1998	19%	15%	66%

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

The negative spread contributed to losses in 1998 as shown in figure 3.3-1. In addition, during the crisis the proportion of non-performing loans increased and contributed to losses in the banking industry. Banks experienced losses in 1998 of more than 100 trillion Rupiah. The banks equity was not capable of covering the losses and it dropped to more than minus 160 trillion Rupiah in 1998.

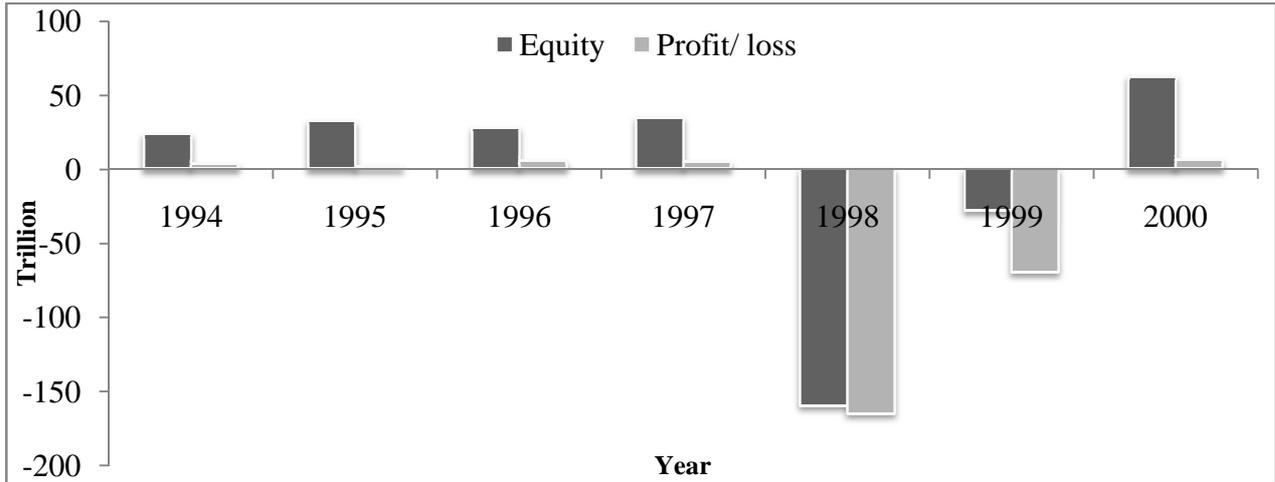


Figure 3.3-1 Equity, Profit/ Loss, Prior Banking Crisis 1997 and During Crisis

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

The economy suffered substantially during the crisis. Macroeconomic indicators during crisis are presented in table 3.3-4. Economic growth was negative 13.70 per cent in 1998. The liquidity injected into some insolvent banks during 1997 increased the value of money circulated as measured by M2 in table 3.3-4 (M2 increased by 52.70 per cent in 1997). Jointly with the depreciation of the Rupiah of about 300 per cent, inflation rose to 45.44 per cent in 1998. Further, there was capital flight with the total value of capital outflow higher than capital inflow. The level of unemployment rose as the business situation got worse and firms

preferred to lay off workers. The unemployment rate increased by 0.6 per cent in one year from 4.30 per cent in 1997 to 5.10 per cent in 1998.

The economic crises affected the banking industry and extended to the overall economy. In order to manage the crisis, government and the central bank decided to close insolvent banks. The first bank closure occurred in November 1997. Sixteen small private banks were closed because they had liquidity problems and were found to breach various prudential regulations (Fane & McLeod 2002). By April 1999 there were sixty-eight bank liquidations from the beginning of the second banking crisis (Djiwandono 2005).

Table 3.3-4 Macroeconomic Indicators 1996 - 1998

Macroeconomic Indicators	1996	1997 (per cent)	1998
Growth of Gross Domestic Product	7.80	4.90	-13.70
Unemployment Rate	4.90	4.30	5.10
Monetary Indicators			
Growth of M2	26.70	52.70	34.10
Interbank interest rates	13.70	47.00	64.70
Foreign Exchange (per US Dollar)	2,419	8,325	8,685
Consumer Price Index	5.17	34.22	45.44
Balance of Payment			
Current Account Deficit	-3.50	-1.20	3.80
Government Debt Service Ratio	14.60	10.10	10.70

Source: Bank Indonesia (2008d)

Banks that experienced liquidity problems but were still solvent, received bail-out support from the government. The government injected liquidity into the banking sector using government bonds in 1997 (Djiwandono 2005). Bail-out banks were placed under a recapitalization program. The Indonesian Banking Restructuring Agency (IBRA) was established in January 1998 under the Ministry of Finance to supervise and manage banks under the restructuring program. In addition, IBRA was responsible for assessing assets that the government acquired when it took over the liabilities of insolvent banks after the implementation of a blanket guarantee to bank creditors in early 1998 (Fane & McLeod 2002, p. 277). Banks under the restructuring program were selected based on their capital adequacy ratio (CAR). The recapitalization program was directed at banks that had a CAR less than 4

per cent but more than minus 25 per cent. According to the authority, those banks were worth saving but needed to be recapitalised (Fane & McLeod 2002). If the owner of recapitalized banks refused to participate in the program, the banks were nationalized and the owner was not be able to access any of the assets from the bank. However, if the owners were willing to participate in the restructuring program, they had to contribute at least 20 per cent of the funds needed to increase their bank's CAR up to 4 percent. The Government would then contribute 80 per cent from the recapitalisation fund in the form of newly issued bonds (Fane & McLeod 2002). The total cost of banking recapitalisation reached 40 percent of annual Gross Domestic Product in 1998 (Fane & McLeod 2002).

Authorities recapitalised three state banks and merged the remaining four state banks; the Bank Bumi Daya, Bank Pembangunan Indonesia, Bank Dagang Negara, and Bank Ekspor Impor Indonesia. The merged entity later became Bank Mandiri (Djiwandono 2005). Overall the number of commercial banks reduced significantly from 218 banks in 1996 to 158 banks in 1999. Table 3.3-5 shows the sharp decline in the number of banks by 32 per cent. The 1997 economic crisis affected the performance of private banks; both the foreign exchange commercial banks and non foreign exchange commercial banks. The number of foreign exchange private commercial banks reduced from seventy-seven (in 1996) to thirty-eight (in 1999) and the private non foreign exchange bank decreased from sixty-three (in 1996) to forty-three (in 1999).

Table 3.3-5 The reduction in the number of banks 1996 - 1999

No	The Commercial Bank Category	1996	1999	Changes (per cent)
1	State Owned Bank	7	5	-28.57
2	Foreign Exchange Commercial Bank	77	38	-50.65
3	Non Foreign Exchange Commercial Bank	63	43	-31.75
4	Joint Venture Bank	34	28	-17.65
5	Foreign Bank	10	10	0
6	Regional Bank	27	25	-7.41
	Total	218	149	-31.65

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

3.3.4. Banking Consolidation

The consolidation policy began in 1997 through bank closures and banks mergers. The consolidation continued with the introduction of the Indonesia banking architecture (API) on January 2004. Table 3.3-6 describes the consolidation policies following the 1998 crisis. API provided the direction for the development of the banking system for the next ten years. It aimed to create a strong, healthy and efficient banking structure. API consists of six pillars to create a healthy domestic banking industry: inventing an effective system for regulating the banking sector based on international standards, increasing the monitoring function of central banks based on international standards, creating a strong banking industry with highly competitive banks and fostering good corporate governance, developing the proper infrastructure to support the creation of a healthy banking system, and increasing consumers' empowerment and protection (Bank Indonesia 2008c).

Table 3.3-6 The banking consolidation policies in Indonesian banking 1997 – 2010

Time	Policies
November 1997	Closures of 16 insolvent banks.
April 1998	Closures of 7 banks
October 1998	The merger of four State Owned Banks became Bank Mandiri.
During 1998	Banking recapitalization by injecting government bonds to 30 banks. The banks under recapitalization were bailed out under the Indonesia Banking Restructuring Agency (IBRA).
2003	Privatization of the bailed-out banks under the Indonesia Banking Restructuring Agency (IBRA).
January 2004	The introduction of the Indonesia Banking Architecture (API).
2004 – 2010	Mergers and consolidation were conducted in the banking industry to comply with Single Presence Policy and Minimum Capital Requirement of 100 billion Rupiah by the end of 2010.

Source: Bin (2003); McLeod (1999); Fane & McLeod (2002)

The first pillar of API required banks to add to their capital base. According to the central bank publication on the Indonesian banking architecture, a bigger capital base enables banks to maintain their business and risks, develop information technology, and increase scale to support the expansion of credit capacity. After the introduction of API, banking market entry was tightened with a minimum capital of 3 trillion Rupiah (US\$335 million) compared to 50 billion Rupiah in 1992 for commercial banks and 100 billion for joint venture banks. Meanwhile, all existing banks, including the banks established by regional governments, were to attain a minimum capital of 100 billion Rupiah by 2010. The introduction of API will be discussed further in the next paragraph. Furthermore, a study by Rosengard and Prasetyantoko (2011) revealed that API imposed barriers to enter Indonesian banking. This restriction is particularly targeted at newly established banks, both local and foreign banks. The banks' licenses were only granted for the acquisition of local existing banks (Rosengard & Prasetyantoko 2011).

At least, two policies under the Indonesian Banking Architecture directly affected the market structure and competition in the banking industry. The first is the minimum capital

requirement as regulated under the Central Bank Regulation number 10/15/PBI/2005¹⁰. The second policy is the single presence policy as explained in the Central Bank Regulation number 8/16/PBI/2006¹¹. According to Central Bank Regulation number 10/15/PBI/2005, banks must increase their capital in alignment with their business scale (Bank Indonesia 2008c). Capital consists of paid-in capital and disclosed reserves. The regulation required all existing banks, including the banks established by regional governments to have minimum capital of 100 Rupiah billion by 31 December 2010 otherwise the Central Bank would impose several restrictions on the banks. In order to increase capital, banks were allowed to receive additional capital injections from existing owners, merge with other banks, be acquired by bigger banks, or sell their shares on the capital market (Bank Indonesia 2008c).

Referring to figure 3.3-2, in 2014, the Central Bank plans to reduce the number of banks to sixty, consisting of two or three international banks, three to five national banks, and thirty to fifty specialized banks (Bank Indonesia 2008c). The international banks should have capital of at least 50 trillion Rupiah. The central bank recommends the national banks have around 10 trillion Rupiah to 50 trillion Rupiah in capital. Further, the specialized banks should have capital of at least 100 million Rupiah. The balance sheet data of 108 banks in 2010 implies that none of Indonesian banks was able to form international banks with minimum capital of 50 trillion Rupiah. The biggest bank, Bank Mandiri, had a capitalization of about 42 trillion Rupiah in 2010. There were at least seven national banks which had equity between 12 trillion Rupiah and 42 trillion Rupiah. The remaining 101 banks were specialized banks because their capitalization stayed below 10 trillion Rupiah by 2010. The data also shows that all banks were able to meet the minimum capital requirements of 100 million Rupiah by 2010. However, the equity of some small banks was just slightly higher than the minimum capital requirement. There are at least twenty banks with equity of around 100 million Rupiah but still below 200 million Rupiah.

¹⁰*Minimum Capital Requirement Regulation of Bank of Indonesia Number 7/15/2005 (Indonesia).*

¹¹*Single Presence Policy Regulation of Bank Indonesia Number 8/16/PBI/2006 (Indonesia).*

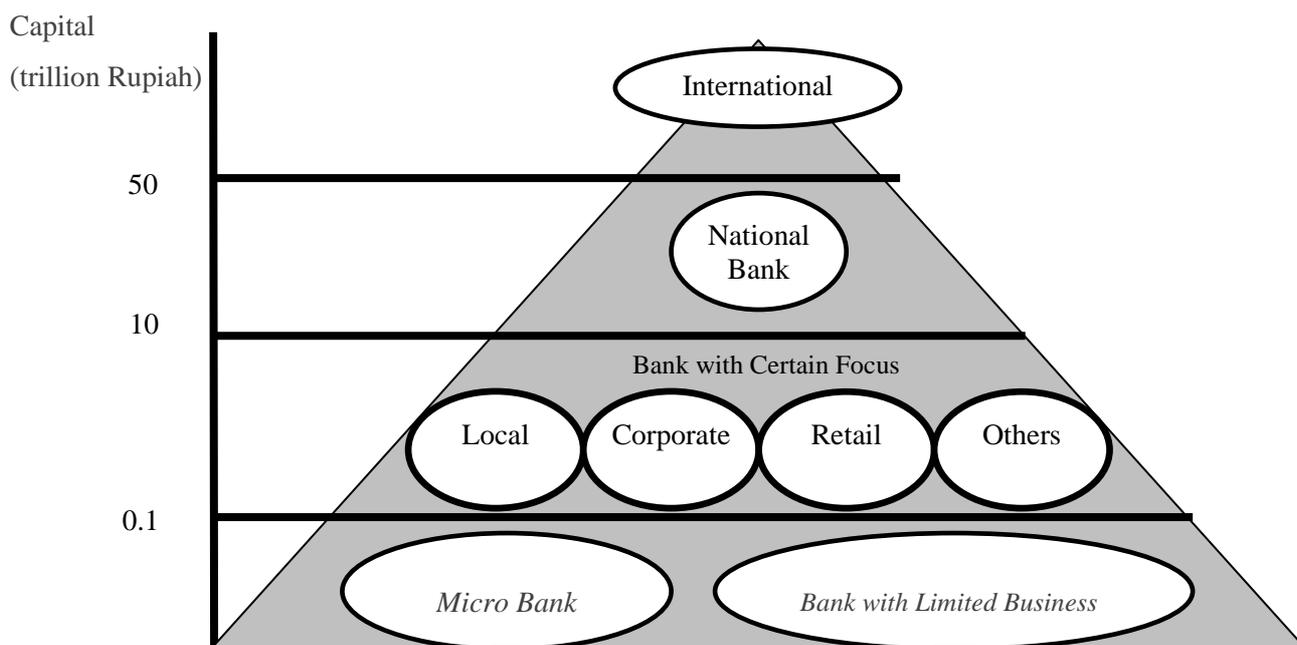


Figure 3.3-2 The vision of Indonesian Banking Architecture Policy for 2014

Source : Bank Indonesia (2008c)

The second policy under API that affects market structure and competition in the Indonesian banking industry is the single presence policy. It was introduced to rearrange the structure of bank ownership (the regulation of Bank of Indonesia, Number 8/16/PBI/2006)¹². Single ownership refers to the condition where one party is eligible to be a main shareholder in one bank. The regulation applies to shareholders who owned more than 25 per cent and those with ownership of less than 25 per cent but control a bank. According to the rule, there should be an adjustment of ownership structure by transferring the ownership (some or all) to one bank. Therefore, owners only become a main shareholder in one bank. In addition, banks under the same ownership are encouraged to merge or they can set up a Bank Holding Company. We argue that the policies under Indonesian Banking Architecture imposed more restrictions on the banking industry and reduced the number of banks. Thus, it may have an impact on the level of competition. Nevertheless, consolidation may have a positive effect on the stability of the industry. This issue will be separately analysed in Chapter six. The next section discusses the empirical model and findings about the impact of structural changes on banking competition.

¹²Ibid.

3.4. Empirical Model and Empirical Findings of the Impact of Structural Changes on Banking Competition

3.4.1. Empirical Model of the Impact of Structural Changes on Banking Competition

The structural changes refer to four significant changes which are the introduction of banking reforms, 1992 banking liberalization, the occurrence of the 1997 crisis and banking consolidation. In order to capture the impact of the structural changes on competition, this study tested the changes on input price coefficients. Referring to Gelos and Roldos (2002), the test of changes on input price coefficients can be implemented by adding interaction variables. The variables will capture structural changes in the banking industry. Further, the study divided the observation period into some sub-periods and “interacting the input price variables ($\log(w_1)$, $\log(w_2)$ and $\log(w_3)$) with a dummy variable that takes the value of one in the tested sub-period” (Gelos & Roldos 2002, p. 15). The interaction variables will show whether structural changes significantly altered bank behaviour. “If the interaction variables generate significant values, they indicate a structural break in the statistical relationship between revenues and input prices” (Gelos & Roldos 2002, p. 15). In addition, the value of interaction variables will determine the direction of changes on competition. If they are positive, we can conclude if the structural changes increase competition or not. Further, if the H-statistics are positive between 0 and 1 and the cumulative value of the interaction variables is positive, it implies stronger competition (Vesala 1995, p. 56)¹³.

As the purpose of the study was to assess the impact of structural changes on banking competition, the interaction dummies were employed to identify different periods of regulations. The first group of interaction dummies measure the impact of the 1988 deregulation on competition covering the period 1988 to 1991 as the deregulation period. The second group of interaction dummies measure the impact of banking liberalization (to represent the larger foreign penetration) on competition covering the period 1992 to 1996 as the liberalization period. The periods designated for banking deregulation and liberalization relate with the time when the initial effect was mostly felt. Thus, this means that the dummy does not preclude effects continuing on into the future. So for example banking reforms in the

¹³Bikker and Haaf (2002) and Vesala (1995) explain that the result of the interpretation of H-statistics between 0 and 1 is a continuous measure of the level of competition. Further, the higher value of H can be used as an indication of the stronger level of competition.

early 1990s may still have an effect on outcome today but more dominant will be the effects of regulation changes made after 1997 crisis.

The third group of interaction dummies shows the influence of 1997 crisis management on competition covering the period of 1997 to 2000 as the crisis period. Finally, the fourth group of interaction dummies covers the impact of banking consolidation in 2001 and covers the period 2001 to 2010. In order to examine the impact of structural changes on banking competition, the interaction dummies were estimated by using a Fixed-Effect (FE) panel data regression. The Fixed-Effect method is preferred to Random-Effect. Chapter 2 reports the result of the Hausman test for the third specification and it showed that the FE is more appropriate for estimating the competition in the banking industry. Below is the specification of the model that was used to estimate the impact of structural change on competition.

Third Specification – Unscaled Revenue Specification with Interaction Variables (1980-1987 as base period)

$$\ln TR_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + 1988D * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + 1992D * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + 1997D * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + 2001D * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + \sigma_i + \epsilon_{it}$$

3.4-1

Table 3.4-1 provides detailed information about the specification of dummies variables. It explains the definitions and proxies used to measure the dummy variables. The specifications of dependent and independent variables other than the dummy variables are available in table 2.4.1-1.

Table 3.4-1 Specification of Dummies Variables for Assessing the Impact of Structural Changes on Competition

Variable	Variable Specification
$1988D_{jit}$	is dummy of Deregulation in 1988 multiplied by input price j , bank i and t $1988D_{jit}=1$ if $t=1988; 1989; 1990; 1991$
$1992D_{jit}$	is dummy of Liberalization in 1992 multiplied by input price j , bank i and time t $1992D_{jit}=1$ if $t=1992; 1993; 1994; 1995; 1996$
$1997D_{jit}$	is dummy of Economic and Banking crisis in 1997 multiplied by input price j , bank i and time t $1997D_{jit}=1$ if $t=1997; 1998; 1999; 2000$
$2001D_{jit}$	is dummy of Consolidation in 2001 multiplied by input price j , bank i and time t $2001D_{jit}=1$ if $t=2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010$

3.4.2. Empirical Findings of the Impact of Structural Changes on Banking Competition

Fixed effect estimation confirmed that the banking deregulations in 1988 and banking liberalization in 1992 significantly enhanced competition. On the contrary, the crisis management in 1997 and banking consolidation in 2001 did not introduce a significant change to improve banking competition. Table 3.4-2 reveals the estimation of the impact of structural changes on banking competition between 1980 and 2010. Figure 3.4-1 provides the summary of values of the interaction variables of input prices and dummy for each structural break. The H-statistic for the base years, 1980 – 1987, is -0.01. The sum of the interaction variables of input prices and the dummy of deregulation for 1988 is 1.15. Its value is significantly larger than zero using the 99 per cent confidence level. It implies that deregulation policies between 1988 and 1991 improved competition in the banking industry. Regarding the liberalization policy in 1992, the interaction variables of input prices and the dummy of liberalization is also significantly different from zero. The sum of interaction variables of banking liberalization is 0.74 and it is significant at the 99 per cent confidence level.

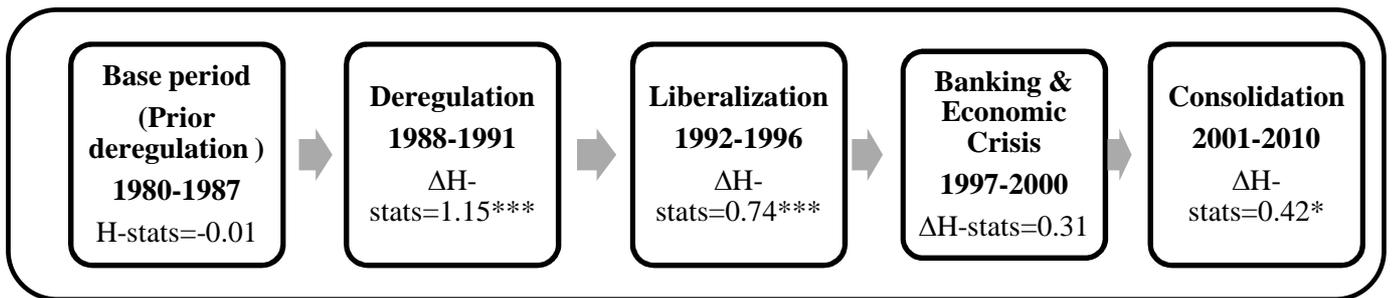


Figure 3.4-1 The Banking Competition (H-statistics) across Periods based on Estimation from table 3.4-2

*** Denotes significance at the 1 per cent level; ** Denotes significance at the 5 per cent level; * Denotes significance at the 10 per cent level.

The interaction variables capture the elasticity of revenue with respect to input prices within the banking and crisis period 1997 to 2000 at 0.31. It is not significantly different from zero thus crisis management in 1997 did not lead to a substantial improvement in banking competition compared to the base period, 1980 – 1987. For the period of banking consolidation in the 2000s, the sum of interaction variables of input prices and the dummy of consolidation is 0.42. The statistical test shows that the value is not significantly different from zero. This finding reveals that banking consolidation in the 2000s did not improve competition. The degree of competition during the consolidation period is not different compared to the degree of competition during the base period of 1980 – 1987.

**Table 3.4-2 The Impact of Structural Changes on Competition between 1980 and 2010
(Total Revenue as proxy of Bank Revenue with and without Time Effect Dummies)**

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a	
w_1	0.41 (0.13)	***
w_2	-0.62 (0.16)	***
w_3	0.19 (0.07)	***
OI	0.07 (0.05)	
EQ	-0.30 (0.1)	***
DEP	0.37 (0.20)	*
DDC	-0.23 (0.14)	*
1988 D_{it}	1.17 ^b (0.05)	***
1992 D_{it}	0.75 ^c (0.06)	***
1997 D_{it}	0.32 ^d (0.15)	
2001 D_{it}	0.43 ^e (0.13)	*
Number of observation	3,639	
R² within	0.73	
H-statistics for the base period (1980 -1987)	-0.01	
Standard deviation of the H-statistics for the base period (1980 -1987)	(0.01)	

*** Denotes significance at the 1 per cent level; ** Denotes significance at the 5 per cent level; * Denotes significance at the 10 per cent level. FE means Fixed Effect estimates. Figures in parentheses are t ratios. Clustered standard errors have been used to deal with general heteroskedasticity and cross-sectional correlation in the model error (Baum, 2006)

- a) Total revenue as dependent variable.
- b) The joint coefficients of interaction variables of deregulation 1988 are significantly different from zero (level of confidence 99%).
- c) The joint coefficients of interaction variables of liberalization 1992 are significantly different from zero (level of confidence 99%).
- d) The joint coefficients of interaction variables of banking and economic crisis 1997 are not significantly different from zero (level of confidence 99%).
- e) The joint coefficients of interaction variables of consolidation 2001 are not significantly different from zero (level of confidence 99%).

3.4.3. The Discussion of the Impact of Banking Deregulation and Liberalization on Competition

Banking reforms and liberalization created a contestable market by removing some restrictions which inhibited new entrants from entering the market. The opening of access to potential competitors created a discipline effect for existing banks to operate efficiently. Furthermore, the reform was also successful in eliminating market failure originating from government intervention in the market. The interest rates control, lending limit, and cheap loans through refinancing programs were lifted in order to provide the same level playing field for all players in the industry. The market distortion originating from the government intention to control the money supply was gradually removed. The empirical findings above show that banking deregulation in the 1980s and banking liberalization at the beginning of the 1990s were effective in enhancing competition in the Indonesian banking industry.

There were at least four main changes in the Indonesian banking landscape after the implementation of the deregulation and liberalization policies in the 1980s and 1990s. The first was related to chartering policy that removed barriers to enter the Indonesian banking industry both for domestic private and foreign banks. Second was the removal of restrictions for expanding business. Third was related to the approach used to implement monetary policies. Prior to deregulation, the government and the central bank used banks as instruments to manage the macro economy. In the earlier period, the authorities adopted direct intervention to manage the growth of the money supply using lending limits. In the later period, the authorities adopted an indirect approach to manage the money supply by requiring banks to place a high reserve in the central bank. During the deregulation and liberalization period, the lending limit was removed and the reserve requirement was lowered by 2 per cent in 1988, compared with 30 per cent in the 1970s. The fourth change was related to the removal of controls on the interest rates of time deposits (of state banks), the removal of directed lending and “cheap loans” or subsidised loans. This chapter discusses each of the policy changes and how it influenced competition in the banking industry.

This starts with the chartering policy of the removal of the barriers to enter the market and its implications on competition. Prior to deregulation, the authorities prohibited the establishment of new private banks, both local and foreign. As there were barriers to enter the industry, Indonesian banking prior to deregulation was dominated by the five state commercial banks. In terms of third party deposits, state-owned banks controlled 80 per cent of the industry on

average. In all types of deposits, state-owned banks had the highest market share compared to private banks. Figure 3.4-2 demonstrates the domination of state-owned banks in the Indonesian banking industry. The state-owned banks collected 88 per cent of demand deposits, 72 per cent of time deposits and 95 per cent of saving deposits. The domination of state banks was becoming very obvious considering the fact that during that period the number of private banks exceeded the number of state banks. It reveals another finding - that the capacity of private banks was much smaller than of state banks.

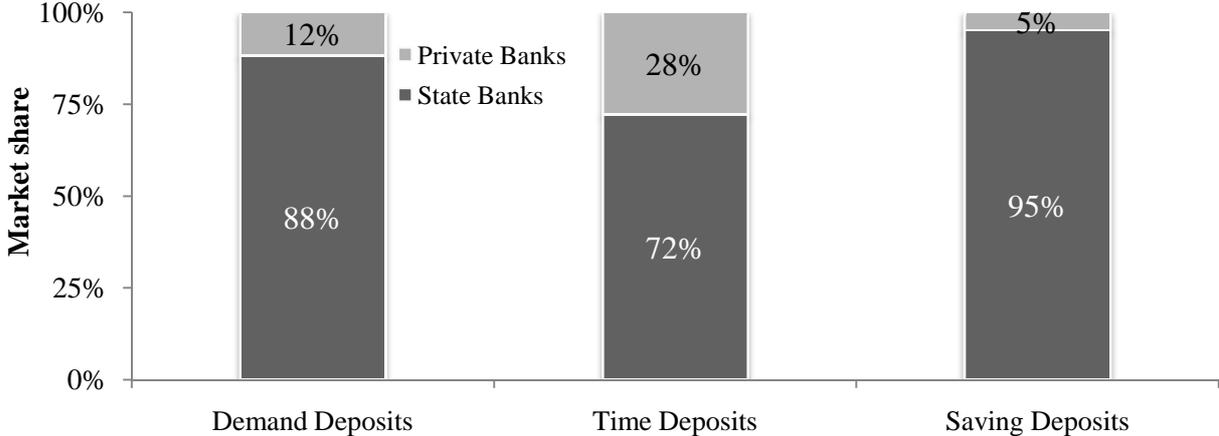


Figure 3.4-2 The Market share of state commercial banks and private banks prior to deregulation in 1981

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

Related to the license to open new banks, banking deregulation in 1988 lowered the capital requirement to a minimum capital of \$US 5M (Low 1997, p. 59). Following the opportunity to enter the industry, the number of banks increased by some ninety-four new private domestic banks plus thirty-two foreign joint ventures within the deregulation and liberalization periods (McLeod 1999, p. 275). Figure 3.4-3 shows that the number of banks increased by 36 per cent from 103 in 1981 to 140 banks in 1988. The number of banks reached a peak in 1993 with 240 banks.

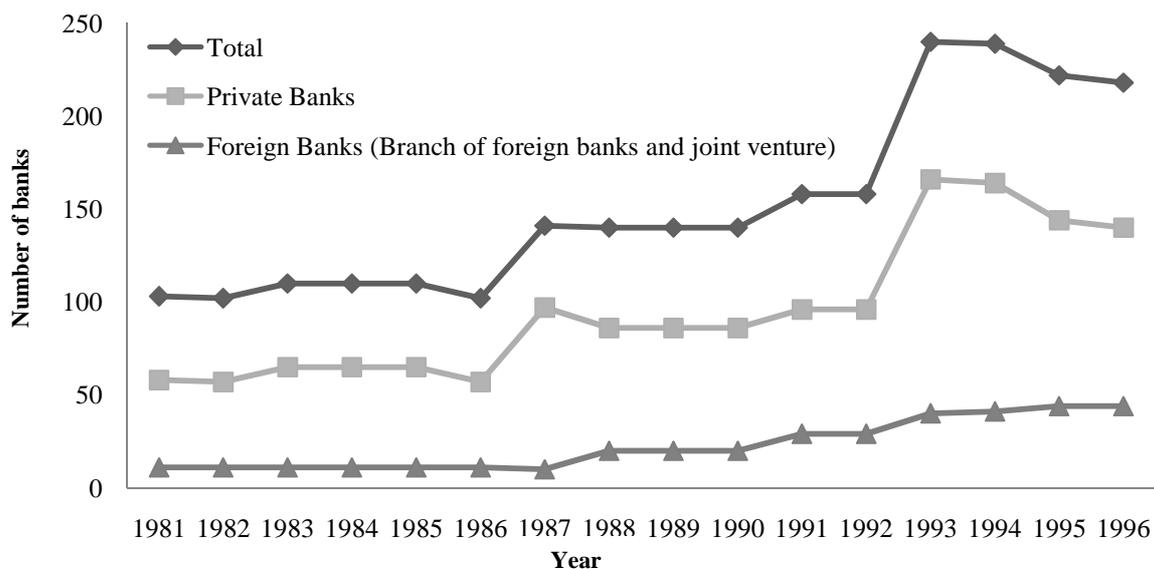


Figure 3.4-3 The Number of Commercial Banks in Indonesia between 1981 and 1996

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

During the deregulation and liberalization period, the state commercial banks were required to compete directly with their private counterparts without major support from the authorities as in the 1970's and early 1980's. The lack of support from government, poor management and intervention from the authorities created less efficient state commercial banks. Deregulation granted the opportunity for the private banks to expand their business. Further, the more competitive market created a favourable climate for the most efficient banks to lead the industry. A comparison of Figures 3.4-2 and 3.4-4, show that the domination of state commercial banks declined and replaced by their private counterparts. The share of state banks demand deposits fell from 88 per cent in 1981 to 30 per cent in 1996. The state banks were still quite strong in time deposits as their share remained constant at 56 per cent in the early part of the deregulation period. However, their share declined after the second banking reform by 36 per cent in 1996. In saving accounts, the share of state commercial banks also declined from 95 per cent in 1981 to 42 per cent in 1996.

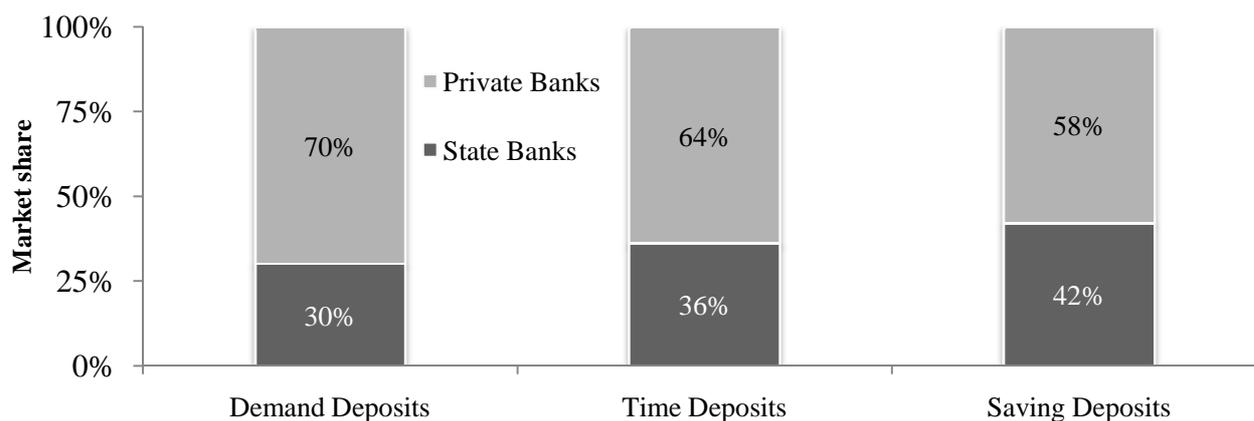


Figure 3.4-4 Market Share of State Owned Banks in 1996

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

The banking reforms also removed the restriction of branch expansion for the existing banks. Following the more market friendly policy, banks expanded their market through the opening of new branches. The branch expansion was noticeable from the flourishing of new branches of the private banks and state commercial banks. McLeod (1999) reported that there were 3,674 new branches of the private banks and 611 new branches of state banks established up to June 1997.

Following the removal of barriers to enter the market and the removal of limitations on branches expansion, the authorities seemed to realize that the lending limit and high reserve requirement generated massive costs for the banking industry. As discussed in section 3.3.1, restrictive policies prior to the deregulation of banks reduced incentives for banks to compete. Lending limits and high reserve requirements affected the banks' ability to set the outstanding loans at a level to maximize their profit. Under the high level of the minimum reserve requirement, banks were required to maintain a high portion of their deposits as an idle fund in the central bank. Banks held higher levels of liquidity than they desired. The lending limit policy also generated a similar impact where banks would hold higher liquidity (Grenville 1977). The policies slashed the banks' ability to provide loans. Therefore, banks were not able to pursue their interest to maximize profit. Moreover, banks could not play their role as an intermediary institution channelling funds to borrowers. Opening the industry for new entrants, opening of new branches, lowering reserve requirements and the removal of lending limits had contributed to the increase in the disbursement of loans. The data compiled from annual financial reports of Indonesian banks between 1980 and 1991 shows that credit

disbursement grew by 36 per cent in 1981-91 on average. The highest growth of 73 per cent was achieved in 1984. The second remarkable year of growth in lending disbursement occurred in 1991 where it grew by 50 per cent.

The fourth policy change within the deregulation and liberalization period was the removal of the control of interest rates for time deposits (for state banks), subsidized loans and directed lending. The interest rates ceiling reduced the attractiveness of the time deposits product. Further, it restrained the state banks in generating public funds. The rate of outstanding deposits of all types (time deposits, demand deposits and saving deposits) to the national GDP prior to deregulation was low. Within one decade from 1970 to 1980 banks held less than 10 per cent of the national GDP in their accounts (McLeod 1999). The removal of controls on interest assets stimulated banks to offer competitive rates and provide better services to attract investors. The state commercial banks increased their interest rates on time deposits and boosted the banks' outstanding balances of deposits. The removal of controls of interest rates of time deposits also converted banks' portfolios from demand deposits to time deposits. Referring to figure 3.4-5, the contribution of demand deposits was reduced substantially from 68 per cent in 1981 to 42 per cent in 1984. In contrast, the contribution of time deposits increased from 26 per cent prior to deregulation to 49 per cent in 1984.

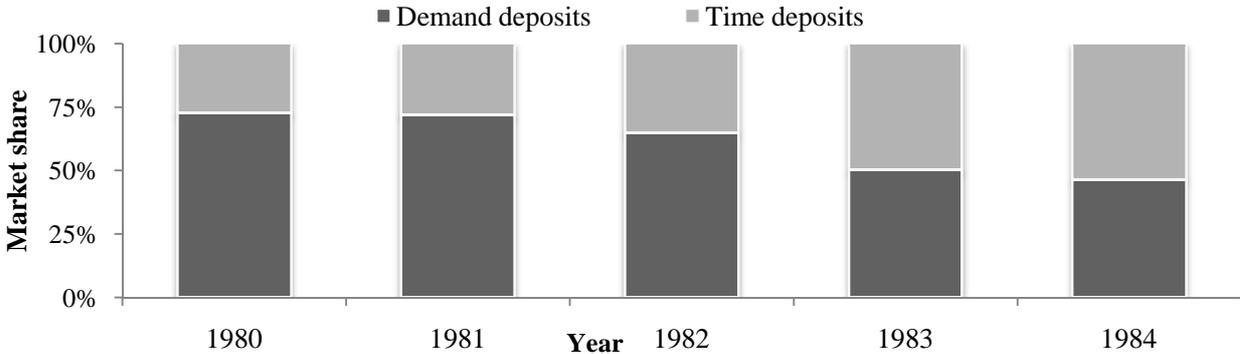


Figure 3.4-5 The composition of bank portfolios after deregulation

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

The removal of interest rate ceilings also contributes to an explanation of the growth of outstanding deposits. The growth mainly originated from the expansion of time deposits and saving accounts as shown in figure 3.4-6. The shift of the banks' portfolios from demand deposits to time deposits is also captured in the figure 3.4-6. After 1983, time deposits

replaced the domination of demand deposits and became the main source of banks liabilities. In total, deposits grew constantly in the 1980s and reached the highest growth rate in 1984 of 72 per cent. McLeod (1999) also found that after the first banking reforms in 1983, the outstanding balances of savings and time deposits grew continuously and reached 30 per cent of GDP by 1996 from 10 per cent during the 1980s (McLeod 1999).

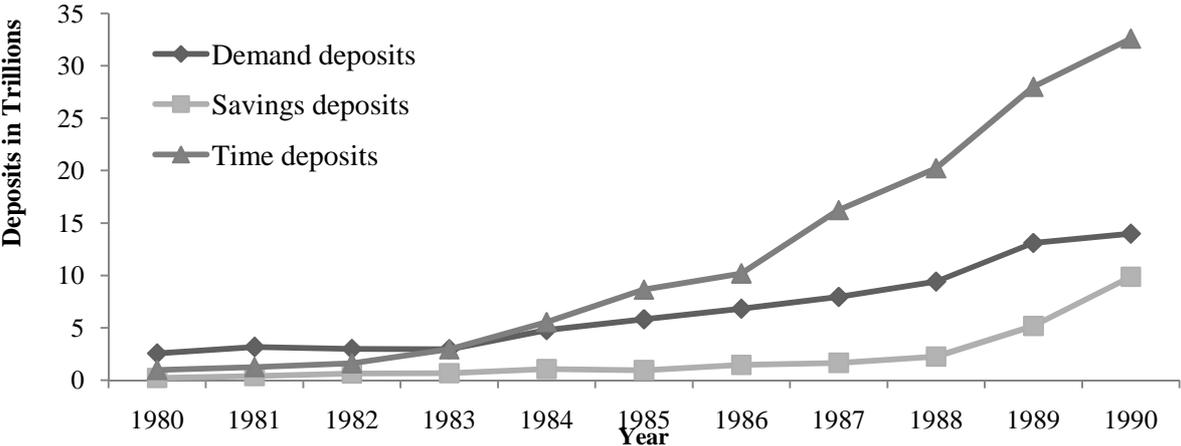


Figure 3.4-6 Impact of deregulation on demand deposits; time deposits and savings deposits (IDR trillion)

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

Regarding the fourth policy changes in the Indonesian banking industry, Arndt (1979) extensively discussed the impact of central bank refinancing through subsidized loans to the targeted sector or borrowers. The policies impeded the development of Indonesian commercial banks as dynamic financial intermediaries (p. 122). The refinancing policy acted as “hidden subsidies” for the state banks thus reducing the private banks’ capacity to compete. Further, the subsidies discouraged the state banks from improving their performance. In addition, McLeod (1999) argued that the subsidies might encourage banks to be corrupt because interest rates were below the market rates. As banks had authority to allocate cheap loans, they might face excess demand from those willing to pay more. Rather than improving their performance, banks preferred to generate and exploit income from the refinancing scheme. The removal of subsidized and directed loans through banking deregulation eliminated market failure which originated from government intervention in the market. Subsidy and directed loans have been lifted to provide a level playing field for every player in the industry.

3.4.4. The Discussion of the Impact of Banking/ Economic Crisis and Consolidation on Competition

The estimation of the impact of the crisis and consolidation by using an interaction dummy shows that the two structural changes slightly increased competition compared to the period of 1980 to 1987. However, they did not significantly improve banking competition. There are at least three reasons explaining the inability of consolidation to improve competition in the Indonesian banking industry. First is the reduction of the number of banks compared to the deregulation and liberalization period. In the 2000s the number of banks was about the same as for the period prior to deregulation in the 1980s. Secondly, compared to the early 1990s, Indonesian banking was challenged with a less favourable macro economics situation including high interest rates, high inflation rates, low economic growth and currency depreciation. Thirdly, during the consolidation period in the 2000s, the banking industry was more regulated as the Central Bank introduced new capital requirements and started to implement new risk management under Basel II. Figure 3.4-7 reveals the continual reduction in the number of banks between 1993 and 2010. The first reduction occurred in 1997 because of bank closures during the crisis. In addition, bank mergers that involved both state banks and private banks contributed to reducing the number of banks¹⁴. Furthermore, the barriers to entry, particularly for newly established banks in the 2000s, explain the lower number of banks during that period.

¹⁴ Some mergers were initiated by the central bank and government to improve the performance of banks affected by crisis.

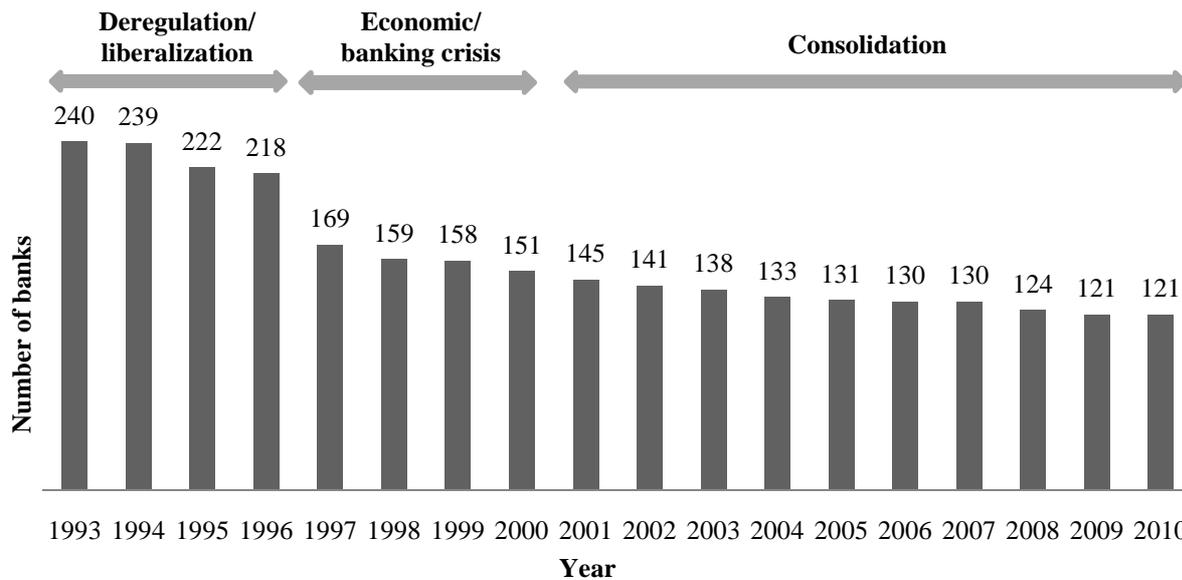


Figure 3.4-7 The number of bank, comparison between deregulation/ liberalization and consolidation period

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia

The number of bank continually fell during the 2000s even though the number of exiting banks at the beginning of the period was smaller compared to the crisis period. Some mergers and acquisitions were conducted in order to comply either with the single presence policy or the new capital requirement under the Indonesian Banking Architecture. Before the 1997 crisis, the number of banks was 218 in 1996. At the end of our observation year in 2010, the number of banks was just half compared to 1996 with 121 banks left. Table 3.4-3 provides a summary of mergers and acquisitions (M&A) in the Indonesian banking industry during the consolidation period of 2000-2010. There was one merger between two large banks to comply with the single presence policy as they have the same ultimate shareholder. There were seven mergers and acquisitions among medium-sized banks and seven within small banks to comply with the current requirement of the minimum capital.

Table 3.4-3 The list of mergers and acquisition between 2000 and 2010

Bank Category	Merging Banks	Year	Name of New Bank
Large banks	PT Bank Niaga; PT Bank Lippo	2008	PT Bank CIMB NiagaTbk
Medium-Sized Banks	Bank Dai-Ichi Kanggo; Bank IBJ Indonesia	2000	PT Bank Mizuho Indonesia
	Bank Bali; Bank Artha Media; Bank Universal; Bank Prima Express; Bank Patriot	2001	PT Bank PermataTbk
	PT Bank Sumitomo Mitsuo Indonesia; Sakura Swadarma Bank	2001	Bank Sumitomo Mitsuo Indonesia
	UFJ Indonesia Bank; Tokai Lippo Bank	2001	UFJ Indonesia Bank
	UFJ Indonesia; PT Bank of Tokyo Mitsubishi	2006	PT Bank of Tokyo Mitsubishi UFJ Ltd.
	Bank Hagakita; Bank Haga; Bank Rabobank Duta	2008	PT Bank Rabobank International Indonesia Bank
	Bank Buana; Bank UOB Indonesia	2010	PT Bank UOB BuanaTbk
	Small Banks	Bank Pikko; Bank CIC	2001 2001
Bank Danpac		2004	
Bank ArthaGraha; Bank Inter-pacific Tbk.		2005	PT Bank ArthaGraha International Tbk
Commonwealth Indonesia; ArthaNiagaKencana		2007	PT Bank Commonwealth
Bank Multicor; Bank WinduKentjana		2007	PT Bank WinduKentjana International Tbk.
Bank Harmoni International; Bank Index Selindo		2008	PT Bank Index Selindo
Bank Haga; Bank Hagakita		2008	Rabobank Duta Bank
Bank OCBC; Bank NISP		2009	PT Bank OCBC-NISP Tbk

Source: Bank annual financial reports collected by the Bank of Indonesia

Another interesting feature during the consolidation period was that as the existing banks were either being closed, merged or acquired by other banks, we also observe that almost no new entrant came to the industry in the 2000s. The study by Rosengard and Prasetyantoko (2011) reveals that after the implementation of API, the Indonesian banking industry was restricted for the establishment of new banks. Bank licenses were only granted for the acquisition of existing banks. Therefore, during the consolidation in the 2000s, foreign penetration shifted from the establishment of joint venture banks to the acquisition of local

existing banks. The annual financial report of banks in the 2000s confirmed the findings of Rosengard and Prasetyantoko (2011). Some small banks, with limited capacity to meet the new capital requirements, invited foreign investors to inject equity into the banks. There were at least six small banks acquired by foreign investors in order to increase equity. Foreign penetration was also observed among the large banks, particularly the banks which were under the recapitalisation program. Starting in 2003, there was a divestment program to sell government shares in the recapitalization banks¹⁵. Therefore, even though foreign penetration was intense in the 2000s, they did not add to the number of bank as they bought into established banks. Refer to table 3.4-4 for a detailed list of foreign purchases among small banks in the 2000s.

Table 3.4-4 Foreign Penetration within Small Banks in the 2000s

No	Bank	Assets in 2009 (in millions)	The position of Banks Capital/ Equity	Foreign penetration
1	Bank Bintang Manunggal/ Bank Hana	1,843,562	in 2006 the equity was 33 billion and increased to 153 trillion in 2007	in 2006 foreign penetration started by the entering of Hana Bank Korea with 70.1 per cent
2	Bank Executive International/ Bank Pundi Indonesia	1,425,576	in 2009 the equity was minus 47 billion and increased to 310 billion in 2010	in 2010 the IF Services Netherlands BV purchased 24 per cent of shares.
3	Bank Indomonex/ Bank SBI Indonesia	1,142,551	in 2006 the equity was 25 billion and increased to 156 trillion in 2007	in 2006 the State Bank of India invested by purchasing 76 per cent of bank shares.
4	Bank Akita/ Bank Barclays Indonesia	841,062	in 2008 the equity was minus 105 billion and increased to 286 billion in 2009	in 2009 Barclays Bank PLC owned the bank with 99 per cent. The change in ownership led to a change in the name of bank to Bank Barclays Indonesia.
5	Bank Aglomas/ Bank Aglomas International	260,074	in 2009 the equity was 84 billion and increased to 104 billion in 2009	in 2007 the foreign penetration started by the investment of Wishart Investments Inc. It purchased 90 per cent of the shares.
6	Bank Sri Partha/ Bank Andara	217,228	in 2006 the equity was 25 billion and increased to 105 billion in 2008	In 2007 the Mercy Corp purchased 40.16 per cent of shares. Further, the International Finance Corp. purchased 19.9 per cent.

Source: Bank annual financial reports collected by the Bank of Indonesia

¹⁵ Referring to the ownership data for Indonesian banks in 2009, there were at least seven banks under the recapitalization program owned by foreign investors. The share of foreign investors in those seven banks was close to 50 per cent or higher for Bank CIMB Niaga, Bank Danamon, Bank International Indonesia, and Bank Tabungan Pensiunan Indonesia.

Finally, the banking environment during the consolidation period was perceived as more regulated as the Central Bank introduced new capital requirements (Indonesian Banking Architecture) and started to implement new risk management under Basel II. The implementation of Basel II encouraged banks to be more cautious in their intermediary activities. The Central Bank of Indonesia started to introduce the Basel II in 2007. In 2010, banks were required to meet the first, second and third pillar of Basel II. Under Basel II, banks must have at least 8 per cent of risk assets ratio (the ratio of capital to weighted risk assets). In addition to Basel I and its amendment in 1996, the first pillar of Basel II required banks to consider the operational risk when banks estimate the level of capital (Heffernan 2005). Furthermore, the second and third pillars of Basel II obliged banks to develop their internal method to assess capital and to disclose their method for computing capital adequacy, their assessment of risks and techniques for risk mitigation. Those additional regulations added risk management burdens to banks. Furthermore the introduction of Basel II may reduce the banks' lending activities to meet the new risk management rules.

3.5. Conclusion

State interventions through the introduction of macroeconomic, monetary and banking policies and regulations affected market structure, bank conduct and banking performance. Barriers to entry restricted the new entrants and preserved the less efficient banks with substantial control. The disproportionate monetary policies through lending limits and high level of reserve requirements imposed costs on the banking industry by reducing the banks' capacities to provide loans. Price control of time deposits of state banks restrained collection of deposits by the industry. Directed loans to the favourable sectors through qualitative control and the subsidized loans created market failure and failed to enhanced development.

The banking reforms which began in 1983 created a contestable market by removing barriers to entry both for local private banks and foreign banks. The removal of price controls as well as the change in the monetary framework from direct intervention in the money supply to indirect intervention created a more competitive industry. These reforms provided the same level playing field for private banks, state-owned banks and foreign banks. Deregulation enabled the more efficient banks to gain substantial market share. Banking reforms also improved access to banking services. Both the values of deposits and loans disbursements increased compared to prior deregulation. However, a highly competitive market increased

the incentives to take more risky investments as margins narrowed. Further, the reduction of constraints on management was not followed by improvement of corporate governance. It created an agency problem in Indonesian banking. The management and shareholders pursued their own interest and there were incentives to violate the legal lending limit by breaching the level of intra-group loans and investment in higher risk portfolios.

The discussion in this chapter has pointed out that not only issues within the banking industry but also the external environment are important to bank performance. A less conducive macroeconomic environment and unpredictable macroeconomic policies also put pressure on the banking industry. Imprudent lending, intra-group lending and the less favourable macroeconomic situation increased the level of bad loans. The crisis management in 1997 contributed to the reduction in the number of banks through bank closures and mergers.

After the banking crisis, the banking industry was consolidated. The authorities preferred to create a banking industry with a smaller numbers of banks and bigger capital that enabled banks to maintain business and spread risks. During the consolidation period, entry was tightened and further prohibited, and banks were required to meet new levels of minimum capital requirement. This may be counter-productive to the objective to create contestable market. In addition, banks which have the same ultimate shareholders were required to merge, create a holding company or sell the shares of one bank to other investors. During the consolidation period, the Central Bank also started the implementation of Basel II new risk management. Briefly, during the consolidation period the banking environment was more regulated. As a result, consolidation reduced the number of banks as some mergers occurred in the industry. Further, increasing capital enhanced bank equity and increased bank profits.

During the consolidation period in the 2000s there were changing modes of entry of foreign banks. In the previous periods of the 1990s, foreign banks penetrated through the establishment of joint venture banks with the local partner. In the 2000s, foreign banks entered the Indonesian banking industry by acquired the local existing banks. Consolidation facilitated the foreign banks acquisitions into local existing banks through two channels. First was the divestment program of recapitalised banks. The second channel was the API policy on a new minimum capital requirement. In order to comply with the higher capital requirement, banks (particularly the small ones) invited the foreign investors and foreign banks to invest in them. In addition, this chapter presents evidence of the increased share

foreign investors have in joint venture banks. Thus, the increase of foreign penetration during consolidation was not associated with an increase in the number of banks.

The evidence from this chapter suggests that the role of the state is substantial in creating a contestable market that further enhances competition in the banking industry. Policies should be directed to remove barriers to enter the market, restrictions on business expansion and controls on lending and interest rates. The removal of barriers to entry is proven to enhance competition. Opening access to potential competitors disciplines the existing banks to operate competitively. Regulations in the banking industry have to be designed to promote competition without hampering bank soundness and stability. The latest report of the World Bank for 2013 Global Financial Development clearly emphasizes the importance of regulatory frameworks that enhance competition by creating contestable markets as well as protecting the depositors and maintaining stability. Furthermore, the policies should be directed to encourage law enforcement and establish crisis management that prevents the insolvent banks from surviving. The latter policy is important to prevent unhealthy competition and distortion on risk-taking incentives (World Bank 2013). Chapter six extends the discussion of policy framework design by considering the trade-off between competition and stability.

Based on some findings in Chapter two and Chapter three, the next chapter continues the discussion of banking competition by examining different groups in the Indonesian banking industry. The study examines whether the banks of different sizes and with different ownership behave differently. Particularly, Chapter four examines the degree of competition of large banks, medium-sized banks and small banks. Moreover, Chapter four compares the degree of competition between local and foreign banks, and the degree of competition between private and government banks.

Chapter Four

Is there Any Difference in the Degree of Competition across Groups?

Study in Banking Competition Concerning Banks of Different Size and Ownership

4.1 Introduction

The previous chapter discussed market competition in Indonesian banking over the last thirty-one years. The chapter shows that between 1980 and 2010, Indonesian banking was a monopolistically competitive market as indicated by the H-statistic of 0.67. Following Bikker, Shaffer and Spierdijk (2011), the estimation of competition using the Panzar-Rosse method should recognize the coexistence of different sizes of banks to manage the problem of long-run disequilibrium and locally constant average costs. It is important to manage market disequilibrium and the existence of constant average costs because both issues undermine the reliability of the Panzar-Rosse method (Bikker, Shaffer & Spierdijk 2011). Furthermore, some studies suggest that the behaviour of large and small banks is different (Berger, Kashyap & Scalise 1995; Berger & Udell 1995; Cole, Goldberg & White 1999; Cole, Goldberg & White 2004; Keeton 1995; Levonian & Soller 1996; Nakamura 1993; Stein 2002; Strahan & Weston 1996). In addition to the size differences, the literature suggests that banks with different types of ownership may have different competitive behaviours (McLeod 1999; Mian 2003). A study by McLeod (1999) of Indonesian banking revealed that government-owned banks behaved differently compared to private banks. The recognition of the different behaviours that depend on banks size and ownership is important because banks supply heterogeneous services and products. Banks offer different products and services because their markets are segmented based on customers' preferences and geographical differences (Alhadeff 1967).

This chapter examines the competitive behaviour of banks of different size and with different types of ownership. Particularly, this chapter explores banking competition by comparing the market structure of large banks, medium-sized banks, and small banks. Regarding bank ownership, this chapter compares the market structure of government banks and private banks. In addition, it compares the market structure of local banks and foreign banks. By estimating the level of competition across different groups of banks, this chapter assists us in understanding competition in the Indonesian banking industry.

This chapter focuses on three research questions:

1. Was there any difference in the level of competition among groups of large banks, medium-sized banks and small banks in Indonesian banking between 1980 and 2010?
2. Was there any difference in the level of competition among groups of government banks and private banks in Indonesian banking between 1980 and 2010?
3. Was there any difference in the level of competition among groups of foreign banks and local banks in Indonesian banking between 1980 and 2010?

4.2 Literature Review

Some studies highlight that the market of large and small banks are segmented. Nakamura (1993), Keeton (1995), Berger and Udell (1995), Berger, Kashyap and Scalise (1995), Levonian and Soller (1996), Peek and Rosengren (1996), Strahan and Weston (1996), and Cole, Goldberg and White (2004) suggest that small banks lend proportionally more to small enterprises. On the contrary, large banks prefer to extend loans to large borrowers rather than to small borrowers (Berger & Udell 2002). Cole, Goldberg and White (1999) retested that finding by conducting a study of small business loans in the U.S for the year 1992. Their study identified that the lending characteristics of large banks and small banks are different. Large banks adopt a “cookie-cutter” approach to extend loans. On the contrary, small banks employ a “character” approach in dealing with loans applications. The study found that large banks with \$1 billion assets or more employ standard criteria from the financial statements to assess loans applications. Alternatively, the smaller banks adopt a character approach by relying to a larger extent on information about the character of the borrowers rather than purely based on company financial reports. The findings of Berger, Klapper and Udell (2001) on Argentinean banking were in line with the study of Cole, Goldberg and White (1999), Stein (2002) and Berger and Udell (2002); that there was a difference in the characteristics of banks of different sizes when extending loans. Large and foreign-owned banks might have difficulty extending loans to opaque small firms. In addition, small firms preferred to borrow from small and single lenders than multi-market and large lenders. Through this relationship, small firms can have more exclusive lending arrangements.

Stein (2002) also suggested that banks of different size may have different behaviours. Size determines the nature of the organisational structure of firms. On the one hand, small banks tend to have a decentralized approach with small, single manager firms. On the other hand, large banks have longer hierarchical management. The different organisational structures influence the bank ability to serve their customers. On the one hand, large banks may prefer to lend to borrowers who can provide the “hard” information on financial performance. Hard information refers to any formal documents containing information on a firm’s management and performance. By using hard information in assessing loans applications, large banks can be assured that the whole lending process is standardized and can be controlled by top management. On the other hand, the article indicates that smaller banks have a greater capacity to extend loans to firms with “soft” information that cannot be credibly transmitted. This notion is also shared by Berger and Udell (2002). The study found that large banks also tend to lend to firms with greater geographical distance, interact more impersonally with the borrowers and have shorter and less exclusive relationships. Unlike the large banks, small banks have a greater capacity to extend loans to small borrowers who find it difficult to produce “hard information” on financial performance.

The above studies imply that bank size has an influence on bank lending behaviour. Some studies cited the theory of hierarchical control developed by Williamson (1967) in explaining the segmented market between large and small banks. According to Williamson (1967), large and small institutions have different organisational structures. As the size of an organisation increases, top management loses control of successive hierarchies (Cole, Goldberg & White 1999, p. 4). Further, in larger organisations the distortions are higher because the orders and directions are transmitted into lower hierarchies. In order to reduce distortions, larger banks set up explicit rules, for example, about extending loans. Thus, larger banks tend to rely on hard information to assess loans applications to ensure that top management maintains control of the whole organisations. On the contrary, managers of small banks have more discretion in the lending process because they are less hierarchical. Top management can more easily monitor the performance of the loans officer than in larger organisation. As loans officers have more flexibility in extending loans, small banks have a comparative advantage to focus on small borrowers who may not be able to provide hard information on firm performance.

In addition to the different organisational structure, banks of different sizes are different in terms of their efficiency level and the nature of risk taking. The size of banks may also have a

correlation with the level of efficiency. Larger organisations may be able to exploit economies of scale to improve their efficiency through a reduction in costs or increase of revenue. A study by Berger, Rosen and Udell (2007) of U.S. banking capturing consolidation period shows that technological progress allows larger banks to be more efficient compared to smaller banks. Other studies highlight the fact that smaller banks in the U.S. behave more aggressively than larger banks. Bassett and Brady (2002) found that smaller banks gave higher interest rates on deposits than larger banks during the consolidation period. The smaller banks faced a challenge as consolidation encourages banks to get bigger. In order to be competitive, small banks became more aggressive. During 1991-93, small banks in the U.S. raised the average rate paid on interest-bearing deposits by about a full percentage point relative to rates at large banks in order to attract progressively more deposit funding (Bassett & Brady 2002, p. 30).

This chapter also considers the impact of ownership on bank behaviour. A study by Micco, Panizza and Yanez (2004) suggests that banks perform differently depending on ownership, particularly in developing countries. State-owned banks located in developing countries tend to be characterized by lower profitability, higher overhead costs, and higher Non-Performing-Loans (NPL) than their local counterparts, whereas foreign-owned banks had higher profitability and lower overhead costs in developing countries. In addition, a study by Mian (2003) provided an extensive comparison between banks with different ownership. On the basis of a study of 1,600 banks in developing countries, foreign banks were found to be more conservative than their local counterparts. This conclusion was derived from the findings that foreign banks hold larger capitalization and local private banks offered higher interest rates on deposits as well as loans. Further, foreign and local banks have a different focus on increasing their income. Interest income, rather than non-interest based activities, was the main source of income of local banks compared to foreign banks. Although government banks had a riskier loan portfolio in terms of loan losses, government banks still enjoyed low cost of deposits, probably reflecting the implicit or explicit support of the government.

A study by Mian (2003) offers a breakthrough in understanding the source of different behaviours and performances of banks with different ownership. The first source is the different control of the cash-flow and overall rights of banks. Control of rights and the cash-flow of foreign banks are in the hand of foreign shareholders rather than domestic shareholders. Secondly, foreign banks have a longer hierarchical organisational design than

their private local counterparts. Therefore, foreign-owned banks may focus on larger borrowers which have hard information compared with smaller borrowers. Third, the incentive to maximise profit is higher for foreign and private domestic banks than for government banks. Finally, the private banks have a comparative advantage in utilizing “soft information”. It implies that local private banks may have a different segment to foreign-owned banks and government banks.

There are few studies that have considered the competition level across groups of banks of different size and ownership in Indonesia or in other countries. Among them, there are De Bandt and Davis (2000), Bikker and Haaf (2002) and Sun (2011) covering competition levels across banks with different size and ownership in European banking and some other developed countries. De Bandt and Davis (2000) measured the level of competition across groups of large banks, medium-sized banks and small banks during the period of 1992 to 1996. The study focused on European countries, for example Germany, France and Italy. In addition, it extended the study to the U.S. banking industry for comparison with the European countries. The study classified banks into two groups based on the value of assets. The cut-off point to distinguish between small and large banks was US\$3 billion (Ecu 2.5 billions). Competition was estimated by employing the Panzar-Rosse method with a scaled-revenue specification where the dependent variable was either the interest revenue or total revenue and equity was used as a scale variable on the right-hand side of the equation.

Large banks in developed countries are perceived to have a more competitive environment compared to the smaller banks. De Bandt and Davis (2000) suggested that in some countries, for example Germany and France, large banks were working under monopolistically competitive market while smaller banks were acting as a monopoly. Regarding Italy, there was no difference in the level of competition across groups. They found that both small and large groups were working under a monopoly market. As a comparison, the study found that U.S. banking was more competitive with a higher H-statistic. Both the larger banks and small bank groups in U.S. banking were working under monopolistic competition where large banks have a slightly larger H-statistic. The study argued that the smaller banks had a lower level of competition because they were operating mainly in a local market therefore they may have enjoyed some degree of market power. Extending the coverage of their study, Bikker and Haaf (2002) estimated competition in twenty-three developed countries, mainly located in Europe, between 1988 and 1998. Their findings strengthened the findings of De Bandt and

Davis (2000). Bikker and Haaf (2002) argued that competition was stronger among large banks because they operated predominantly in international markets. The competition was weaker among small banks because they were predominantly operating in local markets (Bikker & Haaf 2002, p. 2211). Bikker and Haaf (2002) and De Bandt and Davis (2000) came to a similar conclusion even though they employed different datasets, had a different basis for grouping the banks, and a different specification for the Panzar-Rosse. Unlike De Bandt and Davis (2000) who used a particular value of banks assets as a basis of categorization, Bikker and Haaf (2002) grouped the smallest 50 per cent of all banks in the world-wide sample as the small-banks sample, the largest 10 per cent of all banks as the large banks sample, and the remainder as the medium-sized sample (p. 2198). Competition was estimated by employing the Panzar-Rosse method with the price specification where the dependent variable was the ratio of total revenue to the total balance sheet.

The recent observation of European banking by Sun (2011) revealed that after the introduction of the European Single Market (EMU) in the 2000s, small banks worked in a more competitive market compared to large banks in most countries except in France and Spain. Furthermore, in the U.S. and the U.K., smaller banks were working in a more competitive environment in two observation periods; prior to the introduction of EMU in 1995 – 2000 and post EMU in 2001 - 2007. Regarding the difference in the level of competition across groups with different ownerships, Sun (2011) showed that before EMU, the foreign banks competed harder than the local banks. However, the differences between foreign and local markets were smaller and they were not significant after the implementation of EMU. This finding holds in most euro countries, the U.K. market and the U.S. market. Focusing on the same region, Sun (2011) examined banking competition in seven euro area countries plus the U.K. and the U.S as the benchmarks. In terms of method, Sun (2011) employed a similar scaled-revenue specification as De Bandt and Davis (2000). Sun (2011) argued that “the un-scaled revenue specification did not change the results qualitatively but the significance levels were low”(p. 11). In addition, Sun (2011) preferred employment of the scaled-revenue specification to facilitate comparison with previous studies which mainly employed the scaled-revenue specification. Regarding groupings of banks based on size, large banks were those in the top 50 per cent and small banks were those in the bottom 50 per cent. Regarding bank groupings based on ownership, foreign banks were defined as those that had over 51 per cent of foreign ownership.

In the case of Indonesia, there may also be different behaviours of banks across different ownership. The literature suggests that regulation treats banks differently based on their ownership. Indonesia posed more restrictions on foreign banks compared to local banks, particularly before 1998. Foreign banks consisted of joint venture banks and branches of foreign banks. Joint venture banks are created through a partnership between the local banks and foreign banks. The restrictions for the foreign banks are in term of the higher capital requirements and eligibility to open a branch. In regard to the minimum capital requirement, foreign banks had to have higher capital than local banks. Local banks had to provide 50 billion Rupiah while the joint ventures banks had to provide twice that -at least 100 billion Rupiah. Later in 1998 the regulator changed the policy and required the same amount of capital (3 trillion Rupiah) to enter the industry both for local banks and joint ventures banks. Regarding the restriction for opening branches, Hadad et al. (2004) revealed that branches of foreign banks are only allowed to open branches in the capital city of each province while other types of banks do not have a limitation on opening branches. This limitation is not applied to joint ventures bank.

The behaviour of government banks may also differ from their private counterparts. There are two types of government banks, state-owned banks and regional banks. The Indonesian government is the major shareholder of the state-owned banks and regional banks are owned by the local or provincial government. According to Panglaykim (1968), during the 1960s, the state banks were restricted to serve a particular sector of the economy. This restriction still existed up to the 1990s. Bank Rakyat Indonesia focused on the agricultural sector and Bank Dagang Negara served the mining industry particularly. In addition, McLeod (1999) argues that government banks worked to serve the government as their major shareholders (p. 260). Furthermore, the same study by McLeod (1999) argues that state owned banks were less competitive because they had a captive market for both loans and deposits amongst the state enterprises. The controls and intervention of government (or government officials), particularly prior banking reforms in 1988, also contributed to uncompetitive behaviour of state-commercial banks. A similar situation also occurred for the regional banks. Those banks mostly serve local and provincial governments because they are the major shareholders. Finally, regulation number 13 in 1962 concerning regional banks highlighted the role of regional banks as regional development agents. They should focus on funding activities for regional development projects.

The literature provides a substantial theoretical background particularly based on the empirical studies that suggest competitive behaviour of banks with different sizes and ownerships are different. Regarding banks across different sizes, the organisation hierarchical theory of Williamson (1967) suggests that large banks have a longer hierarchy in their organisation compared to small banks. This leads to different lending behaviours where large banks focus on large borrowers who can provide “hard” information and small banks are more capable of managing the soft information of small borrowers. In addition to organisational structure, the different behaviour of banks across different sizes is influenced by the efficiency level and the nature of risk taking (Bassett & Brady 2002; Berger, Rosen & Udell 2007). Some empirical studies also suggest different behaviours of banks with different ownerships. The study by Mian (2003) provides a thorough analysis of the source of different behaviour of local banks, foreign banks, private banks and government banks. The sources of different behaviours are a difference of control of the cash-flow and overall rights, a different hierarchical organisational design, and a comparative advantage of private banks in utilizing “soft information”.

4.3 Comparison of the Degree of Competition between Groups of Banks with Different Size

This study employed two approaches to categorize banks into some groups based on size in order to provide robust estimation of the banks behaviour across different sizes. If the nature of competition across groups is different, the two approaches should deliver similar findings. The first approach categorizes banks based on the average value of bank assets between 1980 and 2010. This study refers to the work of Bikker and Haaf (2002) when dividing industry into three markets, which are the large banks market, medium-sized banks market and small banks market. The second approach categorizes banks by using employee data. Based on the employee data, this study used a natural break method to divide the banking industry into two groups. The sections below provide an extensive description of the empirical methods and results of the comparison of the degree of competition between groups of banks of different sizes.

4.3.1. Empirical Method on Competitive Environment Test of Groups of Banks with Different Size using First Approach of Average Value of Assets between 1980 and 2010

This section discusses the empirical method to measure the degree of competition across groups by using the average value of banks assets between 1980 and 2010 as a basis for bank categorization. This section consists of two parts. The first part discusses the method to split the banks into three groups based on the average value of assets. The second part describes the empirical model to measure the degree of competition across groups and examine whether one groups is more competitive than others. Referring to Bikker and Haaf (2002), large banks are associated with the biggest 10 per cent of banks in the market and small banks are those in the lowest 50 per cent of the market. The remaining 40 per cent of banks belong to the medium-sized banks. Table 4.3-1 provides information on the number of banks in each category based on the average value of total assets between 1980 and 2010. Among 286 banks, there are twenty-nine large banks, 114 medium-sized banks and 143 small banks.

Table 4.3-1 Three Categories of Banks based on the Average value of Assets between 1980 and 2010

Year	Observation (number of bank)	Sub-group		
		Large Banks	Medium-Sized banks	Small banks
1980-2010	286	29 (10%)	114 (40%)	143 (50%)

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

The descriptive statistics of large, medium-sized and small banks show mean values and the standard deviation for each group. The large banks group consists of twenty-nine banks with the mean value of 252,048 million Rupiah and standard deviation of 352,906 million Rupiah. The medium-sized group consists of 114 banks with the mean value 18,702 million Rupiah and standard deviation of 22,824 million Rupiah. The small group consists of 143 banks with the mean value 4,422 million rupiah and standard deviation of 5,410 million Rupiah. The mean values of assets between groups vary significantly confirming that the grouping is appropriate for capturing the difference in sizes of banks. Table 4.3-2 provides information on descriptive statistics of the average value of assets between 1980 and 2010 for the three sub-groups.

Table 4.3-2 Descriptive Statistics of the Average Value of Assets of Large; Medium-Sized and Small Banks between 1980 and 2010

Sub Group	Number of banks	Range of the value of average of Assets between 1980 and 2010 (Real Values, Deflated by GDP Deflator) in million Rupiah			
		Means	Std. Dev	Minimum	Maximum
Large banks	29	252,048	352,906	612	2,698,795
Medium-sized banks	114	18,702	22,824	137	361,765
Small banks	143	4,422	5,410	13.6	50,420
Total	286	56,004	177,288	13.6	2,698,795

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

This following section discusses the empirical model used to assess the competition of banks in each group of large, medium-sized and small banks. Based on the discussion in Chapter two, the un-scaled revenue specification is more appropriate compared to the scaled-revenue and price specification for estimating the degree of competition in the Indonesian banking industry using the reduced-form revenue equation of the Panzar-Rosse method. Therefore, this study relied on the un-scaled revenue specification to estimate the degree of competition across sub-groups. The empirical model is based on Gelos and Roldos (2002), Wong et al. (2006) and Sun (2011). In order to estimate the degree of competition across sub-groups independently, we placed the large bank group as a base and introduced two dummy variables, G_1 and G_2 , to capture the medium-sized and small banks. The value of G_1 equals one for medium-sized banks and G_1 equals zero if otherwise. Further, the value of G_2 equals one for small banks and G_2 equals zero if otherwise. The dummy variables further interacted with all explanatory variables to form interaction variables. The interaction variables show whether there is a different nature of competition between large, medium-sized and small banks. If the interaction variables generate values which are significantly different from the base group, they indicate a different degree of competition in the statistical relationship between revenue and input prices (Gelos & Roldos 2002). In addition, the value of the interaction variables determines the direction of difference on the degree of competition. If they are positive, we can conclude that the particular group is more competitive or otherwise. Below is the econometric model to assess competition across groups.

Third Specification – Unscaled-Revenue Specification with Interaction Variables

$$\ln TR_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + G_1 * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + G_2 * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + \sigma_i + \varepsilon_{i,t} \quad (4.3-1)$$

Table 4.3-3 provides the specification of variables to assess the competition across sub-groups of large, medium-sized and small banks.

Table 4.3-3 Specification of Variables of Assessing the Competition across Sub-groups

Variable	Variable Specification
<i>i</i>	is the index for bank
<i>t</i>	is the index for year between 1980 and 2010
<i>j</i>	is the index for three input price variables which are w_1, w_2, w_3
TR_{it}	is banks revenue measured by the values of total revenue or interest income of bank <i>i</i> and time <i>t</i>
w_{1it}	is funding rate measured by the ratio of annual interest expenses to total deposit of bank <i>i</i> and time <i>t</i>
w_{2it}	is wage rate/ personnel expenses measured by the ratio of annual wage and salary expenses to total deposits plus total loans of bank <i>i</i> and time <i>t</i>
w_{3it}	is capital rate measure by the ratio of other expenses to fixed assets of bank <i>i</i> and time <i>t</i>
$G1_{it}$	is dummy of medium-sized banks multiplied by input prices <i>j</i> , bank <i>i</i> and time <i>t</i> $G1_{jit}=1$ if <i>i</i> = medium-sized bank
$G2_{it}$	is dummy of small banks multiplied by input prices <i>j</i> , bank <i>i</i> and time <i>t</i> $G2_{jit}=1$ if <i>i</i> = small bank
$P1_{it}$	is dummy of private banks multiplied by input prices <i>j</i> , bank <i>i</i> and time <i>t</i> $P1_{jit}=1$ if <i>i</i> = private bank
$L1_{it}$	is dummy of foreign banks multiplied by input prices <i>j</i> , bank <i>i</i> and time <i>t</i> $L1_{jit}=1$ if <i>i</i> = foreign bank
OI_{it}	is the proportion of non-interest income measure by the ratio of non interest income to interest income of bank <i>i</i> and time <i>t</i>
EQ_{it}	is capital risk measured by the ratio of equity to total assets of bank <i>i</i> and time <i>t</i>
DEP_{it}	is deposit mix measured by the ratio of total deposits on total assets of bank <i>i</i> and time <i>t</i>
DDC_{it}	is deposits mix measured by the ratio of demand deposits from customers to total deposit of bank <i>i</i> and time <i>t</i>
σ	is is the bank fixed effect (unobserved heterogeneity)
ε	is a white-noise error term that includes errors in the competition measure.

4.3.2. Empirical Findings on Competitive Environment Test of Groups of Banks with Different Size using First Approach of Average Value of Assets between 1980 and 2010

This section discusses the empirical results of the difference in the degree of competition across groups (markets) of large, medium-sized and small banks. There are two main findings. First, there was a difference in the nature of competition across markets. Secondly, the market of smaller banks was more competitive than the market of larger banks. The first and the second findings are generated from the F-test hypothesis testing assessing the significant difference in the degree of competition between sub-groups. This is a statistical test which has an F-distribution under the null hypothesis. The null hypothesis tested is that the difference in the degree of competition between the base group (large banks) and another group (either medium-sized or small banks) is zero. The F-test compares between-group variability and within-group variability. If between-group variability is significantly higher than within-group variability, the difference in the degree of competition between groups is statistically significant. It implies that one group has a higher degree of competition than another group.

Table 4.3-4 Test on the Difference on H-statistics of Large, Medium-Sized and Small Banks (Large Banks as a base)

Comparing Groups	ΔH	F test	ρ (Probability)	Implication
Large Banks and Medium Sized Banks	0.42	7.03	0.008	There is significant different between the level of competition for large and medium-sized banks.
Large Banks and Small Banks	0.65	15.29	0.000	There is significant different between the level of competition for large and small banks.

The estimation of the competition across sub-groups is presented in table 4.3-5. The values of H-statistics of large banks, medium-sized banks and small banks are 0.18, 0.60, and 0.83 respectively. The different values of H-statistics imply that there is a difference in the nature of competition across sub-groups. The F-test examines whether the difference is statistically significant or not. Refer to table 4.3-4 for the results of the F-test on the difference in H-statistics for large, medium-sized and small banks. The first F-test in the first row of table 4.3-

4 examines the difference of degree of competition between the large banks group and the medium-sized banks group. The second F-test in the second row of table 4.3-4 assesses the difference in the level of competition between the large banks group and the small banks group. The difference in the level of competition between the large banks group and the medium-sized banks group is significantly different at the 99 per cent significance level. The market of medium-sized banks had a higher level of competition than the market of large banks. The second F-test also reveals the same information. The market of small banks was more competitive than the market of large banks. By using the confidence level of 99 per cent, the F-test of the second test is 15.29. The results imply that smaller banks operate in the most competitive market followed by the market for medium-sized banks. On the contrary, the large banks were working in the least competitive market. The tests on the joint coefficients of input prices also confirm the second finding. The joint coefficient tests of input prices of small banks show that banks worked in a market which was close to perfect competition. In regards to the medium-sized banks, the joint coefficient tests reveal that they worked under monopolistic competition. On the contrary, the H-statistic of large banks is significantly different from one but it is not significantly different from zero. This result implies that large banks might work in a monopoly or collusive in an oligopoly.

Table 4.3-5 Competitive Environment Test for Indonesian Banking, Competition Estimation on Sub-Group (Large; Medium-sized and Small Banks) using Average Value of Assets as a Basis of Categorization (Total Revenue as proxy of Bank Revenue and Time Effect Dummies

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a					
	Large banks group as base (FE Estimates)					
	Large Banks Group		Medium-sized Banks Group		Small Banks Group	
w_1	0.45 (0.08)	***	0.67 (0.07)	***	0.87 (0.06)	***
w_2	-0.50 (0.1)	***	-0.3 (0.08)	***	-0.29 0.1	***
w_3	0.22 (0.05)	***	0.226 (0.04)	***	0.25 (0.04)	***
OI	0.17 (0.07)	**	0.04 (0.02)		-0.05 (0.03)	*
EQ	-0.15 (0.04)	***	-0.04 (0.07)		0.001 (0.08)	
DEP	0.26 (0.14)	*	0.43 (0.11)	***	0.83 (0.12)	***
DDC	-0.07 (0.08)		-0.16 (0.06)	**	-0.09 (0.05)	*
Joint Coefficients of input prices or H-Statistics	0.18 ^b (0.12)		0.60 ^c (0.09)		0.83 ^d (0.12)	
Hypothesis testing:						
Ho=0						
F test	2.24		44.95		47.38	
ρ	0.1353		0.000		0.000	
Ho=1						
F test	47.64		20.27		2.08	
ρ	0.000		0.000		0.15	
Degree of freedom	(1,285)		(1,285)		(1,286)	
Number of observation	3,639					
R ² within	0.76					
Time Effect Dummies (F statistics of joint test)	38.28 ^e					

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

a) Total revenue as dependent variable

b) Ho=0 cannot be rejected and Ho=1 rejected on large banks group (both in level of confidence 99%).

c) Ho=0 and Ho=1 rejected on medium-sized banks group (both in level of confidence 99%).

d) Ho=0 and rejected and Ho=1 could not be rejected on small banks group (both in level of confidence 99%).

e) Ho=0 cannot be rejected (level of confidence 99%).

4.3.3. Empirical Method on Competitive Environment Test of Groups of Banks with Different Size using the Second Approach; Number of Employee

Similar to section 4.3.1, the following discusses the empirical method assessing competition within groups of banks of different size by using the number of employees as a basis for categorization. The discussion starts with the description of the natural break method to group banks based on the number of employee. This section assumes that large banks employ a larger number of employees than the smaller bank. Larger banks have a larger business operation than smaller banks for example the larger number of branches and more varieties of services. This study uses data on the number of employees in Indonesian banking between 1980 and 2010. From the publications of banking statistics of the Bank Indonesia, this study collected employee data for nine individual years. Data for some years are not available, especially in the 1980s. The available employee data is for 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2008 and 2010. By using the nine years of data, we calculate the average number of employees for each bank. We were not able to collect data on some banks because the employee data of those banks were not available. It probably occurs because those banks did not exist in the nine years where the data are available. There are only forty-nine banks from 286 banks where the employee data are not available or only 17 percent of all banks. The number of banks that is appropriate to be assessed is 237 banks. Therefore, this study estimates the competitive environment test across sub-groups by using the 237 banks.

Most of the literature on grouping firms that use employment data is more applicable to the manufacturing sector than to the service sector. For example, the Indonesia Bureau of Statistics classifies the small and medium firms as those with fewer than 100 employees. The firms with more than 100 employees are classified as large. However, services are more dependent on human resources than the manufacturing sector thus the existing classification may not be appropriate. The natural break method is considered more suitable for this case because it breaks data based on the distribution information of the data. Many researchers in various areas of study employ the natural break approach to group or cluster the data in one dimension. There are many approaches used; for example the Hartigan algorithm and Jenks' natural breaks classification method. This study uses the Hartigan algorithm under STATA 12 to group banks based on the number of employees. In general, the Hartigan algorithm classifies n banks into k groups or clusters. It assigns each bank to the group or cluster whose average value in a set of n banks is nearest to it by some distance measure. At each stage of

the Hartigan algorithm, it computes the sum of squares within groups which is the sum of squared deviations of each bank from its means on every dimension. The sum of squares of deviations should decline as we add a new group or cluster. Further, the sum of squares of deviations will be zero if we make each bank as one group. The Hartigan algorithm will look for the number of groups or clusters where the sum of squares of deviations within groups is optimal, or where the reduction in the sum of squares by adding a group is negligible.

By using STATA 12, this study divided the banks naturally based on the average number of employees over the nine years. It sorted banks based on the average number of employees from the smallest to largest. The *n* banks were clustered into one or more continuous groups (*k*). The (*k* – 1) boundaries between *k* groups were chosen to minimise the sum of the within-cluster sums of squared deviations from cluster means over the comb(*n* – 1, *k* – 1) possible clustering. Based on data clustering, this study divided the industry into two groups, large banks and small banks. Another consideration of splitting the industry into two groups is assuring there is sufficient data to run the estimation. There are 199 small banks and fifty-five large banks. Table 4.3-6 provides information on descriptive statistics for each group covering the means and standard deviation. There are fifty-five large banks with an average number of employees of 4,252 and the standard deviation is 6,350 employees. Small banks dominated the industry with 199 banks or approximately 78 per cent of banks considered as small. The average of the number of employees of small banks is 256 and the standard deviation is 194 employees. The outcome from the clustering on the employee data confirms that the size of banks in the Indonesian banking industry was relatively heterogeneous. The distribution of banks was skewed to small banks. Thus, in terms of number, the industry was dominated by the small banks.

Table 4.3-6 The Descriptive Statistics of Large and Small Banks (the Number of Employee as a Basis for Categorization)

Sub Group	Number of banks	Range of the average of Employee between 1980 and 2010			
		Means	Std. Dev	Minimum	Maximum
Large banks	55	4,252	6,350	820	37,993
Small banks	199	256	194	5	778

Source: the Annual Financial Report of Banks, published by the Central Bank of Indonesia

Note: The clustering is conducted by using STATA 12

After discussing the natural break method, we continue to describe the empirical model to estimate the degree of competition across sub-groups independently. Similar to section 4.3.1, this section also employs the third specification (un-scaled revenue specification) of the reduce-form revenue equation. As it has fewer groups than the first approach, only one dummy was assigned to estimate the competition across sub-groups independently. The large banks group is used as the base. The dummy G_1 equals one if a bank is small and G_1 equals zero otherwise. As applied in the previous section, the dummy variable is interacted with all explanatory variables to form interaction variables. The variation between the coefficient of input prices of the base group and the coefficients of interaction variables determine the difference in the degree of competition between groups. In addition, it also shows whether the small banks market is more competitive than the large banks market.

Below is the econometric model to assess competition across groups.

Third Specification – Unscaled-Revenue Specification with Interaction Variables

$$\ln TR_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + G_1 * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + \sigma_i + \varepsilon_{i,t}$$

(4.3-2)

Refer to Table 4.3-3 on the specification of variables to assess the competition across sub-groups of large banks and small banks.

4.3.4. Empirical Findings on Competitive Environment Test of Groups of Banks with Different Size using the Second Approach; Number of Employees

The empirical results of the competitive environment test in equation 4.3-2 confirm the previous findings in section 4.3.2. The nature of competition in the market of large banks and the market of small banks was different. Moreover, the market of smaller banks was more competitive than the market of larger banks. The results for the level of competition in the three sub groups are presented in Table 4.3-7. The values of the H-statistics of large banks and small banks are 0.17 and 0.77 respectively. The F-statistics test reveals that the difference in H-statistics between two markets is significant. The market of small banks was more competitive than the market of large banks. The small banks worked in a market close to perfect competition, whereas large banks operated in a monopoly or collusive oligopoly market.

In regards to banks' specific factors that capture bank risk and behaviour, the empirical results of table 4.3-7 show that the off-balance sheet activities significantly influenced revenue of the large banks at the confidence level of 99 per cent, but they were not for smaller banks. The revenue of large banks was also negatively influenced by the ratio of equity to total assets at the confidence level of 95 per cent. In addition, banks revenue for large banks (at the confidence level of 95 per cent) and small banks (at the confidence level of 99 per cent) can be explained by the proportion of deposits in total assets. A higher proportion of deposits in total assets increased bank's capacity to generate revenue. Finally, the proportion of demand deposits in the total third-parties deposits negatively influenced the revenue of banks. This is particularly for small banks because the coefficient is statistically significant at the confidence level of 95 per cent.

By using the two different approaches, assets and employees, this study produced a very similar result. The degree of competition between the group of large banks and group of small banks was different. The market of smaller banks was more competitive that of the larger banks. It is a robust conclusion that the market of large and small banks is segmented. Large and small banks may have different characteristics in lending and accumulating deposits. In terms of lending, as suggested by some studies (Cole, Goldberg and White (1999); Berger, Klapper and Udell (2001); Berger and Udell (2002); Stein (2002)), larger banks prefer to extend loans to larger firms. In contrast, small banks have a competitive advantage in allocating loans to small firms with a limited capacity for providing "hard information" on the firm performance.

A study by Rosengard and Prasetyantoko (2011) of Indonesian banking supports the above argument that large banks disburse more loans to larger firms. Their study revealed that based on data from December 2009, the portfolio of assets of large banks was dominated by government bonds, BI certificates (SBIs) and loans to large corporations, rather than loans to small and medium enterprises (SMEs). The lending to small and medium enterprises of the three biggest banks in the Indonesian banking industry, Bank Mandiri, Bank Central Asia and Bank Negara Indonesia was only 15 per cent, 19 per cent and 20 per cent of the loans portfolio respectively. Large banks preferred to target large corporations rather than the small firms (SMEs) because lending to SMEs is riskier and contains higher transaction costs (Rosengard & Prasetyantoko 2011).

Regarding the share of interest income to total revenue, small banks are more dependent on interest-based activity than are their larger counterparts. The proportion of interest income to total revenue of small banks between 1980 and 2010 was 93 per cent. The larger banks were less dependent on interest income which contributed 82 per cent to their total revenue. It shows that smaller banks have less diversified products than the larger banks. As their products are relatively homogeneous and based on products such as time deposits, demand deposits and savings, the competition among smaller banks was more intense. On the contrary, large banks have a greater capacity to generate income from off-balance sheet activities such as fees and commissions for services. It contributes to the market power of larger banks.

The findings of the comparison of the degree of competition between groups of large and small banks indicate the market of small banks was more competitive than the large banks market. It may imply that the competition in the market of small banks was more intense than in the large banks market. As small banks depend more on interest-based activity than the large banks, they behave more aggressively than larger banks. As suggested by Bassett and Brady (2002), smaller banks in U.S. banking offered higher interest rates on deposits than larger banks particularly during the consolidation period. The smaller banks faced a challenge as consolidation encourages banks to get bigger. In order to be competitive, small banks are more aggressive by raising the average rate paid on interest-bearing deposits in order to attract

progressively more deposit funding (Bassett & Brady 2002, p. 30). The cost of funds¹⁶ data of Indonesian banking also shows that small banks paid higher rates for deposits than did larger banks. The cost of funds of small banks was 0.27 on average for the period of 1980 to 2010. The interest rates paid for average deposits in medium-sized banks and large banks paid were 0.16 and 0.13 respectively.

Regarding large banks, the value of H-statistics signals that they worked in a less competitive market. Moreover, the test of joint coefficients of input prices of large banks using average assets as a basis for categorization suggests that large banks worked under monopoly or colluding oligopoly types of market. Banks with larger assets have a larger share in the industry. It enables them to control the banking industry. The market shares relate to banks' possession of market power which allows them to generate an excess profit by producing output less than competitive equilibrium and a higher price level than marginal cost. In addition, the large banks market was dominated by the state-owned banks. State-owned banks have a large captive market for both loans and deposits amongst the state enterprises (McLeod 1999). Furthermore, as argued by McLeod (1999), they have been controlled and directed by government (or government officials) as shown by the Bappindo case in the early 1990s. This may explain why the market of large banks is less competitive than the small banks market.

A study by Rosengard and Prasetyantoko (2011) strengthens the findings of this study. There were some indications that the Indonesian banking industry was dominated by a few large banks that worked in an oligopoly market. There are at least three signals of oligopoly in Indonesian banking. First, compared to neighbouring countries in South-East Asia, Indonesian banks recorded the highest net interest margins (NIM) by 6 per cent. At the same time, the ratio of average operating cost to operating income was also the highest by 82 per cent (BOPO). While, the NIM and BOPO of neighbouring countries ranged between 2 per cent and 5 per cent and 33 per cent and 73 per cent respectively (Samboh 2011). The second indication was Indonesian banking enjoyed high banks' spread despite the low inflation rate and concomitant low cost of funds (Rosengard & Prasetyantoko 2011). Banks spread shows the discrepancy between the rates of the deposit interest and loans rates. The spread in Indonesia based on data in June 2009 ranged from 2.7 per cent to 4.5 per cent on a monthly basis (Rosengard & Prasetyantoko 2011). The third indicator of oligopoly in Indonesian

¹⁶ Cost of funds is calculated by dividing the interest expenses by total third-party deposits. It can be used as a proxy of the interest rates paid for the average deposits.

banking was the extremely high price earnings ratio (PER) of the 10 largest banks. The annualized PERs for the 10 largest banks in Indonesia were double that of the standard of global banking. The annualized PERs for Indonesian banks in 2010 were from 14 per cent to 18 per cent, while the global banking standards were between 8 per cent and 10 per cent. Rosengard and Prasetyantoko (2011, p. 288) argue that the high PERs may reflect the expectation of profit from the continued reaping of monopoly rents.

Table 4.3-7 Competitive Environment Test of Indonesian Banking, Competition Estimation of Group of Large Banks and Group of Small Banks using the Number of Employees as a Basis of Categorization (Total Revenue as proxy of Bank Revenue and Time Effect Dummies)

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^f			
	FE Estimates			
	Large Banks Group		Small Banks Group	
w_1	0.46 (0.08)	***	0.78 (0.06)	***
w_2	-0.51 (0.1)	***	-0.27 (0.08)	***
w_3	0.21 (0.04)	***	0.26 (0.04)	***
OI	0.13 (0.04)	***	-0.01 (0.02)	
EQ	-0.13 (0.06)	**	-0.0024 (0.06)	
DEP	0.3 (0.14)	**	0.71 (0.1)	***
DDC	-0.07 (0.06)		-0.1 (0.04)	**
Joint Coefficients of input prices or				
H-Statistics	0.17 ^g		0.77 ^h	
Hypothesis testing:	(0.06)		(0.01)	
Ho=0				
F test	2.89		57.37	
ρ	0.09		0.000	
Ho=1				
F test	73.41		4.88	
ρ	0.000		0.0281	
Degree of freedom	(1,243)		(1,243)	
ΔH			0.60 ⁱ	
F test, $\Delta H=0$			19.43	
P			0.000	
Number of observation	3,419			
R ² within	0.74			
Time Effect Dummies	39.59 ^j			
(F statistics of joint test)				

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

f) Total revenue as dependent variable

g) Ho=0 could not be rejected and Ho=1 rejected on large banks group (both in level of confidence 99.9%).

h) Ho=0 rejected and Ho=1 rejected on small banks group (both in level of confidence 99.9%).

i) Ho=0 rejected (level of confidence 99.9%).

j) Ho=0 rejected (level of confidence 99.9%).

4.4 The Comparison of the Degree of Competition between Groups of Banks with Different Ownership

The Bank of Indonesia, as the regulator of the banking industry divides banks into six categories based on ownership and business capacity. The local banks consist of four categories which are the state-owned banks, the regional banks, the private banks with capacity to handle foreign exchange activities and the private banks without capacity to handle foreign exchange activities. The Government of Indonesia is the major shareholder of the state-owned banks. The regional banks are owned by the local or provincial governments. The private local banks belong to Indonesian private entities.

The foreign banks category consists of two categories which are the joint venture banks and branches of foreign banks. Joint venture banks are created through a partnership between local banks and foreign banks. The second type of foreign banks is the branches of overseas banks in Indonesia. The literature groups the joint ventures and branches of foreign banks under the term *de novo* bank. Clarke et al. (2001), Claeys and Hainz (2006) and Sengupta (2007) define a *de novo* bank as a branch or a subsidiary of foreign banks in local banking. Subsidiary refers to a fully owned subsidiary of foreign banks or joint ventures with foreign banks as a majority shareholder (Montgomery 2003). The current pattern, particularly during the 2000s reveals that foreign penetration also appeared in the form of acquisition of the local existing banks (foreign acquired banks). This chapter extends the definition of foreign banks to represent the current pattern and trend of foreign penetration. Relying on the definition of the Bank of Indonesia may lead to underestimation of the information about the domination of foreign banks or entities in the local market. Furthermore, once the foreign proportion reaches 25 per cent, the foreign shareholders have control of the bank (regulation Number 8/16/PBI/2006 of Bank Indonesia). Therefore, excluding local private banks which have substantial foreign participation will underrate the role of foreign banks in the banking industry. This section analyses the competitive behavior of foreign banks that enter the market through the establishment of *de novo* banks and foreign acquired banks.

Table 4.4-1 provides information on the number of banks in each category across the major periods in the last three decades. In total, the number of banks reached the highest point under the deregulation and liberalization period and reduced to half within the consolidation and crisis periods. In terms of the number of banks, Indonesian banking is dominated by the local private banks. The number of private banks increased during the deregulation and

liberalization period (1988-1997) from sixty-five banks to 181 banks. It is followed by joint venture banks with twenty-nine banks between 1998 and 2000 or 18 per cent of the market. There were eleven branches of foreign banks. The number of regional banks was twenty-five and there were four state-owned banks after the crisis.

Table 4.4-1 The Number of Banks for each Category between 1980 and 2010

Period (Year)	Number of banks	Group/ Category						
		Government Banks		Private Banks				Foreign Acquired Banks
		State Owned Banks	Regional Banks	Local Private Banks		<i>De novo</i> Banks		
				Local private – Foreign Exchange Banks	Local private – Non Foreign Exchange Banks	Joint Venture Banks	Branches of Foreign Banks	
Prior deregulation: 1980-1987	110	7 (6%)	27 (25%)	10 (9%)	55 (50%)	none	11 (10%)	none
Deregulation and liberalization: 1988-1997	259	7 (3%)	27 (10%)	80 (31%)	101 (39%)	34 (13%)	10 (4%)	none
Crisis: 1998-2000	159	5 (3%)	25 (16%)	46 (29%)	44 (28%)	29 (18%)	10 (6%)	none
Consolidation: 2000-2010	148	4 (3%)	25 (17%)	32 (21%)	38 (26%)	18 (12%)	11 (7%)	20 (14%)

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

Data in the bracket is the percentage of banks in each category compared to total banks.

The first issue for discussion about the degree of competition across groups with different ownership begins with a comparison between government banks and private banks. Government banks are defined as banks owned by the central, state or regional governments. More specifically, central, state or regional governments are the main shareholders of the government banks. On the contrary, private banks are owned by private entities either local or foreign.

Next, this study compares the degree of competition within the groups of foreign banks and local banks. The local banks consist of the state-owned banks, the regional banks, and the local private banks. In order to examine the differences in the competitive behaviour of local and foreign banks, there are four analyses. First, the comparison of the competitive behavior

of local banks with joint ventures banks. Secondly, comparison of the local banks with branches of foreign banks. Next, this section covers both joint venture banks and branches of foreign banks in the *de novo* bank category. The competitive behaviour of *de novo* bank (in the forms of joint venture and branches of foreign banks) will be compared to the local banks. Finally, this section compares the competitive behaviour of the local banks with the banks that are at least 50 per cent owned by foreign banks or foreign entities. It examines the difference between local banks and foreign banks regardless of the modes of entry. As long as foreign banks or entities have control of the banks, they may influence the competitive behaviour of those banks.

4.4.1. The Empirical Method and Empirical Findings on the Comparison of the Degree of Competition between Government Banks and Private Banks

This section also employs the third specification, or un-scaled revenue specification, of the Panzar-Rosse method. It estimates the degree of competition in the group of government banks and the group of private banks. The base group is government banks. The model introduces one dummy variable, P_1 , to estimate the degree of competition across groups independently. The dummy variable of P_1 is assigned to private banks and is equal to one if it is a private bank and zero if it is a government bank. The treatment of the dummy variable is similar to the previous sections with the multiplication of explanatory variables and the dummy variable to form interaction variables. The difference between the coefficient of input prices for the base group and the interaction variables determines the difference in the degree of competition between groups. The F-test is again employed to examine whether the difference is statistically significant. Further, the coefficient of interaction variables inform whether the group of private banks is more competitive than the group of government banks. Below is the econometric model used to assess competition across groups.

Third Specification – Unscaled-Revenue Specification with Interaction Variables

$$\ln TR_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + P_1 * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + \sigma_i + \varepsilon_{i,t} \tag{4.4-1}$$

Table 4.3-3 provides the specification of variables to assess the competition across sub-groups of government banks and private banks.

The results on the competition level in the two sub groups are presented in Table 4.4-2. The values of the H-statistics for government banks and private banks are 0.27 and 0.73 respectively. This implies government and private banks had a different degree of competition. The F-test was employed to assess whether the difference in the values of the H-statistics was significant or not. The outcomes of the hypothesis test shows that the difference in the degree of competition between the government and private banks was significant using the 99 per cent confidence level. The results imply that the private banks were more competitive than were government banks. The test of the joint coefficient of input prices supports the above findings. By using the 99 per cent confidence level, the joint coefficient of input prices of government banks could not reject the null hypothesis that the government banks worked in a monopoly or collusive oligopoly type of market. In contrast, their private counterparts were more competitive. The test of joint coefficients of input prices of the private banks rejects monopoly and perfect competition. Thus, private banks were operating under a monopolistically competitive market.

The finding indicates that the markets of government banks and private banks were segmented. The literature, discussing organisational design such as Williamson (1967) may explain why the two groups are segmented. State-owned banks have a longer hierarchical organisational design than private banks which are dominated by small local banks and joint ventures. Government banks have bigger constraints in extending loans to small borrowers with the limitation to provide “hard information”. In contrast, private banks with less hierarchical organisational design may have a comparative advantage in using soft information to extend loans to smaller borrowers. Thus, the two markets may be segmented on the type of borrowers that they serve. Government banks prefer to extend loans to bigger borrowers while private banks may be more willing to allocate some loans to smaller borrowers. Another supporting argument of market segmentation between government and private banks relies on the existence of high switching costs in the banking industry. It involves some costs if customers plan to switch from one bank to another. Most of state-owned banks have existed for longer than their private counterparts. Therefore, state banks may already have a large number of devoted long-term customers who find it costly to switch to a newer private bank.

Government banks were working under a monopoly or collusive oligopoly market. This result may also be interpreted as the government banks attempting to collude rather than compete to

generate profit maximisation. Vesala (1995) provides evidence that the non-positive value of H-statistics may also imply that banks are working under monopolistic competition without threat of entry. This type of market may also explain the type of competition within government banks. Under monopolistic competition banks tend to differentiate themselves by various product quality variables and advertising. However, government banks work under monopoly profit maximization because there was an entry restriction to becoming a government banks. In contrast, the private banks worked in a monopolistic competition market. The finding is consistent with the evidence presented in the previous section where it is shown that the small banks market was more competitive than the large banks. Private banks were dominated by small banks that are likely to be more aggressive than the larger banks (Berger, Klapper & Udell 2001; Berger & Udell 2002; Cole, Goldberg & White 1999; Stein 2002). Therefore, it is clear that private banks behave in a more competitive way than do the government banks.

This finding is also in line with the argument presented by McLeod (1999) that the state-owned banks have some advantages compared to their private counterparts. There was a policy that required state-owned enterprises to deposit all their funds in the state-owned banks (Margono, Sharma & Melvin Ii 2010; McLeod 1999). This policy benefitted the state-owned banks as they have captive funds from the deposits of the state enterprises. In addition, before banking deregulation in the 1980s, the government subsidised the interest rates of deposits of the state-owned banks (Margono, Sharma & Melvin Ii 2010). These advantages spoiled the state-owned banks and generated un-competitive behaviour. On the contrary, private banks work to maximize the profit and behave more aggressively to increase their market shares. The study by Laeven, Luc (2005) on the banking industry in East Asian countries also found that the performance of private banks in general was superior to state banks. Banks' performance was measured by the ratio of operating income to total assets. The study assumed that banks are profit maximisers, thus higher profit is associated with better performance (Laeven, Luc 2005).

The empirical results from table 4.4-2 particularly the banks specific factors provide other sources of difference between government and private banks. As explained in chapter two, banks specific factors reflect risk and behaviour of government and private banks. Unlikely private banks, the revenue of government banks was negatively influenced by the proportion of deposits in total assets (DEP) and it is significant at confidence level of 95 per cent. In the

case of private banks, a higher proportion of deposits from total assets significantly increases banks revenue at confidence level of 99 per cent. The data of balance sheet, particularly in the 1980s and 1990s show that government banks relied more on borrowing, for example from government, than third parties deposits. This may explain why DEP has negative coefficients for government banks. In regards to deposits mix variable, the proportion of demand deposits to total third-parties fund (DDC) negatively influenced revenue of government and private banks. However, this variable is only statistically significant for private banks at the confidence level of 99 per cent. Finally, the bank revenue was also negatively influenced by the ratio of equity to total assets (EQ). This is particularly important variable for government banks as the coefficient is statistically significant at the confidence level of 95 per cent.

Table 4.4-2 Competitive Environment Test of Indonesian Banking, Competition Estimation on Sub-Group, Government Banks and Private Banks (Total Revenue as proxy of Banks' Revenue and Time Effect Dummies)

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^k			
	FE Estimate		FE Estimate	
	Government Banks		Private Banks	
w_1	0.11 (0.08)	**	0.84 (0.06)	***
w_2	0.04 (0.09)		-0.34 (0.08)	***
w_3	0.13 (0.05)	**	0.23 (0.03)	***
OI	0.01 (0.03)		0.03 (0.02)	
EQ	-0.1 (0.09)	**	-0.02 (0.05)	
DEP	-0.36 (0.13)	**	0.74 (0.12)	***
DDC	-0.01 (0.04)		-0.1 (0.04)	***
Joint Coefficients of input prices or H-Statistics Hypothesis testing:				
Ho=0	0.27 ^l (0.06)		0.73 ^m (0.01)	
F test	4.25		51.45	
ρ	0.04		0.000	
Ho=1	30.43		6.97	
ρ	0.000		0.009	
Degree of freedom	(1,285)		(1,285)	
ΔH			0.46	
F test (1,288), $\Delta H=0$			8.12 ⁿ	
P			0.000	
Number of observation	3,639			
R ² within	0.77			
Time Effect Dummies (F statistics of joint test)	37.43 ^o			

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

k) Total revenue as dependent variable

l) Ho=0 cannot rejected and Ho=1 rejected (both in the level of confidence 99%).

m) Ho=0 and Ho=1 are rejected (both in the level of confidence 99%).

n) Ho=0 rejected (in the level of confidence 99%)

o) Ho=0 rejected (in the level of confidence 99%).

4.4.2. The Empirical Method and Empirical Findings on the Comparison of the Degree of Competition between Foreign Banks and Local Banks

Similar to the method employed to compare the degree of competition across groups of different size, this section uses the third specification, or un-scaled revenue of the reduce-form revenue equation, to estimate the degree of competition in the markets of foreign banks and local banks. The dummy variable L_1 is introduced to estimate the degree of competition across groups independently. As we treat local banks as the base group, the dummy variable of L_1 is assigned for foreign banks. L_1 equals one if it is a foreign bank and L_1 equal zero if otherwise. As discussed in section 4.4, there are four estimation models to examine the competitive behaviour of foreign banks across different modes of entry. In the first model, L_1 is assigned to joint venture banks. In the second model, L_1 refers to branches of foreign banks. In the third equation, L_1 is assigned to *de novo* banks including both joint ventures and branches of foreign banks. In the fourth equation, L_1 refers to banks where at least 50 per cent of shares are owned by foreign banks or entities. In addition, the fourth model uses a shorter period than the other equations. The observation period for equation four is between 2000 and 2010 because foreign penetration through acquisitions of local existing banks occurred in the 2000s. Prior to 2000, foreign penetration was only through the establishment of *de novo* banks which is already captured in equations one, two and three.

As applied in the previous sections, in order to form the interaction variable, this study multiplied dummy variables with all explanatory variables. The difference between the coefficient of the input price of the base group and the coefficient of the interaction variables determines the difference of the degree of competition between groups. An F-test was employed to examine whether the difference is statistically significant. Further, the coefficient of interaction variables inform whether a group of local banks is more competitive than a group of foreign banks. Below is the econometric model to assess competition across groups.

Third Specification – Unscaled-Revenue Specification with Interaction Variables

$$\ln TR_{it} = \alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it} + L_1 * [\alpha_0 + \sum_{j=1}^3 \beta_j \ln w_{jit} + \gamma_1 \ln EQ_{it} + \gamma_2 \ln DEP_{it} + \gamma_3 \ln OI_{it} + \gamma_4 \ln DDC_{it}] + \sigma_i + \varepsilon_{i,t} \quad (4.4-2)$$

Refer to Table 4.3-3 for the specification of variables to assess the competition across sub-groups of foreign banks and local banks.

Regardless of the different entry modes and definitions of foreign banks, the estimations of equation one to four confirm that the H-statistics of foreign banks were higher than the H-statistics of local banks. The results for the competition level for all equations are presented in table 4.4-3. From the results of equation 1, the H-statistics of local banks and joint venture banks were 0.64 and 0.83 respectively. Regarding equation 2, the H-statistics of local banks and branches of foreign banks were 0.63 and 0.84 respectively. The results of the third equation show that the H-statistics of local banks and *de novo* banks were 0.62 and 0.83 respectively. Finally, the results of the fourth equation show that the H-statistics of local banks and foreign banks were 0.33 and 0.37 respectively.

The foreign banks had higher H-statistics than their local counterparts. It probably signals that the foreign banks had a higher level of competition than the local banks. The findings are particularly valid if foreign penetration was conducted through the creation of *de novo* banks, either by creating joint venture banks or establishing the branches of foreign banks. The above argument is supported by the results of the test on the joint coefficient of input prices. The H-statistics of foreign banks and local banks are significantly different from zero. It implies that local and foreign banks were not working under a monopoly type of market. The different outcomes are from the test of joint coefficients of input prices from the perfect competition hypothesis. In the case of local banks, the test shows that the joint coefficients rejected the perfect competition hypothesis. However, in the case of *de novo* banks (either joint ventures or branches of foreign banks as in the equation one, two and three) the joint coefficients were not significantly different using the confidence level of 99 per cent. This result implies that *de novo* banks were working under a very competitive environment which was close to perfect competition.

Table 4.4-3 Competitive Environment Test of Indonesian Banking, Competition Estimation of Group of Local Banks and Group of Foreign Banks (Total Revenue as proxy of Banks' Revenue and Time Effect Dummies)

3 rd Specification (Fixed Effect Model of Unscaled Revenue Specification) ^p	Equation 1		Equation 2		Equation 3		Equation 4	
	Local banks	Joint Venture banks	Local banks	Branches of Foreign banks	Local banks	De novo banks ^q	Local banks	Foreign Banks ^r
H-stats	0.64	0.83	0.63	0.84	0.62	0.83	0.33 ^s	0.37 ^s
Hypothesis test								
H0=0	31.35 ^t (0.000)	87.59 ^u (0.000)	29.41 ^t (0.000)	16.69 ^u (0.000)	28.89 ^t (0.000)	50.96 ^u (0.000)	12.43 ^t (0.000)	12.49 ^t (0.000)
H0=1	9.80 ^t (0.001)	3.50 ^u (0.062)	9.88 ^t (0.001)	2.09 ^u (0.1497)	10.81 ^t (0.001)	2.09 ^u (0.1497)	51.12 ^t (0.002)	33.91 ^t (0.000)
Market structure	Monopolistic competition	Close to perfect competition	Monopolistic competition	Close to perfect competition	Monopolistic competition	Close to perfect competition	Monopolistic competition	Monopolistic competition
Number of banks	234 banks	39 banks	234 banks	13 banks	234 banks	52 banks	73 banks	75 banks
Observation period	1980 – 2010		1980 - 2010		1980 - 2010		2000 - 2010	
ΔH	0.19		0.20		0.21		0.04	
F-test of ΔH	F-test= 1.99 Probability = 0.1598		F-test= 0.79 Probability = 0.3742		F-test = 1.73 Probability = 0.1888		F-test = 0.245 Probability = 0.6243	
F-test results	The difference in degree of competition is not statistically significant		The difference in degree of competition is not statistically significant		The difference in degree of competition is not statistically significant		The difference in degree of competition is not statistically significant	

FE means Fixed Effect estimates. Figures in parentheses are probability of rejecting the null hypothesis.

p) Total revenue as dependent variable.

q) De novo banks consisted of joint venture banks and branches of foreign banks.

r) Foreign banks are defined as those with at least 50 per cent of foreign ownership.

s) The values of H-statistics are smaller than obtained with other equation. It is probably because they cover a shorter period of observation.

t) Ho=0 rejected and Ho=1 rejected (level of confidence 99%)

u) Ho=0 rejected and Ho=1 could not be rejected (level of confidence 99%).

The results of equation four suggest that banks which are controlled by foreign owners were not more competitive than their local counterparts. The findings are different from the previous findings using equations one to three. It is probably because foreign banks in equation four include *de novo* banks and foreign acquired banks as long as the share of foreign owners is at least 50 per cent. In the equations one to three, foreign banks only capture *de novo* banks both joint venture banks and branches of foreign banks. In order to examine this variation, we used equation five. It compares the level of competition between local banks and *de novo* banks by using the same observation period as equation four so as to provide comparable information to equation four on the competitive behaviour of local and foreign banks. Confirming the findings of equation one, two and three, between 2000 and 2010, *de novo* banks were more competitive than the local banks. According to the F-test, the H-statistics of *de novo* banks was statistically higher than the H-statistics of local banks at the 90 per cent confidence level.

Table 4.4-4 Competitive Environment Test of Indonesian Banking, Competition Estimation of Group of Local Banks and Group of Foreign Banks between 2000 and 2010 (Total Revenue as proxy of Bank Revenue and Time Effect Dummies)

3 rd Specification (Fixed Effect Model of Unscaled Revenue Specification) ^v	Equation 4		Equation 5	
	Local banks	Foreign Banks ^w	Local banks	<i>De novo</i> banks ^x
H-stats	0.33	0.37	0.19	0.51
Hypothesis test				
H0=0	12.43 ^y (0.000)	12.49 ^y (0.000)	3.59 ^y (0.06)	12.38 ^y (0.000)
H0=1	51.12 ^y (0.002)	33.91 ^y (0.000)	66.48 ^y (0.000)	11.26 ^y (0.001)
Market structure	Monopolistic competition	Monopolistic competition	Monopolistic competition	Monopolistic competition
Number of banks	73 banks	75 banks	96 banks	52 banks
Observation period	2000 - 2010		2000 – 2010	
ΔH	0.04		0.32	
F-test of ΔH	F-test = 0.245 Probability = 0.6243		F-test = 3.43 Probability = 0.07	
F-test results	The difference in degree of competition is not statistically significant		The difference in degree of competition is statistically significant at the 90% level of confidence ^z	

v) Total revenue as dependent variable.

w) Foreign banks are defined as those with at least 50 per cent of foreign ownership.

x) *De novo* banks consisted of joint venture banks and branches of foreign banks.

y) $H_0=0$ rejected and $H_0=1$ rejected (level of confidence 99%).

z) However, it is not statistically significant by using level of confidence 95% and 99%.

De novo banks exhibited more competitive behaviour than their local counterparts. In terms of assets, compared to the overall banks in the industry, on average *de novo* banks were smaller with assets of 43,431 million Rupiah between 2000 and 2010. According to table 4.4-5, the average asset of all banks in the industry between 2000 and 2010 was 77,454 million Rupiah. If we compare the assets of two groups of foreign banks, *de novo* banks and foreign acquired banks, *de novo* banks also recorded the smaller assets between 2000 and 2010. The foreign acquired banks are considered to be large banks with average assets surpassing the most banks in the Indonesian banking industry. On average, the asset of foreign acquired banks between 2000 and 2010 was 192,100 million Rupiah. Furthermore, the financial reports data shows that some foreign acquired banks, for example Bank Central Asia, Bank CIMB Niaga, Bank Danamon Indonesia, Bank International Indonesia, Bank OCBC NISP, Bank UOB Buana and Bank Ekonomi Rahardja, are large banks with assets in the top 10 per cent of all banks. Within the *de novo* group, joint venture banks were smaller than branches of foreign banks. The mean of total assets of joint venture banks between 2000 and 2010 was 23,015 million Rupiah. The branches of foreign banks were larger with mean assets of 77,638 million rupiah.

Table 4.4-5 Mean of Assets of Foreign Banks between 2000 and 2010

Type of Bank based on Ownership	Mean of assets <i>(Real values in Millions of Rupiah, after deflation with GDP deflator)</i>
<i>De novo</i> banks	43,431
Joint venture banks	23,015
Branches of foreign banks	77,638
Foreign acquired banks	192,100
Overall banks in the industry	77,454

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

As smaller banks, *de novo* are more likely to behave more competitively than larger banks. The sections 4.3.2 and 4.3.4 suggest that smaller banks have more competitive behaviour than larger banks. Small banks have a shorter hierarchical management than larger banks. This enables small banks to have more discretion in the lending process (Cole, Goldberg & White 1999; Stein 2002; Williamson 1967). Smaller banks have less diversified products because

they depend more on interest-based activities than do the larger banks. As their products, are relatively homogeneous such as time deposits, demand deposits and savings, the competition among smaller banks was more intense. The above arguments may explain the nature of the competitive behaviour of the *de novo* banks. Chapter five will examine the role of foreign bank penetration on banking competition. It will assess the role of *de novo* banks and foreign acquired banks jointly and individually.

4.5 Conclusion

This study reveals that size and ownership affect bank behaviour and banking competition. Banks with different sizes and ownership have potentially different competitive behaviours. It may happen because the market of large and small banks is segmented. Large banks have more constraints to extend loans to small firms as banks prefer to utilize ‘hard information’ in assessing loans application. In contrast, small banks with less hierarchical organisations have a comparative advantage to extend loans to small firms. Smaller organisations allow management to be more flexible in assessing loans applications because a less hierarchical organisation makes the controlling process easier.

A comparison of the degree of competition amongst groups of banks of different size shows that small banks were more competitive than large banks. The finding is robust because by using both assets and employment data, the results are similar. Small banks behaved as though under perfectly competition where banks’ products are regarded as perfect substitutes for one another. The medium-sized banks were operating under a monopolistically competitive market. In contrast, the large banks appeared to collude as the hypothesis testing on the H-value could not reject the monopoly market. Small banks behave more aggressively than the larger banks because they depend more on interest-based activity than do the large banks. In order to be competitive, “small banks are becoming more aggressive by raising the average rate paid on interest-bearing in order to attract progressively more deposits funding” Bassett and Brady (2002, p. 30). Data from Indonesian banking between 1980 and 2010 shows that on average, smaller banks had higher interest expenses per deposit than their larger counterparts. Regarding large banks, the value of H-statistics signals that they worked in an uncompetitive market. The state-owned banks are at the top of the list of large banks. They had a captive market for both loans and deposits amongst the state enterprises (Margono, Sharma & Melvin Ii 2010; McLeod 1999). This may explain why the market of large banks is

less competitive than the small banks market. At the beginning of 2011, the Indonesian Competition Commission (KPPU) revealed that the commission investigated interest rate collusion among fourteen large banks in Indonesian banking. KPPU suspected that Indonesian banking had high interest margins, 7 per cent, and was considered the highest compared to other South East Asian countries excepts the Philippines. The reduction in the base interest rates of the Central Bank did not induce the same movement from the banks to reduce their lending rates. However, until mid-2012, the commission had not released their report concerning evidence of collusion. Responding to the suspicions of KPPU about collusion of banks in determining the interest rates, in February 2011 the Central Bank, as regulator, introduced the rule that banks disclose their lending rate¹⁷. The regulation aims to enhance competition in the industry.

Further, this chapter also shows that government banks had different characteristics to private banks. Some literature provides an explanation for the difference between government banks and private banks. The government banks worked to serve the interest of government as the majority shareholder (McLeod 1999). In addition, the government banks, particularly state-owned banks have long hierarchical organisational designs which leads banks to focus more on large borrowers than the small ones (Williamson 1967). Government banks also suffered from quality controls, government intervention and were used to disburse directed loans. This contributes to create uncompetitive behaviour of government banks. After all, government banks receive an implicit guarantee from the government against failure as shown by a series of government bank bailouts, for example Bappindo, in the early 1990s and all state commercial banks during the 1997 crisis.

On the contrary, private banks which are dominated by small banks have more capacity to extend loans to small borrowers. The private banks competed more rigorously than government banks. The private bank market was close to perfect competition or monopolistic competition where bank products are regarded as perfect substitutes for one another. In contrast, government banks attempted to collude rather than to compete to generate a maximum profit. Or the government banks may operate under monopolistic competition with a fixed number of banks as there was a restriction to establish government banks. Small banks, joint venture banks, and branches of foreign banks contributed to enhance competition

¹⁷*Circulation Letter of Bank of Indonesia Regarding the Release of the Prime Lending Rate Number 13/5/DPNP/2011 (Indonesia).*

within the private banks market. They behaved more aggressively in order to survive or reap some shares in the market. On the contrary, the state-banks worked to serve the government interest as the major shareholder and were used to fulfil the interests of some individuals or groups. Therefore, the degree of competition in the market of government banks was much lower than in the market of private banks.

The empirical findings from this chapter also show that foreign banks have higher H-statistics than their local counterparts. It may signal that foreign banks are more competitive than local banks. If we estimated the H-statistics of foreign banks across different modes of entry, the findings suggest that *de novo* banks, either joint ventures or branches of foreign banks, had consistently higher H-statistics compared to local banks. Furthermore, the F-test shows that the difference of the degree of competition between *de novo* banks and local banks between 2000 and 2010 is statistically significant by using 90 per cent level of confidence. As the newly established banks that have small size, *de novo* banks behaved more competitively in order to acquire market share.

The findings of this chapter suggest that the behaviour of banks of different sizes and ownership was different. Small banks, private banks, and *de novo* banks were the main drivers of competition in Indonesian banking. The current policy under the Indonesian Banking Architecture (API) clearly put a weight on banking soundness and stability. Nevertheless, API may be detrimental to competition by prohibiting the entry of competitive banks, for example private banks and *de novo* banks. The current chartering policy that only grants licenses to foreign acquired banks may impair competition by eliminating the discipline effects of the entry of potential competitors. Another consideration related to API is on its effect of the lending access of small firms (small and medium enterprises or SMEs). Banking consolidation aims to create an industry with a smaller number of banks. In addition, the consolidation encourages mergers among small banks in order to comply with the capital requirement and other risk management rules. This condition potentially crowds out lending for small and medium enterprises. As the banking industry is supplied by a smaller number of banks and is dominated by large banks, it is harder for the small firms to access the lending. The current and future policies should be directed to provide more opportunity for small banks and *de novo* banks to enter Indonesian banking as well as encouraging the banks to enhance their soundness. Finally, policies should encourage large and government banks to behave more competitively and to prevent collusion between them.

The next chapter focuses on some variables such as market concentration, foreign penetration and the proportion of government banks assets in the banking industry. Chapter five examines the relationship between market concentration and competition to test the hypothesis under the structural approach that there is a linear relationship between market structure, measured by market concentration, and bank behaviour. There is a long dispute about whether market concentration is a key variable determining bank behaviour or whether bank behaviour is determined by other variables, as suggested by the non-structural approach of new industrial organisation. Chapter five will provide evidence about whether the structural approach is preferred to explain competition in the Indonesian banking industry.

APPENDIX

Appendix 1 - The Estimation of the First Equation of Table 4.4-3 that Compares the Competitive Behaviour of Local Banks and Joint Venture Banks

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a Local banks group as base	
	Local Banks (FE Estimate)	
w_1	0.72 (0.06)	***
w_2	-0.32 (0.08)	***
w_3	0.24 (0.03)	***
OI	0.014 (0.02)	
EQ	-0.05 (0.06)	
DEP	0.65 (0.16)	***
DDC	-0.06 (0.03)	**
	Local Banks	Joint Venture Banks
Joint Coefficients of input prices or H-Statistics	0.64 ^b (0.11)	0.83 ^c (0.089)
Hypothesis testing:		
Ho=0		
F test	31.35	87.59
ρ	0.000	0.000
Ho=1		
F test	9.80	3.50
ρ	0.001	0.062
Degree of freedom	(1,272)	(1,272)
Number of observation	3,364	
R ² within	0.75	
Time Effect Dummies (F statistics of joint test)	37.39 ^d	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

a) Total revenue as dependent variable

b) Ho=0 and Ho=1 rejected on local banks group (both in level of confidence 99%).

c) Ho=0 rejected and Ho=1 could not be rejected on joint venture banks group (both in level of confidence 99%).

d) Ho=0 rejected (level of confidence 99%).

Appendix 2 - The Estimation of the Second Equation of Table 4.4-3 that Compares the Competitive Behaviour of Local Banks and Branches of Foreign Banks

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a Local banks group as base	
	Local Banks (FE Estimate)	
w_1	0.74 (0.06)	***
w_2	-0.35 (0.09)	***
w_3	0.24 (0.03)	***
OI	0.02 (0.02)	
EQ	-0.05 (0.06)	
DEP	0.6 (0.16)	***
DDC	-0.08 (0.04)	**
	Local Banks	Branches of Foreign Banks
Joint Coefficients of input prices or H-Statistics	0.63 ^b (0.11)	0.84 ^c (0.20)
Hypothesis testing: Ho=0		
F test	29.41	16.96
ρ	0.000	0.000
Ho=1		
F test	9.80	0.60
ρ	0.001	0.44
Degree of freedom	(1,248)	(1,248)
Number of observation	3,266	
R ² within	0.75	
Time Effect Dummies (F statistics of joint test)	36.46 ^d	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

a) Total revenue as dependent variable

b) Ho=0 and Ho=1 rejected on local banks group (both in level of confidence 99%).

c) Ho=0 rejected and Ho=1 could not be rejected on branches of foreign banks group (both in level of confidence 99%).

d) Ho=0 rejected (level of confidence 99%).

Appendix 3 - The Estimation of the Third Equation of Table 4.4-3 that Compares the Competitive Behaviour of Local Banks and *De Novo* Banks

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a Local banks group as base	
	Local Banks (FE Estimate)	
w_1	0.72 (0.06)	***
w_2	-0.34 (0.08)	***
w_3	0.24 (0.04)	***
OI	0.017 (0.02)	
EQ	-0.05 (0.07)	
DEP	0.65 (0.16)	***
DDC	-0.09 (0.04)	**
	Local Banks	<i>De Novo</i> Banks
Joint Coefficients of input prices or H-Statistics	0.62 ^b (0.11)	0.83 ^c (0.12)
Hypothesis testing: Ho=0		
F test	28.89	50.96
ρ	0.000	0.000
Ho=1		
F test	10.81	2.09
ρ	0.001	0.1497
Degree of freedom	(1,285)	(1,285)
Number of observation	3,639	
R ² within	0.74	
Time Effect Dummies (F statistics of joint test)	37.14 ^d	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are *t* ratios.

a) Total revenue as dependent variable

b) Ho=0 and Ho=1 rejected on local banks group (both in level of confidence 99%).

c) Ho=0 rejected and Ho=1 could not be rejected on branches of de novo banks group (both in level of confidence 99%).

d) Ho=0 rejected (level of confidence 99%).

Appendix 4 - The Estimation of the First Equation of Table 4.4-3 that Compares the Competitive Behaviour of Local Banks and Foreign Banks

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a Local banks group as base	
	Local Banks (FE Estimate)	
w_1	0.47 (0.05)	***
w_2	-0.32 (0.07)	***
w_3	0.18 (0.05)	***
OI	0.016 (0.03)	
EQ	-0.048 (0.06)	
DEP	0.23 (0.12)	**
DDC	0.013 (0.05)	
	Local Banks	Foreign Banks
Joint Coefficients of input prices or H-Statistics	0.33 ^b (0.9)	0.37 ^c (0.1)
Hypothesis testing: Ho=0		
F test	12.43	12.49
ρ	0.000	0.000
Ho=1		
F test	51.12	33.91
ρ	0.000	0.000
Degree of freedom	(1,144)	(1,144)
Number of observation	1,242	
R^2 within	0.47	
Time Effect Dummies (F statistics of joint test)	12.40 ^d	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are t ratios.

a) Total revenue as dependent variable

b) Ho=0 and Ho=1 rejected on local banks group (both in level of confidence 99%).

c) Ho=0 and Ho=1 rejected on foreign banks group (both in level of confidence 99%).

d) Ho=0 rejected (level of confidence 99%).

Appendix 5 - The Estimation of the Fifth Equation of Table 4.4-3 that Compares the Competitive Behaviour of Local Banks and *De Novo* Banks

Explanatory Variables	3 rd Specification (Unscaled Revenue Specification) ^a Local banks group as base	
	Local Banks (FE Estimate)	
w_1	0.40 (0.07)	***
w_2	-0.41 (0.09)	***
w_3	0.20 (0.05)	***
OI	0.009 (0.035)	
EQ	-0.04 (0.06)	
DEP	0.24 (0.10)	**
DDC	0.04 (0.05)	
	Local Banks	<i>De Novo</i> Banks
Joint Coefficients of input prices or H-Statistics	0.19 ^b (0.1)	0.51 ^c (0.14)
Hypothesis testing: Ho=0		
F test	3.59	12.38
ρ	0.06	0.000
Ho=1		
F test	66.48	11.26
ρ	0.000	0.001
Degree of freedom	(1,144)	(1,144)
Number of observation	1,242	
R^2 within	0.48	
Time Effect Dummies (F statistics of joint test)	12.8 ^d	

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. FE means Fixed Effect estimates. Figures in parentheses are *t* ratios.

a) Total revenue as dependent variable

b) $H_0=0$ could not be rejected and $H_0=1$ rejected on local banks group (both in level of confidence 99%).

c) $H_0=0$ and $H_0=1$ rejected on *de novo* banks group (both in level of confidence 99%).

d) $H_0=0$ rejected (level of confidence 99%).

Chapter Five

What Factors Are Driving Banking Competition?

Analysis of the Influence of Market Concentration and Foreign Penetration on Banking Competition

5.1. Introduction

The aim of Chapter five is to examine the role of market concentration and foreign penetration on banking competition. The data of banks assets and ownership shows that during the consolidation period in the 2000s, Indonesian banking became more concentrated and had a higher proportion of foreign banks compared to the 1990s. The current policy of the Indonesian Banking Architecture (API) suggests that following the economic and banking crisis of 1997 the central bank has consolidated the banking industry in order to create a stronger and more stable banking industry. The central bank encourages banks to strengthen by having a larger capital capacity and better risk management. In order to meet the new capital requirements and more prudent risk management under Basel II, banks can merge, inject more capital from the current shareholders, invite new shareholders, or reduce riskier activities. In addition to more stringent regulation, entry of newly established banks is prohibited (Rosengard & Prasetyantoko 2011). The current policies contributed to reducing the number of banks, creating a more concentrated industry, and changing the modes of entry of foreign banks from the establishment of *de novo* banks to the acquisition of local existing banks.

Indonesian banking consolidation, which started in the late 1990s, has contributed to increased market concentration. At that time, the authorities closed insolvent banks and merged some other banks to improve their performance. As a result, between 1997 and 2000, market concentration measured by the Herfindahl-Hirschman index went up 45 per cent compared to the deregulation period between 1988 and 1996. In the 2000s market concentration was lower than during the 1997 crisis, however it was still higher than for the deregulation period. The current policies encourage market consolidation through mergers and acquisitions. Banks must comply with a higher capital requirement, more prudent risk management and a restriction on the single presence of shareholders in more than one bank.

Banking consolidation may increase market concentration, especially if mergers are conducted by large banks. Therefore, it is important to examine the relationship between market concentration and competition. The Structure-Conduct-Performance (SCP) model, a well-established theory, suggests that a concentrated market leads to less competitive behaviour and creates excess profit for firms (Mason 1939). In contrast, a less concentrated market enhances competition and produce better market performance such as lowering of profits and price. According to this theory, it is necessary to identify the structure of the market to infer the level of competition.

The consolidation process in the Indonesian banking sector has been accompanied by an increase in foreign penetration. In the 2000s, foreign penetration increased considerably compared to previous periods. Penetration through acquisition of the local existing banks contributed to a larger foreign penetration in the local market¹⁸. If we define foreign banks as those with foreign ownership of at least 50 per cent then in the 1990s the assets of foreign banks accounted for less than 10 per cent of the local market. The share of foreign banks in the Indonesian banking became much larger in the 2000s; by 35 per cent on average. In terms of numbers of banks, the foreign banks increased significantly in the 2000s by 13 per cent compared to the 1990s. As discussed in Chapter four, recent acquisitions of local banks by the foreign banks have been more common than the establishment of *de novo* banks, for example through new joint ventures or branches of foreign banks. Therefore, the increasing number of foreign banks was not associated with a growing number of banks in the industry.

The impact of consolidation on competition is mixed because competition is not solely influenced by the level of market concentration. There are other factors affecting banking competition. The findings of the previous chapter suggest that the removal of market restrictions enhanced competition in the banking industry. Chapter three suggests that the removal of restrictions during the banking reforms in the 1980s had been effective in enhancing competition. The entry barriers were eliminated and thus local private banks, joint venture banks and branches of foreign banks could be established in the Indonesian banking market. The entry of private and foreign banks, particularly smaller banks, during the deregulation period in the late 1980s and the beginning of the 1990s contributed to a

¹⁸The foreign banks that formed through the acquisition of the local existing banks by the foreign banks/ institutions are known as foreign acquired banks (World Bank 2013). This type of bank has also been discussed in Chapter four. Chapter four distinguishes two types of foreign banks based on the modes of entry, *de novo* banks and foreign acquired banks. The same definitions for *de novo* banks and foreign acquired banks are employed in this chapter.

contestable market. In contrast, during consolidation, the banking environment has been more restrictive through the introduction of Basel II and the Indonesian Banking Architecture (API) which requires banks to comply with the single presence policy, the new minimum capital requirement and a prudent assets management system. In addition, under consolidation foreign penetration involved different modes of entry which were mostly in the form of the acquisition of local existing banks or entities by the foreign banks rather than by establishing *de novo* operations (joint venture banks or branches of foreign banks). Therefore, in addition to market concentration and foreign penetration, Chapter five includes other variables that have been argued to affect banking competition. These include the proportion of government banks, the macroeconomic environment, for example Gross Domestic Product per capita as a measure of the level of development and inflation as the measure of the price stability (Claessens & Laeven 2004).

This chapter focuses on five research questions as follows:

Research questions:

1. Did a highly concentrated market create a less competitive market?
2. Did the penetration of foreign banks improve competition in the banking industry?
 - a. Did the penetration of *de novo* banks (joint venture banks and branches of foreign banks) improve competition in the banking industry?
 - b. Did the changes of the modes of foreign penetration from *de novo* to acquisition of the local banks improve competition in the banking industry?
3. Did a lower proportion of government banks in the banking industry contribute to a more competitive market?
4. Did a higher level of economic development contribute to create a more competitive market?
5. Did a lower level of inflation contribute to a more competitive market?

5.2. Literature Review

Competition is one of the major topics discussed in the industrial organization literature. The discussion of market competition cannot be separated from the discussion of market structure and market performance. There are two competing paradigms which attempt to address the issue of market structure; firms' behaviour and market performance. The first paradigm is the

Structure-Conduct-Performance (SCP) and the second paradigm is the New Industrial Organization (NIO). The first paradigm emerged in 1939 through the article written by Edward S. Mason in the American Economic Review entitled, "Price and production policies of large-scale enterprises". The article argued that differences in market structure is the source of the differences in price responses (Mason 1939). Further, market structure determines the distribution of economic resources among different users, for example between producers and consumers. In a monopoly market, firms restrict output and investment below the level of a competitive market and drive the price up. Monopoly markets create excess profit for the producers at the expense of consumers. In contrast, firms in a perfectly competitive market could not affect market price as the demand curve is perfectly elastic for each individual firm. In equilibrium, the market produces at the lowest average cost where the price level is the same as the marginal cost. Therefore, perfect competition will not create an excess profit for producers and will not create loss for the consumers.

The findings of Mason (1939) became the foundation of the first paradigm. It is known as the Structure-Conduct-Performance hypothesis or the structural approach because it argues that there is a direct relationship between market structure, the behaviour of firms and market performance (Mason 1939). In most studies market structure is determined by the level of concentration of output in a few firms (Bain 1951; Berger & Hannan 1989; Bikker & Haaf 2002; Neumark & Sharpe 1992). The concentrated market reduces the cost of collusion so it facilitates collusive behaviour. Therefore, this market produces poor performance where the price ratio to cost is high at the expense of lower consumer welfare. In contrast, the competitive market will produce an efficient outcome as price equals marginal cost. Thus, an increase in firm numbers and lower market concentration will lead to more competitive conduct evidenced by lowering price and reducing a firm's profitability. In general, the structure-conduct-performance approach argues that market structure is an exogenous variable that comes from outside the model. Further, market structure determines firms' behaviour and market performance. Most studies employing the structural approach assume that market structure is determined by the level of concentration of output in a few firms. Concentrated markets lead to less competitive behaviour and create excess profit for firms. In contrast, less concentrated markets enhance competition and produce better market performance including lower profits and prices.

Following Mason there have been many studies testing the hypothesis of market structure and market performance. Some studies confirmed the structure-conduct-performance hypothesis that market structure, measured by the market concentration, has a negative relationship with either the firms' behaviour or market performance. Among the list of studies supporting the SCP theory were Bain (1951), Berger and Hannan (1989), Neumark and Sharpe (1992), and Bikker and Haaf (2002). Bain (1951) tested the structure-conduct-performance hypothesis empirically using data from the American manufacturing industry during the period 1936 to 1940. The study employed market concentration as a measurement of market structure and firms' profits as a measurement of market performance. By using a Z score test, the study compared the profit rates of a group of firms that worked in a highly concentrated market and those that worked in a less concentrated market. The research confirmed the structure-conduct-performance hypotheses. The study found that the profits of firms in industries with high seller concentration were on average larger than those for firms in industries of lower concentration. An example of the application of the structure-conduct-performance hypothesis to the banking sector was undertaken by Berger and Hannan (1989) based on survey data on interest rates on retail deposits in U.S banking. The Berger and Hannan (1989) findings for the U.S. banking industry were consistent with the structure-conduct-performance hypothesis and showed that banks in the concentrated markets paid lower deposit rates. Further, Berger and Hannan (1989) tried to determine whether market concentration facilitated price rigidity where banks are slow to adjust their prices. By employing monthly observations data of the deposit rates offered by 398 banks located in 132 local banking markets between 1983 and 1986, the study found that the rate of price adjustment was lower for banks with higher market shares compared to banks with smaller market shares. Hence, their findings also supported the structure-conduct-performance hypothesis (SCP) that concentrated market may facilitate price rigidity.

Neumark and Sharpe (1992) also employed market concentration as a proxy of market structure. They extended the study of market concentration in the banking industry by analysing the impact of market concentration on price adjustment. Consistent with Berger and Hannan (1989), this study also showed that a concentrated market had a substantial negative impact on the rate offered on deposits in the U.S. banking industry. Market concentration facilitated downward price rigidity and upward flexibility. In responding to the rising market rates, banks in concentrated markets preferred to be slower to increase the interest rates on deposits. In contrast, those banks were faster to lower interest rates on deposits in response to

falling market interest rates. Bikker and Haaf (2002) tested the Structure-Conduct-Performance approach (SCP) in the consolidated banking environment of some developed countries. They conducted an empirical test of the relationship between market structure and competition. The market structure was measured by two indexes, the k -bank concentration ratio (CR_k) and the Herfindahl-Hirschman index (HHI), plus one more indicator of the number of banks. Banking competition was estimated by the elasticity of bank revenue in response to changes in the input prices (H-statistics) of the Panzar-Rosse method. By regressing the H-statistics and the measure of market concentration, the study confirmed the SCP hypothesis that concentration impaired competitiveness. Further, a Wald test showed that both variables that measured market structure (the concentration index and the number of banks) were negatively related to the competitive behaviour of banks.

However, as discussed in Chapter two, other studies found evidence that the relationship between market structure, firm behaviour and market performance is not linear (Baumol 1982; Demsetz 1973; Peltzman 1977; Smirlock 1985; Smirlock, Gilligan & William 1984). The findings are consistent with the second Non-structuralist paradigm. Under the second paradigm, economists look beyond the number of firms and market concentration in an industry in determining the characteristics likely to promote a competitive industry and keep economic profit low. They argue that a competitive industry may also exist even when only a small number of firms operate in the industry or in the case of a concentrated market. The main critique of the Non-structural approach of the structural approach is on the position of market structure or market concentration as a sole determinant of firm behaviour and market performance. The studies under the non-structural approach argue that market structure is an endogenous variable rather than an exogenous variable. These studies suggest that the existence of contestable markets determines the structure of a market (Baumol 1982; Demsetz 1973; Molyneux, Thornton & Llyod-Williams 1996; Peltzman 1977; Smirlock 1985; Smirlock, Gilligan & William 1984). Contestable markets require freedom of entry and exit. The removal of restrictions to enter the market is one main factor creating contestable markets (Claessens & Laeven 2004; Sengupta 2007). In addition, the removal of restrictions in conducting business, for example interest rate control and lending limits, contribute to creation of contestable markets.

Some studies found that the penetration of foreign banks into a market is also important for creating contestable markets because they compete with the local banks to enhance their

efficiency and lower the spread of interest rates (Claessens, Demirgüç-Kunt & Huizinga 1998; Cole, Goldberg & White 2004; Jeon, Olivero & Wu 2011; Manlagñit 2011; Martinez Peria & Mody 2004; Unite & Sullivan 2003). With respect to developing countries, most studies were concerned with the penetration of foreign banks in Latin American countries. There have been fewer studies conducted in Asian countries. The focus of attention has been on the Latin American countries because foreign penetration was firstly observed in that region. Moreover, the degree of foreign penetration in that region is much higher than in other developing countries. Among the studies of foreign bank penetration in Latin American countries were those by Martinez Peria and Mody (2004), Yeyati and Micco (2003), Yeyati and Micco (2007), Barajas, Steiner and Salazar (2000), and Jeon, Olivero and Wu (2011). There were also some studies about foreign bank penetration in the emerging markets of Asian countries; for example Manlagñit (2011) and Unite and Sullivan (2003) in Philippines banking, and Cho (1990) and Montgomery (2003) in South East Asian countries included Indonesia.

Penetration of foreign banks was capable of lowering intermediation costs (Claessens, Demirgüç-Kunt & Huizinga 1998) because foreign banks had lower operating expenses (Martinez Peria & Mody 2004; Unite & Sullivan 2003) and overhead costs (Manlagñit 2011). Thus, the penetration of foreign banks put pressure on local banks to lower their costs (Clarke et al. 2001), and to increase their efficiency and lower profits (Manlagñit 2011; Sengupta 2007). In addition, foreign banks had a lower spread of interest rates¹⁹ (Martinez Peria & Mody 2004) and better loan quality (Claessens, Demirgüç-Kunt & Huizinga 1998). Foreign banks were smaller than local banks. A study by Claessens, Demirgüç-Kunt and Huizinga (1998) revealed that the number of foreign penetration measures exceeds assets penetration measures. If they used the number of foreign banks as the measure of foreign penetration, it produced a higher magnitude compared to when they employed the market shares of foreign banks as the measure of foreign penetration. It showed that foreign banks tend to be smaller than local banks. The findings in Chapter four also suggest that foreign banks, particularly joint venture banks and branches of foreign banks, are smaller banks compared to the average size of local banks. The empirical results of Chapter four indicate that smaller banks are more competitive than larger banks. Thus, having small foreign banks enter a market is essential to enhancing competition in the local banking market. Cho (1990) examined foreign penetration in the Indonesian banking industry between 1974 and 1983. The establishment of branches of

¹⁹ Spread is calculated by subtracting the division of total interest income on loans and the division of interest cost on deposits.

foreign banks reduced the level of concentration in Indonesian banking. However, the study revealed that the reduction in the level of concentration was also affected by the increase in the size of the industry and more permissive government policies for banks to expand their business. This supports the hypothesis that foreign bank penetration enhances competition in the local banking industry. However, a study by Yeyati and Micco (2007) on the impact of foreign penetration on competition in Latin American countries reached a different conclusion. This study indicated that foreign penetration had a negative impact on competition in the banking industry. They argue that “entry of foreign banks was more likely to increase market power of the representative banks”(Yeyati & Micco 2007, p. 1642).

In relation to the modes of entry of foreign banks, some recent studies have suggested that different modes of entry may have different effects on competition. Martinez Peria and Mody (2004), Clarke et al. (2001), Montgomery (2003), Berger et al. (2004), Claeyns and Hainz (2006), Lehner (2009) and Jeon, Olivero and Wu (2011) analysed the different impacts of foreign penetration on competition if entry is conducted either through the establishment of *de novo* operations or the acquisition of the local existing banks (foreign acquired banks). As discussed in Chapter four, Clarke et al. (2001), Claeyns and Hainz (2006) and Sengupta (2007) define *de novo* operations as either penetration through the establishment of branches or the formation of subsidiaries of foreign banks in local banking. Subsidiary refers to a fully owned subsidiary of foreign banks or joint ventures with foreign banks as a majority shareholder (Montgomery 2003). In contrast, foreign penetration through acquisition occurs where foreign banks acquire the local existing banks.

In general, *De novo* operation does more to enhance competition in the local banking industry compared to foreign acquired banks. Martinez Peria and Mody (2004) showed that *de novo* banks operated with lower spreads compared to foreign banks that entered the market by acquiring local existing banks. The literature also suggests that *de novo* banks are more aggressive because they are a new business entities unlike the foreign acquired banks. On the one hand, *de novo* banks as the newcomers are more willing to charge lower rates because they have to work hard to establish market share (Martinez Peria & Mody 2004). On the other hand, the foreign acquired banks already have a captive market from the acquired local banks. In addition, as a new business entity a *de novo* bank is not likely to possess knowledge about borrowers in the local banking industry. Martinez Peria and Mody (2004) argue that *de novo* banks focus on transparent segments of the market where the information asymmetry is lower

and information about borrowers can be accessed. The segment of the transparent borrowers is perceived to be more competitive thus *de novo* banks have to charge a lower spread in order to attract these borrowers (Dell'Ariccia & Marquez 2004).

Montgomery (2003) also favoured *de novo* operations because they were more stable in terms of having a higher position of the spread between foreign liabilities and foreign assets. In addition, the lending of *de novo* operations fluctuated less compared to domestic bank lending, particularly during the 1997 economic crisis. Claeys and Hainz (2006) also suggested that competition was stronger if market entry occurred through Greenfield investment or the establishment of *de novo* operations. Their study indicated that a 1 per cent increase in foreign *de novo* market share would lead to a reduction in domestic bank average lending rates of 0.17 per cent compared to a reduction of 0.13 per cent for foreign acquired banks. This study revealed interesting findings regarding the behaviour of *de novo* banks. Claeys and Hainz (2006) argue that *de novo* banks were working under a non-linear age dynamic. They charged higher interest rates on average but subsequently reduced the interest rates over the years. *De novo* operations charged higher rates in the beginning because they focused on small firms with the characteristic of soft information.

A similar notion was advanced by Jeon, Olivero and Wu (2011). They suggest that *de novo* foreign bank entry had a stronger positive impact on competition than foreign acquired banks. Some studies also highlighted another disadvantage of having foreign entry through the acquisition of local existing banks. Clarke et al. (2001) and Berger et al. (2004) confirm that foreign presence through acquisition of local existing banks reduced the supply of small business credit. However, Berger et al. (2004) added that foreign entry through the acquisition of local existing banks may induce the entry of *de novo* (new established banks, not necessarily foreign banks) in order to supply loans to small firms.

In addition to the modes of entry, the level of development also contributes to explain the role of foreign banks in creating a contestable market. Lensink and Hermes (2004) analysed the impact of foreign penetration in the local banking market by distinguishing the level of development of the country where the market is located. Their findings revealed that with different levels of development, the influence of foreign banks changed. Foreign penetration in the countries with lower levels of economic development had a higher spill-over impact than foreign penetration in developed countries. In countries with lower levels of

development, the gap in terms of the adoption of modern techniques and practices between foreign and local banks was larger. Consequently, the gap between local and foreign banks was less in developed countries. However, the spill-over effect of foreign banks may also be lower in developing countries where the banking industry is segmented and the incumbent local banks possess substantial market power (Lensink & Hermes 2004).

In addition to the penetration of foreign banks, the relationship between market structure and competition is also influenced by the proportion of government banks in the local banking market. Chapter four of this thesis suggests that the behaviour of government banks was not competitive because they had long hierarchical organisational design which leads banks to focus more on large borrowers than on the small ones (Williamson 1967) and had a captive market for both loans and deposits amongst the state enterprises (McLeod 1999). The larger proportion of government banks in the local market signals the existence of barriers to entering or expansion by private banks. In the case of Indonesia prior to the banking reforms in the 1980s, state-owned banks dominated the banking industry with more than 80 per cent of deposits. Banking reform in the 1980s removed the restrictions to enter the market. In addition, the reforms also lifted some hidden subsidies and controls. Those policies provided equal treatment for state-owned, private, local and foreign banks. After the banking reforms, the domination of state commercial banks declined and was replaced by their private counterparts²⁰. The above illustrations suggest that the domination of government banks in the local banking market determines the level of restrictions in the banking industry.

In addition, the literature suggests that the macroeconomic environment determines the level of competition in the banking industry. Claessens and Laeven (2004) found that unfavourable macroeconomic conditions, for example high inflation rates, may constrain competition in the banking industry. Under conditions of high inflation, prices of financial services, for example interest rates, will be less informative. During the high inflation, the increase of interest rates reflects the increase in inflation rather than a more expensive price of financial services. The study by Jeon, Olivero and Wu (2011) on emerging economies in Asia and Latin America also found that in a better macroeconomic environment with a high level of economic growth,

²⁰ The share of state banks demand deposits fell from 88 per cent in 1981 to 30 per cent in 1996. The state banks were still quite strong in time deposits as their share remained constant at 56 per cent in the early part of the deregulation period. However their share declined after the second banking reform to 36 per cent in 1996. In saving accounts the share of state commercial banks also declined from 95 per cent in 1981 to 42 per cent in 1996.

a high level of gross domestic product and lower inflation are more capable of enhancing competition in the banking industry.

Briefly, the literature suggests that in addition to market structure, which is measured by market concentration, competition in the banking industry is influenced by other factors: the existence of a contestable market (Baumol 1982; Demsetz 1973; Peltzman 1977; Smirlock 1985; Smirlock, Gilligan & William 1984), the modes of entry of foreign banks (Berger et al. 2004; Claeys & Hainz 2006; Clarke et al. 2001; Jeon, Olivero & Wu 2011; Lehner 2009; Martinez Peria & Mody 2004; Montgomery 2003), the level of development (Lensink & Hermes 2004), and the macroeconomic environment (Claessens & Laeven 2004; Jeon, Olivero & Wu 2011). The freedom of entry for potential competitors, both local private banks and foreign banks, and fewer restrictions in the market contribute to create a contestable market. In order to examine the determinants of competitive banking, this chapter focuses on the role of market concentration, foreign penetration, the entry modes of the foreign penetration, the proportion of the government banks in the banking industry, the degree of development, and the macroeconomic environment in the Indonesian banking industry.

5.3. Empirical Methodology

The empirical methodology consists of three parts. First is the empirical methodology to measure market concentration in the Indonesian banking industry. This chapter relies on the Herfindahl-Hirschman index to measure the banking concentration. Second is the discussion on the method of measuring foreign penetration. Third is the empirical method of the time series econometric approach, particularly the Vector Error Correction Model (VECM). In order to estimate the competition level on a yearly basis, refer to the estimation of the yearly H-statistics discussed in Chapter two.

5.3.1. Measuring Banking Concentration – Herfindahl-Hirschman Index (HHI)

The first section of the empirical method is to measure banking concentrations for each year in the thirty one years (1980 – 2010). There are two prominent methods to measure market concentration which are the *k*-bank concentration ratio (CR_k) and the Herfindahl-Hirschman index (HHI). The first index takes the market shares of the *k* largest banks in the market and ignores the remaining banks in that market (Bikker & Haaf 2002, p. 2206). Bikker and Haaf

(2002) argue that this index is based on the assumption that the market is controlled by a small number of large banks. The second index is the Herfindahl-Hirschman index (HHI). This index uses market shares as weights, thus larger banks are assigned larger weights in order to take into account the different sizes of banks in the market. According to Bikker and Haaf (2002, p. 2206), “the index includes each bank separately and differently, and thereby avoids an arbitrary cut-off and insensitivity to the share distribution”. Furthermore, HHI covers all banks in the industry rather than focusing on a small number of large banks. Due to these advantages of the Herfindahl-Hirschman index (HHI), this chapter chooses Herfindahl-Hirschman index (HHI) rather than the *k*-bank concentration ratio (CR_k).

The formula to compute the Herfindahl-Hirschman index is as follows:

$$\text{HHI} = \sum_{i=1}^n s_i^2 \quad 5.3-1$$

Where, s_i refers to the market share of bank i in the market and n is the number of banks. The Herfindahl Index (H) ranges from $1/N$ to one, where N is the number of banks in the market. The magnitude of HHI implies the level of concentration in the industry where the larger the value of the index demonstrates a more concentrated market. For an industry that consists of a single monopoly, $\text{HHI}=1$ because a monopolist has a market share of $s_1=1$ thus $s_1^2 = 1$. On the other hand, an industry with N banks with equal market shares will have $\text{HHI}=1/N$ (Lipezynski, Wilson & Goddard 2005).

The U.S. Department of Justice and the Federal Trade Commission presented horizontal merger guidelines in 2010 that use the HHI index to classify the level of concentration in the observed market. The classification is as follows:

- HHI index below 0.15 implies an un-concentrated market
- HHI index between 0.15 and 0.25 implies a moderately concentrated market
- HHI index above 0.25 implies highly concentrated market

Source: The Department of Justice and Federal Trade Commission of the United States (2010)

By using the share of assets of banks in the industry as the determinant of market share, the HHI index for the thirty-one years was computed. Figure 5.3-1 shows the evolution of the market concentration in Indonesian banking between 1980 and 2010. In the early 1980s the index ranged from 0.15 to 0.19. Based on the classification of the horizontal merger

guidelines of the U.S. Department of Justice and Federal Trade Commission, the market is perceived as moderately concentrated. Following deregulation under the two banking reforms in 1983 and 1988, market concentration significantly reduced from 0.16 in 1988 to 0.08 in the following years as nineteen new banks entered the local banking market in 1989. Banking concentration gradually decreased during the deregulation and liberalization in the 1990s. Ultimately, the market became less concentrated in the period 1993 to 1997 as indicated by HHI indexes of 0.04 and 0.05.

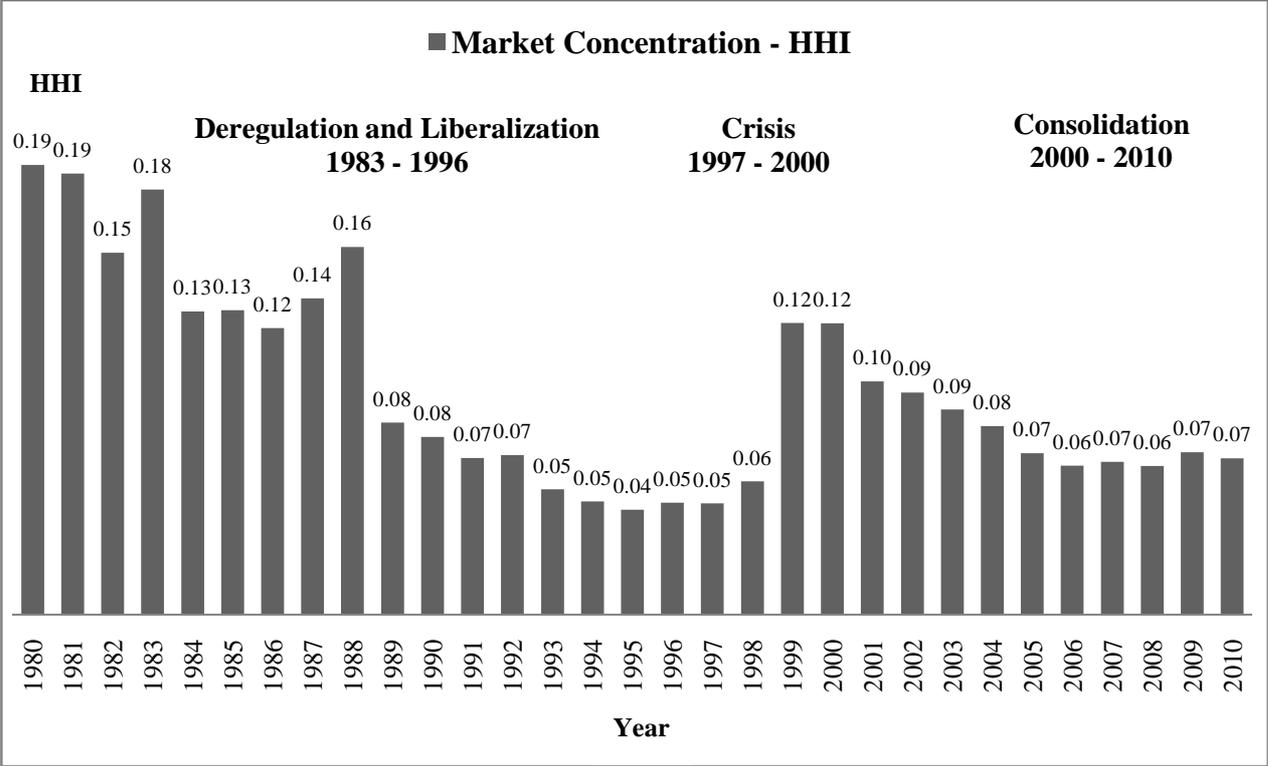


Figure 5.3-1 The Banking Concentration, Herfindahl-Hirschman Index in the Indonesian Banking between 1980 and 2010

Note: There is some rounding as the heights of some bars with the same HHI index are not similar.

The concentration began to increase following the 1997 crisis. In 1999 and 2000 the HHI index reached its highest level of 0.12 after the banking deregulation in the 1980s. The increase in market concentration was associated with the reduction in the number of banks due to closure of banks and bank mergers. The closure of banks, many of which were small banks, had skewed the market share distribution to large banks. Furthermore, the merger of state banks into Bank Mandiri also contributed to increased market inequality. During the consolidation period in the 2000s, the HHI index was higher compared to the deregulation and

liberalization period however it was still lower compared to the crisis period in 1998 - 2000. In the 2000s market concentration gradually lowered to 0.06 to 0.07, especially after 2004. The consolidation policy in Indonesia, which was driven by the Central Bank through the introduction of a single presence policy and minimum capital requirement under Indonesian Banking Architecture, effectively encouraged medium-sized and small banks to consolidate in order to comply with the banking regulations. The mergers of medium-sized and small banks improved the distribution of market share and reduced the market concentration.

5.3.2. Measuring Foreign Penetration

There was a changing pattern to the form of foreign penetration in the Indonesian banking industry in the 2000s. As discussed in Chapter four, foreign banks and entities have recently penetrated the local market through the acquisition of the local existing banks rather than the establishment of new joint ventures or branches. In the beginning, foreign banks penetrated the local market through the divestment programs of large banks under recapitalization following the economic and banking crisis in 1997²¹. According to the ownership data for Indonesian banks in 2009, there were at least seven banks under the recapitalization program owned by the foreign investors. The shares of foreign investors in those seven banks were close to 50 per cent or even higher for Bank CIMB Niaga, Bank Danamon, Bank International Indonesia, and Bank Tabungan Pensiunan Indonesia. Those banks controlled 28.6 per cent of the total assets of the Indonesia banking industry in 2009 or equal to 698 trillion IDR approximately (see Table 5.3-1 on the foreign penetration of the bail-out banks).

²¹ In order to improve the banks' financial performance in the 1997 economic crisis, the government bailed-out some banks through the Indonesian Banking Restructuring Agency (IBRA). The government contributed 80 percent of funds required to increase bank equity to meet the CAR requirement by 4 per cent. The government contribution was then converted into shares in the recapitalized banks. In 2003 under the privatization program, the Indonesian government offered their shares in bailout-banks to the public.

Table 5.3-1 The Ownership Composition of Bail-Out Banks under the Indonesian Banking Restructuring Agency in 2009

No	Bank	Assets in 2009 (in millions Rupiah)	Ownership composition in 2009
1	Bank Central Asia	280,817,308	Farlindo Investment (Mauritius) Ltd. (47.15%); Public (49.91%)
2	Bank Niaga/ Bank CIMB Niaga	106,803,360	CIMB Group Sdn Bhd (77.24%); Santubong Ventures Sdn Bhd, Malaysia (16.64%)
3	Bank Danamon Indonesia	96,630,214	Asia Financial (Indonesia) Ltd Pte (67.76%); Public (32.24%)
4	Pan Indonesia Bank Ltd/ Bank Panin	76,075,202	PT PANIN Life (45.92%); Votrant No 1103 PTY Limited (38.48%); Public (15.6%)
5	Bank International Indonesia	58,701,483	Sorak Financial Holding Pte.Ltd (54.33%); Mayban Offshore Corporate Services (Labuan) Sdn Bh (43.19%); Public (2.48%)
6	Bank Bali/ Bank Permata	55,900,751	PT Astra Indonesia Tbk (44.5%); Standard Chartered Bank (44.5%); Public (10.99%)
7	Bank Tabungan Pensiunan Nasional	22,272,246	TPG Nusantara S.a.r.i * (71.61%)

Source: Bank annual financial reports collected by the Bank of Indonesia

Foreign banks and entities also penetrated local small banks. Under consolidation, banks had to meet a new capital requirement by 2010. Some small banks invited investors to inject additional capital so as to comply with the new requirement. There was foreign participation in six small banks via injection of capital in 2009. Foreign investors injected capital so the small banks could comply with the capital requirement of 100 billion Rupiah by 2010. After the initial involvement, the shares of foreign shareholders increased substantially. In some banks, for example Bank Barclays Indonesia and Bank Aglomas, foreign participation was more than 90 per cent (see Table 5.3-2 for detailed information on foreign penetration to the small banks). In addition, an intensity of foreign penetration has recently occurred as the existing foreign partners in the joint ventures increased their participation so that they became the main shareholders. The current Banking Law number 10 (1998) permits foreigners including banks, entities and individuals, to have up to 99 per cent of shares in joint venture banks. Based on ownership data in Table 5.3-3, among the sixteen joint ventures, foreign banks participation increased substantially up to 99 per cent.

Table 5.3-2 The Foreign Penetration to the Small Banks

No	Bank	Assets in 2009 (in millions)	The position of Banks Capital/ Equity	Foreign penetration
1	Bank Bintang Manunggal/ Bank Hana	1,843,562	in 2006 the equity was 33 billion and increased to 153 trillion in 2007	in 2006 Foreign penetration started with the entry of Hana Bank Korea with 70.1%
2	Bank Executive International/ Bank Pundi Indonesia	1,425,576	in 2009 the equity was minus 47 billion and increased to 310 billion in 2010	in 2010 the IF Services Netherlands BV purchased 24% of shares.
3	Bank Indomonex/ Bank SBI Indonesia	1,142,551	in 2006 the equity was 25 billion and increased to 156 trillion in 2007	in 2006 the State Bank of India purchased 76% of banks' shares.
4	Bank Akita/ Bank Barclays Indonesia	841,062	in 2008 the equity was minus 105 billion and increased to 286 billion in 2009	in 2009 Barclays Bank PLC owned 99% of the bank. The name of the bank was changed to Bank Barclays Indonesia.
5	Bank Aglomas/ Bank Aglomas International	260,074	in 2009 the equity was 84 billion and increased to 104 billion in 2009	in 2007 the foreign penetration started by the investment of Wishart Investments Inc. It purchased 90 per cent of the bank's shares.
6	Bank Sri Partha/ Bank Andara	217,228	in 2006 the equity was 25 billion and increased to 105 billion in 2008	In 2007 the Mercy Corp purchased 40.16% of shares. Further the International Finance Corp. purchased 19.9%.

Source: Bank annual financial reports collected by the Bank of Indonesia

As discussed previously, regulations changed and the banking environment increased foreign penetration into the local market. A larger share of foreign banks in the local market can be explained by three features. First, foreign banks acquired the local existing private banks through the divestment program of bail-out banks. Secondly, foreign banks purchased shares of small private local banks. Thirdly, foreign partners in joint venture banks increased their participation up to 99 per cent. Figure 5.3-2 demonstrates the increased participation of foreign banks or entities in Indonesian banking. The larger foreign participation in the 2000s is mostly due to penetration through the acquisition of local existing banks (foreign acquired banks).

Table 5.3-3 The increase of foreign shares in Joint ventures

No	Bank	The increase in foreign shares
1	ANZ Panin	85% (2009) to 99% (2010)
2	Commonwealth Bank Indonesia	50% (1998) to 97.44% (2010)
3	BNP Lippo Indonesia	75% (1995) to 99% (2009)
4	Bank of Chinatrust	85% (1998) to 99% (2008)
5	Bank Fuji International/ Bank Mizuho Indonesia	80% (1995) to 99% (2010)
6	Bank Hanvit/ Bank Woori	80% (1999) to 95.18% (2009)
7	Bank Korea Exchange Danamon/ Bank KEB Indonesia	85% (1995) to 99% (2009)
8	Bank Multicor/ Bank WinduKentjana International	76% (1995) to 90% (2009)
9	Bank Mitsubishi Buana/ Bank DBS Buana/ Bank DBS Indonesia	85% (1995) to 99% (2009)
10	Rabobank Duta Indonesia	85% (1995) to 99% (2008)
11	Bank Sakura Swadharma	85% (1995) to 97% (2000)
12	UFJ Indonesia/ Bank Sanwa Indonesia	79.9% (1995) to 96.23% (2005)
13	Societe Generale Summa	85% (1995) to 99% (2002)
14	Sumitomo Niaga	79.9% (1995) to 99% (2009)
15	Tokai Lippo	70% (1995) to 84.39% (2000)
16	UOB Indonesia	79.9% (1995) to 99% (2009)

Source: Bank annual financial reports collected by the Bank of Indonesia

In order to properly define foreign banks, this chapter refers to other studies of the banking industry. According to Claessens, Demirgüç-Kunt and Huizinga (1998), foreign banks are those in which at least 50 per cent of assets are foreign-owned. They measured foreign penetration as the proportion of the number of foreign banks to total banks in the banking industry and the proportion of assets of foreign banks to the total assets of the banking industry. In addition, Yeyati and Micco (2007) defined foreign penetration as the ratio of foreign bank assets to total banking assets and described foreign banks as those controlled by institutions with at least 51 per cent of total shares. They only consider banks where the foreign owner was located in developed countries. They argue that banks where the foreign control is located in developing countries (typically neighbouring countries) do not benefit from greater financial sophistication and implicit parent guarantees because their holdings are not financial firms (Yeyati & Micco 2007, p. 1636). Jeon, Olivero and Wu (2011) also defined foreign banks as those with more than 51 per cent of the capital owned by foreign individuals, firms (including banks) or international organizations. Similar to previous studies,

Jeon, Olivero and Wu (2011) employed both the share of the number of foreign banks and the share of the size of foreign banks to measure foreign penetration.

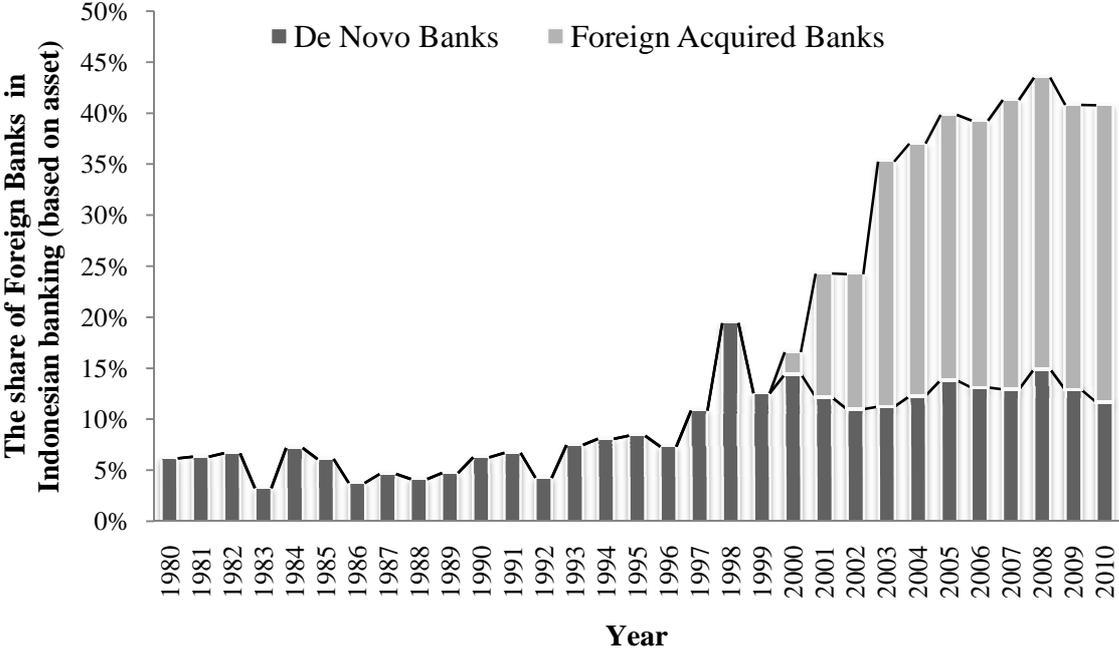


Figure 5.3-2 Foreign Penetration in the Indonesian Banking Sector between 1980 and 2010

Based on the literature discussed above, we define foreign banks as those with foreign ownership of at least 50 per cent. We did not limit the foreign banks to those with the foreign control located in developed countries as did Yeyati and Micco (2007). In the case of Indonesian banking, there are some owners from neighbouring countries, for example, Malaysia and India. However, as described in Table 5.3-1 above, the foreign controllers from Malaysia and India are from the banking or financial industries. Therefore, related Indonesian banks may still benefit from greater financial sophistication.

5.3.3. Time Series Method – Vector Error Correction Model (VECM)

A Time series approach is appropriate to examine the relationship between the evolution of market concentration and the trend of foreign penetration and the evolution of competition in the Indonesian banking industry between 1980 and 2010. As explained by Lutkepohl and Kratzig (2004), typically, the time series method is able to work on a very limited number of variables. However, if we have a limited number of observations, we have to be cautious in covering the variables in the model. A larger number of variables will cost degrees of freedom. Lutkepohl and Kratzig (2004) advise narrowing the number of variables by focusing

on the central variables in the model. The choice of variables that contribute to a competitive banking industry is suggested by the literature and findings discussed in the previous chapter. This chapter also continues the process of selecting variables by conducting the data generation process (DGP). This process was conducted by a detailed analysis of the characteristic of the individual time series variables involved (Lutkepohl & Kratzig 2004, p. 2). Lutkepohl and Kratzig (2004) argue that it is important to have a diagnostic test of stationarity of the individual time series variables to have a system that has potentially related variables.

The discussion of the time series method begins with examination of the characteristics of each time series variable. It aims to find out whether the variables have values that evolve regularly around their means or whether they may have stochastic or deterministic trending behaviour. It is important to identify the characteristics of each time series variable because they have an impact on the statistical inference procedures that are used to analyse the variables (Lutkepohl & Kratzig 2004). Therefore, the individual examination of characteristics of the individual variables should be conducted before those variables are modelled jointly. A stationarity test is conducted to examine the individual characteristic of the variables. It informs whether the variable evolves regularly around their means or they have stochastic behaviour. The second step of the time series method is to investigate the existence of integration among variables in the model. This test is important to ensure that we can discover the long-run relationship in the model. Finally, this chapter estimates the long-run relationship of the evolution of market concentration and the trend of foreign penetration on the evolution of market competition.

5.3.3.1. Stationarity Test

The variable will follow a stochastic process y_t if it has time-invariant first and second moments. In other words, y_t is stationary if:

1. $E(y_t) = \mu_y$ for all $t \in T$
2. $E[(y_t - \mu_y)(y_{t-h} - \mu_y)] = \gamma_h$ for all $t \in T$ and all integers h such that $t - h \in T$

According to Lutkepohl and Kratzig (2004), the first condition implies that all members of a stationary stochastic process have the same constant mean. Therefore, a stationary variable

will fluctuate around a constant mean and does not have a trend. The second condition ensures that the variances are also time invariant because, for $h=0$, the variance $\sigma_y^2 = E[(y_t - \mu_y)^2] = \gamma_0$ does not depend on t . Moreover, the covariance $E[(y_t - \mu_y)(y_{t-h} - \mu_y)] = \gamma_h$ does not depend on t but just on the distance in time h of the two members of the process. Briefly, Lutkepohl and Kratzig (2004) concluded that the variables that are generated by the stochastic stationary process will have a finite number of means, variances and covariances.

The Augmented Dickey Fuller test is employed to test data stationarity. It tests the null hypothesis that there is a unit root against the alternative of stationarity of a data generating process that may have a nonzero mean term, a deterministic linear trend, and perhaps seasonal dummy variable. The Augmented Dickey Fuller test statistic is based on the t-statistic of the coefficient from an OLS estimation of the model below.

$$\Delta \mathbf{y}_t = \phi \mathbf{y}_{t-1} + \sum_{j=1}^{p-1} \alpha_j^* \Delta \mathbf{y}_{t-j} + \mathbf{u}_t, \quad 5.3-2$$

Where $\phi = -\alpha(1)$ and $\alpha_j^* = -(\alpha_{j+1} + \dots + \alpha_p)$. In this model we wish to test the pair of hypotheses $H_0: \phi = 0$ versus $H_1: \phi < 0$. If the unit root is not found in a level equation, unit root tests were carried out on the first difference of the variables. Next, we have to examine whether all variables are stationary at the first difference. If they are stationary at the first difference, it may indicate that each series is integrated at the same order- I(1).

5.3.3.2. Cointegration Test

The main objective of this chapter is to examine the long-run relationship of the focus variables, market concentration; foreign penetration and competition. With regard to econometrics, the existence of a long-run relationship is determined by the existence of cointegration in the system. Cointegration means that variables in the system have a common stochastic trend thus there are linear combinations of them. A combination of variables that are stationary in the first difference – I(1), may integrate in the level - I(0). Lutkepohl and Kratzig (2004) show that a set of I(1) variables are cointegrated if a linear combination exists that is I(0). In order to examine the existence of a long-run equilibrium relationship among the variables, we conducted cointegration tests. This study employed Johansen's (1995) cointegration procedure (Johansen 1995). The test shows whether there is cointegration equation and how many ranks. The Johansen test provides the number of cointegration

vectors in non-stationary time series and report trace statistics and max-eigen statistics. Below is the equation 5.3-3 for the cointegration test:

$$y_t = A_1 y_{t-1} + \dots + A_k y_{t-k} + B X_t + \mu_t \quad 5.3-3$$

Where, y_t is an endogenous variable and X_t are deterministic variables (a constant and time trend).

5.3.3.3. Vector Error Correction Model (VECM)

The Vector Error Correction Model is perceived as a suitable approach to examine the long-run relationship of market concentration evolution and the trend in foreign penetration on the evolution of banking competition. The model measures the long-run relationship and reveals the speed of adjustment to the equilibrium. Furthermore, this model is suitable for a system that has a potential endogeneity problem. This study performed the weak exogeneity test to examine the endogeneity in the model. Research under the New Industrial Organization approach argues that market concentration is an endogenous variable rather than an exogenous variable. As explained extensively in Chapter two, the structural approach is based on a perceived market structure, which is usually measured by market concentration, as an exogenous variable that determines firm behaviour and market performance. Concentrated markets lead to less competitive behaviour and creation of excess profit for firms. In contrast, a less concentrated market enhances competition and produces better market performance, such as lowering profits and price. The New Industrial Organization (NIO) argues that market structure is not an exogenous variable. Rather, it is an endogenous variable because market structure is also determined by other variables, for example the existence of barriers to entry (Baumol 1982) and the level of efficiency (Peltzman 1977; Smirlock 1985). Baumol (1982, p. 7) argues that market structure is an endogenous variable because it depends on its output vector rather than being determined exogenously. The efficient scale of production will determine the number of firms supplying the market. This approach is opposed to the structural approach which considers market structure as an exogenous variable that determines market performance.

Regarding the foreign penetration variable, the study by Yeyati and Micco (2007) indicated a potential endogeneity problem between foreign penetration and market competition. The decision of foreign banks to penetrate local banking may depend on the level of competition

in the local banking industry. They argue that foreign banks are more likely to enter a less competitive market (Yeyati & Micco 2003, p. 1640). Therefore, the level of competition could be a determining factor for foreign penetration. This implies that foreign penetration may be endogenous in the model rather than being exogenous.

The present study used a weak exogeneity test to examine whether there is an endogeneity problem in the model. The test uses the VECM equation 5.3-4 as below:

$$\Delta \mathbf{y}_t = \boldsymbol{\pi} \mathbf{y}_{t-1} + \boldsymbol{\Gamma}_1 \Delta \mathbf{y}_{t-1} + \dots + \boldsymbol{\Gamma}_{p-1} \Delta \mathbf{y}_{t-p+1} + \mathbf{B} \mathbf{X}_t \mathbf{u}_t \tag{5.3-4}$$

Where $\boldsymbol{\pi}$ is $\alpha\beta$ matrix and α is the adjustment coefficient informing the speed of adjustment to equilibrium. According to Lutkepohl and Kratzig (2004), if all α_{ij} in row i of α are equal to zero, the corresponding cointegration equation determines the i^{th} element of $\Delta \mathbf{X}_t$ is weakly exogenous. Table 5.3-4 shows that competition and market concentration are endogenous while foreign penetration is weakly exogenous. This test supports the argument that there is a potential endogeneity problem in a system.

Table 5.3-4 Weak Exogeneity Test

	Competition	Market concentration	Foreign penetration
Chi-square(1)	6.847378	9.041818	0.646321
probability	0.008877*	0.002639*	0.421431

* Denotes rejection of the hypothesis at the 1 per cent level.
 Note: the test for weak exogeneity is run under the assumption of one cointegrating equation. The failure to reject the null hypothesis is evidence of the weak exogeneity of the variable of interest.

For the three variables case with one cointegrated relationship, the Vector Error Correction Models can be expressed as follows:

$$\Delta(\ln H_t) = \boldsymbol{\mu}_1 + \boldsymbol{\alpha}_{11} \mathbf{ECT}_{t-1} + \sum_{j=1}^{p-1} \phi_{1j} \Delta(\ln H_{t-j}) + \sum_{j=1}^{p-1} \boldsymbol{\theta}_{1j} \Delta(\ln \text{HHI}_{t-j}) + \sum_{j=1}^{p-1} \boldsymbol{\theta}_{1j} \Delta(\ln \text{FP}_{t-j}) + \boldsymbol{\varepsilon}_{1t} \tag{5.3-5}$$

$$\Delta(\ln \text{HHI}_t) = \boldsymbol{\mu}_2 + \boldsymbol{\alpha}_{21} \mathbf{ECT}_{t-1} + \sum_{j=1}^{p-1} \phi_{2j} \Delta(\ln H_{t-j}) + \sum_{j=1}^{p-1} \boldsymbol{\theta}_{2j} \Delta(\ln \text{HHI}_{t-j}) + \sum_{j=1}^{p-1} \boldsymbol{\theta}_{2j} \Delta(\ln \text{FP}_{t-j}) + \boldsymbol{\varepsilon}_{2t} \tag{5.3-6}$$

$$\Delta(\ln FP_t) = \mu_3 + \alpha_{31} ECT_{t-1} + \sum_{j=1}^{p-1} \phi_{3j} \Delta(\ln H_{t-j}) + \sum_{j=1}^{p-1} \theta_{3j} \Delta(\ln HHI_{t-j}) + \sum_{j=1}^{p-1} \theta_{3j} \Delta(\ln FP_{t-j}) + \varepsilon_{3t} \quad 5.3-7$$

H represents the evolution of competition, HHI is the Herfindahl-Hirschman Index measuring market concentration and FP is the trend in foreign penetration. In addition, this study also added variables that have been argued to influence the evolution of market competition, for example the penetration of *de novo* banks (*DE NOVO*), the proportion of assets of government banks (GOV), per capita of Gross Domestic Product (GDP_percapita) as a measure of the level of development, and the inflation rate (INFLATION) as a measure of macroeconomic environment. Furthermore, there is one more exogenous variable of the dummy for year 2000 and for all following years (D2000) added in the VECM model. Thus, D2000 equals one if the observation period is between 2000 and 2010, and zero if otherwise. This dummy provides information on the impact of the changing type of foreign penetration. Prior to the year 2000, foreign penetration was only in the form of *de novo* operations. After 2000, foreign entry to the market was in the form of *de novo* and foreign acquired banks. In order to capture all relevant variables in the model, several models are used to investigate the role of market concentration and foreign penetration in enhancing competition.

5.4. Empirical Findings and Discussion

The Augmented Dickey Fuller test was employed to test the existence of unit roots for each variable. In order to determine whether the test requires a constant and/or trend or not, the graphical presentation of time-series data for each variable can be used. The plots demonstrate whether the time-series data fluctuates around a non-zero mean or not. If yes, it is more appropriate to include a constant in testing the unit-root. In applying the Augmented Dickey Fuller, this study selected the length of lag for testing the variable. Some model selection parameters, for example, AIC, SIC and FPE, can be used to guide the selection of the lag length. For variables H, HHI, FP, *DE NOVO*, GOV, and GDP_percapita, all model selection parameters suggest using the lag length of one. In regard to INFLATION, model selection of the FPE suggests using a lag length of 2, the AIC suggests employing a lag length of 3, and the SC advises using a length of lag of 0. The unit root tests showed that the null hypothesis for the existence of a unit root cannot be rejected at the 5 per cent significance level. Further, the unit root test was carried out on the first difference. The test results showed that all

variables are stationary at the first difference. As described in the methodology section, it indicated that the variables are jointly integrated in the same level - I(1).

Table 5.4-1 Unit Root Test

Variable	No. of lags	ADF Test Statistics		ADF Critical Value (1 %)	Result
		Levels	First difference		
Ln(H)	1	-3.075	-3.893	-2.968	I(1)
Ln(HHI)	1	-2.217	-3.377	-2.968	I(1)
Ln(FP)	1	-0.064	-6.104	-2.968	I(1)
Ln(DE NOVO)	1	-1.188	-6.149	-2.968	I(1)
Ln(GOV)	1	-1.642	-5.134	-2.968	I(1)
Ln(GDP_percapita)	1	-0.546	-3.306	-2.968	I(1)
Ln(INFLATION)	2	-2.731	-4.764	-2.976	I(1)

Note: the null hypothesis of unit root is rejected if ADF test statistics < ADF critical value. ADF critical values are MacKinnon (1996) one-sided p-value at 5 per cent significance level, provided by Eviews software.

A cointegrated test was conducted to confirm the previous presumption that the system of the variables is stationary at the first difference and jointly integrated. The Johansen cointegration test is conducted by firstly selecting the length of lag for the system. The model selection parameters, such as AIC, SIC and FPE are employed to determine the length of lag. This study ran some exercises involving the basic variables, competition, market concentration and foreign penetration, and added other variables to the right-hand side of the equation. Table 5.4-3 and 5.4-4 propose some models to explain the relationship between the evolution of market concentration, trends in foreign penetration and the evolution of banking competition in the Indonesian banking industry between 1980 and 2010. The cointegration tests show that Max-Eigen statistics and Trace statistics rejected the null hypothesis that the model has zero cointegrated rank. Further, when we test the null hypothesis of one cointegration rank, the Max-Eigen statistics and Trace statistics show that the null hypothesis could not be rejected at the 5 per cent significance level. The result of cointegration tests reveal that in all models, the variables are integrated and they have one cointegrated rank. Table 5.4-2 provides the descriptive statistics of all variables employed in this chapter. The dependent variable is the level of competition which is measured by H-statistics (H).

Table 5.4-2 Descriptive Statistics

Descriptive Statistics	H	HHI	FP	DE NOVO	GOV	GDP_ Percapita (US\$)	INFLATION (per cent)
Mean	0.28	0.09	0.17	0.09	0.59	717.03	10.69
Median	0.29	0.08	0.08	0.08	0.51	748.32	9.28
Maximum	0.87	0.19	0.43	0.19	0.88	1,145.38	58.39
Minimum	0.01	0.04	0.03	0.03	0.26	390	3.72
Std. Dev.	0.17	0.04	0.15	0.04	0.17	215.17	9.57
Skewness	1.10	0.97	0.79	0.40	0.39	0.12	4.19
Kurtosis	5.68	2.99	1.91	2.26	1.97	1.99	21.32
Jarque-Bera	15.51	4.86	4.73	1.50	2.15	1.38	524.14
Probability of Jarque-Bera	0.000	0.09	0.09	0.47	0.34	0.50	0.00
Sum	8.70	2.90	5.25	2.83	18.36	22,228	331.39
Sum Sq. Dev.	0.88	0.05	0.64	0.05	0.88	1,435,085	2,748.87
Observations	31	31	31	31	31	31	31

The main focus of the seven models in table 5.4-3 is on the contribution of market concentration to banking competition. The long-run coefficients of market concentration (HHI) of all seven models are negative and the values are significant in five of seven models. These findings support the structural approach that market concentration was negatively related to the competition in Indonesian banking during the past thirty years. The banking industry was more competitive when the market was less concentrated. In the un-concentrated market, it had a large number of banks and/or a more equal-distribution of market shares between banks. The larger number of banks increased the cost of collusion. Thus, a smaller number of banks was more favourable to uncompetitive behaviour. In regards to the distribution of market share, a small number of large banks was likely to contribute to create a concentrated market, even though the overall number of banks was large. In contrast, a handful of banks with relatively equal market share contributed to a less concentrated market.

Figure 5.4-1 demonstrates that the number of bank has a negative relation to the degree of market concentration. The figure below shows the evolution of market structure by comparing the number of banks prior to deregulation and after deregulation periods. Prior to deregulation, there were substantial barriers to entry, both for local private and foreign banks. Furthermore, the restrictive banking environment, for example, the limits on loans and limits

on interest rates of time deposits for state banks, created an unattractive industry. As a result, the number of banks was relatively small after a series of banking reforms in the 1980s. The introduction of the first banking reform in 1983 and second banking reform in 1988 contributed to a reduction in the barriers to enter the market and relaxed some restrictions in the market. As a result, the number of banks increased substantially and created a less concentrated market.

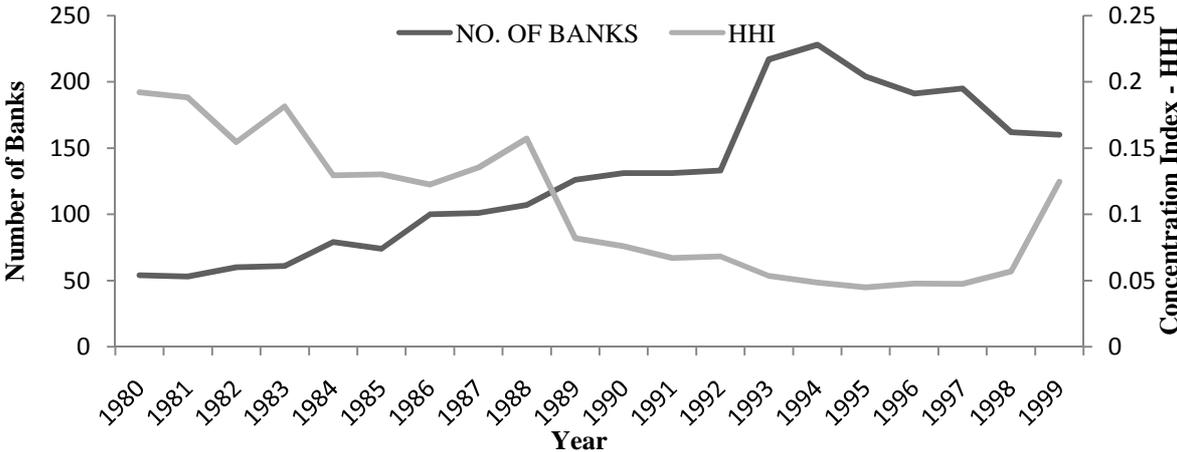


Figure 5.4-1 Market Concentration Index and the Number of Bank

The distribution of market share was important in explaining the role of market concentration in influencing competition during the consolidation period. The data reveals that mergers and acquisitions in the 2000s reduced the skewness of the distribution of market share²². This occurred as mergers and acquisitions took place within the medium-sized and small banks, rather than being conducted by the large banks. Consolidation within smaller banks enhanced the size of merging banks and produced a more equal distribution of market share in Indonesian banking. Figure 5.4-2 demonstrates the positive relationship between the concentration index and the skewness of the market share distribution. A less skewed distribution would contribute to a less concentrated market if we compared the 1997 crisis period and consolidation period.

²² The skewness of the distribution of market shares is calculated by $\frac{n}{(n-1)(n-2)} \sum \left(\frac{x_j - \bar{x}}{s} \right)^3$. Skewness characterizes the degree of asymmetry of a distribution around its means. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values.

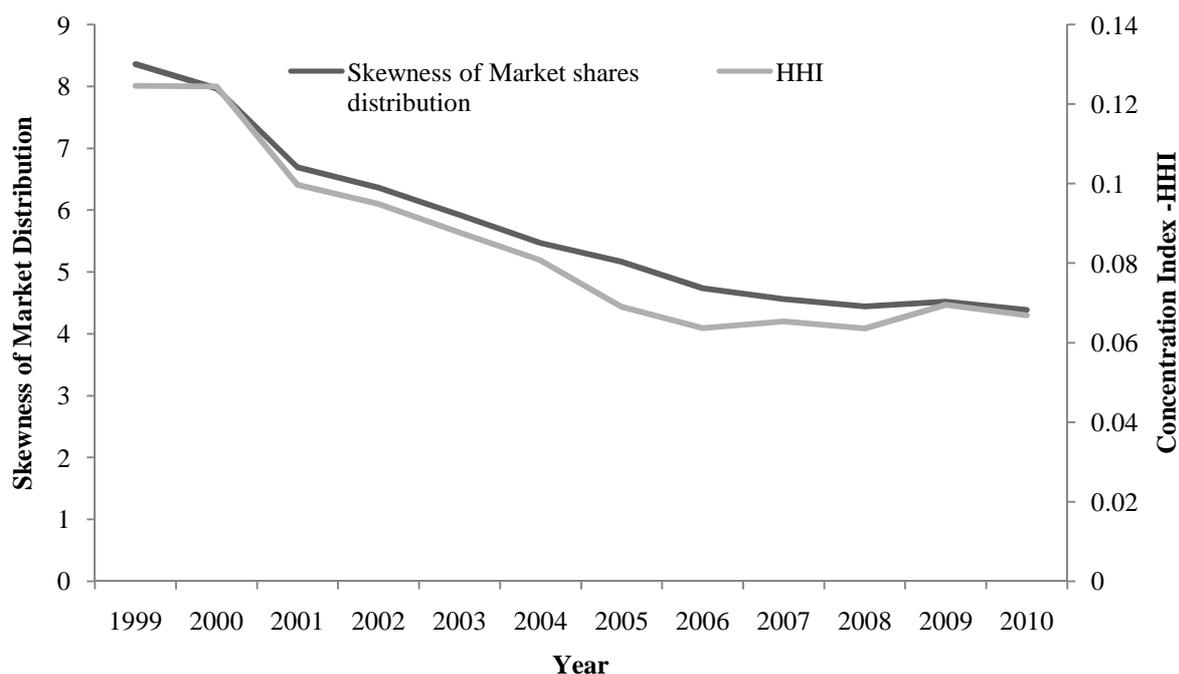


Figure 5.4-2 Market Concentration Index and the Skewness of Market Share Distribution

Tables 5.4-3 and 5.4-4 present the results of the estimations using the vector error correction (VECM) examining the role of market concentration and foreign penetration on competition. With regard to model number 5 in Table 5.4-3 and model 12 in Table 5.4-4, either the coefficient of market concentration or foreign penetration was negative but it was not significant. The estimations of models number 5 and 12 reveal that there was another variable capable of explaining the evolution of banking competition. They indicate that the share of government banks, consisting of state owned banks and regional development banks, negatively and significantly influenced banking competition at the one per cent confidence level. This supports the finding in Chapter four that government banks behaved less competitively compared to private banks. Figure 5.4-3 presents the trend of the competition index of H-statistics and the proportion of the assets of government banks in the Indonesian banking industry.

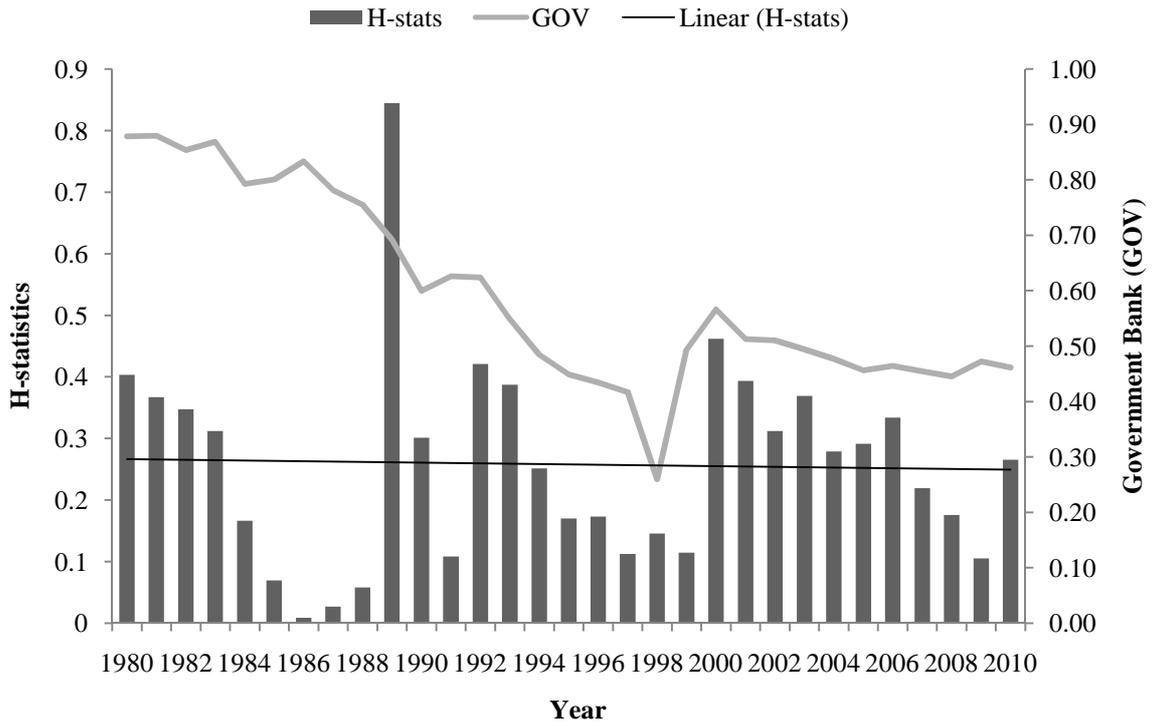


Figure 5.4-3 Banking Competition and the Dominance of Government Banks

Table 5.4-3 Results of the VECM Model - part 1

Dep. Variable/ Independent Variable	Competition Index (H-statistics)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Concentration (HHI)	-1.50*** (0.41)	-1.83*** (0.35)	-0.19 (0.27)	-0.31** (0.18)	-0.94 (0.57)	-1.36** (0.77)	-1.80*** (0.46)
Foreign penetration (FP)		0.14 (0.14)					
Penetration of <i>de novo</i> foreign bank (<i>DE NOVO</i>)			1.00*** (0.27)	1.11*** (0.17)			
Proportion of assets of government banks (GOV)					-1.45** (0.79)		
Per capita GDP (GDP_percapita)						1.10* (0.76)	
Inflation rate (INFLATION)							-2.70 (0.51)
Constant	-5.33*** (1.04)	6.02			4.89	11.70*** (3.32)	
Ho: r = r0							
Max-Eigen Statistics							
ro = 0	21.82**	30.51**	31.33**	28.84***	28.41***	25.17**	25.78**
ro = 1	5.03	11.41	10.06	8.46	14.09	11.41	4.58
Critical Value (5%)							
ro = 0	20.26	21.13	24.28	17.80	21.94	22.30	17.80
ro = 1	9.16	14.26	12.32	11.22	15.89	15.89	11.22
Trace Statistics							
ro = 0	16.78**	42.91***	21.27**	39.46***	50.36***	40.12**	30.88**
ro = 1	5.03	12.40	8.23	10.61	21.94	14.95	5.09
Critical Value (5%)							
ro = 0	15.89	29.80	17.80	24.28	35.19	35.19	24.28
ro = 1	9.16	15.50	11.25	12.32	20.26	20.26	12.32
Number of Cointegration Rank	1	1	1	1	1	1	1
Error Correction Term of the First Cointegration Rank	-0.88	-0.50	-0.58	-0.60	-1.28	-0.45	-0.39
Observation	26	26	27	26	26	27	27
R-squared	0.50	0.50	0.39	0.39	0.67	0.50	0.51
Akaike AIC	2.54	2.91	2.76	3.03	2.43	2.55	2.54
Schwarz SC	2.97	3.58	3.24	3.66	3.06	3.03	3.02
Log likelihood	-23.97	-23.78	-27.30	-26.35	-18.61	-24.40	-24.34
Lag length	4	4	3	4	4	3	3
Akaike AIC	Lag 4: 2.35	Lag 4: 2.46	Lag 3: 1.73	Lag 4: 1.70	Lag 4: -0.26	Lag 3: -2.30	3.03
Schwarz SC	Lag 4: 3.21	Lag 4: 4.33	Lag 3: 3.16	Lag 4: 3.57	Lag 4: 1.61	Lag 3: -0.86	4.47

Table 5.4-4 proposes seven models (8 – 15) to explore the relationship between the trend in foreign penetration and the evolution of banking competition. The cointegration tests show that Max-Eigen statistics and Trace statistics rejected the null hypothesis that the models have zero cointegrated rank. Further, when we tested the null hypothesis of one cointegration rank, the Max-Eigen statistics and Trace statistics show that the null hypothesis could not be rejected at the 5 per cent significance level. The result of cointegration tests reveal that in all models, the variables are integrated and they have one cointegrated rank.

The results of models 8, 10, 11 and 15 using the vector error correction model show that foreign penetration was positively related to competition. This means that foreign penetration contributed to enhancing banking competition. However, the test of the significance of the coefficient of foreign penetration implies that the variable did not significantly boost the level of competition. The coefficient of foreign penetration was only significant in model 11 which included the dummy of year 2000 to control for a change in policy with respect to foreign banks entering the market. The evolution of banking competition was better explained by the penetration of *de novo* operations either by establishing joint ventures or branches of foreign banks in the local market. Model 3 and 4 in Table 5.4-3 and model 9 and 13 in Table 5.4-4 show that penetration of *de novo* banks was positively and significantly related to banking competition at the 1 per cent confidence level. In order to examine the role of *de novo* banks in comparison with the role of foreign acquired banks, we added model 11 in Table 5.4-4. In model 11, a dummy variable of the year 2000 onward was employed to capture the changing pattern of foreign penetration from *de novo* operations prior to 2000 and both *de novo* and merger and acquisition after 2000. The coefficient of this dummy variable was negative but it was not significant. With the aim of better covering the changing pattern of foreign penetration, this study interacted the year dummy 2000 with the proportion of foreign assets in the banking industry in model 11 of Table 5.4-4. The coefficient of the interaction variable was also negative, but it was also not significant. The results suggest that having foreign penetration through the acquisition of local private banks in the 2000s did not significantly improve competition in the Indonesian banking industry.

Table 5.4-4 Result of the VECM Model- part 2

Dep. Variable/ Independent Variable	Competition Index (H-statistics)							
	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Foreign penetration	0.24 (0.19)		0.75*** (0.07)	0.25 (0.30)	-0.34 (0.38)		0.16 (0.35)	0.18 (0.31)
Penetration of <i>de novo</i> foreign bank		0.66*** (0.05)				0.90*** (0.12)		
Proportion of assets of government banks					-4.78*** (1.23)	-1.16*** (0.50)		
GDP_per capita (GDP_percapita)							0.33 (1.15)	
Inflation rate (INFLATION)								-3.75*** (1.08)
Exogenous Variable								
Dummy for year 2000 (the cut off of the start of the foreign penetration through the acquisition of local existing banks)			-0.35 (0.31)					
Interaction variable, Foreign penetration times Dummy for year 2000				-0.19 (0.27)				
Constant	1.48*** (0.50)			1.44 (0.84)		5.12	4.95 (8.07)	5.90*** (2.55)
Ho: r = r0								
Max-Eigen Statistics								
ro = 0	19.12**	13.12**	19.59**	18.28**	21.89**	19.50**	29.08**	30.35***
ro = 1	4.52	1.40	4.59	3.85	8.59	4.68	10.37	9.57
Critical Value (5%)								
ro = 0	15.89	11.22	17.79	15.89	21.13	17.80	22.30	22.29
ro = 1	9.16	4.13	11.22	9.16	14.26	11.22	15.89	15.89
Trace Statistics								
ro = 0	23.64**	14.52**	25.07**	22.13**	30.84**	24.46**	44.78**	42.36***
ro = 1	4.52	1.40	5.48	3.85	8.95	6.97	15.71	12.02
Critical Value (5%)								
ro = 0	20.26	12.32	24.28	20.26	29.80	24.28	35.19	35.19
ro = 1	9.16	4.13	12.32	9.16	15.49	12.32	20.26	20.26
Number of Cointegration Rank	1	1	1	1	1	1	1	1
Error Correction Term of the First Cointegration Rank	-0.63	-0.95	-0.65	-0.69	-0.32	-0.56	-0.45	-0.23
Observation	27	26	27	27	28	28	27	27
R-squared	0.42	0.47	0.41	0.44	0.34	0.43	0.41	0.43
Akaike AIC	2.48	2.58	2.58	2.51	2.62	2.41	2.73	2.68
Schwarz SC	2.81	3.02	2.96	2.90	3.00	2.74	3.21	3.16
Log likelihood	-26.47	-24.58	-26.82	-25.96	-28.74	-26.68	-26.82	-26.23
Lag length	3	4	3	3	2	2	3	3
Akaike AIC	2.67	2.74	Lag 3: 2.71	Lag 3: 2.73	Lag 2: 2.08	Lag 2: 1.83	Lag 3: -1.26	Lag 3: 4.13
Schwarz SC	3.34	3.61	Lag 3: 3.39	Lag 3: 3.41	Lag 2: 3.10	Lag 2: 2.83	Lag 3: 0.18	Lag 3: 5.75

The empirical findings show that *de novo* banks were more likely to put larger competitive pressure on local banks as shown in Chapter four. This empirical findings are consistent with other studies, for example Claeys and Hainz (2006) and Jeon, Olivero and Wu (2011). Based on the discussion in the literature review at section 5.2, this study argues that *de novo* banks are more competitive because of at least three factors. Firstly, the market entry through the establishment of *de novo* banks reduced market concentration because *de novo* establish a new entity unlike acquired foreign banks. Secondly, *de novo* banks as newly established banks are more willing to charge lower rates to gain market share (Martinez Peria & Mody 2004). The literature suggests that as a new business entity, *de novo* banks are not likely to possess knowledge about the borrowers in the local banking industry (Martinez Peria & Mody 2004). In order to target the transparent segments of the market where banks are able to access information about the borrowers, banks have to charge a lower rate for loans (Dell'Ariccia & Marquez 2004). Regarding foreign acquired banks, Martinez Peria and Mody (2004) argue that banks already have a captive market from acquired local banks. By acquiring local existing banks, the foreign banks or investors do not need to behave aggressively by offering much lower lending rates because they already have existing customers.

Thirdly, as discussed in Chapter four, on the one hand, in terms of assets, *de novo* banks were small banks with assets of 43,431 million Rupiah during 2000 to 2010 (section 4.4-2). On the other hand, foreign acquired banks are the larger banks with assets of 192, 100 million Rupiah on average between 2000 and 2010. Foreign acquired banks are mostly the bail-out banks which divested in 2003 onwards. Most of bail-out banks were formerly large banks with a 28.6 per cent share of assets of the Indonesia banking industry in 2009. As large and existing banks, the foreign acquired banks already have captive markets and loyal customers. Thus, foreign acquired banks generate less pressure on competition in the local banking market.

To conclude, in regard to their role in creating a contestable market, *de novo* banks are willing to behave more aggressively by cutting their interest margins. Therefore they put pressure on the local market to lower the overall costs (Clarke et al. 2001), lower the intermediation costs (Barajas, Steiner & Salazar 2000), lower the overhead costs (Manlagñit 2011), improve loan quality (Barajas, Steiner & Salazar 2000) and reduce accounting profit (Unite & Sullivan 2003). Another finding related to the level of development of the Indonesian economy is consistent with the literature. The influence of foreign banks on competition was also affected by the level of development (Lensink & Hermes 2004). Model 14 was estimated to assess the

role of foreign penetration by controlling for the level of development in the Indonesian economy. The level of development is measured by per capita Gross Domestic Product. Both the coefficients of foreign penetration and the level of development are positive. The Indonesian economy benefits from the penetration of the foreign banks because this emerging economy receives a spill-over impact from the presence of foreign banks. Finally, the macroeconomic environment represented by the rate of inflation, contributed to a competitive banking industry. The estimation results of model 7 and 15 suggest that unfavourable macroeconomic condition, for example high inflation rates, may put constraints on enhancing competition in the banking industry. Under high inflation, prices of financial services, for example interest rates, will be less informative (Claessens & Laeven 2004; Jeon, Olivero & Wu 2011).

5.5. Conclusion

This chapter explored the role of market structure and foreign penetration in creating a competitive banking industry. The weak exogeneity test of market structure, which is measured by market concentration, and banking competition, shows that both variables are endogenous to the system. It favours the New Industrial Organization approach that market structure is not exogenous; rather it is determined by variables in the system, for example the freedom of entry and exit, market restrictions and foreign penetration.

The cointegration tests of the series of three variables, market concentration, the evolution of competition, and the trend of foreign penetration, show that they are jointly integrated using first differences. It implies that the three variables have a long-run relationship. As the variables are integrated in the long-run and the model has an endogeneity issue, the vector error correction model is appropriate to estimate the long-run relationship between market concentration, the evolution of competition and the trend of foreign penetration

In regard to the first research question, the empirical results of seven models suggest that market concentration has a negative relationship with competition. Market concentration is measured by the Herfindahl-Hirschman index and banking competition is measured by H-statistics of the Panzar-Rosse model. The banking industry is more competitive if the market is less concentrated. A market with a lower concentration level may have a large number of banks or a more equal market share for banks. The larger number of banks increases the cost

of collusion. Thus, a smaller number of banks is more favourable to uncompetitive behaviour. In regards to the distribution of market share, a smaller number of large banks contribute to create a highly concentrated market even though overall the number of banks is large. In contrast, a handful of banks with relatively equal-distribution of market share contribute to create a less concentrated market. This finding implies that the structural approach also provides a valid prediction of the relationship between market structure and bank behaviour by recognizing the endogeneity issue between those two variables.

Banking deregulation and liberalization in the late 1980s and 1990s were effective in lowering market concentration because they widened access for private local and foreign banks to penetrate the local banking market. The freedom of entry facilitated the establishment of new banks and increased the number of market players. A larger number of banks increased the cost of collusion and pushed banks to be more competitive. Banking consolidation in the 2000s also lowered the market concentration compared to the crisis period between 1997 and 2000. Mergers of small private banks in the 2000s reduced the skewness of the market share distribution. A more equal-distribution of market share facilitates a more balanced capacity of banks to compete. Nevertheless, the merger of state banks following the 1997 crisis and the introduction of barriers to enter the market in the 2000s negatively influenced competition. Rosengard and Prasetyantoko (2011) argued that the implementation of the Indonesian Banking Architecture in the 2000s posed barriers to enter the market. Their argument is based on the plentiful anecdotal data and extensive discussions of the authors with senior BI officials in January 2011. In addition, the Survey of Banking Regulation and Supervision by the World Bank revealed that in the 2000s there were no applications by local investors to establish a bank. However, there were at least fourteen applications received from foreign banks to acquire the local existing banks. All fourteen applications for foreign acquired banks were accepted by the Central Bank.

Foreign penetration also contributed to improve competition in the banking industry; however, the influence was not statistically significant. The Indonesian economy enjoyed benefits from the presence of foreign banks. As a developing country, Indonesia receives a spill-over impact from the presence of foreign banks. In regard to the modes of entry, the empirical results show that the establishment of joint ventures and branches of foreign banks were crucial to enhance competition in the local market. The establishment of *de novo* operations increased the number of banks in the market and thus contributed to the creation of

a less concentrated market. Further, *de novo* banks had a role in creating a contestable market as *de novo* banks were willing to behave more aggressively by cutting their interest margins. *De novo* banks put pressure on the local market to lower overall costs (Clarke et al. 2001), lower intermediation costs (Barajas, Steiner & Salazar 2000), lower overhead costs (Manlagñit 2011), improve loan quality (Barajas, Steiner & Salazar 2000) and reduce accounting profit (Unite & Sullivan 2003). In contrast, foreign penetration through the acquisition of local private banks did not increase the number of banks. Further, foreign acquired banks were likely to behave less aggressively compared to *de novo* banks, particularly as acquisitions took place among large banks which had a captive market and loyal consumers.

This chapter also finds that the reduction of the domination of government banks was crucial to foster competition. This finding supports the result of Chapter four that state owned banks and regional development banks were perceived to behave in a less competitive way compared to their private counterparts. Their un-competitive behaviour was related to the market power originating from captive funding from other state-owned companies and a long hierarchical organization. Finally, the unfavourable macroeconomic conditions, for example high inflation rates, may have put constraints on enhancing competition in the banking industry. Under high inflation, prices of financial services, for example interest rates, are less informative (Claessens & Laeven 2004; Jeon, Olivero & Wu 2011). The estimation result suggests that the macroeconomic environment, represented by the rate of inflation, contributed to create a competitive banking industry.

The above findings highlight some policy recommendations. Current consolidation following the 1997 economic crisis increased the degree of market concentration due to bank closures, bank mergers and barriers to enter the industry. At the introduction of barriers to enter the market, in the 2000s, foreign penetration was in the form of acquisition of local existing banks rather than the establishment of *de novo* banks. The empirical findings suggest that *de novo* banks put more pressure on competition in the local banking market. The series of bank closures, mergers of state banks and barriers to enter the market show that the current policy of banking consolidation did not promote competition. Furthermore, the policy has weakened competition because, in fact, Indonesian banking is “under banked” (Rosengard & Prasetyantoko 2011). The current banking system has not been able to effectively meet demand, particularly from the medium and small sized borrowers. Restrictions on the

establishment of new banks, by both local and foreign banks, inhibited the role of new entrants in creating a contestable market. The changing trend of foreign penetration from the establishment of *de novo* banks to the acquisition of local existing banks also posed concern about the reduction of the supply of loans to small scale borrowers. The data shows that *de novo* banks are mostly small banks, and foreign acquired banks are mostly large banks. The literature suggests that small banks lend proportionally more to small enterprises (Berger, Kashyap & Scalise 1995; Berger & Udell 1995; Cole, Goldberg & White 2004; Keeton 1995; Nakamura 1993; Peek & Rosengren 1996; Strahan & Weston 1996). The study by Rosengard and Prasetyantoko (2011) observed that during consolidation, there was a reduction in the supply of loans to small and medium enterprises. The portfolio of assets of banks, particularly the large banks, was mostly corporate loans, the investment of Bank Indonesia certificates (SBIs) and government bonds.

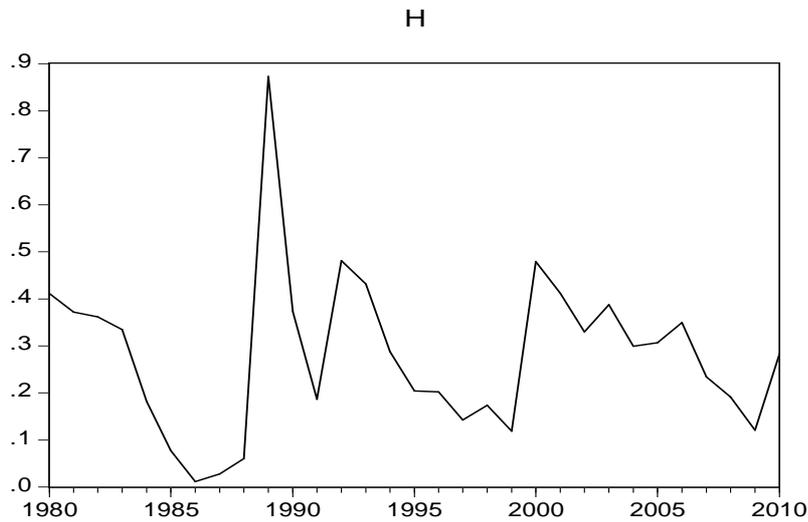
Extending the discussion of banking competition, the next chapter considers the existence of a trade-off between banking competition and banking stability. Literature in this area is growing because studies have arrived at different conclusions. Some studies under the competition-fragility hypothesis suggest that a highly competitive market induces banks to behave more aggressively (Davis 1995; Jiménez, Lopez & Saurina 2007; Keeley 1990; Matutes & Vives 2000). On the contrary, the scholars who employed a competition-stability hypothesis argue that a concentrated market which consists of a small number of large banks has a greater possibility of creating banking instability (Boyd, De Nicolò & Jalal 2006; Caminal & Matutes 2002; Fane & McLeod 2002; Mishkin 1996; Schaeck & Cihak 2007; Schaeck, Cihak & Wolfe 2006; Soedarmono, Machrouh & Tarazi 2011). Furthermore, Indonesian banking has experienced crisis and instability at least twice in the past thirty years. First, it occurred in the early 1990s involving eight banks which were Bank Duta, Bank Summa, Bank Panin, Bank Sampoerna, Bank Continental, Bank Yama, Bank Pacific and Bank Bapindo. The second, and the worst, crisis occurred in 1997 following sharp depreciation of the currency. The 1997 banking crisis influenced the overall economy by reducing economic growth to the lowest level in the last twenty years. This underlines the importance of extending the discussion to examine the trade-off between competition and instability in the banking industry.

APPENDIX

Appendix 1 - The graphical illustration of the data of Chapter 5

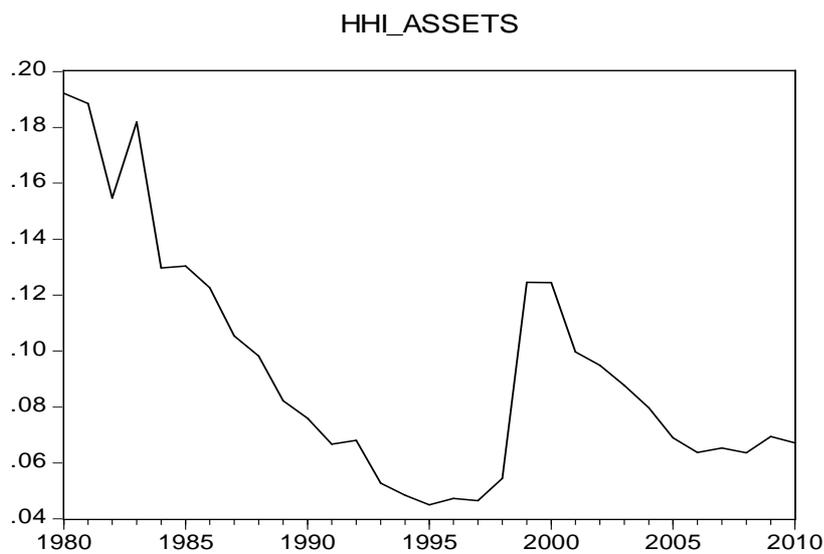
1. Competition Index (H)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



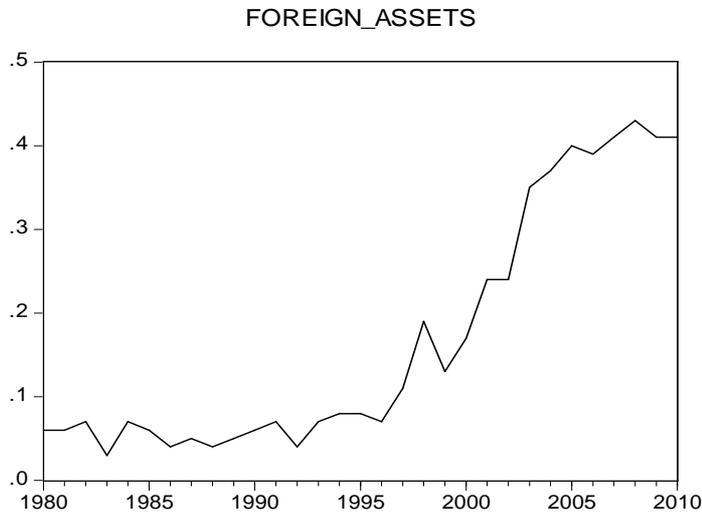
2. Concentration ratio of HHI index based on assets (HHI)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



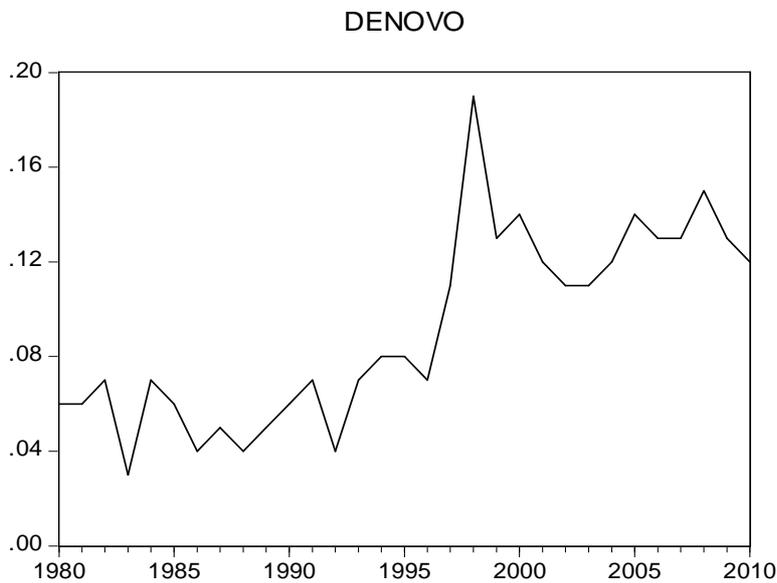
3. Foreign Penetration (FP)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



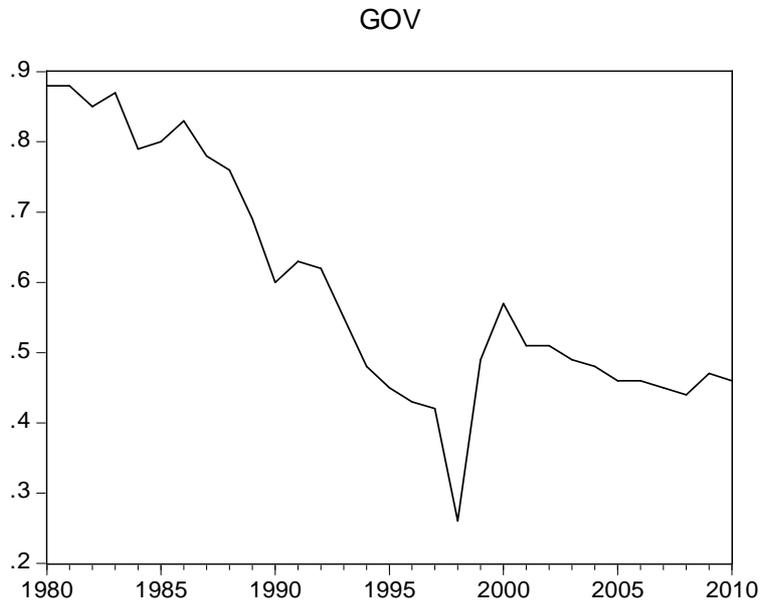
4. De novo banks (DE NOVO)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



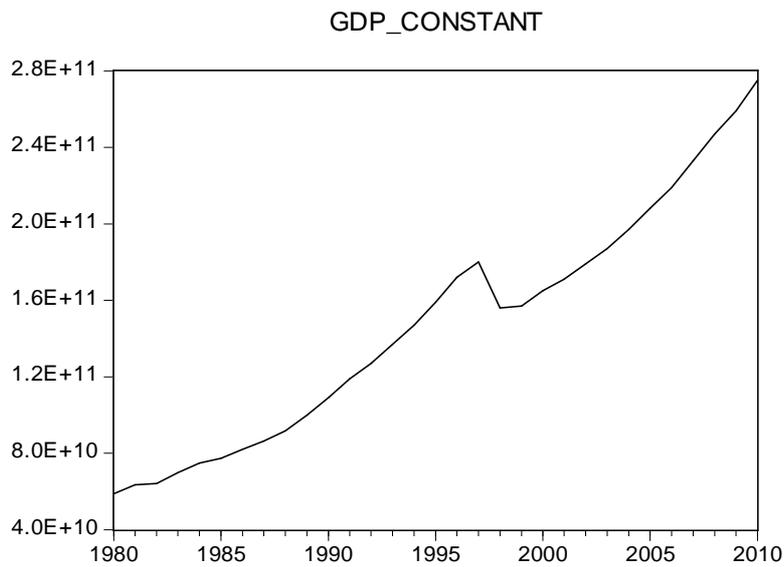
5. Proportion of government banks (GOV)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



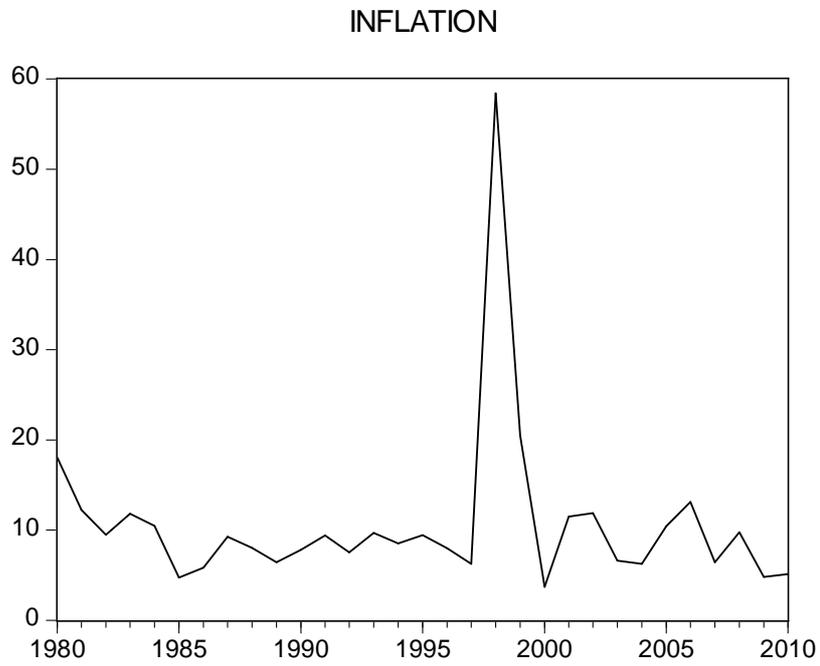
6. The level of development (GDP_percapita)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



7. Inflation (INFLATION)

The values are fluctuated around the non-zero means. Thus, the AF test should include a constant.



Chapter 6

Does a Competitive Market Induce Banking Instability?

Evidence from Indonesian Banking between 1980 and 2010

6.1. Introduction

This chapter extends the discussion on banking competition by examining the trade-off with banking instability. It is important to include this issue because the literature examining the relationship between banking competition and stability has inconclusive findings. There are a large number of studies that explore the contribution of competitive banking on instability. Among them, four cross-country studies capture Indonesian banking: Turk Ariss (2010); Soedarmono, Machrouh and Tarazi (2011); Beck, De Jonghe and Schepens (2013) and Liu, Molyneux and Wilson (2013). Soedarmono, Machrouh and Tarazi (2011) and Liu, Molyneux and Wilson (2013) found that competitive banking benefits banking stability. In contrast, the empirical findings of Turk Ariss (2010) and Beck, De Jonghe and Schepens (2013) imply that competitive banking induces banking fragility.

Despite the inconclusive conclusions about the relationship between competition and stability, the current policies in Indonesian Banking perceive that competitive banking leads to banking fragility. The Indonesian Banking Architecture particularly aims to create an industry with fewer banks (Bank Indonesia 2008; Rosengard & Prasetyantoko 2011). Following the banking crisis in 1997, Indonesia continues consolidating the banking industry and widening the access for foreign penetration to the local banking industry. Banking consolidating rather than deregulation is perceived to be capable of creating a strong and stable industry (Bank Indonesia 2008). Through consolidation, banks will have a larger capital base that enables them to maintain their business and control risks, develop information technology, and increase the scale to support the expansion of credit capacity. In order to encourage banks to be better capitalized, banks had to comply with a higher minimum requirement for base capital of 100 billion Rupiah by 2010. To increase capital, banks are allowed to receive additional capital injections from existing owners, merge with other banks, be acquired by bigger banks, or sell their shares on the capital market in order (Bank Indonesia 2008). Meanwhile, recently banking market entry was tightened with a minimum capital of Rp3 trillion (US\$335 million) compared to 50 billion Rupiah for commercial banks and 100 billion for joint venture banks in 1992. According to the Indonesian Banking Architecture, banking

consolidation will reduce the number of banks by half to 121 banks in 2010 and to fifty-eight banks in 2015. Banking consolidation may create strong banks at the expense of having a less competitive banking industry (Rosengard & Prasetyantoko 2011). Thus, it is essential to examine the relationship between competition and stability in the case of Indonesian banking.

The inconclusive findings of the relationship between competition and stability show that the relationship is complex. The observation by Djwandono (2005) of the Indonesian economy suggests that the Indonesian banking and economic crisis in 1997 was contributed to by multiple factors that originated from the internal economy and from the external economy. The weak domestic economy and financial structure were identified as the internal contributing factors, and currency depreciation was the external factor. Another study by Beck (2008) and Beck, De Jonghe and Schepens (2013) also revealed that the trade-off between competition and stability is not perfect as other factors and conditions determine the link between competition and stability. Beck (2008) and Beck, De Jonghe and Schepens (2013) emphasized that the different circumstances related to the reserve requirement level, the existence and the coverage of deposit insurance, bank equity, the availability of exit mechanisms for insolvent banks, corporate governance practices, the proportion of government banks, the degree of market restriction, the herding behaviour of banks and the level of foreign penetration in the local banking industry governed different relationships between competition and stability in different countries.

The studies by Beck, De Jonghe and Schepens (2013) covered seventy-nine developed and developing countries. In order to capture the heterogeneity among countries, Beck, De Jonghe and Schepens (2013) incorporated country-specific characteristics, for example the institutional and financial development, regulation and supervision and the herding behaviour of banks²³. In general the study by Beck, De Jonghe and Schepens (2013) favoured the competition – fragility hypothesis that a competitive banking industry contributes to an increase in banking instability. However, by considering that developing countries have less information sharing, a less-well developed stock market and lower coverage of deposits insurance compared to developed countries, Beck, De Jonghe and Schepens (2013) argued that competition may enhance stability in the case of developing countries. Soedarmono,

²³ Herding behaviour is referred to the covariation of bank behaviour (Beck, De Jonghe and Schepens 2013). Herding behaviour is measured by the degree of activity restriction, the heterogeneity of bank revenue and the occurrence of systemic stability. The higher degree of activity restriction, the less heterogeneity of bank revenue and the higher risk of systemic stability lead to increase risk of herding.

Machrouh and Tarazi (2011) and Liu, Molyneux and Wilson (2013) shared the same views as Beck, De Jonghe and Schepens (2013) in regard to the relationship between competition and banking stability in the developing countries of Asia. Soedarmono, Machrouh and Tarazi (2011) suggested that a higher degree of market power contributed to a higher insolvency risk even though banks with market power had higher capitalization. The findings by Soedarmono, Machrouh and Tarazi (2011) implied that a concentrated banking industry had a higher default risk. Furthermore, a study by Liu, Molyneux and Wilson (2013) in four Asian countries - Indonesia, Malaysia, Philippines, and Vietnam - argued that a less competitive industry increased profit volatility and insolvency risk.

This chapter contributes to the discussion of the relationship between competition and stability in the banking industry particularly in the context of developing countries. Turk Ariss (2010, p. 776) underlines the importance of conducting studies in developing countries where capital markets are relatively underdeveloped, and banks represent the main providers of credit to the economy. In addition, Indonesian banking is a rich laboratory because it experienced banking deregulation, at least one banking distress and one banking crises in the 1990s, and currently is exposed to consolidation and increased foreign penetration. Previous studies by Soedarmono, Machrouh and Tarazi (2011) and Liu, Molyneux and Wilson (2013) relied on the observation period of 1998 to 2007. Thus, their studies do not cover the critical time of crisis in the Indonesian banking industry. As discussed in Chapter three, banking distress and banking crisis in the Indonesian banking occurred at least twice. The banking distress occurred in 1992 and 1995 (Laeven & Valencia 2008; McLeod 1999; Rosser 2002) and involved seven private commercial banks and one state-owned commercial bank. Imprudent banking practices such as intra-group loans and a risky investment in property explain the collapse of banks in the first banking crisis (Rosser 2002). In addition, a study by Djwandono (2005) reveals that liquidity problems in the Indonesian banking industry were observed even earlier. In late 1988, some small banks experienced severe liquidity problems induced by fears that some banks had serious financial problems not reflected in their financial reports. The banking crisis began in mid-1997 (Enoch et al. 2001) when banks experienced a negative interest spread²⁴ of 6.18 per cent. This chapter covers a larger number

²⁴Negative spread refers to the condition where the interest rates of loans/credit are lower than the interest rates of deposits. This situation creates loss for banks because the interest revenue from loans disbursement is lower than the interest expenditure to be paid to the savers. Data from the Annual Financial Report 1998/1999 on the Indonesian Economy published by the Central Bank reveals that the deposit rates for one month deposits in 1997 was 28.34 per cent. In contrast, the interest rate of investment was just 22.16 per cent in 1997 (Bank Indonesia 2008b)

of banks than the previous studies of Turk Ariss (2010), Soedarmono, Machrouh and Tarazi (2011), Beck, De Jonghe and Schepens (2013), and Liu, Molyneux and Wilson (2013). This present study was able to access all commercial banks in the industry between 1980 and 2010 by using a database of banks financial reports published by the Bank of Indonesia. By capturing all commercial banks in the industry, the analysis is not be biased toward particular groups of banks. Thus, this study, by focusing on the stability (insolvency) of the individual banks rather than on stability of the banking system as a whole, has representative data to test the trade-off between competition and stability in the case of emerging countries.

This chapter also contributes to the literature by employing the recent refinements of Bikker, Shaffer and Spierdijk (2011) of the Panzar-Rosse method. As discussed in Chapter two, the un-scaled revenue specification delivers more reliable results on the degree of competition in the banking industry compared to the price and scaled-revenue specifications. The studies by Turk Ariss (2010), Soedarmono, Machrouh and Tarazi (2011), and Beck, De Jonghe and Schepens (2013) employed the Lerner Index as a measure of competition and Liu, Molyneux and Wilson (2013) relied on the price specification of the Panzar-Rosse method. With regard to the measure of banking stability, this study adopted three measures of banking stability which are the z-score of the insolvency risk measure, profit volatility, and bank capitalization (Beck, De Jonghe & Schepens 2013; Soedarmono, Machrouh & Tarazi 2011). Banking instability is measured at the bank level rather than at the industry level as in Schaeck, Cihak and Wolfe (2006). The approach adopted by this study recognizes that bank failure can occur without the banking system experiencing systemic strain (Schaeck & Cihak 2007, p. 4). In the case of Indonesia, this study argues that measuring banking instability at the bank level is more suitable than using the industry level. The bank crises in late 1988 and between 1992 and 1995 involved several banks, however they did not spread to the whole system. In 1997, a large number of banks experienced financial problems and the crisis spread throughout the system. Measuring the instability at the bank level assures that both types of crises are captured. Individual bank instability and system instability are different but they are related. An individual bank may fail in a competitive market just as any individual company in any market. But the real concern is if substantial parts of the banking industry fail and there are systemic consequences.

Furthermore, this study takes into account the possibility of the endogeneity of competition and banking stability by employing the Generalized Method of Moment (GMM) (Beck, De

Jonghe & Schepens 2013; Liu, Molyneux & Wilson 2013; Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011). The GMM approach produces robust estimation of the distribution of error and produces efficient estimates because it takes into account heteroscedasticity (Soedarmono, Machrouh & Tarazi 2011). The GMM manages the endogeneity problem by employing an instrumental variables approach. This chapter focuses on five research questions as follow:

Research questions:

1. Did a highly competitive market contribute to banking instability?
2. Did a higher exposure to non-interest based activities increase banking instability?
3. Did a higher level of economic development as measured by the GDP per capita reduce banking instability?
4. Did higher economic growth reduce banking instability?
5. Did currency depreciation contribute to banking instability?

6.2. Literature Review

There is extensive literature discussing the trade-off between competition and instability in the banking industry. The earlier studies were mostly conducted in developed countries. Recently, the discussion has started to cover the banking industry in developing countries because the emerging countries have also experienced a number of crises. Generally, the literature does not suggest conclusive findings about whether there is a trade-off between competition and banking instability. Furthermore, the theoretical models and empirical models make contrasting predictions about the trade-off (Beck 2008).

A highly competitive market induces banking instability because it triggers higher risk taking activities. Studies by Keeley (1990), Davis (1995), Matutes and Vives (2000) and Jiménez, Lopez and Saurina (2007) confirmed the existence of the competition – fragility hypothesis. Most of the studies show the reduction of charter values following deregulation contributed to the increase of risk-taking activities by bankers. Charter value is a measure of a firm's profit but it is a better proxy than profit based on the accounting "book value" (Smirlock, Gilligan & William 1984). On the contrary, other authors do not share the view of the existence of a trade-off between competitive markets and banking instability. Boyd, De Nicoló and Smith (2004), Caminal and Matutes (2002), Mishkin (1996), Demirgüç-Kunt, Laeven and Levine (2004); Boyd, De Nicolò and Jalal (2006) and Schaeck and Cihak (2007) support the notion

that less competitive markets are prone to banking fragility. In other words, those studies support the competitive – stability hypothesis. Boyd, De Nicolò and Jalal (2006) argued that a concentrated market will allow banks to boost interest rates. Another proposed argument is that a less competitive market with few large banks will not let large banks fail. The “too big to fail” hypothesis argues that having large banks fail creates large costs. In order to avoid the costs, the authorities are reluctant to liquidate the insolvent large banks (Mishkin 1996). It creates a moral hazard for the large banks that may take excessive risks as they assume that the authorities will not let them fail. The studies that support the “too big to fail” hypothesis argue that there is no trade-off between competition and banking stability (Caminal & Matutes 2002; Mishkin 1996). In fact, where there are large banks in a concentrated industry, there may be more instability because of the moral hazard problem.

The first part of the literature review will discuss the two competing hypotheses; the competition – fragility hypothesis and the competition – stability hypothesis. Through the discussion of the two competing hypotheses, this chapter explores the link between competition and banking instability. Thus, we can relate to the Indonesian banking environment and explore which theory is suitable for the local banking market in Indonesia. Inconclusive findings on the trade-off between competition and instability may occur as the relationship is very complex and it relates to many other variables, both microeconomic and macroeconomic. This chapter captures other relevant variables, for example banks portfolio characteristics related to the role of non-interest based activities (Beck, De Jonghe & Schepens 2013; Laeven 2005; Liu, Molyneux & Wilson 2013), proportion of loans to total assets (Beck, De Jonghe & Schepens 2013; Liu, Molyneux & Wilson 2013), technical efficiency measured by overhead cost (Soedarmono, Machrouh & Tarazi 2011), loans to deposits ratio (Soedarmono, Machrouh & Tarazi 2011), banks size (Beck, De Jonghe & Schepens 2013; Liu, Molyneux & Wilson 2013; Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011), growth of assets (Beck, De Jonghe & Schepens 2013; Schaeck & Cihak 2007), the level of development (Berger et al. 2008; Demirgüç-Kunt & Detragiache 1998; Schaeck & Cihak 2007), macroeconomic environment, for example the depreciation of currency (Schaeck, Cihak & Wolfe 2006), and economic growth (Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011). We consider macroeconomic shocks are important in causing banking instability as was observed in the 1997 banking crisis.

6.2.1. Competition – Fragility Hypothesis versus Competition – Stability Hypothesis

Charter value, franchise value and agency problems explain the existence of a trade-off between competitive markets and banking instability. As discussed the charter value reflects firm rents²⁵. Charter value shows the quasi-monopoly rents granted by their government charters (Jiménez, Lopez & Saurina 2007). The agency problem occurs when there is a shifting of risks from the principal to the agent. Agency issues mostly take place in the banking industry where firms are debt-financed and in which the agent (managers) are acting in the principal's (depositors) interest (Allen & Gale 2000). The agency problem occurs if the agent is taking benefit at the expense of the principal. According to Davis (1995), there are three conditions that increase the occurrence of agency problems. First, if the incentives of the principal and agents are not aligned. The second is where the principal does not have control over the agent and the third is when the principal cannot properly assess the agent's actions.

Banking liberalization and deregulation contribute to a declining charter value. Keeley (1990) compared the level of the charter value in two different periods of U.S. banking. Regulation restrictions on entry and competition in the 1950s and 1960s made bank charter values high. On the contrary, the increased competition in the 1970s and 1980s was accompanied by lower charter values. The study concluded that competition induces a decline in charter value. Further, a lower charter value induced agency problems because the gain from taking excessive risk is more attractive (Allen & Gale 2000). Therefore, the lower charter value increased the default risk as banks took on risky assets and/or reduced their capital. If banks had less capital and held assets risk constant, they had less protection against failure. Another study by Weisbrod, Lee and Rojas-Suarez (1992) covering the banking systems in the United States and Japan underlined the banks' ability to provide liquidity as a source of franchise value. Following the liberalization of the financial markets and increased efficiency in the payment system, the franchise value of banking declined. Recently the corporate sector reduced demand for liquidity thus contributing to lowering the position of bank charter values compared to other financial institutions. They observed the decline of the franchise value in the US and Japanese banking in the 1990s. They suggested that this led to an increase in risk taking activities by US banking and lowered the earnings of Japanese wholesale banks.

²⁵Charter value is measured by the ratio of the market value of equity plus the accounting value of liabilities divided by the accounting value of assets. "The efficient capital market will produce an appropriate measure of firms' rents because the capital market valuation incorporates firms risk and corresponds to an equilibrium valuation of rents and minimizes any distortion introduced by tax law and accounting convention"(Smirlock, Gilligan & William 1984, p. 1054).

The franchise value contributes to limit banking fragility because it has an important role in limiting excessive risk taking by banks. The study by Jiménez, Lopez and Saurina (2007) confirmed the competition – fragility hypothesis as they found that market power as measured by the Lerner index negatively influenced the risk profiles of the bank. On the contrary, lower market power contributes to an increase in non-performing loans. By assuming that market power was the source of franchise value, their finding implied that a less competitive market contributed to banking stability. Hence, the competitive market will erode the firm rents and induce banks to take more risk. Another study by Davis (1995) considered the link between banking deregulation and bank failures. The study argued that banking deregulation in Australia increased the bank failures in the 1990s. Deregulation reduced the ‘franchise’ value of licenses and managerial tenure and it further increased the incentives for risk taking by bank managers and shareholders. Further, if bank depositors were not subject to some protection by government, the shareholders or the management had an incentive to increase the value of assets by taking on risky business, for example by investing in a high risk assets portfolio (Davis 1995). Rosser (2002) supported this idea by arguing that an increasing level of competition in the banking industry encouraged banks to invest in riskier sectors, for example consumer spending, property and the stock exchange. The empirical study by Yeyati and Micco (2007) in eight emerging countries of Latin American showed that competition increases bank risk, measured by z-scores of bank insolvency risk. The estimates of the trade-off between competitive markets and insolvency risk controlled for the degree of foreign penetration and macroeconomics shocks.

Some studies revealed an alternative explanation of the relationship between banking competition and banking instability. In contrast to the competition – fragility hypothesis, Boyd, De Nicolò and Jalal (2006), Caminal and Matutes (2002), Schaeck, Cihak and Wolfe (2006), Schaeck and Cihak (2007), Soedarmono, Machrouh and Tarazi (2011), and Mishkin (1996) argued that there is no trade-off between competition and stability. In addition, Fane and McLeod (2002) argument on moral hazard arising from too big to fail supports the link between competition and stability. Moreover, Schaeck and Cihak (2007, p. 22) emphasized that “competition and soundness tend to go hand in hand”. The competition – stability hypothesis argues that market power resulting from a concentrated market was the source of banking instability. According to Boyd, De Nicolò and Jalal (2006), market power enabled banks to charge higher interest rates to the borrowers. The higher interest rates increased the risk of loan default. Caminal and Matutes (2002) also found that market power contributed to

bank insolvency. In addition to the traditional channel of banks' charter value, they addressed an issue of "the banks' incentives to invest in reducing information asymmetries about project selection" (Caminal & Matutes 2002, p. 1342). Comparing monopoly and Bertrand competition, market power provided more incentives to the monopolist to invest in monitoring of their loans rather than impose credit rationing. It implies that a more concentrated industry lends more but also allocates more for monitoring activities. By assuming that larger loans had a higher probability of failure because they were more subject to multiplicative uncertainty, a more concentrated market was more prone to crisis. However, the study suggested that the overall effect of competition and banking instability depended on which channel was more dominant in a concentrated market; the traditional charter value or banks' incentive to invest in monitoring.

Market power is also perceived as inducing banks to engage in higher risk-taking activities. The empirical cross-country study by Soedarmono, Machrouh and Tarazi (2011) of the Asian countries between 1994 and 2009 focused on examining the measure of market power and banking stability by using bank level data. Soedarmono, Machrouh and Tarazi (2011) found that the banking consolidation increased market power. Higher market power was associated with higher risk taking and a higher rate of bank capitalization. Soedarmono, Machrouh and Tarazi (2011) show that the increased levels of capitalisation under consolidation periods were not sufficient to offset the impact of higher risk taking on default risk. Thus, overall, a higher level of market power arising from banking consolidation increased the overall bank insolvency risk. Another study by Schaeck, Cihak and Wolfe (2006) used systemic banking crises as a measure of banking instability rather than bank-level data of insolvency risk. In accordance with Soedarmono, Machrouh and Tarazi (2011), the study concluded that there was no trade-off between competition and bank soundness. Schaeck, Cihak and Wolfe (2006) revealed that a more competitive banking system, reflected in high values of the Panzar and Rosse (1987) H-Statistic, were less likely to experience a banking crisis and exhibited a longer time between episodes of systemic problems as competition increases.

Stiffer competition explains the increased capitalization of banks in the fifteen European countries between 1999 and 2004. Schaeck and Cihak (2007) argued that their study was substantial because it was the first to examine the relationship of a direct measure between bank competition and the level of capital ratios. Their study revealed that banks acted prudently by increasing their capitalization under stiffer competition. By using H-statistics

derived by the Panzar-Rosse method, the study found that a 1 per cent increase in the H-statistics increased the capital ratio for the median bank in the sample from 5.6 per cent to 5.9 per cent.

In addition to the increase in capitalization, competition limited moral hazard. It implies that a concentrated market facilitates moral hazard and contributes to greater banking fragility. Two studies by Mishkin (1996) and Fane and McLeod (2002) emphasize the moral hazard of “too big to fail” banks in the concentrated market. In such a market, the large banks are more likely to take more risks because they received larger subsidies through an implicit deal of being “too big” and “too important” to fail. Studies of the Indonesian banking industry, particularly during the 1997 crisis, indicated that the “too big to fail” hypothesis was relevant for explaining Indonesian banking history (Fane & McLeod 2002; Pangestu 2003). The government decision to bail out “troubled banks” in the early 1990s, for example Bappindo (the state-owned bank) and Bank Duta (private banks), implied there was an implicit government guarantee. In addition, the indication of government guarantee was noticeable by the fact that there was no exit policy for insolvent banks and almost no insolvent bank closures (Pangestu 2003). There was only one bank closure prior to the 1997 crisis which was Bank Summa but there was a very long review process before the government finally let it fail (Djiwandono 2005; Pangestu 2003). During the 1997 crisis, large banks were predominantly insolvent thus they were either being closed, nationalized or jointly recapitalized (Fane & McLeod 2002)²⁶. As the result of implicit government guarantees, particularly for large banks, taking excessive risk was a moral hazard²⁷.

Banking fragility in the concentrated market is also found if banks have an option in allocating their portfolio between loans and bonds. Banks will allocate their portfolio in order to achieve the optimal portfolio choice. If banks have the possibility of investing in riskless bonds (government bonds), Boyd, De Nicolò and Jalal (2006) suggest that banks in concentrated markets will choose to hold bonds rather than disburse loans. Under a concentrated market for loans, borrowers (entrepreneurs) have few options when they are

²⁶ “Based on the assessment from the central bank and the international monetary fund, 73 private banks that were classified in March 1999 as category A (not needing further immediate action in relation to capital adequacy) had an average market share of 0.07 per cent each, whereas the other 84 in existence just prior to the crisis (which have all been either closed, nationalized, or jointly recapitalized) were more than seven times larger, with an average market share of 0.50 per cent each” (Fane & McLeod 2002, p. 289).

²⁷ However, in the case of problems affecting the whole system, small banks may also face a moral hazard if they start acting as a group. For example one bank starts offering loans to more risky borrowers so other banks follow and collective action is destabilising.

looking for a loan. In that case, borrowers are willing to pay high interest rates. However, banks may still be reluctant to disburse the loans because the high rent that banks are extracting from borrowers would force the borrowers to choose a level of risk so high as to make the probability of a good outcome small (Boyd, De Nicolò & Jalal 2006, p. 14). Further, the lower probability of generating a good outcome will increase the probability of default loans. The above argument was supported by empirical evidence both in the case of developed markets and emerging markets. Boyd, De Nicolò and Jalal (2006) tested the above hypothesis using the 2,500 banks operating in the U.S. banking market in June 2003 and 2,700 banks in 134 developing countries over the period 1993 to 2004. The empirical findings concluded that competition, as measured by the Herfindahl-Hirschman Index, positively influenced banking fragility as measured by the z-score of probability of insolvency risk. On the one hand, in a less competitive market indicated by a higher HHI index, banks preferred to hold bonds than to disburse loans. On the other hand, in a competitive market for loans, banks faced stiffer competition that encouraged them to lend more at lower rates. The study by Boyd, De Nicolò and Jalal (2006) also found evidence that banks in a concentrated market have higher insolvency risk because bank profits were more volatile. To sum up, Boyd, De Nicolò and Jalal (2006) suggest that a concentrated market contribute to increased fragility because higher rates charged by banks increase default loans and induce profit volatility. This occurs in a concentrated market where the negative effect from the increased probability of default loans surpasses the positive effect of having a larger monitoring activity.

The least competitive banking system is more fragile because there is a lack of market discipline to motivate banks to improve their efficiency. Berger and Hannan (1998) argued that in addition to dead-weight loss²⁸, an uncompetitive market generated other social costs in terms of poor performance. As cited by Berger and Hannan (1998), an uncompetitive market reduces the competitive pressure for firms to maximize operating efficiency reflected in the quiet life hypothesis by Hicks (1935). Firms in an uncompetitive market are perceived to enjoy a quiet life as a result of their market power. Firms with market power generate supernormal profits because the actual price is higher than the competitive price level. The supernormal profits provide a comfort zone for firms. In such markets, firms will not be motivated to keep costs low. Furthermore, Berger and Hannan (1989, p. 455) argue that

²⁸Dead-weight loss (DWL) refers to the social cost related to an exercise of market power. Particularly, DWL is taking the form of resource misallocation because a higher price in uncompetitive markets restricts the output relative to the competitive level (Berger & Hannan 1998, p. 454).

“market power may allow managerial incompetence to persist without any wilful shirking of work effort, pursuit of other goals, or efforts to defend or obtain market power”. Inefficient banks generate additional social costs because banks have a higher cost per unit of output. Furthermore, an inefficient cost structure may disturb a bank’s capacity to generate profits that may lead to increased risk. Thus, the finding by Berger and Hannan (1998) provides a basis for a nexus between competition, efficiency and stability.

An empirical study of the U.S banking industry between 1980 and 1989 supported the existence of a quiet life in an uncompetitive market. By assuming that a concentrated market was associated with uncompetitive behaviour, Berger and Hannan (1998) found evidence that banks in more concentrated markets had poorer cost efficiency. Market concentration, measured by the Herfindahl-Hirschman index, negatively influenced the measure of efficiency. Berger and Hannan (1998) emphasize that the influence of market concentration on efficiency is substantial. The increase of market concentration from the least concentrated market in the sample (HHI=0.04) to that of the most concentrated market (HHI=0.60) decreased efficiency by between 8 per cent and 32 per cent (Berger & Hannan 1998, p. 459). Another study by Schaeck and Cihak (2007) also found a positive effect of competition on profit and cost efficiency. Some other studies by Delis, Staikouras and Varlagas (2008) and Turk Ariss (2010) strengthen the contribution of competitive banking to efficiency. Their study revealed that market power has a negative cost of efficiency. Finally, the investigation by Demirgüç-Kunt, Laeven and Levine (2004) found that the chartering policy that restricts bank entry and the expansion of business activities increase the cost of the intermediation of banks. By assuming that limited chartering policy creates concentrated banking and grants banks with market power, the efficiency level in the concentrated market is lower than in less concentrated ones.

Laeven (2005) and Margono, Sharma and Melvin Ii (2010) reveal that Indonesian banking is associated with higher risk and less competition than other East Asian countries. Margono, Sharma and Melvin Ii (2010) found that the efficiency level was lower post the 1997 crisis. Based on their observation prior crisis, between 1993 and 1997, the Indonesian banking system had a comparable level of efficiency (78.7 per cent) as other countries (Turkish, Korea, European countries). As a comparison, the cost efficiency of Turkish banks averaged 75.7 per cent (Kasman 2010) and the efficiency of Korean banks was 89.0 per cent between 1985 and 1995 (Hao, Hunter & Yang 2001) and that of European banks ranged from 66.9 per

cent to 88.9 per cent (Vennet 2002). However, post the 1997, Margono, Sharma and Melvin Ii (2010) estimated that the cost efficiency was 53.4 per cent²⁹. The efficiency level post crisis was lower than that prior to the crisis because on average the increase in efficiency was higher prior crisis than post-crisis³⁰. A higher efficiency prior to the crisis was associated with a competitive market under the introduction of deregulation policies (Margono, Sharma & Melvin Ii 2010). Furthermore, the study by Viverita and Ariff (2011) on the Indonesian banking industry suggested that Indonesian banks were less efficient than banks in developed countries because banks overuse inputs. They argued that on average banks could reduce their costs by 78 per cent and banks can improve their profits by 25 per cent.

In summary, there are two contrasting hypotheses about the relationship between competitive banking and financial stability. The first is the competition – fragility hypothesis and the second is the competition – stability hypothesis. The first hypothesis argues that there is a trade-off between competitive banking and stability because a competitive environment contributes to the decline of bank charter values that triggers banks to take more risks. Instead, the second hypothesis asserts that competitive banking contributes to lower financial instability by preventing the moral hazard from the “too big to fail” presumption of large banks enhancing bank efficiency, and increasing bank capitalization. The two hypotheses above will be used as the theoretical framework to examine the relationship between competition and stability in the Indonesian banking industry.

The next section discusses the empirical methodology. This is followed by the empirical findings and discussion and the conclusion. The empirical methodology section provides a discussion of the measures of banking instability/stability, control variables, and the econometric approach of dynamic panel data, particularly the generalized method of moment (GMM).

²⁹The cost efficiency estimation employed the stochastic frontier analysis (SFA) approach (Margono, Sharma and Melvin Li 2010).

³⁰According to Margono, Sharma and Melvin Ii (2010) the increase in efficiency on average was 1.4% from 1998 through 2000 as opposed to 6.3% from 1993 to 1997.

6.3. Empirical Methodology

The empirical methodology consists of several sections. It begins with the description of the z-score as a measure of banking stability. The z-score has been widely used in the empirical banking and finance literature as a measure of banking stability (Beck, De Jonghe & Schepens 2013; Boyd, De Nicolò & Jalal 2006; De Nicoló 2000; Liu, Molyneux & Wilson 2013; Soedarmono, Machrouh & Tarazi 2011; Yeyati & Micco 2007). It measures the probability of bank failure for banks close to insolvency. Particularly, the z-score measures the insolvency risk where the probability that losses (negative profits) are larger than bank equity (De Nicoló 2000). The calculation of the score is based on three years of data of bank returns and equity at each point of time as recommended by some studies; for example Yeyati and Micco (2007), Boyd, De Nicolò and Jalal (2006) and Soedarmono, Machrouh and Tarazi (2011). Section 6.3.1 provides an extensive discussion of the z-score as a measure of banking stability. In regards to the measure of market structure, this chapter employs H-statistics calculated by the Panzar-Rosse method as a measure of competition. Chapter two (section 2.6) provides a thorough description of the method used in generating the yearly estimates of H-statistics. H-statistics derived from the Panzar-Rosse method are also employed in this chapter to reflect the evolution of the degree of competition in the Indonesian banking industry.

6.3.1. Measures of Banking Instability

There are at least three major measures of bank instability in the empirical studies. These are the level of non-performing loans (NPL), systemic banking distress, and the insolvency probability of z-score. Some studies, for example Demirgüç-Kunt and Detragiache (1998) and Jiménez, Lopez and Saurina (2007), employed the level of non-performing loans to determine the probability of bank failure. A higher level of NPL is associated with a higher probability of bank failure. However, the level of non-performing loans is considered to reflect the risk of loans particularly thus it is not able to provide the signal of the overall risk facing a bank (Beck 2008). A second measure of bank failure is systemic banking distress. Distress occurs if the banking system is not capable of effectively fulfilling its role as an intermediary institution in the economy. According to Beck (2008), distress refers to the situation where the lending, deposit taking and payment services are not conducted properly by the banking system. Following Demirgüç-Kunt and Detragiache (1998) and Laeven and Valencia (2008), the banking system is categorized as experiencing systemic banking distress if the NPL reaches 10 per cent of total assets at the peak of a crisis and/or the fiscal cost of the rescue

operation is at least 2 per cent of Gross Domestic Product (GDP) and/or emergency measures; for example bank holidays, deposit freezes, blanket guarantees to depositors or other bank creditors are taken to assist the banking system and/or large-scale bank nationalization takes place.

The third measure of banks' failure is the z-score. It measures the probability of banks being insolvent. The basis of observation is an individual bank. Hence, unlike systemic banking distress that identifies the failure of the banking system, the z-score shows how close an individual bank is to being insolvent. Schaeck and Cihak (2007) argue that measuring a bank's insolvency risk by using bank-level data improves statistical power compared to the systemic bank measure. It is due to the ability of bank-level data to identify bank failure even though the banking system does not experience systemic distress³¹. The z-score is also preferred because it reflects the overall risk level covering the level of profitability, level of capitalization and the variability of returns on assets (Beck 2008). Further, the z-score is also proven to be associated with a broad range of potential default situations such as narrower returns, larger return volatility and higher leverage. A study by Yeyati and Micco (2007) found that the z-score is negatively correlated over time with other conventional risk measures, for example the non-performing loans ratio, the interbank interest rate, bank funding costs, and the capital asset ratio.

By using the z-score, we assume the probability of bank failure is associated with banking instability. Particularly, the z-score measures solvency risk as the probability that losses in a given year (or negative returns) exceed the banks equity capital and forces banks to default (Yeyati & Micco 2007). Further, the z-score normalizes returns and equity with banks assets. In other words, the z-score identifies the probability of the occurrence of insolvency where gross profits are not sufficient to pay off depositors so the equity is depleted (Boyd, De Nicolò & Jalal 2006).

The z-score defines the probability of a bank being insolvent as the condition when equity is less than loss or $P\{r \leq -K\}$ where $K = \frac{k}{A}$ and $= \frac{\pi}{A}$. K denotes bank equity to assets which is measured by dividing bank equity to asset (A). r denotes returns on assets which is measured

³¹ Furthermore, z-score can also be used to measure the probability of banking industry as a system to be insolvent as used by Yeyati and Micco (2007). The study by Yeyati and Micco (2007) aggregate the data of banks returns, banks assets and banks equity to have the overall returns, assets and equity of the banking system in a particular country. They used the aggregate data to calculate the z-score for the country i and time t .

by dividing bank return (r) by assets (A). If we assume that returns follow a distribution with finite first two moments μ and σ_r^2 , we can estimate the probability of insolvency as below:

$$P\{r \leq -K\} \leq \frac{\sigma_r^2}{(\mu+K)^2} \quad 6.3.1-1$$

The z-score measures of insolvency risk is defined as

$$z = \frac{\mu+K}{\sigma_r}, \quad 6.3.1-2$$

The inequality becomes: $P\{r \leq -K\} \leq \frac{1}{z^2}$ and it implies that a bank is close to failing as standard deviations or returns drop below expected values and exhaust the bank's equity as demonstrated by the equation below:

$$P\{r \leq K\} = P\left\{\frac{r-\mu}{\sigma_r} \leq \frac{-K-\mu}{\sigma_r}\right\} = P\left\{\frac{r-\mu}{\sigma_r} \leq z\right\} = P\{r \leq \mu - z\sigma_r\} \quad 6.3.1-3$$

The above equations show that the z-score has a negative relationship with the probability of bank failure. It means that a lower probability of insolvency risk reduces the risk of failure and increases bank stability. A higher z-score represents a more stable bank with a lower probability of insolvency. On the contrary, a lower z-score implies an unstable bank with a higher probability of insolvency. In the empirical research, the z-score is calculated as below:

$$z_{it} = \frac{E(ROAa)_{it} + \frac{EQ_{it}}{TA_{it}}}{\sigma(ROAa)_{it}} \quad 6.3.1-4$$

where ROA is the rate of return on assets, EQ is the ratio of equity to assets and $\sigma(ROA)$ is an estimate of the standard deviation of the rate of return (Boyd, De Nicolò & Jalal 2006), i refers to bank i and t refers to time t . The above formulation implies that z-scores increase with higher profitability and capitalization and decrease with higher return volatility (Beck 2008). All data is based on accounting data where the EQ, ROA and TA are calculated on the basis of a three-year rolling window. By using the three-years rolling window, the z-score captures not only the variation of capital and profitability driven by the changes in the internal bank condition, but also the variation that is driven by the external environment (Schaeck & Cihak 2007).

In order to examine the source of banking instability, some studies (for example Boyd, De Nicolò and Jalal (2006); Soedarmono, Machrouh and Tarazi (2011); Beck, De Jonghe and

Schepens (2013) and Liu, Molyneux and Wilson (2013)) also estimated the influence of competition on some measures of banks soundness; for example profits, profits volatility and bank capitalization. Banks are perceived to be secure if banks record high profits, less volatile profits and have a high level of capital. Profits are measured by the return on assets, profit volatility is measured by the standard deviation of return on assets, and bank capitalization is measured by the ratio of equity to total assets. The three measures of banks soundness are components of the z-score of probability of insolvency risk. Thus, by estimating the influence of competition on bank profits, profit volatility and bank capitalization, the source of banking instability can be identified.

6.3.2. Control Variables

In order to capture the influence of other variables on the probability of insolvency, this study incorporates variables related to a bank's specific factors, the level of development and macroeconomics environment. Bank specific factors include bank portfolio characteristics related to the level of business diversity which are measured by the role of non-interest based activities (Beck, De Jonghe & Schepens 2013; Laeven 2005; Liu, Molyneux & Wilson 2013), asset composition which is measured by the proportion of loans to total assets (Beck, De Jonghe & Schepens 2013; Liu, Molyneux & Wilson 2013), technical efficiency which is measured by overhead cost (Soedarmono, Machrouh & Tarazi 2011), loans to deposits ratio (Soedarmono, Machrouh & Tarazi 2011), size (Beck, De Jonghe & Schepens 2013; Liu, Molyneux & Wilson 2013; Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011), and growth of assets (Beck, De Jonghe & Schepens 2013; Schaeck & Cihak 2007).

In term of business diversity, a higher contribution of non-interest based activities in bank revenue signals business diversification into fee generating activities such as securities underwriting, brokerage services, and insurance underwriting. Alternatively, a lower contribution of the non-interest based activities implies banks specialization in lending activities. Chapter two suggests that non-interest based activities contributes to increased revenue and, further, it will enhance profits. In addition, a study by Demirgüç-Kunt and Huizinga (2010) suggests that expansion into non-interest income-generating activities such as trading, fees and commissions may increase the rate of return on assets but benefit banks at very low levels. The non-interest based activities improve asset diversification. However, engaging in the non-interest based activities at the larger level will increase risks (Demirgüç-

Kunt & Huizinga 2010). Furthermore, high reliance on non-interest based activities may lead to increased profit volatility that may increase bank fragility. Diversification may intensify the agency problem between corporate insiders and small shareholders (Laeven 2005).

Regarding the composition of assets, a study by Jiménez, Lopez and Saurina (2013) suggests a higher proportion of loans to bank assets implies that banks become more specialized in disbursing loans. By specialising in commercial lending, banks have better screening and monitoring and lower non-performing loans. Thus, a larger proportion of loans may lower the overall risk of banks. Following Agoraki, Delis and Pasiouras (2011), Boyd, De Nicolò and Jalal (2006), and Soedarmono, Machrouh and Tarazi (2011), this present study controlled for differences in technical efficiency. A lower technical efficiency, which is reflected by a higher proportion of overhead cost to bank revenue, may disturb a bank's capacity to generate profits. Thus, a higher overhead cost may adversely affect risk of failure (Boyd, De Nicolò & Jalal 2006; Soedarmono, Machrouh & Tarazi 2011). Overhead cost is measured by the proportion of operating expenses to total revenue (Soedarmono, Machrouh & Tarazi 2011). The loans to deposits ratio captures bank liquidity that may affect the probability of bank default (Soedarmono, Machrouh & Tarazi 2011, p. 464).

Most studies examining the trade-off between competition and stability capture the influence of size on banking stability (Beck, De Jonghe & Schepens 2013; Berger, Klapper & Turk-Ariss 2009; Liu, Molyneux & Wilson 2013; Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011). Soedarmono, Machrouh and Tarazi (2011) argue that capturing size is essential to examining whether large banks engage in higher risk-taking activities due to a "too big to fail" effect as underlined by Mishkin (1996). If the hypothesis is valid, the variable size has a negative and significant influence on banking stability. Particularly, variable size contributes to increased profit volatility. In addition, studies by Schaeck and Cihak (2007), Berger, Klapper and Turk-Ariss (2009), Soedarmono, Machrouh and Tarazi (2011), and Beck, De Jonghe and Schepens (2013) confirm that larger banks had lower capitalization compared to smaller banks. Higher risk taking activities and lower capitalization may contribute to the increased risk faced by larger banks. However, other studies by Berger, Klapper and Turk-Ariss (2009) and Beck, De Jonghe and Schepens (2013) suggest that overall, larger banks were more stable. Their studies found that even though larger banks had lower capitalization, they had lower non-performing loans. This may be due to better monitoring and technologies. Finally, this present study also controlled for the influence of growth of assets on bank

stability. Beck, De Jonghe and Schepens (2013) suggested that assets growth had a negative relationship with overall bank risk (z-score) because it contributed to increased profit volatility. In addition, the growing assets were not associated with a stronger capitalization.

Many studies, for example Demirgüç-Kunt and Detragiache (1998), Schaeck and Cihak (2007), and Berger, Klapper and Turk-Ariss (2009), controlled for different levels of development. A higher level of development is likely to create more sophisticated procedures for bank oversight (Demirgüç-Kunt & Detragiache 1998). Thus, the level of development is expected to have a positive effect. The level of development is measured by per capita Gross Domestic Product. Finally, this study controlled for the macroeconomic environment. It considers macroeconomic shocks are an important cause of banking instability as was observed in 1997 in the Indonesian banking crisis. The macroeconomic variables are represented by economic growth (Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011) and depreciation of the currency (Schaeck, Cihak & Wolfe 2006). Demirgüç-Kunt and Detragiache (1998) suggested that crises tend to erupt when the macroeconomic environment is weak, particularly when growth is low and inflation is high. A favourable macroeconomic environment also contributes to enhance the level of capital (Schaeck & Cihak 2007). Currency depreciation contributes to increased bank risk because it poses a threat to bank profitability (Demirgüç-Kunt & Detragiache 1998). In the case of the Indonesian banking industry, pressure from significant currency depreciation in January 1998 and tight monetary policy worsened the liquidity problem in the banking system (Nasution 2000). Regarding economic growth, Demirgüç-Kunt and Detragiache (1998) suggested that low GDP growth was clearly associated with a high probability of a banking crisis.

6.3.2. Dynamic Panel Data, Generalized Method-of-Moment (GMM)

To examine the existence of trade-off between the level of competition and bank stability, this study relied on a cross-sectional time-series or panel dataset of individual banks. The level of banking competition is a non-unit variant variable as it measures the degree of competition in the market. Thus, the focus of this chapter is examination of whether a competitive market induces individual banking stability by increasing the risk of banks being insolvent. A panel data approach was employed for thirty-one years ranging from 1980 and 2010. Further, as extensively discussed in Chapter two, pooling the cross-section and time-series data will produce more reliable estimates of the relationship between banking competition and bank

stability. Panel data produces more efficient estimators compared to individual cross-sections because it has more observations. As the number of observations grows larger, the distribution of the OLS estimator declines and it further diminishes to the real values (Methodological and Empirical Advances in Financial Analysis 2010). In addition, a panel data regression method captures the fixed individual bank effects that may determine the bank's stability or risk characteristics. Thus, it can control the heterogeneity between banks that are not captured in the model. By controlling the heterogeneity of fixed individual bank effects, the model will generate the consistent measures of the estimators.

A dynamic panel data model is preferred to a static panel data because it manages the endogeneity problem in the model. The literature suggests that there may a possible endogeneity of the measures of the degree of banking competition. Endogeneity occurs when the causality is reversed, particularly when the degree of competition depends on loan risk, overall bank risk and the capitalization level (Berger, Klapper & Turk-Ariss 2009; Schaeck & Cihak 2007). By assuming that banks with larger capitalization have a lower probability of being insolvent, the reverse causality of competition and concentration as the measures of bank stability arises if a large, well-capitalized bank decides to pursue a growth strategy and merges with another large bank (Schaeck & Cihak 2007). The merger will increase market share of the merging banks and create a more concentrated banking industry. Considering the findings in Chapter five that a concentrated market reduces competition, the merger may lower competition in the banking industry. The above descriptions imply that there is a positive association between bank capital and the measures of banking concentration and competition. It also shows the negative association between the capital level and banking competition. On the contrary, a negative association between the measures of the capitalization level and banking concentration (or positive association between the measures of the level of capitalization and the measure of banking competition) make possible the argument that larger banks are capable of diversifying assets and, thus, they operate with lower capitalization (Demsetz & Strahan 1995). In addition, Flannery and Rangan (2004) support the argument that larger banks have lower levels of capital because they have better access to wholesale markets.

To address possible endogeneity, this chapter considers employment of the instrumental variable technique of GMM, Generalized Method-of-Moment. There are two methods developed under the GMM approach. First is the difference GMM introduced by Arellano and

Bond (1991). The more recent method is system GMM developed by Arellano and Bover (1995) and Blundell and Bond (1998). These methods are increasingly popular because they are designed for models and data that: 1) have a small number of time series “T” observation and a large number of cross-sectional unit of “N” panels, 2) assume a linear functional relationship, 3) one left-hand-side variable is dynamic which depends on its own past values, 4) the independent variables are not strictly exogenous or they may correlate with the past values of the error and possibly be correlated with the error term, 5) assume the existence of fixed individual effects, and 6) assume the existence of heteroskedasticity and autocorrelation within banks but not across banks (Roodman 2009, p. 86).

A dynamic model manages the endogeneity problem by incorporating the further lags of the dependent variables on the right-hand side of the equation. If we consider a model without explanatory variables $y_{it} = \alpha y_{it-1} + \eta_i + v_{it}$, it is clear that the lag of dependent variable y_{it-1} is correlated with the fixed individual effect (η_i). They are correlated because η_i does not vary through time and thus the same component in v_{it} that influences y_{it} will also influence y_{it-1} . Since the covariance between y_{it-1} and v_{it} is positive, estimating the lags of the dependent variable by ordinary least squares produces an upward biased estimator.

In contrast, estimating the lags of the dependent variable by a fixed effect method generates downward biased estimates. The fixed effect using the within estimator eliminates inconsistency which arises from the fixed individual effect (η_i) by subtracting all variables from their means. Thus, the within estimator with additional explanatory variables will be the following:

$$(\mathbf{y}_{it} - \bar{\mathbf{y}}_i) = \alpha(\mathbf{y}_{i,t-1} - \bar{\mathbf{y}}_{i-1}) + \sum_{k=1}^K \beta_k(\mathbf{x}_{kit} - \bar{\mathbf{x}}_{ki}) + (v_{it} - \bar{v}_i), \quad 6.3.2-1$$

$$\text{where } \bar{\mathbf{y}}_i = \frac{1}{T-1} \sum_{t=2}^T \mathbf{y}_{it} \quad 6.3.2-2$$

$$\bar{\mathbf{y}}_{i-1} = \frac{1}{T-1} \sum_{t=2}^T \mathbf{y}_{i,t-1} \quad 6.3.2-3$$

In particular, the transformed lagged dependent variable and the transformed error are equal to

$$(\mathbf{y}_{it} - \bar{\mathbf{y}}_i) = \mathbf{y}_{i,t-1} - \frac{1}{T-1} (\mathbf{y}_{i1} + \dots + \mathbf{y}_{it} + \dots + \mathbf{y}_{iT-1}) \quad 6.3.2-4$$

$$(v_{it} - \bar{v}_i) = v_{it} - \frac{1}{T-1} (v_{i2} + \dots + v_{i,t-1} + \dots + v_{iT}) \quad 6.3.2-5$$

The bias of within estimates is coming from the negligible correlation between the transformed lagged dependent variable $(y_{i,t-1} - \bar{y}_{i-1})$ and the transformed error $(v_{it} - \bar{v}_i)$. The downward bias occurs as the correlation between $-y_{it}/(T-1)$ and v_{it} is higher than the correlation between $-v_{i,t-1}/(T-1)$ and $y_{i,t-1}$. The first correlation is negative and the second correlation is positive. Thus, the within estimates of models with lagged dependent variables on the right-hand side of the equation will be lower than the actual estimates.

The Difference GMM (generalized-method-of-moment) eliminates the correlation between the lagged dependent variable and the error term by transforming the data. Particularly, Arellano and Bond (1991) use the first-difference transformation for all variables. The generalized-method-of-moment is an extension of the instrumental variable approach (IV) by Anderson and Hsiao (1982). GMM constructs the further lags (2 periods or more) either in the form of the level or the difference of the dependent variable to instrument the lagged dependent variable (Baum 2006). By having this process, the GMM approach provides more instruments than the two stages least squares approach presented by Anderson and Hsiao (1982). The instruments that can be employed are lags of the level of the endogenous variable in the differenced form and the strictly exogenous variables (Baum 2006). Furthermore, the number of instruments can be large because the observations of lags of the period (t) minus two are available as instruments. If the model specification is,

$$\mathbf{y}_{it} = \alpha \mathbf{y}_{i,t-1} + \beta' (\mathbf{x}_{it}) + \varepsilon_{it} \quad 6.3.2-6$$

$$\varepsilon_{it} = \eta_i + v_{it} \quad 6.3.2-7$$

the first-difference transformation of the model is:

$$\Delta \mathbf{y}_{it} = \alpha \Delta \mathbf{y}_{i,t-1} + \beta' \Delta \mathbf{x}_{it} + \Delta v_{it} \quad 6.3.2-8$$

The first differentiation removes the fixed individual effect (η_i) however the endogeneity problem in the lagged dependent variables persists. The problem relies on the correlation between the $y_{i,t-1}$ term in $\Delta y_{i,t-1}$ and v_{it} term in Δv_{it} and within any predetermined variables in x_{it} that are not strictly exogenous (Roodman 2009). In addition, the first difference transformation of the Difference GMM enlarges the gaps in unbalanced panel data. Where y_{it} is missing, the observation Δy_{it} and $\Delta y_{i,t-1}$ will also be absent (Roodman 2009). Furthermore, Arellano and Bover (1995) and Blundell and Bond (1998) argue that the results of a first-differenced GMM estimator have poor finite sample properties particularly if the

variables are close to a random walk. Weak instruments cause the problem where in a short panel the model has a moderately persistent series (α is high), the instrument of the lagged dependent variable may not be correlated with the error term but is also weakly correlated with the endogenous variables (Baum 2006; Blundell & Bond 1998).

System GMM (generalized-method-of-moment) aims to minimize the data loss from the previous method of Difference GMM³² and improve the estimation. The System GMM is an extension of the Difference GMM because it combines the equations of levels with equations of differences and estimates a system of equations (Arellano & Bover 1995; Blundell & Bond 1998). Essentially, this method employs two types of instruments which are the lagged first-differences of the dependent variable in addition to the usual lagged levels for equations in first-difference (Arellano & Bover 1995). The combination of the moment conditions of the difference model and the levels model produces less bias and higher precision estimators compared to Difference GMM (Bun & Windmeijer 2010).

As discussed above, to address the possible endogeneity, this study incorporates instrumental variables. The instruments provide consistent estimates of the parameter of banking competition. There are two conditions that instruments must satisfy. First, instruments must not be correlated with the current value of the error term in order to deliver a valid estimate. In other word, instruments should be exogenous variables that $cov(z_1u) = 0$, where z_1 and u are the instrument and error term respectively. Second, instruments must be relevant which means that instruments must correlate with the endogenous regressor (here the competition measure) conditional on other exogenous variables in the model. The instrumental variables indirectly influence the dependent variable of the measure of bank stability through their impacts on competition measure.

This study employed further lags of the dependent variable as instruments on the right-hand side of the equation. In addition, some studies (for example Boyd, De Nicolò and Jalal (2006), Schaeck and Cihak (2007), Soedarmono, Machrouh and Tarazi (2011), Beck, De Jonghe and Schepens (2013)) recommend the employment of instruments that are capable of explaining

³² It is conducted by using the Mata version in STATA that includes the option to use the forward orthogonal deviations transform instead of first differencing. The orthogonal deviations have the virtue of preserving sample size in panels with gaps (xtabond2.log).

the nature of competition in the banking industry (H-statistics)³³ but that do not directly affect stability. This study employed four variables which are the degree of market concentration, the penetration of foreign banks, the domination of government banks and the dummy of banking reforms. Market concentration directly determines the level of competition as proven by the vector error correction estimation in Chapter five. The foreign banks penetration, the domination of government banks and dummy of banking reforms reflects the degree of openness in the banking industry. As discussed by Berger, Klapper and Turk-Ariss (2009) and Schaeck and Cihak (2007) the degree of openness is a critical measure of banking freedom. The degree of market concentration is measured by the Herfindahl-Hirschman index. The degree of foreign penetration is calculated by measuring the assets of foreign banks in the Indonesian banking industry. Consistent with Chapter five, foreign banks are defined as those with foreign ownership of at least 50 per cent in order to capture the foreign banks regardless of the modes of entry. Each foreign bank is assigned by a dummy then we multiply the dummy with the values of total assets which have been deflated by the GDP deflator. Consistent with Chapter four, government banks consist of state-owned banks and regional banks. The domination of government banks is measured by multiplying the dummy of government banks with the values of total assets which have been deflated by the GDP deflator. A dummy of banking reforms captures the implementation of deregulation and liberalization policies between 1988 and 1996. As discussed in chapter Three of section 3.4.1, the time period of dummy specified relates to the period when the initial effects will be felt.

In order to test the relevance of the instruments in affecting banking competition, this study relied on the F test which is generated from the first stage regression (Berger, Klapper & Turk-Ariss 2009). This is a joint test of all excluded instruments. The rejection of the null hypothesis implies that the instruments are able to explain the endogenous variable of banking competition. In addition, the correlation matrix between the instruments and the endogenous variable of banking competition provides information of the possible relationship between those variables. The Hansen J test of over identification was employed to check the validity of the instruments (Boyd, De Nicolò & Jalal 2006, p. 10). The results of the F-test from the first-stage of regression and the Hansen J test are available at Table 6.4-2. The complete results of the first-stage regression and the correlation matrix are presented in the appendix.

³³Berger, Klapper and Turk-Ariss (2009) employed activity restrictions, banking freedom, and the percent of foreign and government-owned banks as instruments to explain measures of the degree of market power. Schaeck and Cihak (2007) employed entry restrictions, activity restrictions, and banking freedom as instruments to explain the H-Statistic.

The instrumental variables are estimated using the ivstyle technique. The technique assumes that the instrumental variables may correlate with the past error term and thus they are treated as standard instruments. As the variables are predetermined, they are only valid as instruments in the levels equation. In a small sample size, the number of instruments may climb toward the number of observations. If the number of instrument is too great, the instruments will be over fitted and produce biased results as appeared in OLS/GLS (Roodman 2009). The collapse technique is useful to avoid this problem as suggested by Roodman (2009). This will create one instrument for each variable and lag distance, rather than one for each time period, variable and lag distance. In addition, this technique is capable of limiting computational demands by reducing the width of the instrument matrix as provided by STATA software. The present study employed the collapse technique to control the problem of too many instruments. The model specification examining the trade-off between banking competition and banking stability is as below,

$$\begin{aligned}
 \mathbf{Z}_{it} = & \beta_1(\mathbf{H}_t) + \beta_2(\mathbf{OI}_{it}) + \beta_3(\mathbf{LO}_{it}) + \beta_4(\mathbf{overhead}_{it}) + \beta_5(\mathbf{LDR}_{it}) + \beta_6(\mathbf{Size}_{it}) + \\
 & \beta_7(\mathbf{Assetsgrowth}_{it}) + \beta_8(\mathbf{Growth}_t) + \beta_9(\mathbf{Depreciation}_t) + \\
 & \beta_{10}(\mathbf{Per\ capita\ GDP}_t) + (\eta_i + v_{it} + \mathbf{m}_{it})
 \end{aligned}
 \tag{6.3.2-9}$$

Where i and t refer to bank and time index respectively. The table below provides comprehensive information on the definition of dependent and explanatory variables.

Table 6.3.2-1 Definition of Variables

Explanatory Variable	Expected Relationship	Variable definition and measure
Banking Competition		
H ^a	(+) or (-)	<i>Log of banking competition</i>
Banks' specific factors		
OI	(+) or (-)	<i>Log of proportion of non-interest income to interest income</i>
LO	(+)	<i>Log of proportion of loans to total assets</i>
Overhead (Technical efficiency)	(-)	<i>Log of proportion of operating expenses to total revenue</i>
LDR	(-)	<i>Log of proportion of loans to deposits</i>
Size	(-)	<i>Log of total assets</i>
Assets growth	(-)	<i>Log of growth of total assets</i>
Macroeconomic environment		
Growth ^a	(+)	<i>Log of economic growth</i>
Depreciation ^a	(-)	<i>Log of yearly changes in the value of local currency (Rupiah) to US Dollar^b</i>
Level of development		
Per capita GDP ^a	(+)	<i>Log of per capita GDP</i>
Instrument Variables		
HHI		<i>Degree of market concentration measured by log of concentration HHI index</i>
Foreign		<i>Penetration of foreign banks measured by log of foreign bank assets</i>
Government		<i>Domination of government banks measured by log of government banks assets</i>
Reform		<i>Dummy of banking reform. This is dummy variable which equals 1 if year = 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996 and 0 if otherwise</i>
Dependent Variable		
Z		<i>Overall banks risk (z-score of insolvency risk) measured by log of z-score. Profit is based on return on assets</i>
Profit		<i>Banks profits measured by log of return on assets</i>
Sd_ROA		<i>Profit volatility measured by log of standard deviation of return on assets (ROA)</i>
EQ		<i>Bank capitalization measured by log of proportion of equity to total assets</i>

Note: a). These variables are a non-unit variant variable; b). It was calculated by comparing the value of local currency to US Dollar at the end of financial year of 31 December with the value in previous year.

In the shorter model, the specification is as below,

$$\mathbf{z}_{it} = \alpha \mathbf{z}_{i,t-1} + \beta' \mathbf{x}_{it} + (\eta_i + v_{it} + \mathbf{m}_{it}), \quad 6.3.2-10$$

where, $v_{it} = \rho v_{i,t-1} + e_{it} \quad |\rho| < 1$

$$e_{it}, m_{it} \sim \text{MA}(0)$$

η_i is the unobserved fixed-individual effect

v_{it} is a possibly autoregressive shock

m_{it} is serially uncorrelated measurement errors.

x_{it} is the explanatory variables

The dynamic version of the model above is as below.

$$z_{it} = \beta' x_{it} - \beta' x_{i,t-1} + \alpha z_{i,t-1} + (\eta_i (1 - \rho) + e_{it} + m_{it} - \rho m_{i,t-1}) \quad 6.3.2-11$$

The standard assumption under the first differences is that the variables do not correlate with the serially measurement errors of m_{it} or e_{it} .

$$\mathbf{E}[\mathbf{n}_{i1} \mathbf{e}_{it}] = \mathbf{E}[\mathbf{x}_{i1} \mathbf{m}_{it}] = \mathbf{0}, \text{ for } t=2, \dots, T \quad 6.3.2-12$$

The above assumption leads to the moment condition as below.

$$\mathbf{E}[\mathbf{n}_{i,t-s} \Delta \mathbf{w}_{it}] = \mathbf{0}, \text{ where } \mathbf{n}_{it} = (\eta_i, \mathbf{x}_{it}, \mathbf{z}_{it}), \text{ for } t=2, \dots, T \quad 6.3.2-13$$

As explained by Blundell and Bond (1998), the moment is fulfilled for $s \geq 2$ when $w_{it} \sim \text{MA}(0)$, and for $s \geq 3$ when $w_{it} \sim \text{MA}(1)$. Thus, the Difference GMM facilitates using the suitable lagged levels of the variables as instruments after the equation has been differenced. In order to eliminate the problem of weak instruments found in the Difference GMM, the System GMM suggests adding suitably lagged first differences of the variables as the additional instruments (Blundell and Bond, 1998). The addition of instruments should be conducted by assuming that the additional instruments do not correlate with the unobserved fixed-individual effect or $E[\Delta x_{it} \eta_i^*] = 0$.

Based on the above additional assumption, the system GMM has additional moment conditions (Blundell and Bond, 1998) as below.

$$\mathbf{E}[\Delta \mathbf{x}_{i,t-s} (\eta_i^* + \mathbf{w}_{it})] = \mathbf{0} \quad 6.3.2-14$$

Based on Arellano and Bover (1995), the above moment is fulfilled for $s = 1$ when $w_{it} \sim \text{MA}(0)$, and for $s = 2$ when $w_{it} \sim \text{MA}(1)$. The assumption allows the employment of

suitably lagged first differences of the variables as instruments for the equations in levels (Blundell and Bond, 1998, p. 7). This approach is considered capable of improving the precision of the estimators and of reducing the finite sample bias in the situation where the lagged variable is only weakly identified from the first-differenced equations.

There are two tests that have to be conducted to assure that the model fulfills the assumption of the System GMM. The first is the Sargan/Hansen test examining the suitability of instruments. The null hypothesis for this test is that the instruments are not correlated with the errors in the first-differenced equation. The Sargan/Hansen test is computed as below.

$$\mathbf{S} = \mathbf{N} \mathbf{J}_{\mathbf{N}}(\hat{\boldsymbol{\alpha}}_2) = \mathbf{N} \left(\frac{1}{\mathbf{N}} \sum_{i=1}^{\mathbf{N}} \mathbf{Z}'_i \Delta \hat{\mathbf{v}}_{i2} \right)' \mathbf{W}_{\mathbf{N}}^{-1}(\hat{\boldsymbol{\alpha}}_1) \left(\frac{1}{\mathbf{N}} \sum_{i=1}^{\mathbf{N}} \mathbf{Z}'_i \Delta \hat{\mathbf{v}}_{i2} \right) \quad 6.3.2-15$$

The test statistic has a χ^2_q distribution where q equals the total number of instruments subtracted from the number of parameters in the model. The acceptance of the Hansen test implies that the instruments pass the identification test and the model can be estimated using the System GMM.

Secondly, we have to test the existence of serial correlation in the errors measurements. This test is important because the GMM estimator in the dynamic model is not consistent if the errors v_{it} are correlated over time. The System GMM, the serial correlation of errors is permitted in the first order ($(\Delta v_{it} \Delta v_{i,t-1}) = -\sigma_v^2$) but it could not be correlated in the second order ($(\Delta v_{it} \Delta v_{i,t-2}) = 0$). Bun and Windmeijer (2010) highlight that if the model does not reject the null hypothesis of no serial correlation of the errors, the test statistics are standard and normally distributed.

6.4. Empirical Findings and Discussion

The descriptive statistics of all variables for example means and standard deviation are available in table 6.4-1. The descriptive statistics are based on the original values of the variables before they are transformed into log form. The mean value of banking competition is 0.28 and the standard deviation is 0.17. Regarding the measure of banking stability, the mean value of z-scores is 64.76 and the standard deviation is 545.16. The yearly data shows that average z-scores were particularly high in the years 1985, 1987, 1988, and 1994. In spite of high z-scores in those times, the standard deviation of z-scores is also high. The z-scores were lowest in the three years of crisis between 1998 and 2001 with the score range of 10 –

16. During the crisis period of 1998 to 2001, the standard deviations of the z-scores were also low, indicating that the insolvency risks were high for all banks. In the 2000s, the z-scores were higher compared to the crisis period in the late 1990s, but they were still lower than the z-scores in the early 1990s.

As discussed previously in the empirical method, the main estimation uses the z-score as the measure of banking stability. In addition, there are some estimations using different measures of banking stability; for example profits, the profits volatility, and banking capitalization. With those additional estimations, this study examined the source of banking instability; whether it comes from lower profits, higher profits volatility or lower capitalization. All estimations employed lagged one period of the dependent variable as an instrument. In addition, there are four instrument variables to explain the nature of competition in the banking industry. These are the degree of market concentration, foreign penetration, the domination of government banks and banking reform. There are eight estimations based on equation 6.3.2-9 presented in Table 6.4-2. We can group the eight estimations into two. The first group is estimations 1 to 4. The remainder estimations belong to the second group. The first group relies on economic growth as the representation of the macroeconomic environment. The second group uses currency depreciation to control for the macroeconomic environment. The two macroeconomic variables of economic growth and currency depreciation are likely to be correlated, thus they are not placed together in the same estimation model. The correlation index between the two variables is 0.43 and it is significant at the 99 per cent level of confidence. In addition, we add banking reform as an instrumental variable in the second group.

Table 6.4-1 Descriptive Statistics

Variable	Means	Std. Dev
H	0.28	0.17
OI	0.18	0.51
LO	0.58	0.20
Overhead	0.88	0.62
LDR	2.41	54.39
Size (in million Rupiah)	56,003.75	177,288.3
Assets growth (in per cent)	18	48
Growth (in per cent)	5.46	3.98
per capita GDP (in US\$)	717.03	215.17
Depreciation	0.11	0.19
HHI	0.09	0.04
Foreign (in million Rupiah)	11,559.43	61,588.74
Government (in million Rupiah)	29,158.56	16,0570.6
Banking reform (Dummy variable)	0.29	0.45
Z	64.76	545.16
Profits (in per cent)	0.79	12.96
Sd_ROA	0.03	0.11
EQ	0.12	0.19

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia for bank database and the World Bank database for macroeconomic variables.

The discussion of the estimation results begins with a test of the capability of the explanatory variables to explain the dependent variable using the chi-square test (χ^2_q), the instruments identification test and the autocorrelation test. All estimations passed the chi-square test using the 95 per cent confidence level, except for estimation 8 using 90 per cent. Next, we tested the identification of the instruments using the Hansen test. The acceptance of the Hansen test implies that the instruments pass the identification test and the model can be estimated using the System GMM. The chi-square values of the Hansen test for all estimations are less than the values of the chi-square table, thus the models could not reject the null hypothesis at the 99 per cent confidence level for all estimations. It implies that it is valid to estimate equation 6.3.2-9 of trade-off between banking competition and stability by using the selected instruments for all estimations.

The discussion continues with the autocorrelation test to assess the existence of serial correlation in the errors measurements. The autocorrelation tests of the Arrelano-Bond method show that there are no serial correlations of the errors in the second-order for all

estimations. The chi-square, the instrument identification and autocorrelation tests show that it is valid to use the generalized-method-of-moment (GMM System) to estimate equation 6.3.2-9³⁴. The GMM is estimated with robust standard errors clustered at the bank level to correct for within-bank correlation. Table 6.4-2 demonstrates the empirical results of eight equations using the generalized-method-of-moment. The first part provides the information of the value of coefficients and the standard deviations for each explanatory variable. The values of standard deviations are in brackets. The second part of the table describes the instrumental variables, the chi-square test (χ_q^2), the instruments identification test and the autocorrelation test.

³⁴This study also tested the likelihood of multicollinearity within explanatory variables. The variance inflation factors (VIF) shows that the mean VIF for the empirical model presented at equation 6.3.2-9 is 1.34. The mean VIF indicates that the model does not have a multicollinearity problem. The rule of thumb for mean VIF is 10 which indicates high collinearity (Gujarati 2003).

Table 6.4-2 Empirical Result of Generalized-Method-of-Moment

	(1) ^a z-score	(2) Profits	(3) ^a Profits volatility	(4) ^a Bank capitalization	(5) ^b z-score	(6) ^b Profits	(7) ^b Profits volatility	(8) ^b Bank capitalization
H	0.17 (0.21)	0.007 (0.009)	-0.09 (0.29)	0.036 (0.09)	0.67** (0.29)	0.013* (0.007)	-0.34 (0.32)	0.28* (0.16)
OI	1.03** (0.44)	0.002 (0.006)	-0.20 (0.66)	0.32** (0.16)	0.68 (0.52)	-0.007 (0.006)	-0.16 (0.97)	0.46* (0.25)
LO	4.32* (2.31)	-0.005 (0.023)	-7.14*** (2.26)	0.72 (0.80)	6.38*** (2.4)	-0.03 (0.025)	-7.23** (3.31)	1.99* (1.12)
Overhead	-2.24 (2.27)	-0.09*** (0.019)	6.87 (3.49)	-0.70 (0.53)	-0.67 (1.84)	-0.09*** (0.026)	6.33*** (2.47)	0.18 (0.66)
LDR	-3.29* (1.69)	-0.008 (0.013)	2.40 (2.11)	-0.93 (0.68)	-2.27* (1.38)	0.013 (0.014)	2.27 (1.90)	-1.26 (0.78)
Size	-0.91* (0.53)	-0.005 (0.003)	0.0005 (0.79)	-0.42** (0.20)	-0.21 (0.20)	-0.004 (0.003)	-0.008 (0.27)	-0.23** (0.10)
Assets growth	-0.48*** (0.18)	-.001 (0.003)	-0.35 (0.25)	-0.032 (0.07)	-0.54** (0.26)	-.0003 (0.002)	-0.39 (0.38)	-0.06 (0.088)
Growth	0.76 (0.53)	0.01 (0.009)	-1.1 (0.77)	0.15 (0.13)				
Per capita GDP	3.1 (2.3)	0.005 (0.007)	1.06 (3.56)	1.19* (0.68)				
Depreciation					-.33* (0.18)	-.004 (0.002)	.27 (0.39)	-.20 (0.12)

	(1) ^a z-score	(2) Profits	(3) ^a Profits volatility	(4) ^a Bank capitalization	(5) z-score	(6) Profits	(7) Profits volatility	(8) Bank capitalization
Instrumental variables								
HHI	√	√	√	√	√	√	√	√
Foreign	√	√	√	√	√	√	√	√
Government	√	√	√	√	√	√	√	√
Banking reform		√			√	√	√	√
Number of observation	2,302	2,369	2,325	2,340	2,122	2,191	2,148	2,161
F test/ Chi Square	39.35 (0.000)	74.42 (0.000)	35.76 (0.000)	19.11 (0.024)	50.41 (0.000)	75.95 (0.000)	37.98 (0.000)	15.21 (0.055)
Test of instrument identification								
Hansen test of over identification	Chi square (22) =23.59 ProbPr>chi2 = 0.369	Chi square (25) =29.51 ProbPr>chi2 = 0.243	Chi square (22) = 14.28 ProbPr>chi2 = 0.891	Chi square (24) =18.14 ProbPr>chi2 = 0.796	Chi square (21) = 23.30 ProbPr>chi2 = 0.328	Chi square (23) = 28.88 ProbPr>chi2 = 0.184	Chi square (21) = 16.19 ProbPr>chi2 = 0.759	Chi square (23) = 19.03 ProbPr>chi2 = 0.7000
F test of the first-stage regression	F test =1.65 Prob> F-test=0.1769	F test =107 Prob> F-test= 0.000	F test =2.15 Prob> F-test=0.09	F test =5.20 Prob> F-test=0.001	F test =53.57 Prob> F-test=0.000	F test =50.59 Prob> F-test=0.000	F test =51.22 Prob> F-test=0.000	F test =52.53 Prob> F-test=0.000
Arrelano-Bond test of autocorrelation								
AR(1)	z= -2.95 ProbPr>z=0.003	z= -1.74 ProbPr>z=0.081	z= -2.75 ProbPr>z=0.006	z= -2.33 ProbPr>z=0.02	z=-3.13 ProbPr>z=0.002	z=-1.59 ProbPr>z=0.11	z=-1.95 ProbPr>z=0.052	z=-2.17 ProbPr>z=0.030
AR(2)	z= -0.82 ProbPr>z=0.412	z= 0.06 ProbPr>z=0.955	z= -1.24 ProbPr>z=0.216	z= -0.18 ProbPr>z=0.861	z=-0.18 ProbPr>z=0.857	z=0.26 ProbPr>z=0.793	z=0.06 ProbPr>z=0.951	z=-0.72 ProbPr>z=0.469

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. Figures in parentheses are t ratios. a) This study also run estimations number 1, 3, and 4 by using D1988_1996 as instrument variable. The results are not different with the model specification without D1988_1996 as instrument variable. However, per capita GDP entered the model incorrectly with negative influence on z-score (overall bank risk). Thus we rely on specification without D1988_1996 as instrument variable; b) This study also run the estimations number 5 to 8 using both macroeconomic variables of economic growth and currency depreciation. In addition, the estimation covered per capita GDP. The results are similar to findings of estimation 5 to 8.

For the measure of banking competition, H-statistics enter estimations one and five with a positive sign, also equations 2, 4, 6, and 8 but not always statistically significant. It implies that the competitive banking industry contributed to reducing insolvency risk. In the main estimation of number five that uses the z-score as the measure of banking stability, the coefficient of the H-statistic is 0.67 and it is statistically significant at the 95 per cent confidence interval. In order to examine the source of banking soundness under a competitive environment, estimations number four and eight were estimated. The two estimations suggest that under a competitive market, banks had higher capitalization. The coefficient on H-statistics in estimation eight is 0.28 and it is significant using a confidence interval of 90 per cent. In addition, banks in competitive markets have higher profits and more stable profits. By using profits as the measure of stability, estimation number six shows the coefficient H-statistics is positive at 0.013 and is significant using a confidence interval of 90 per cent. If we are using profit volatility as the dependent variable, the coefficient of the H-statistic in equation three and seven are negative but they are not significant. According to empirical results presented in Table 6.4-2, this study relies on estimation five to eight because estimations they are more powerful in estimating the influence of banking competition on banking stability. In those estimations, banking competition measured by H-statistics significantly influences banking stability. The inclusion of banking reform as an instrumental variable and currency depreciation to represent the macroeconomic environment produces better estimation of the influence of competition on stability.

In order to test the robustness of the above findings, this study estimated the same specification of equation 6.3.2-9 for large and medium-sized, and small banks separately. In other words we test the consistency of empirical findings of table 6.4-2 by using a different dataset. The first dataset comprises large and medium-sized banks and the second dataset contains the small banks. We collapsed the large banks and medium-sized banks so as to have an adequate sample size. The banks categorisation based on assets follows Bikker and Haaf (2002). The same method has been discussed in Chapter four in analysing the degree of competition across banks with different sizes³⁵. By using a smaller dataset, the empirical findings are similar. A competitive banking system contributes to reduce risks. Competitive

³⁵ The bank categorization is based on Biker and Haaf, K (2002). The same method has been discussed in chapter three. It is based on the average value of banks assets. The large banks are associated with the biggest ten per cent of banks in the market and small banks are those in the lowest 50 per cent of the market. The remaining 40 per cent of banks belong to the medium-sized banks.

banking is associated with higher profits, lower profit volatility and better capitalization. The findings are the same for both the groups of large and small banks. Furthermore, competition (H-statistics) significantly improves banks soundness particularly for larger banks. Table 6.4-3 shows the coefficients of H-statistics for the estimation of equation 6.3.2-9 for large and medium-sized banks and small banks.

Table 6.4-3 Empirical Findings of Competition - Stability for Large Banks and Small Banks

Sample	Competition (H-statistics)			
	(5) ^a z-score as dependent variable	(6) ^b Profits as dependent variable	(7) ^c Profits volatility as dependent variable	(8) ^d Banks capitalization as dependent variable
Large and medium-sized banks	0.67*** (0.25)	0.009* (0.005)	-0.35 (0.22)	0.33** (0.15)
Observation	1,402	1,453	1,424	1,426
Small banks	0.25 (0.27)	0.0002 (0.003)	-0.17 (0.31)	0.047 (0.13)
Observation	720	738	724	735

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. Figures in parentheses are t ratios. a) It uses the same specification as estimation 5 at Table 6.4-2; b) It uses the same specification as estimation 6 at Table 6.4-2; c) It uses the same specification as estimation 7 at Table 6.4-2; d) It uses the same specification as equation 8 at Table 6.4-2 but the estimation dropped the overhead variable to correct of autocorrelation issues.

The empirical findings show that there was no trade-off between competition and stability in the Indonesian banking industry. Moreover, competitive banking contributed to enhanced stability. Thus, the empirical findings suggest that the competition – stability hypothesis is suitable to explain the relationship between competition and stability in the Indonesian banking industry. The findings are consistent with Boyd, De Nicolò and Jalal (2006), Schaeck and Cihak (2007), Soedarmono, Machrouh and Tarazi (2011), Liu, Molyneux and Wilson (2013) and Beck, De Jonghe and Schepens (2013). Boyd, De Nicolò and Jalal (2006), Schaeck and Cihak (2007), Soedarmono, Machrouh and Tarazi (2011), Liu, Molyneux and Wilson (2013) revealed that competition and stability can go hand in hand. Furthermore, Soedarmono, Machrouh and Tarazi (2011) and Liu, Molyneux and Wilson (2013) observed the emerging markets in Asian countries including Indonesia. According to Beck, De Jonghe

and Schepens (2013) the study generally supported the competition – fragility hypothesis. However, Beck, De Jonghe and Schepens (2013) made an exception for developing countries. By considering the characteristics of developing countries where the amount of information sharing, the liquidity of the stock market, and the coverage of deposits insurance are significantly lower than in developed countries, the competition – stability hypothesis was more appropriate for developing countries (Beck, De Jonghe & Schepens 2013, p. 238).

The following is a discussion of the role of bank specific factors, the level of development and the macroeconomic environment in enhancing banking stability. Business diversity and loans disbursement contributed to reducing risk. A higher income generated from the non-interest based activities reduced profit volatility and enhanced capitalization. Particularly it enhanced capitalization as the coefficients were positive and significant. Regarding loans, a higher loans disbursement reduced profit volatility and enhanced capitalization. Particularly higher loans disbursement was associated with a reduction of profit volatility. Banks were more specialized in disbursing loans thus they had better screening and monitoring so it lowered the non-performing loans (Jiménez, Lopez & Saurina 2013). Technical efficiency which is measured by overhead costs also contributed to reducing risk by increasing profits and lowering profit volatility. Consistent with Boyd, De Nicolò and Jalal (2006) and Soedarmono, Machrouh and Tarazi (2011), a more efficient bank was capable of boosting profits. In addition, by having lower overhead costs, banks had more stable profits. In terms of the ratio of loans to deposits (LDR), a higher LDR was associated with a higher risk. Banks with higher LDR were more likely to have a liquidity problem than banks with lower LDR (Soedarmono, Machrouh & Tarazi 2011).

The empirical findings show that size is important in explaining the relationship between competition and stability. Larger banks were associated with higher insolvency risk. Equation four and eight show that larger banks had lower capitalization. This finding is consistent with Schaeck and Cihak (2007), Berger, Klapper and Turk-Ariss (2009), Soedarmono, Machrouh and Tarazi (2011), Beck, De Jonghe and Schepens (2013). In terms of risk taking, the empirical findings could not support a “too big to fail” hypothesis as the variable size did not have a significant impact on profit volatility in equations three and seven. Finally banks with higher growth of assets also had higher risk. Growth of assets were not followed by a stronger capitalization, thus insolvency risk increased (Beck, De Jonghe & Schepens 2013).

Regarding the macroeconomic environment, currency depreciation is associated with bank insolvency as shown in the estimation five, even though it was only significant by using 90 per cent of confidence interval. This may reflect that the exchange rate was only freely floating for about half of the estimation period³⁶. Currency devaluations contributed to increased banks risk because it poses a threat to bank profitability (Demirgüç-Kunt & Detragiache 1998). This finding is consistent with Nasution (2000) and Djiwandono (2005) who argued that a pressure from significant currency depreciation in January 1998 and tight monetary policy had squeezed the liquidity in the banking system. The tight monetary policy increased the interest rates of BI notes (SBI's) from 17.4 per cent in 1997 to 52.82 per cent in 1998 (Djiwandono 2005). The higher interest rates of BI notes induced an increase in interest rates of deposits and interbank loans. The pressure on liquidity extended to banks' profitability as banks experienced loss more than 100 trillion Rupiah in 1998. As banks' equity was not capable of covering the losses so banks were being insolvent. In 1998 banks' equity dropped to more than minus 160 trillion Rupiah in 1998. In addition, estimations number six, seven and eight show that currency depreciation was associated with lower profits, larger profit volatility and lower capitalization. Regarding economic growth and the level of development, both variables had a positive influence on reducing risk however their influence were not statistically significant.

The following discussion explores the contribution of a competitive banking system to reducing risk. Empirical findings presented in Table 6.4-2 show that competitive banking enhanced profits, reduced profit volatility and increased capitalization. Under a competitive banking system, banks have to enhance their capability in order to survive in a more challenging environment. Banks must improve their efficiency, increase their loans disbursement, diversify their business, and boost their assets. By improving the level of efficiency, disbursing more loans, diversifying business to non-interest based activities and increasing their assets, banks are capable of generating higher profits. In the case of large banks, improving efficiency is also important to have less volatile profits. Regarding small banks, the increase in loans disbursement is associated with lower profit volatility because banks have better screening and monitoring of the loans. Finally, a competitive banking system puts pressure on banks to be better capitalized. This finding agrees with previous

³⁶ Indonesia changed the exchange rate regime from a managed foreign exchange regime to free-floating exchange regime on 14 August 1997 (Djiwandono 2005).

studies, for example Schaeck and Cihak (2007), Berger, Klapper and Turk-Ariss (2009), Soedarmono, Machrouh and Tarazi (2011) and Beck, De Jonghe and Schepens (2013).

The data shows that large banks had a higher insolvency risk compared to smaller banks. The means of the z-scores for large banks between 1980 and 2010 was the lowest compared to their smaller counterparts. Table 6.4-4 reveals that large banks had an average z-score of 36.61. The average z-score for medium-sized banks was 65.57 and the mean of z-score of small banks was 78.97. In terms of profits, medium-sized banks had better performance compared to large and small banks. However, medium-sized banks also had more profit volatility. In contrast, small banks had the most stable profits as they had lower standard deviation of the return on assets. Finally, small banks had the lowest insolvency risk because they had better capitalization. The proportion of equity to total assets for small banks on average was 0.168, while the mean capitalization of medium-sized banks was 0.106 and the mean capitalization of large banks was 0.068.

Table 6.4-4 Means of Z-scores, Return on Assets and Capitalization of Large Banks, Medium-Sized Banks and Small Banks between 1980 and 2010

Group of banks based on size	Insolvency risk (z-score)	Profitability (Return on Assets)	Profits volatility (standard deviation of Ratio of Assets)	Banks capitalization (Ratio of Equity to total assets)
Large banks	36.61 ^a	0.084	0.0256	0.068
Medium-sized banks	65.57	0.079	0.0327 ^b	0.106
Small banks	78.97	0.077	0.0202 ^c	0.168 ^d
All banks	64.76	0.079	0.0269	0.121

Source: calculated using data from the Annual Financial Report of Banks, published by the Central Bank of Indonesia.

a) The large banks had the lowest z-score implying the highest insolvency risk compared to medium-sized and small banks. This is significant at the 10% level; b) The profit of the medium-sized banks was the most volatile compared to large and small banks. This is significant at the 5% level; c) The profit of the small banks was the least volatile compared to large and medium-sized banks. This is significant at the 1% level; d) The small banks had the highest capitalization compared to large and medium-sized banks. This is significant at the 1% level.

Further exploration of the source of bank risk across banks of different sizes shows that banks were exposed to larger risk as their assets grew. An increase in loans disbursement contributed to the growth of assets. Larger banks had a more challenging situation because

they had a lower access to cheap sources of funds from deposits. Figure 6.4-1 demonstrates the composition of banks liabilities prior and during the 1997 banking crisis. Small banks had a greater access to cheap funds as 70 per cent of banks liabilities were in the form of deposits. In addition, small banks had a lower level of borrowing by 12 per cent compared to larger banks. Within large and medium-sized banks, the contribution of deposits to bank liabilities was lower by 60 per cent. Larger banks borrowed both from the local market and from overseas to fund their loans disbursement and other investment activities. In addition to the growth of assets, banks experienced maturity mismatches³⁷. It further increased the demand on overseas funding particularly for the large banks. Large banks benefitted in accessing overseas loans because the creditors preferred to disburse loans to banks with investment-grade rating. By using the overseas loans, banks saved 7 per cent compared to use the interbank loans and over 10 per cent compared to use time deposits (Chou 1999). In addition, prior to the 1997 banking crisis, foreign money surged to the local economy. Indonesia was popular as the destination of foreign money because it had strong domestic growth, low currency fluctuation and high interest rates. The lack development of the capital market also contributed to the escalation of overseas loans. Just a few months prior to the crisis, the reported foreign borrowings for the private sector had increased to \$61 billion (March 1997) from \$48 billion at the end of 1995 (Chou 1999).

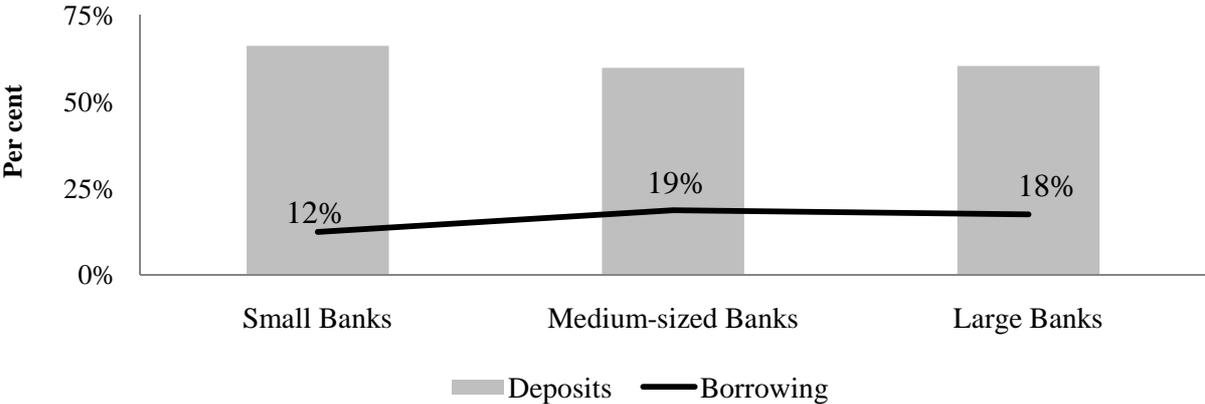


Figure 6.4-1 Contribution of Borrowing in Banks Liabilities (Indonesian Banking between 1988 and 1998)

³⁷ Most deposits were short-term with the maturity of less than one year. According to Chou (1999), 95 per cent of deposits in local currency were short-term. On the contrary, a quarter of loans had longer maturity because they were investment loans. Banks, particularly large banks, preferred to engage in overseas loans because there was a large differential between local and international interest rates.

The empirical results also suggest that the insolvency risk is higher if banks have a lower level of capitalization and are inefficient. The level of capitalization is particularly relevant to explain the higher insolvency risk of the large banks. The estimation results and the data show that large banks had a higher insolvency risk because they had lower capitalization compared to small banks. Banks must have adequate capital if they face more challenging business. Furthermore, the estimation of competition and stability across banks with different sizes suggest that lower efficiency contributed to increase insolvency risk. In this chapter, efficiency refers to technical efficiency that measures overhead cost by dividing the operating expenses to revenue. A high overhead cost contributed to lower profits, increased profit volatility and lowered capitalization. The findings were relevant for large banks and small banks. To sum up, all results presented in this chapter suggest that a competitive market enhanced banking stability. The estimations also show that the high overhead costs that reflects the efficiency level negatively contributed to stability. Furthermore, a competitive market induced banks to have a higher capitalization. Thus, by having a competitive banking system, banks are more efficient and stable.

In addition, the Indonesian banking industry was characterized by a variety of structural weaknesses, for example a high percentage of non-performing loans (NPL) and weak compliance of prudential regulation (particularly the limit of connected or intra-group lending (Djiwandono 2005; Enoch et al. 2001; Nasution 2000; Rosser 2002)) as discussed in the section 3.3.31 in chapter Three. According to Enoch et al. (2001), both state-owned banks and private banks, particularly private banks under conglomerate business, are involved in connected lending practices. For state-owned banks, they were used as the supplier of subsidized lending to the targeted projects or sectors. With regards to private banks, they supplied the credit to their affiliated companies under the same conglomerate. Many conglomerates established banks to collect funds to be allocated as credit for their own groups, particularly after the 1988 banking deregulation. Connected lending was eminent because the economy was controlled by some groups or families. The data from Claessens, Djankov and Lang (1999) showed that 67.3 per cent of business belonged to fifteen families. The Central Bank introduced a measure to limit connected lending by creating a limit on the disbursement of connected lending, however banks frequently exceeded the limit (Enoch et al. 2001; Nasution 2000; Rosser 2002). A number of banks violated the limits of connected lending which reached a peak in 1998 of 137 banks (Enoch et al. 2001). All state-owned banks and 118 private banks, both local and foreign exceeded the limit. Connected lending

contributes to the increase in the number of non-performing loans that may lead to the increase in insolvency risk. In addition, Indonesian banking suffered from a lack of banking supervision, lack of transparency and poor corporate governance (Djiwandono 2005). Those institutional weaknesses contribute to promoting the moral hazard in the banking industry which endangers financial stability.

Finally, the lack of competition within the banking industry was accompanied by a lack of competition in other parts of the financial industry. In the case of the Indonesian economy, the development of other financial institutions and the stock market has been much slower than the growth of the banking industry. Less developed non-bank financial institutions and stock markets reflect the lack of alternative sources of funds for enterprises. Rosul (2002) demonstrated that bank loans dominated the source of financing for the real sector in the Indonesian economy. Within the financial industry, banking dominated 87 per cent of assets between 2006 and 2008 and other financial institutions shared the rest of market (Pradiptyo et al. 2011). In regard to the stock market, at the beginning of the 1990s the proportion of bonds and equity issued by the capital market was only one-tenth that of bank loans. Gradually, the capital market has increased its participation in the Indonesian economy however it is still behind the banking industry. In 2001, the value of bonds and shares issued reached almost three-quarters of the value of bank lending. The lack of competition from other financial institutions and the stock market may explain how market power in Indonesian banking is more detrimental to banking instability as it facilitates moral hazard.

6.5. Conclusion

This chapter has validated the use of the generalized-method-of-moment (GMM System) to estimate the trade-off between competition and stability in the Indonesian banking industry. GMM can manage the endogeneity problem between the measure of competition and the measure of banking stability. GMM utilizes the instrumental variables approach by taking the lagged dependent variable as instruments on the right-hand side of the equation. Furthermore, by using GMM, this study assigned some instrumental variables that determine the nature of competition in the Indonesian banking industry but the instruments do not directly influence banking stability. In addition, the GMM was estimated with robust standard errors that clustered at the bank level to correct the within-bank correlation.

By using different specifications and different datasets, all estimations confirm that the competitive environment contributed to reducing banks' insolvency risk. Banks in a competitive market have a higher profit and better capitalization. The empirical findings signal that there was no trade-off between competition and stability in the Indonesian banking industry. The competition – stability rather than competition – fragility hypothesis is more appropriate to explain the relationship between competitive banking and stability. Under a competitive industry banks must improve their efficiency, increase their loans disbursement, diversify their business, boost their assets and enhance their capitalization. For both large and small banks, efficiency is a critical factor to reduce risk. Finally, for all banks, regardless of size, adequate capital is an important factor to cope with any shock in the market.

A competitive environment is important to enhance efficiency in the banking industry. Laeven (2005), Bikker, Spierdijk and Finnie (2006) and Bikker, Shaffer and Spierdijk (2011) argued that the Indonesian banking system was least competitive compared to other developing countries. Findings discussed in Chapters two and three are of the same view. Berger and Hannan (1998) suggest that under a less competitive market, firms enjoy market power to generate supernormal profits. In such markets, firms have less incentive to improve efficiency and lower costs because firms are in the position of enjoying supernormal profits. Among the sources of market power in the Indonesian banking industry was lack of competition within the banking industry as well as from other parts of the financial industry. The finding by Berger and Hannan (1998) provide a basis for the nexus between competition, efficiency and stability. The empirical findings reveal that a competitive industry improves banking efficiency which leads to enhanced profits, reduced profit volatility and enhanced capitalization. On the contrary, in a less competitive banking system, banks enjoy a quiet life. Berger and Hannan (1998) suggest that under an uncompetitive industry banks enjoy market power to gain supernormal profits. In such markets, banks have no incentive to improve their performance by minimizing their costs and/or enhancing their business. Thus, by having a competitive banking system, banks are more efficient and stable.

Consistent with the competitive – stability hypothesis, this study found that large banks had a higher insolvency risk compared to smaller banks. Large banks had a lower level of capitalization compared to smaller banks. In addition, the dependence on overseas loans was one of the sources of banking fragility. Banks, particularly the large banks, relied on overseas loans to fund their growing loans disbursement and cover the maturity mismatches. By having

a higher risk source of funds and low capitalization, large banks were exposed to larger risks. In contrast, small banks had the lowest insolvency risk represented by the highest z-score. Small banks were more stable because they had less volatile profits and higher levels of capitalization.

Regarding the macroeconomic environment, currency depreciation is related to increased pressure on banks. The currency devaluations contributed to increase banks risk because it poses a threat to bank liquidity (Djiwandono 2005) and profitability (Demirgüç-Kunt & Detragiache 1998). The econometric model is established the relation between the interest variable, which are competitive banking and banks' stability. This does not imply that competitive banking is the most important variable. There are important factors for example supervisory of the central bank, Indonesia economic system, under developed capital market and connected or intra-group lending that influence banks' stability. However, this study is not able to capture them. In regard to connected lending, the studies of Enoch et al. (2001) and Djiwandono (2005), as discussed in section 3.3.3.1 of the chapter Three, identified that the Indonesian banking industry has a deep rooted problem of connected lending. The problem appeared both in the state-owned banks and private banks. Connected lending contributes to an increase in the number of non-performing loans that may lead to the increase in insolvency risk.

As discussed in the methodology section, this chapter preferred to rely on insolvency risk at the bank-level to measure banks instability. This is due to the capability of bank-level insolvency risk to identify bank failure even though the banking system does not experience systemic crisis. Nevertheless, the determinants of insolvency of individual banks might be different from the determinants of the problems for the banking system as a whole. By capturing banks' external factors for example the degree of banking competition and macroeconomic environment, this chapter may also identify the determinants of systemic banking crisis. Particularly, if the external factors put pressure to many banks that lead to banks are being insolvent as occurred in the 1997.

The findings of this study underline the importance of competitive banking in enhancing banking stability. Competitive markets induce banks to improve their efficiency, increase their lending and the level of capitalization. The current policies under the Indonesian Banking Architecture also aim to improve the level of capitalization. However, it is conducted

by introducing a higher requirement on the minimum base capital and tightening conditions of entry to the industry. In addition, foreign penetration is encouraged under the mode of acquisition of local existing banks (foreign acquired banks) rather than establishing *de novo* banks. Moreover, the object of the current policies is to reduce the number of banks by half from 121 banks in 2010 to fifty-eight banks in 2015. A more restrictive environment under the current policies of banking consolidation may be counterproductive to the overall goal of enhancing banking stability. A higher level of market restrictions under consolidation is not effective in enhancing competition as shown in Chapter three. The degree of competition during the consolidation period in the 2000s was lower compared to the deregulation period in the 1990s. The lack of competition enables banks to enjoy market power so it reduces the incentives to improve efficiency and the level of capitalization.

The findings in this chapter provide an alternative policy for the Indonesian banking industry. The policy should be directed to increase competition because competitive banking contributes to enhance banking stability. The recent Global Financial Report of the World Bank strengthens the findings of this study that the evidence of the trade-off between competition and stability is very weak (World Bank 2013). Moreover, the Global Financial Report found evidence that the too-big-to-fail hypothesis as systemic risk was higher in concentrated markets. As competitive banking promotes stability and enhances banking efficiency, policy in the banking system should be directed towards promoting competition. The Global Financial Report provides some policy recommendations in regards to designing policies that enhance competition and stability. First, the state must create a proper exit policy for insolvent banks in order to prevent too-big-to-fail subsidies for the large banks. A proper crisis management setup that does not facilitate the survival of insolvent banks will prevent unhealthy competition and avoid a distortion of risk-taking incentives. Second, there should be a guarantee of market contestability, for example by removing barriers to entry for well-capitalized financial institutions. Third, the policy should facilitate a timely flow of adequate credit information and encourage contract enforceability.

This is the final empirical chapter presenting results of an empirical study of the relationship between competitive banking and financial stability. The next chapter focuses on the general conclusion and makes policy recommendations based on the results discussed in the empirical chapters.

APPENDIX

Appendix 1 – The results of the first-stage regression of Chapter 6

Dependent variable	Overall bank risk (Insolvency risk)	Profits	Profits volatility	Bank capitalization	Overall bank risk (Insolvency risk)	Profits	Profit volatility	Bank capitalization
OI	-0.02 (0.015)	-0.014 (0.01)	-0.02 (0.01)	-0.019 (0.01)	-0.003 (0.01)	0.0003 (0.01)	-0.0017 (0.01)	0.0019 (0.01)
LO	-0.24*** (0.05)	-0.124*** (0.04)	-0.23*** (0.05)	-0.24*** (0.05)	-0.3*** (0.05)	-0.3*** (0.05)	-0.3*** (0.05)	-0.296*** (0.05)
Overhead	-0.13* (0.07)	-0.155** (0.06)	-0.108 (0.07)	-0.126** (0.07)	-0.1* (0.07)	-0.08 (0.06)	-0.049 (0.06)	-0.067 (0.07)
LDR	-0.006 (0.035)	0.0158 (0.03)	-0.01 (0.03)	0.003 (0.04)	-0.05 (0.03)	-0.038 (0.03)	-0.057* (0.03)	-0.043 (0.03)
Size	-0.009 (0.01)	-0.0168 (0.01)	-0.009 (0.01)	-0.015 (0.01)	0.013 (0.01)	0.0057 (0.01)	0.014 (0.01)	0.005 (0.01)
Assets growth	0.026* (0.01)	0.033*** (0.01)	0.028** (0.1)	0.027** (0.01)	0.009 (0.01)	0.0128 (0.01)	0.0114 (0.01)	0.014 (0.01)
Growth	0.37*** (0.04)	0.232*** (0.04)	0.37*** (0.04)	0.42*** (0.04)				
Per capita GDP	0.92*** (0.09)	2.380*** (0.1)	0.94*** (0.09)	0.924*** (0.09)				
Depreciation					-0.33*** (0.02)	-0.33*** (0.02)	-0.325*** (0.02)	-0.34*** (0.02)
Instruments								
HHI	0.1434971** (0.07)	1.57*** (0.09)	0.16** (0.07)	0.253*** (0.07)	0.29*** (0.06)	0.387*** (0.05)	0.279*** (0.06)	0.41*** (0.06)
Foreign	0.0025929 (0.005)	0.006 (0.004)	0.003 (0.05)	0.0027 (0.005)	0.0076 (0.006)	0.0073 (0.005)	0.0082 (0.005)	0.0068 (0.006)
Government	0.0023157 (0.004)	0.0008 (0.004)	0.003 (0.004)	0.0021 (0.004)	-0.0012 (0.005)	-0.0013 (0.004)	-0.00059 (0.004)	-0.00074 (0.005)
Banking reform		1.08*** (0.05)			0.59*** (0.04)	0.59*** (0.04)	0.57*** (0.04)	0.60*** (0.04)

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level.

Appendix 2 – The results of correlation matrix (instrument) of Chapter 6

Instrument Variables	LH
HHI	-0.0768*
Foreign	0.0320*
Government	-0.0099
Reform	0.1755*

Note: * Indicated that the correlation is significant by using the confidence interval of 5 per cent.

Appendix 3 – The Empirical Results of General Method of Moment of Large and Medium-Sized Banks Small Banks of Chapter 6

	Large and Medium-Sized Banks				Small Banks			
	(5) ^a z-score as dependent variable	(6) ^b Profit as dependent variable	(7) ^c Profit volatility as dependent variable	(8) ^d Bank capitalization as dependent variable	(5) ^a z-score as dependent variable	(6) ^b Profit as dependent variable	(7) ^c Profit volatility as dependent variable	(8) ^{d,e} Bank capitalization as dependent variable
H	0.67*** (0.25)	0.009* (0.006)	-0.35 (0.22)	0.33** (0.15)	0.25 (0.27)	0.0002 (0.003)	-0.18 (0.31)	0.047 (0.13)
OI	0.005 (0.71)	.0048 (.008)	1.15 (0.84)	0.35* (0.21)	-0.18 (0.39)	-0.0019 (0.003)	0.24 (0.49)	-0.25** (0.11)
LO	0.72 (2.19)	0.026 (.022)	-1.83 (3.17)	2.15** (0.99)	2.67*** (0.95)	-0.0098 (0.01)	-3.46*** (0.96)	-0.095 (0.40)
Overhead	4.63 (4.60)	-0.075** (.035)	4.68*** (1.74)	0.076 (0.52)	-1.71 (2.46)	-0.065** (0.025)	3.89 (2.46)	
LDR	-0.45 (1.23)	-0.014 (0.015)	-0.67 (1.68)	-1.39** (0.60)	-0.027 (0.30)	0.006 (0.0072)	0.19 (0.45)	0.18 (0.33)
Size	-0.30 (0.23)	0.00002 (0.004)	0.15 (0.32)	-0.13 (0.10)	0.29* (0.159)	-0.0035** (0.0017)	-0.44** (0.18)	-0.097*** (0.063)
Assets growth	-0.97*** (0.29)	0.004 (0.003)	0.19 (0.33)	0.013 (0.092)	-0.32** (0.16)	-0.0007 (0.0015)	0.20 (0.24)	-0.30 (0.09)
Depreciation	-0.26 (0.23)	-0.002 (0.002)	0.29 (0.32)	-0.024 (0.15)	-0.15 (0.18)	-0.0009 (0.0012)	0.018 (0.23)	0.051 (0.063)

	Large and Medium-Sized Banks				Small Banks			
	(5) ^a z-score as dependent variable	(6) ^b Profit as dependent variable	(7) ^c Profit volatility as dependent variable	(8) ^d Bank capitalization as dependent variable	(5) ^a z-score as dependent variable	(6) ^b Profit as dependent variable	(7) ^c Profit volatility as dependent variable	(8) ^d Bank capitalization as dependent variable
Instrumental variables								
HHI	√	√	√	√	√	√	√	√
Foreign	√	√	√	√	√	√	√	√
Government	√	√	√	√	√	√	√	√
Banking reform	√	√	√	√	√	√	√	√
Number of observation	1,402	1,453	1,424	1,426	720	738	724	735
F test/ Chi Square	39.34 (0.000)	53.30 (0.000)	54.87 (0.000)	10.17 (0.253)	49.28 (0.000)	71.31 (0.000)	54.05 (0.000)	20.83 (0.000)
Test of instrument identification								
Hansen test of over identification	Chi square (21) =31.78 ProbPr>chi2 = 0.062	Chi square (23) =23.42 ProbPr>chi2 = 0.437	Chi square (21) =26.81 ProbPr>chi2 = 0.177	Chi square (23) =21.69 ProbPr>chi2 = 0.539	Chi square (18) =13.26 ProbPr>chi2 = 0.776	Chi square (19) =21.14 ProbPr>chi2 =0.329	Chi square (18) =16.26 ProbPr>chi2 = 0.574	Chi square (21) =23.86 ProbPr>chi2 = 0.249
Arrelano-Bond test of autocorrelation								
AR(1)	z= -3.11 ProbPr>z= 0.002	z= -1.75 ProbPr>z= 0.08	z= -2.73 ProbPr>z= 0.006	z= -2.58 ProbPr>z= 0.01	z= -2.10 ProbPr>z= 0.035	z= -1.63 ProbPr>z= 0.103	z= -1.97 ProbPr>z= 0.049	z= -1.99 ProbPr>z= 0.046
AR(2)	z= -0.53 ProbPr>z= 0.599	z= 0.26 ProbPr>z= 0.796	z= 0.35 ProbPr>z= 0.728	z= -0.54 ProbPr>z=0.5 86	z= -0.94 ProbPr>z= 0.349	z= -0.69 ProbPr>z= 0.489	z= -0.44 ProbPr>z= 0.664	z= -0.49 ProbPr>z= 0.627

*** Denotes significance at the 1% level; ** Denotes significance at the 5% level; * Denotes significance at the 10% level. Figures in parentheses are t ratios. a) It uses the same specification as equation 5 at Table 6.4-2; b) It uses the same specification as equation 6 at Table 6.4-2; c) It uses the same specification as equation 7 at Table 6.4-2; d) It uses the same specification as equation 8 at Table 6.4-2 but the estimation dropped the overhead variable to correct of autocorrelation issues; e) Overhead is dropped to eliminate the autocorrelation problem.

Chapter Seven

Conclusions and Policy Implications

7.1. Introduction

This thesis studies competition in the Indonesian banking industry based on panel data covering 286 banks over the three decades of 1980 – 2010. It is the first study that covers competition in the Indonesian banking industry over a long time frame in order to capture the structural changes. This study contributes to the body of literature about banking competition in developing countries by considering Indonesia's banking market and by addressing some issues concerning the estimation of competition, the determinants of competitive banking and the effect of competitive banking on banking stability. In particular there were five objectives of this study: to measure the degree of competition in the Indonesian banking industry between 1980 and 2010, to examine the impact of policies (deregulation, liberalization, crisis management, and consolidation) on banking competition, to estimate the competitive behaviour of banks across different sizes and ownership, to examine the determinants of competitive banking, and to estimate the relationship between competition and stability.

7.2. Empirical Findings

The Indonesian banking industry between 1980 and 2010 operated under an imperfect market of monopolistic competition. The empirical estimation (Chapter two) of three specifications³⁸ based on the recent refinement of the Panzar-Rosse method established by Bikker, Shaffer and Spierdijk (2011) reveals that the H-statistics was 0.67. The hypothesis testing of H-statistics indicates that Indonesian banking was neither perfectly competitive nor monopolistic. It was a monopolistically competitive market. Under monopolistic competition, banks differentiate their products either to meet consumer preferences and geographical differences (Alhadeff 1967) or to simply distinguish their product from their competitors³⁹. In addition, some literature suggests that banks are inclined to behave as monopolistically competitive entities because of high switching costs in the banking industry, the locational

³⁸Price specification, scaled-revenue specification and un-scaled revenue specification.

³⁹ Product differentiation is important because banks as an intermediary institution actually offer similar services which collect the excess funds from depositors and disburse loans to borrowers who need additional funds or capital.

characteristics and bank's possession of specialized knowledge: for example about their customers, the borrowers and the market (Allen & Gale 2004).

The estimation of the evolution of the degree of competition in Chapter two shows that the Indonesian banking industry was very competitive during the periods of banking reforms and liberalization in the late 1980s up to the mid-1990s. Furthermore, empirical estimation of the impact of structural changes on competition based on the un-scaled revenue specification of the Panzar-Rosse method in Chapter three also shows that banking reforms of deregulation and liberalization enhanced competition in the Indonesian banking industry. Reforms removed barriers to entry for local private banks and foreign banks, restrictions on business expansion and qualitative controls and further facilitated the creation of a contestable market. In a contestable market, the new entrants acted as a market discipline that encouraged the existing banks to produce at the minimum cost so price equals cost and normal profits are generated. Conversely, the 1997 crisis management and banking consolidation in the 2000s introduced barriers to entry and exit which reduced competition. In addition, an unfavourable macroeconomic environment, particularly during the crisis from 1997 to 2000, put pressure on the banking industry that led to mounting bad loans and a disincentive for new entrants to enter the market.

The estimation of competition in the Indonesian banking industry is extended in Chapter four by considering size and ownership differences in the market. The study by Bikker, Shaffer and Spierdijk (2011) recognized the existence of banks with different sizes in the market in estimating competition using the Panzar-Rosse method. In addition, Chapter four recognizes that it is the nature of the banking industry that banks supply differentiated services and products in order to meet customers' preference and geographical differences (Alhadeff 1967). Furthermore, the literature suggests that banks behave differentially according to their size and ownership (Berger, Kashyap & Scalise 1995; Berger & Udell 1995; Cole, Goldberg & White 1999; Cole, Goldberg & White 2004; Keeton 1995; Levonian & Soller 1996; McLeod 1999; Mian 2003; Nakamura 1993; Stein 2002; Strahan & Weston 1996). Chapter four contributes to the literature by conducting an empirical estimation of the competitive behaviour of banks across different sizes and ownership. Particularly, the chapter compares the competitive behaviour of larger banks with small banks, local banks with foreign banks, and government banks with private banks.

The empirical estimations based on two approaches⁴⁰ confirm that small banks behave more competitively than their larger counterparts. The behaviour of small banks is close to banks that work in a perfectly competitive market. On the other hand, larger banks behave less competitively. The group of largest banks in particular is the least competitive. Estimation based on the Panzar-Rosse method shows that large banks appeared to collude because hypothesis testing on the H-statistics could not reject the monopoly market. The empirical estimation in Chapter four also confirms the previous studies (McLeod 1999; Mian 2003) that compared private banks, and government banks consisting of regional banks and state-owned banks are less competitive entities. Furthermore, estimation of the Vector Error Correction Model (VECM) in Chapter five shows that a higher share of government banks in the banking industry had a negative influence on competition. Overall, the empirical findings suggest that the competitive behaviour of banks of different size and ownership is different. Small banks and private banks are the main drivers of competition in Indonesian banking. Small banks are very aggressive in attracting deposits because they rely on interest-based activities compared to larger banks. In addition, some large banks are government banks which have a captive market among state enterprises for both loans and deposits (McLeod 1999).

Foreign bank penetration⁴¹ has a positive influence on competition in Indonesian banking but the influence is not statistically significant. As presented in Chapter five, the evolution of banking competition is better explained by the penetration of *de novo* operations either by establishing joint ventures or branches of foreign banks in the local market than by foreign acquired banks. This indicates that mode of entry determines the competitive behaviour of foreign banks. Empirical estimation of the comparison between the competitive behaviour of local banks and foreign banks in Chapter four also presents evidence that *de novo* banks behaved more competitively than their local counterparts. Of the newly established banks, *de novo* banks are more aggressive by charging lower rates on loans in order to establish market share (Martinez Peria & Mody 2004). In addition, the literature suggests that *de novo* banks put pressure on the local market to lower the overall costs (Clarke et al. 2001), to lower the

⁴⁰The first approach uses value of assets as the basis of categorization of large banks, medium-sized banks and small banks following Bikker and Haaf (2002). The second approach is based on the number of employees for categorization of large banks and small banks.

⁴¹Penetration of foreign banks is defined as the proportion of assets of foreign banks to total assets of the banking industry. Foreign banks are those with ownership of at least 50 per cent.

intermediation costs (Barajas, Steiner & Salazar 2000), to lower the overhead costs (Manlagñit 2011), to improve the loan quality (Barajas, Steiner & Salazar 2000) and to reduce accounting profit (Unite & Sullivan 2003). Recently, foreign penetration took the form of acquisition of local existing banks to form the foreign acquired banks. Moreover, foreign acquired banks were formerly the large banks which already had a captive market from the acquired local banks. Empirical estimation of Vector Error Correction Model (VECM) in Chapter five shows that the recent penetration of foreign banks in the form of foreign acquired banks did not contribute to enhance competition because banks do not need to behave aggressively as they already have existing customers.

Freedom of entry is critical to create less concentrated market. In such markets, either the number of banks is large enough or the market shares distribution is relatively equal to prevent collusion. Empirical estimation of VECM in Chapter five denotes the role of market concentration in determining the level of competition in Indonesian banking after considering the endogeneity issue between market concentration and competition. The market was less concentrated during the deregulation and liberalization in the late 1980s and the beginning of the 1990s because the reforms facilitated the establishment of new banks that further increased the number of players. Thus, Indonesian banking was more competitive during the banking reforms as shown by the yearly estimation of H-statistic in Chapter two. During the consolidation in the 2000s, Indonesian banking was less competitive because the policy framework under the Indonesian Banking Architecture imposed barriers to entry particularly for local private and *de novo* banks (Rosengard & Prasetyantoko 2011). A favourable macroeconomic environment also has a major role in creating a competitive banking industry. A lower inflation rate provides more accurate information of the prices of financial services (Claessens & Laeven 2004; Jeon, Olivero & Wu 2011) and contributed to a competitive banking industry.

Competitive banking is also found to be essential to promote banking stability. Empirical estimation of generalized method-of-moment (GMM) reveals that the competition – stability rather than competition – fragility hypothesis is more appropriate to explain the role of competitive banking in banking stability. By using different measures⁴² and datasets⁴³,

⁴²In addition to the z-score of insolvency probability risk, this study used profits, profits volatility and bank capitalization as the measures of bank stability.

estimations using GMM indicate that a competitive environment contributes to reduced insolvency risk. In a competitive market, banks recorded higher profits. Furthermore, a competitive environment is essential to encourage banks to enhance their efficiency (Berger & Hannan 1998; Margono, Sharma & Melvin Ii 2010) and increase their capitalization (Beck, De Jonghe & Schepens 2013; Berger, Klapper & Turk-Ariss 2009; Schaeck & Cihak 2007; Soedarmono, Machrouh & Tarazi 2011). The level of efficiency (measured by the overhead cost) has a significant influence on a bank's overall insolvency risk. The empirical findings also underline the importance of a favourable macroeconomic environment, for example a stable currency. The literature shows that currency depreciation threatens bank profitability which leads to increased bank insolvency (Demirgüç-Kunt & Detragiache 1998). Finally, some previous studies, for example studies by Enoch et al. (2001) and Djiwandono (2005), emphasized that connected lending practice in the Indonesian banking industry contributes to an increase in bad loans and insolvency risk. However, the influence of connected lending on banking instability has not been tested directly due to lack of data.

7.3. Policy Implications of the Findings

State intervention through the introduction of regulations and controls influences banks behaviour. This thesis provides evidence that policy changes altered market structure and bank behaviour. Policy should be directed to providing more room to promote competition without hampering banking soundness. Considering the nature of the banking industry (that banks offer differentiated services and therefore have market power) the policy has to be directed to create a contestable market. Consistent with the literature, the empirical results from this study confirm that the removal of barriers to entry to the market, restrictions on business expansion and controls on lending and interest rates create a contestable market. The freedom to enter the market disciplines the behaviour of existing banks to behave competitively and produces a better outcome in terms of a more dynamic banking sector. This is particularly important because some studies confirm that Indonesian banking was less competitive compared to other developing countries⁴⁴.

⁴³ The first dataset comprises all banks in the Indonesian banking industry. The second dataset consisted of large and medium-sized banks and the third dataset consisted of small banks.

⁴⁴ Among the Asian countries, the H-statistics of Indonesian banking was the lowest at 0.016 based on Bikker, Spierdijk and Finnie (2006) and 0.288 according to Bikker, Shaffer and Spierdijk (2011). Other East Asian countries, for example Malaysia, Philippine and Thailand, had H-statistics above 0.5. Compared with developing countries in the Latin American region, the competition level in the Indonesian banking was also considered the lowest.

The current policy framework of the Indonesian Banking Architecture may have an adverse impact on competition as it prohibits the establishment of new banks, favours the large banks over the small and is designed to encourage mergers among the existing banks. First, barriers to entry to the market eliminate the disciplinary effects of the entry of potential competitors. The introduction of barriers to enter the market, particularly for small banks and *de novo* banks, is to the detriment of competition considering that they are the most competitive banks. Secondly, the restrictions on entering the industry particularly reduce the lending access of small firms (small and medium enterprises or SMEs). A study by Rosengard and Prasetyantoko (2011) emphasizes the inability of the current banking system to effectively meet demand, particularly from the medium and small sizes borrowers. The banking system is dominated by the large banks which prefer to disburse loans to large borrowers or simply to invest their portfolio in the Bank Indonesia certificates and government bonds (Rosengard & Prasetyantoko 2011).

A more balanced policy is required to promote competition in Indonesian banking without hampering banking stability. Moreover, this study found that a competitive environment enhances stability and increases efficiency. The 2013 Global Financial Report of the World Bank also takes the same stance; that the trade-off between competition and stability is very weak. In general, regulations in the banking industry have to be designed to promote competition without hampering bank soundness, stability, and customer protection. The findings from this study suggest at least two considerations for developing policies to promote competition in the Indonesian banking industry. First, the policy should allow the establishment of small banks and *de novo* banks with a sound financial capacity. Second, active intervention from the regulator is required to induce large banks and government banks to behave more competitively and to prevent collusion among them. In addition, this study supports the policy recommendation to enhance competition and stability in banking as proposed by the World Bank. First, the policy and regulations have to encourage the enforcement of law and the regulator must set up a crisis management policy that prevents insolvent banks from surviving (World Bank 2013). Crisis management should establish a proper exit policy for insolvent banks. The lack of a clearly defined exit policy induces the too-big-to-fail subsidies for large banks, unhealthy competition, and increases the incentives for risk taking. In addition to proper crisis management, the policy should facilitate a timely flow of adequate credit information and encourage contract enforceability (World Bank 2013).

7.4. Limitation and Future Research

This study has several limitations related to the empirical method and data. As suggested by Bikker, Shaffer and Spierdijk (2011), a meaningful interpretation of the H-statistics (generated by the Panzar-Rosse method) requires information about costs, market equilibrium and market demand elasticity. This study tested the condition of long-run market equilibrium based on Shaffer (1982) and found that the market was likely to reach equilibrium in the long-run. However, this study did not have information about cost structures and demand elasticities of the Indonesian banks. Thus, the interpretation of H-statistics is based on the assumption of constant demand elasticity over time and U-shaped average costs.

The empirical model used to estimate the competitive behaviour of Indonesian banking should include some essential variables, for example the ratio of non-earning assets to total assets, to reflect the characteristics of asset composition and the ratio of customer deposits to customer deposits plus short term funding to capture the features of funding mix (Bikker, Shaffer & Spierdijk 2011). This information was not fully available in the Indonesian Banking Statistics published by the Central Bank of Indonesia. With regard to the measure of personnel expenses (one of the input price variables) the literature suggests the use of the ratio of annual personnel expenses to the number of full-time employees. However, the employee data was not fully available from the primary source. The database only provides information about the number of employees for the years 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2008 and 2010.

The study covered all commercial banks in the industry based on the database of Indonesian Banking Statistics. However, there are some limitations in the data. First, although they entered the industry prior to 1988 the data of the regional banks is available only from 1988 onwards. In order to manage this problem, the empirical analysis in Chapter two used two datasets. The first dataset covered all banks in the industry and the second database dropped the regional banks. The estimations of the degree of competition in the Indonesian banking industry using both datasets are very similar. Another consideration about the data is the lack of financial information for banks in some years, particularly for the small banks. Finally, future research should employ a longer period of observation covering the most recent period, particularly for estimating the empirical model described in Chapter five. The time series model in Chapter five relies on only thirty one years of observations. As time series data for

Chapter five has a small sample size, the empirical models could not cover all interested variables in one estimation model. Nevertheless, despite the limitation, sensitivity analysis was conducted to maintain the robustness of the estimations. In order to control for the other variables that may determine the competition in the Indonesian banking industry, the empirical analysis in Chapter five ran some estimations to cover the focus variables of market concentration and foreign penetration.

Competition has evolved in the Indonesian banking sector according to the regulatory environment. Banking reforms through a series of deregulations and liberalizations in the 1990s enhanced competition. Nevertheless, banking consolidation in the 2000s introduced barriers to entry to the banking industry that further reduced competition. Furthermore, the discussion in Chapter two shows that Indonesian banking was the least competitive compared to the neighbouring ASEAN countries. There are lessons to be learned from how the industry operated in neighbouring countries. For example, is it easier or more difficult to establish a bank in other ASEAN countries? However, we also need to remember that things that work elsewhere may not work in Indonesia - but it is worth discussing.

In addition, the findings from this study provide a direction for future research. First is a qualitative study to examine the difference on pricing strategy and market segmentation of banks across different sizes and ownerships. This study will contribute to understanding the different nature of competition among different groups of banks; for example, large, small, private, government, *de novo*, and foreign acquired banks. Further, research could focus on exploring the impact of the issuance of Bank Indonesia certificates of deposits (SBIs) to control money supply on competition in the industry. A study by Rosengard and Prasetyantoko (2011) and Wie and Negara (2010) illustrated an increase in the portion of bank portfolios accounted for by SBIs lessened bank incentives to compete in disbursing loans. Thus, it is important to consider the impact of monetary policy on banking competition. Thirdly, future research should be directed to cover the non-bank financial institutions that offer substitute products in estimating the competition in banking industry.

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