

NEXUS OF COMPETITION AND STABILITY: CASE OF BANKING IN INDONESIA

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Abstract

This paper analyzes the relationship between banking competition and banking stability in Indonesia, where the bank lending is the major source of funding on this country with a series of structural changes including deregulation, economic crisis, and consolidation. We apply generalized method of moment approach on individual bank data, and the result shows that competitive banking will increase the economic stability. Under a competitive industry, banks must improve their efficiency, increase their loans disbursement, diversify their business, boost their assets and enhance their capitalization. This paper emphasize that the efficiency is a critical to reduce risk, both for large and small banks. Furthermore, regardless their size, an adequate capital is an important factor for the bank to cope with shocks in the market.

Keywords: Bank competition, stability, GMM.

JEL Classification: G21; G28; D43

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I. INTRODUCTION

The current consolidation policy of the Indonesian Banking Architecture 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 is planned to reduce the number of banks by half to 121 banks in 2010 and to fifty-eight banks in 2015. It is argued that 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.

This study 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. Moreover, this study focuses on the stability (insolvency) of the individual banks rather than on stability of the banking system as a whole, in order to recognize any bank failure that may occur without the banking system experiencing systemic strain (Schaeck & Cihak, 2007, p. 4). 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 accounts heteroscedasticity (Soedarmono et al., 2011). The GMM manages the endogeneity problem by employing an instrumental variables approach.

II. THEORY

There is extensive literature discussing the trade-off between competition and instability in the banking industry. 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). The first group of studies predicts that 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. A study by 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. 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). 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.

On the contrary, the second group of studies argues that there is no trade-off between competitive markets and banking instability., Boyd, De Nicoló, and Smith (2004); Mishkin (1996), Caminal and Matutes (2002), Boyd, De Nicoló, and Smith (2004); Demirgüç-Kunt, Laeven, and Levine (2004); Boyd, De Nicolò, and Jalal (2006) and Schaeck and Cihak (2007) support the competitive – stability hypothesis. Boyd et al. (2006) argued that a concentrated market will allow banks to boost interest rates that further will increase the risk of loan default. Market power is also perceived as inducing banks to engage in higher risk-taking activities.

Some studies highlight the existence of the "too big to fail" hypothesis in the banking industry. In a less competitive market with few large banks, the regulator will not let large banks fail. This creates a moral hazard for the large banks that may take excessive risks as they assume that the authorities will not let them fail (Caminal & Matutes, 2002; Mishkin, 1996). Therefore, where there are large banks in a concentrated industry, there may be more instability because of the moral hazard problem. 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 1990, 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)². As the result of implicit government guarantees, particularly for large banks, taking excessive risk was a moral hazard.

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 loss, 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). The finding by Berger and Hannan (1998) provides a basis for a nexus between competition, efficiency and stability. 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 (1998, p. 455) argue that “market power may allow managerial incompetence to persist without any willful shirking of work effort, pursuit of other goals, or efforts to defend or obtain market power”. Furthermore, an inefficient cost structure may disturb a bank’s capacity to generate profits that may lead to increased risk.

Laeven (2005) and Margono, Sharma, and Melvin Li (2010) reveal that Indonesian banking is associated with higher risk and less competition than other East Asian countries. Margono et al. (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 et al. (2010) estimated that the cost efficiency was 53.4 per cent³. 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-crisis⁴. A higher efficiency prior to the crisis was associated with a competitive market under the introduction of deregulation policies (Margono et al., 2010).

2 “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 percent 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).

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

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

Finally, an empirical cross-country study by Soedarmono et al. (2011) of the Asian countries between 1994 and 2009 found that the banking consolidation increased market power. A higher market power was associated with higher risk taking and a higher rate of bank capitalization. However the increased levels of capitalization 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 increased the overall bank insolvency risk.

III. METHODOLOGY

3.1. Measures of Banking Instability

This study uses z-score that measures the probability of banks being insolvent. The basis of observation is an individual bank. 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 distress. 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.

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:

$$Z_{it} = \frac{E(ROAa)_{it} + \frac{EQ_{it}}{TA_{it}}}{\sigma(ROAa)_{it}} \quad 1$$

where ROA is the rate of return on assets, EQ is the ratio of equity to assets and σ (ROA) is an estimate of the standard deviation of the rate of return (Boyd et al., 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).

3.2. Measures of Competitive Banking

This study employed the Panzar-Rosse (P-R) method to assess the competitive environment of Indonesian banking. This approach has been used extensively in empirical studies on banking competition because the modest data requirement compared to Bresnahan (Bresnahan, 1982) and Iwata (1974) approaches. Please refer to Bikker and Haaf (2002) and Bikker, Shaffer, and Spierdijk (2011) for an extensive discussion of the P-R method. The competitive degree of Indonesian banking is reflected by the value of H-statistics or the joint-elasticity of banks revenue in respect to changes in input prices. A higher value of H-statistics implies more competitive environment. In order to estimate the evolution of H-statistics, this study estimates the yearly H-statistics by using the Fixed-Effect approach of the panel data. The estimation is conducted by breaking the panel based on the year where there were significant changes of banks entry. Splitting the panel based on the break in the number of banks creates a more balanced panel and it is aligned with the structural changes in the banking industry because policy changes alter the competitive environment. The evolution of elasticity of the reduced form of revenues with respect to factor prices was calculated by summing up the coefficient of the interaction variables (β_j). The interaction variables are the multiplication of input prices variables and years dummies.

$$\ln TR_{it} = \alpha_0 + \left(\sum_{i=1}^3 \beta_j \ln(w_{jit} \mid \text{with } t \text{ E year} = 1 \mid) \right) + \sum_{j=1}^J \gamma_j \ln BSF_j + \gamma_3 \ln OI_{it} + \sigma_i + \varepsilon_{i,t} \quad 2$$

$$\ln(w_{jit} \mid \text{with } t \text{ E year} = 1 \mid) = \ln(w_{jit}) \text{ if } t \text{ is in year} = 1, \quad \text{otherwise} = 0$$

where TR is the bank revenue; w represents three input prices which are the funding price, the wage or personnel costs and the capital price; BSF are bank-specific exogenous factors to capture risk components and differences in the deposit mix and OI is the contribution of non-interest income (Bikker et al., 2011; Yeyati & Micco, 2007). There are three variables representing bank-specific components. First is capital risk to cover banks risk components that measured by the ratio of equity to total assets. The other two variables capture the variety of funding sources. First is the proportion of deposits on total assets to capture the role of deposits in the banks' funding mix and second is the proportion of demand deposits to total deposits.

3.3. Empirical Model for Estimating the Trade-off between Banking Competition and Banking Instability

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.

To address possible endogeneity, this study considers employment of the instrumental variable technique of GMM, Generalized Method-of-Moment. In order to use the GMM, this study selected instruments that are satisfy the two conditions. 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 et al. (2006), Schaeck and Cihak (2007), Soedarmono et al. (2011), Beck et al. (2013)) recommend the employment of instruments that are capable of explaining the nature of competition in the banking industry (H-statistics)⁵ but that do not directly affect stability.

This study employed four variables which are the degree of market concentration and the degree of openness in the banking industry for example the penetration of foreign banks, the domination of government banks and the dummy of banking reforms. As discussed by Berger et al. (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. 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. Government banks consist of state-owned banks and regional banks. A dummy of banking reforms captures the implementation of deregulation and liberalization policies between 1988 and 1996 when the initial effects will be felt. The model specification examining the trade-off between banking competition and banking stability is as below.

$$Z_{it} = \beta_1(H_t) + \beta_2(OI_{it}) + \beta_3(LO_{it}) + \beta_4(\text{overhead}_{it}) + \beta_5(LDR_{it}) + \beta_6(\text{Size}_{it}) + \beta_7(\text{Assetsgrowth}_{it}) + \beta_8(\text{Depreciation}_t) + (\eta_i + v_{it} + m_{it}) \quad 3$$

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.

5 Berger, 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.

Table 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		
Depreciation ^a	(-)	<i>Log of yearly changes in the value of local currency (Rupiah) to US Dollar^b</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>
<small>Note: a). This variable is a non-unit variant variable and 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.</small>		

IV. RESULT AND ANALYSIS

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. The estimations have passed the instruments identification using Hansen test of over identification, F-test of the first-stage regression and the correlation matrix between the instruments and the endogenous variable of banking competition. In addition, an autocorrelation tests are conducted to comply with the requirement under GMM method. Finally, the GMM is estimated with robust standard errors clustered at the bank level to correct for within-bank correlation. All tests are available upon request to the authors.

For the measure of banking competition, H-statistics enter estimation one, two and four with a positive sign and the coefficient is statistically significant. It implies that the competitive banking industry contributed to reducing insolvency risk. In the estimation number one 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 was estimated. The estimation suggests that under a competitive market, banks had higher capitalization. The coefficient on H-statistics in estimation four 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 two 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 is negative but it is not significant.

In order to test the robustness of the above findings, this study estimated the same specification of equation three by using a different data set. 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). 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. By using a smaller dataset, the empirical findings are similar. A competitive banking system contributes to reduce risks. Competitive 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.

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 et al. (2006), Schaeck and Cihak (2007), Soedarmono et al. (2011), Liu et al. (2013) and Beck et al. (2013).

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 and a higher loans disbursement reduced profit volatility and enhanced capitalization. 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 et al. (2006) and Soedarmono et al. (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 et al., 2011).

Regarding the macroeconomic environment, currency depreciation is associated with bank insolvency as shown in the estimation one, 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 period⁶. 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 Djwandono (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 (Djwandono, 2005). The higher interest rates of BI notes induced an increase in interest rates of deposits and interbank loans.

Table 2
Empirical Result of Generalized-Method-of-Moment

	All Bank				Large and Medium Banks				Small Banks			
	(1) z-score	(2) Profit	(3) Profit volatility	(4) Bank capitalization	(1) z-score	(2) Profit	(3) Profit volatility	(4) Bank capitalization	(1) z-score	(2) Profit	(3) Profit volatility	(4) a Bank capitalization
H	0.67** (0.29)	0.013* (0.007)	-0.34 (0.32)	0.28* (0.16)	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	0.68 (0.52)	-0.007 (0.006)	-0.16 (0.97)	0.46* (0.25)	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	6.38*** (2.4)	-0.03 (0.025)	-7.23** (3.31)	1.99* (1.12)	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	-0.67 (1.84)	-0.09*** (0.026)	6.33*** (2.47)	0.18 (0.66)	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	-2.27* (1.38)	0.013 (0.014)	2.27 (1.90)	-1.26 (0.78)	-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	-0.21 (0.20)	-0.004 (0.003)	-0.008 (0.27)	-0.23** (0.10)	-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	-0.54** (0.26)	-0.003 (0.002)	-0.39 (0.38)	-0.06 (0.088)	-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	-0.33* (0.18)	-0.004 (0.002)	.27 (0.39)	-0.20 (0.12)	-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)
Instrumental variables												
HHI	√	√	√	√	√	√	√	√	√	√	√	√
Foreign	√	√	√	√	√	√	√	√	√	√	√	√
Government	√	√	√	√	√	√	√	√	√	√	√	√
Banking reform	√	√	√	√	√	√	√	√	√	√	√	√
Number of observation	2,122	2,191	2,148	2,161	1,402	1,453	1,424	1,426	720	738	724	735
F test/ Chi Square	50.41 (0.000)	75.95 (0.000)	37.98 (0.000)	15.21 (0.055)	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)

*** 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) Overhead is dropped to eliminate the autocorrelation problem.

6 Indonesia changed the exchange rate regime from a managed foreign exchange regime to free-floating exchange regime on 14 August 1997 (Djwandono 2005).

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 two, three and four show that currency depreciation was associated with lower profits, larger profit volatility and lower capitalization.

The following discussion explores the contribution of a competitive banking system to reducing risk. Empirical findings presented in Table two 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 to enable banks in 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 studies, for example Schaeck and Cihak (2007), Berger et al. (2009), Soedarmono et al. (2011) and Beck et al. (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 three 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.

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. The composition of banks liabilities prior and during the 1997 banking crisis reveals that 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 mismatches⁷. 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).

Table 3
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.

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 study, 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 study suggest that a competitive market enhanced banking stability. The estimations also show that the high overhead costs that reflects the efficiency

⁷ 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.

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, Baldwin, Frecaut, & Kovanen, 2001; Nasution, 2000; Rosser, 2002). 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.

V. CONCLUSION

This paper concludes that competitive environment contributed to reducing banks' insolvency risk. This result is robust across various model specifications and datasets. 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.

The findings of this study underline the importance of competitive banking to maintain 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. 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 provide an alternative policy for the Indonesian banking industry. The policy should be directed to increase competition due to its contribution to increase the 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.

REFERENCES

- Allen, Franklin dan Gale, Douglas, (2000), *Comparing Financial System*, Massachusetts: MIT Press.
- Bank Indonesia. (2008). The Program of Indonesian Banking Architecture. <http://www.bi.go.id/web/id/Publikasi/Perbankan+dan+Stabilitas+Keuangan/Arsitektur+Perbankan+Indonesia/api18.htm>
- Beck, Thorsten, (2008), *Bank Competition and Financial Stability: Friends or Foes?*, Paper presented at the G20 Seminar in the Financial Sector, Bali, Indonesia,
- Beck, Thorsten, De Jonghe, Olivier dan Schepens, Glenn, "Bank competition and stability: Cross-country heterogeneity". *Journal of Financial Intermediation*, 2013, 22(2), hal. 218-244, doi: <http://dx.doi.org/10.1016/j.jfi.2012.07.001>
- Berger, Allen N. dan Hannan, Timothy H., "The efficiency cost of market power in the banking industry: A test of the 'quiet life' and". *Review of Economics & Statistics*, 1998, 80(3), hal. 454,
- Berger, Allen N., Klapper, Leora F. dan Turk-Ariss, Rima, "Bank Competition and Financial Stability". *Journal of Financial Services Research*, 2009, 35(2), hal. 99-118, doi: 10.1007/s10693-008-0050-7
- Bikker, Jacob A. dan Haaf, Katharina, "Competition, concentration and their relationship: An empirical analysis of the banking industry". *Journal of Banking & Finance*, 2002, 26(11), hal. 2191-2214, doi: [http://dx.doi.org/10.1016/S0378-4266\(02\)00205-4](http://dx.doi.org/10.1016/S0378-4266(02)00205-4)
- Bikker, Jacob A., Shaffer, Sherrill dan Spierdijk, Laura, "Assessing Competition with the Panzar-Rosse Model: The Role of Scale, Costs, and Equilibrium". *Review of Economics and Statistics*, 2011, 94(4), hal. 1025-1044, doi: 10.1162/REST_a_00210
- Boyd, John H., De Nicolò, Gianni dan Jalal, Abu M., "Bank Risk-Taking and Competition Revisited: New Theory and New Evidence". *IMF Working Paper*, 2006, 06(297), hal.,
- Boyd, John H., De Nicoló, Gianni dan Smith, Bruce D., "Crises in Competitive versus Monopolistic Banking Systems". *Journal of Money, Credit & Banking* (Ohio State University Press), 2004, 36(3), hal. 487-506,
- Bresnahan, Timothy F., "The oligopoly solution concept is identified". *Economics Letters*, 1982, 10(1-2), hal. 87-92, doi: [http://dx.doi.org/10.1016/0165-1765\(82\)90121-5](http://dx.doi.org/10.1016/0165-1765(82)90121-5)
- Caminal, Ramon dan Matutes, Carmen, "Market Power and Banking Failure". *International Journal of Industrial Organization*, 2002, 20(9), hal. 1341-1361,

- Chou, Catherine. (1999). Indonesian banks: Survival of the fittest. In A. D. Bank (Ed.), *Rising to the Challenge in Asia: A Study of Financial Market* (Vol. 6, pp. 1-72). Manila: Asian Development Bank,.
- Claessens, Stijn, Djankov, Simeon dan Lang, Larry H.P. . (1999). Who controls East Asian corporations? *Policy Research Working Paper World Bank 2054*, 1-42. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=597191
- Davis, Kevin, "Bank deregulation, supervision and agency problem". *Australian Economic Review*, 1995, 28(3), hal. 43-54,
- Demirgüç-Kunt, Asli dan Detragiache, Enrica "The determinants of banking crises in developing and developed countries". *IMF Staff Papers*, 1998, 45(1), hal. 81-109,
- Demirgüç-Kunt, Asli, Laeven, Luc dan Levine, Ross, "Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation". *Journal of Money, Credit & Banking* (Ohio State University Press), 2004, 36(3), hal. 593-622,
- Djiwandono, Soedrajad J., (2005), *Bank Indonesia and the crisis: An insider's view*, Singapore: Institute of Southeast Asian Studies.
- Enoch, Charles , Baldwin, Barbara, Frecaut, Olivier dan Kovanen, Arto, "Indonesia: Anatomy of a Banking Crisis, two years of living dangerously 1997-1999". *Working Paper of International Monetary Fund*, 2001, 01(52), hal. 139,
- Fane, George dan McLeod, Ross H., "Banking collapse and restructuring in Indonesia, 1997-2001". *Cato Journal*, 2002, 22(2), hal. 277-295,
- Hao, Jonathan, Hunter, William Curt dan Yang, Won Keun, "Deregulation and efficiency: the case of private Korean banks". *Journal of Economics and Business*, 2001, 53(2-3), hal. 237-254, doi: [http://dx.doi.org/10.1016/S0148-6195\(00\)00051-5](http://dx.doi.org/10.1016/S0148-6195(00)00051-5)
- Hicks, J. R., "Annual Survey of Economic Theory: The Theory of Monopoly". *Econometrica*, 1935, 3(1), hal. 1-20, doi: 10.2307/1907343
- Jiménez, Gabriel, Lopez, Jose A. dan Saurina, Jesús. (2007). How does competition impact bank risk-taking? *Working Paper of Federal Reserve Bank of San Fransisco*, 23 (September), 1-37. <http://www.frbsf.org/publications/economics/papers/2007/wp07-23bk.pdf>
- Jiménez, Gabriel, Lopez, Jose A. dan Saurina, Jesús, "How does competition affect bank risk-taking?". *Journal of Financial Stability*, 2013, 9(2), hal. 185-195, doi: <http://dx.doi.org/10.1016/j.jfs.2013.02.004>
- Kasman, Adnan "Consolidation and competition in the banking industries of the EU member and candidate countries". *Emerging Markets Finance and Trade*, 2010, 46(6), hal. 121-139, doi: 10.2753/REE1540-496X460608

- Keeley, Michael C., "Deposit Insurance, Risk, and Market Power in Banking". *The American Economic Review*, 1990, 80(5), hal. 1183-1200, doi: 10.2307/2006769
- Laeven, Luc, (2005), *Banking Sector Performance in East Asian Countries: The Effects of Competition, Diversification, and Ownership*, Washington D.C.: World Bank
- Liu, Hong, Molyneux, P. dan Wilson, John O.S., "Competition and Stability in European Banking: A Regional Analysis". *The Manchester School*, 2013, 81(2), hal. 176-201, doi: 10.1111/j.1467-9957.2011.02285.x
- Margono, Heru, Sharma, Subhash C. dan Melvin Li, Paul D., "Cost efficiency, economies of scale, technological progress and productivity in Indonesian banks". *Journal of Asian Economics*, 2010, 21(1), hal. 53-65, doi: <http://dx.doi.org/10.1016/j.asieco.2009.06.001>
- Matutes, Carmen dan Vives, Xavier, "Imperfect competition, risk taking, and regulation in banking". *European Economic Review*, 2000, 44(1), hal. 1-34, doi: [http://dx.doi.org/10.1016/S0014-2921\(98\)00057-9](http://dx.doi.org/10.1016/S0014-2921(98)00057-9)
- Mishkin, Frederic S. , "Understanding financial crises: A developing country perspective". NBER Working Paper Series, 1996, 5600(May), hal. 1-49,
- Nasution, Anwar. (2000). The financial crisis in Indonesia. In S. Masuyama, D. Vandenbrink & C. S. Yue (Eds.), *East Asia's financial systems: Evolution and crisis* (pp. 370). Singapore: Institute of Southeast Asian Studies Publishing.
- Pangestu, Mari, "The Indonesian Bank Crisis and Restructuring: Lessons and Implications for other Developing Countries". G-24 Discussion Paper Series of United Nations Conference on Trade and Development, 2003, 23 (November), hal. 1-36,
- Pradiptyo, Rimawan, Rokhim, Rofikoh, Gumilang Aryo, Sahadewa, Ulpah, Maria, Sasmitasiwi, Banoon dan Faradynawati. (2011). A bridge too far: the strive to establish a financial service regulatory authority (OJK) in Indonesia. Retrieved from SSRN website: <http://ssrn.com/abstract=1878565> doi:<http://dx.doi.org/10.2139/ssrn.1878565>
- Rosengard, Jay K. dan Prasetyantoko, A., "If the Banks are Doing So Well, Why Can't I Get a Loan? Regulatory Constraints to Financial Inclusion in Indonesia". *Asian Economic Policy Review*, 2011, 6(2), hal. 273-296, doi: 10.1111/j.1748-3131.2011.01205.x
- Rosser, Andrew (2002), *The Politics of Economic Liberalisation in Indonesia: State, Market and Power*, Oxon, UK: Routledge.
- Rosul, Mochammad. (2002). The Capital Market in Indonesia's Economy: Development and Prospect. <http://www.nomurafoundation.or.jp/en/capital/archive/>
- Schaeck, Klaus dan Cihak, Martin, "Banking Competition and Capital Ratios". Working Paper of International Monetary Fund, 2007, 07(216), hal. 1-42,

Smirlock, Michael, Gilligan, Thomas dan William, Marshall, "Tobin's q and the Structure-Performance Relationship". *The American Economic Review*, 1984, 74(5), hal. 1051-1060,

Soedarmono, Wahyoe, Machrouh, Fouad dan Tarazi, Amine, "Bank market power, economic growth and financial stability: Evidence from Asian banks". *Journal of Asian Economics*, 2011, 22(6), hal. 460-470, doi: <http://dx.doi.org/10.1016/j.asieco.2011.08.003>

Turk Ariss, Rima, "On the implications of market power in banking: Evidence from developing countries". *Journal of Banking & Finance*, 2010, 34(4), hal. 765-775, doi: <http://dx.doi.org/10.1016/j.jbankfin.2009.09.004>

Vennet, Rudi Vander, "Cost and Profit Efficiency of Financial Conglomerates and Universal Banks in Europe". *Journal of Money, Credit and Banking*, 2002, 34 (1), hal. 254-282, doi: 10.2307/3270685

World Bank. (2013). *Global Financial Development Report. Rethinking the Role of State in Finance*. Retrieved from econ.worldbank.org website: <http://econ.worldbank.org/>

Yeyati, Eduardo Levy dan Micco, Alejandro, "Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk". *Journal of Banking & Finance*, 2007, 31 (6), hal. 1633-1647, doi: <http://dx.doi.org/10.1016/j.jbankfin.2006.11.003>