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Government intervention, bank ownership and risk-taking during the Indonesian financial crisis

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Abstract

The 1997/98 financial crisis forced the Indonesian government to inject capital into selected banks, introduce deposit insurance and change capital requirements. This study investigates the relation between highly concentrated ownership and bank risk-taking using a sample of 52 insured private commercial Indonesian banks during the 1995-2003 period. For restructured banks, ownership concentration is positively related to overall risk, and negatively related to credit and liquidity risk, especially during the relaxed capital adequacy requirement period. Liquidity risk is reduced when the government and owners contribute additional capital, and credit risk is lowered as the government removes bad loans from problematic banks.

JEL classification: G21, G28, G30, G32.

Keywords: government intervention, bank risk taking, ownership structure, blanket guarantee, capital regulation.

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Government intervention, bank ownership and risk-taking during the Indonesian financial crisis

1. Introduction

The 1997/98 Southeast Asian financial crisis occurred unexpectedly and was exacerbated by the excessive use of bank borrowing due to a lack of debt financing alternatives. Miller (1998) suggests that the banks' widespread use of short-term debt to fund long-term investments and the U.S. denomination of the loans exposed the banks to severe maturity-gap risk and exchange rate risk. In addition, Chowdhry and Goyal (2000) suggest banking supervision was lax, much of the lending was politically motivated and no adequate regulatory procedures for handling bankruptcy were present. Kho and Stulz (2000) analyzed bank stock return performance during the Asian crisis when the market indexes fell some 60 percent. They report Indonesia's market decline was directly related to their currency exposure and that the IMF programs had little impact on the values of banks.

In Indonesia the government intervened by implementing a blanket guarantee scheme to protect depositors, by providing liquidity through less stringent requirements to access central bank funds, by guaranteeing debt issues of financial institutions, by taking over bad loans from banks, and by directly injecting funds into banks through equity positions.¹ Bank solvency was the central issue during this period. Without additional capital, individual banks, and the banking system, could have collapsed. Under the bank recapitalization program, the government selectively contributed capital and also forced existing shareholders to provide additional funds. This government intervention changed the ownership concentration.

¹ Anginer, de la Torre, and Ize, (2014) use banks in 74 countries to observe risk bearing by the state. During financial crises governments came to the rescue of troubled financial markets and institutions. State banks provide liquidity support by purchasing bad assets, injecting fresh capital and relaxing collateral requirements.

The objective of the current study is to investigate the relation between ownership concentration, government intervention and bank risk-taking in Indonesia during 1995-2003. This study also examines how the relation between ownership concentration and bank-risk taking in Indonesia is affected by government intervention, particularly the bank recapitalization program, under different regulatory regimes. By doing so, we expect that we can demonstrate that government intervention which led to more concentrated bank ownership has had unintended consequences for bank risk taking in Indonesia.

Saunders et al. (1990) argue that, at least in the short term, risk-taking is an endogenous decision of the bank affected by ownership structure, the regulatory environment, and variables such as size and leverage. We follow Saunders et al. (1990) and argue that “at least in the short term”, government intervention that leads to more concentrated bank ownership will have a significant impact on risk-taking. We use the same expression as Saunders et al. (1990) “at least in the short term” because in Indonesia the government interventions/ownerships were only temporary. We focus on Indonesia because of its unique setting. In particular, ownership is extremely concentrated with most banks having only two owners. Additionally, the Indonesian banks were so severely affected by the crisis that the government instituted a significant bank recapitalization program² and initiated regulatory changes including the introduction of deposit insurance in the form of a Blanket Guarantee Scheme (BGS) in 1998 and changes in the Capital Adequacy Requirement (CAR) in 1998 and 2001.

The present study contributes to the literature in several ways. First, it extends the literature by investigating the relation between ownership and bank risk-taking in Indonesia, a developing country, while the focus of most prior research considers developed countries.

² Batunanggar (2002) notes that the fiscal cost of resolving of the 1997/1998 banking crisis in Indonesia is the highest among Asian countries amounted to Rp654 trillion or 51 percent of annual GDP. The majority of the cost (amounted to Rp425 trillion) is for the bank recapitalization program.

Second, this study examines the impact of government intervention on the relation between pronounced ownership concentration and bank risk-taking. Moreover, to capture the dynamics of regulatory changes necessitated by crisis conditions, we incorporate the impact of the changes in deposit insurance and bank capital regulation. This is also an important contribution since existing studies mainly focus on the relation between managerial ownership and bank risk-taking that involve discretionary regulatory changes, such as deregulation versus reregulation (see for example, Saunders et al., 1990, Chen et al., 1998, and Anderson and Fraser, 2000).

Using panel data regressions, the present study examines a sample of 52 insured private commercial banks in Indonesia during the period 1995-2003. The results suggest that there is no relation between ownership concentration and overall risk; however, the relation is significantly positive for banks that have been recapitalized. Moreover, for these recapitalized banks, the relation is most pronounced during the period when capital adequacy requirements were lowered. Our results also show that overall liquidity risk is unrelated to ownership concentration, but, unsurprisingly, in banks where the government or shareholders provided liquidity under the recapitalization agreement, the relation is strongly negative. Therefore, the relation between ownership concentration and liquidity is exclusive to the recapitalized banks.

When the relation between ownership concentration and loan loss reserves is examined, we find a negative relation for the capitalized banks. This is consistent with improved monitoring of loans by the major shareholders as their inability to diversify risk necessitated improved screening. However, it is also possible that in this environment, concentrated ownership may encourage lower loan loss provisions to circumvent regulatory scrutiny.

In general, the results are consistent with the moral hazard hypothesis. That is, when the government intervenes by introducing deposit insurance and/or lowering the capital requirement,

banks are encouraged to take more risks. In addition, when the government provides enhanced liquidity, we find a positive relation between banks' liquidity and government intervention. Finally, the recapitalization process caused banks' bad loans to be transferred to the Indonesian Bank Restructuring Agency (IBRA). Because this form of government intervention was more focused on the banks with high credit risk, a significantly negative relation is observed between intervention and credit risk.

2. Literature review

In emerging markets the measurement of risk is problematic because most banks are not publicly traded. Because of the lack of market risk measures, alternative measures are necessary. Fortunately, Jahankhani and Lyngé (1980), Mansur et al. (1993), McAnally (1996), and Elyasiani and Mansur (2005) conclude that in developed capital markets, accounting measures of risk are significantly related to market risk measures. Agusman et al. (2008) report similar relations exist in developing markets during times of financial crisis. The relations appear to be robust across emerging markets with different deposit insurance schemes including implicit, limited and risk-based insurance, and blanket guarantees. Accounting risk measures found to be related to market risk measures include the variability of the return-on-assets, credit risk and liquidity measures.

Saunders et al. (1990) suggest that increasing asset risk and/or leverage transfers wealth from depositors to shareholders. Saunders et al. (1990) and Anderson and Fraser (2000) find that the relation between managerial ownership and bank risk taking is positive when the industry is undergoing deregulation. John et al. (1991) argue that risk shifting incentives in banks arise from the existence of limited liability for owners. Simpson and Gleason (1999) assert that as banks are

largely financed with debt, imperfect monitoring by depositors and regulators allow bank owners to undertake riskier activities at the expense of depositors.

2.1 Deposit insurance and capital requirements

Diamond and Dybvig (1983) assert that while deposit insurance is useful in preventing bank runs, its use may also encourage excessive bank risk taking. Merton (1977) points out that when the deposit insurance premiums do not reflect the actual level of bank risk, banks have an incentive to assume more risk. Studies by Kareken (1983) and White (1989) suggest that fixed-premium insurance encourages banks to take riskier activities.

Demirguc-Kunt and Detragiache (2002) argue that whether or not deposit insurance is the best policy to prevent depositor runs, it is a source of moral hazard. Studies by Wheelock (1992), Grossman (1992), Alston et al. (1994), Wheelock and Kumbhakar (1994), Hooks and Robinson (2002), Önder and Özyildirim (2003), and Agusman (2006) report a positive relation between deposit insurance and bank risk taking.³ Forssbaeck (2011) examines the relation between ownership structure and banks' risk-taking incentives under deposit insurance for banks in 47 countries, including Indonesia and concludes that deposit insurance creates incentives for bank owners to increase the banks' risk.⁴

Anginer, Demirguc-Kunt and Zhu (2014) examine banks in 96 countries to compare the effect of deposit insurance on bank risk and systemic stability during normal economic conditions and during the recent financial crisis. They point out that deposit insurance affects banks in two conflicting ways. First, deposit insurance increases depositor confidence which can

³ We thank an anonymous referee for the suggestion to consider the role of risk shifting behavior during the 1997/98 crisis in Indonesian banks.

⁴ In contrast, Karels and McClatchey (1999) and Gueyie and Lai (2003) do not find evidence of excessive risk taking or moral hazard following the introduction of deposit insurance.

increase stability in a banking system, but, second, can lead to an increase in moral hazard that can increase the probability of a financial crisis. They report that, indeed, the impact of the insurance is different in the two very different economic regimes. Deposit insurance increased moral hazard during the years leading up to the crisis, increasing the probability of a crisis, but had a stabilizing influence during the crisis period. Over the entire time period, the destabilizing effect was greater than the stabilizing effect.

The impact of capital regulation on bank risk has also been widely discussed in the literature. Studies by Kahane (1977), Koehn and Santomero (1980), Kim and Santomero (1988) and Gennote and Pyle (1991) claim that higher capital requirements may induce banks to increase the risk of their asset portfolio. However, Furlong and Keeley (1989), Keeley and Furlong (1990) and Jacques and Nigro (1997) find that capital standards are effective in reducing bank portfolio risk and the lower capital requirement regime encourages bank risk taking.⁵ These conflicting results may be reconciled if ownership concentration is included in the analysis.

2.2 Ownership concentration

Claessens et al. (2000) examine the separation of ownership and control in publicly traded financial and non-financial corporations in nine East Asian countries (including Indonesia). They find that more than two-thirds of the firms are controlled by a single shareholder, and that separation of management from ownership control is rare. DeYoung et al. (2001) indicate that closely held banks face a classic monitoring problem. In particular, market discipline, institutional oversight and direct monitoring of these banks are either unavailable or

⁵ The capital requirement was reduced in 1998 in Indonesia. Some researchers argue that, given the industry was under distress and protected by a blanket guarantee, it may not be an appropriate policy because it can encourage moral hazard or excessive risk taking. For example, Fane and McLeod (2002) state that government regulators should increase rather than decrease the minimum capital standard.

are ineffective tools for mitigating agency costs. In the absence of appropriate monitoring, bank shareholders may prefer to take riskier activities in order to increase their wealth at the expense of depositors.

Laeven (2002) examines ownership concentration, deposit insurance and bank risk in 14 countries. Using the cost of insurance as a risk measure he finds a positive relation between ownership concentration and bank risk taking. Kim and Rhee (2000) and Kim et al. (2002) examine a sample of Japanese commercial banks over the period 1983-1991. They partition these years into three periods and report that when the Japanese government increase the coverage of deposit insurance and reduce the capital requirement, ownership concentration and bank risk is positively related.

Barry, Lepetit and Tarazi (2011) use European banks from 16 countries to examine the relation between ownership structures and different levels of risk and profitability. For the 1999–2005 period, they find that a shift in equity from institutional investors to individuals/families or to banking institutions results in a decrease in asset risk and default risk, but observe no change in profitability. For publicly held banks with more diffused ownership, a change in ownership structure had no effect on risk taking.

2.3 Deposit insurance, capital adequacy requirements and ownership concentration in Indonesia

Deposit insurance may enhance financial stability, or alternatively, encourage banks to take on more risk. In the crisis period, government regulators in Indonesia took the position that deposit insurance would help stabilize the banking system and that lower capital adequacy requirements would minimize bank closures. Bank ownership concentration increased due to the recapitalization program as the government and/or owners injected additional capital.

The nature of the Indonesian bank sample allows us to distinguish how the risk measures, government intervention and ownership concentration differ between banks with different corporate ownership structures. By comparing banks with significant government ownership with banks with concentrated private ownership during the periods when the CAR and BGS were in effect, we provide additional insights into risk taking and bank moral hazard.

3. Institutional background and government intervention

The Indonesian financial crisis started when the rupiah experienced a sudden decline in value in July 1997. Subsequently Bank Indonesia (the Central Bank) abandoned the exchange rate intervention band and moved to a floating exchange rate. The rupiah weakened further and this led to a banking crisis. To resolve the crisis, four major interventions were adopted by the Indonesian government: (1) some banks were closed, (2) Bank Indonesia provided liquidity support, (3) the blanket guarantee scheme was introduced and the Indonesian Bank Restructuring Agency (IBRA) was created and (4) some banks were recapitalized.⁶

The first round of bank closures occurred on 1 November 1997. At the time, Bank Indonesia closed down 16 small insolvent banks (3 percent of the total assets of the banking industry). The closure of these small insolvent banks in the absence of explicit deposit insurance did not improve the situation, and even encouraged bank runs. Investors continued to lose confidence in the Indonesian banking sector culminating in January 1998, when foreign banks refused to accept letters of credit from Indonesian banks. The second and third rounds of bank closures took place during April to August, 1998, and March 1999, respectively. In total, at least 68 banks were closed during the 1997-1999 period.

⁶ For a more detailed discussion, see for example, Enoch (2000), Batunanggar (2002), and Pangestu and Habir (2002).

In late-January 1998, faced with a deeply depreciated currency, protracted bank runs, and the threat of imminent hyperinflation and financial meltdown, the government introduced a BGS for domestic banks to restore confidence in the national banking system, and created the Indonesian Bank Restructuring Agency (IBRA). Under the BGS, the government guarantees all bank liabilities, including off-balance sheet items. IBRA was established to restructure problem banks and to act as an asset management company to restructure the banks' bad assets.

After the first round of bank closures in November 1997, Bank Indonesia also provided liquidity support to all banks without taking any collateral, by allowing their current accounts with the Central Bank to be overdrawn. As the crisis intensified, the amount of liquidity support increased dramatically from Rp31 trillion in December 1997 to Rp170 trillion in December 1998. Unfortunately, the provision of liquidity support became a controversial policy. This is partly based on bank examinations which revealed strong signs of moral hazard by recipient banks as indicated by dubious interbank transactions. Also, it appears that there were some weaknesses in the governance of the liquidity support (Batunanggar, 2002).

Meanwhile, reflecting the fact that the country was in a deep banking crisis, in November 1998, Bank Indonesia modified the minimum capital adequacy requirement (CAR) by temporarily reducing it from 8 percent of risk-weighted assets to 4 percent. However, in December 2001, Bank Indonesia required all commercial banks to return to a minimum CAR of 8 percent.

The bank recapitalization program was announced in March 1999. Before initiating the program, due diligence was conducted on all commercial banks. Based on the due diligence results, banks were categorized by their CAR. "Category A" banks had a CAR of above 4 percent and were exempt from the recapitalization program and could continue operations.

“Category B” banks had a CAR of between 4 percent and -25 percent and were candidates for the program provided that their owners could inject 20 percent of the new capital required to attain a CAR of 4 percent. Banks with a CAR less than -25 percent were placed in “Category C” and their owners were given time to inject sufficient equity to push them into a higher category that would make them eligible for recapitalization. Category B and C banks whose owners could not add sufficient capital were taken over by the IBRA or closed (Pangestu and Habir, 2002). Our sample of 52 banks includes 46 from Category A and 6 from Category B. No Category C banks are included.

Prior to the crisis, ownership concentration was high. Typically, a single shareholder possessed over 50 percent of the bank’s equity. Government intervention significantly changed ownership concentration. Under the bank recapitalization program, the government injected new capital of up to 80 percent of the funding requirement while the bank’s majority shareholders provided the rest. In case the majority shareholders failed to provide the 20 percent funding required, the bank was taken over by the government.⁷ This program led to greater ownership concentration as the government became a temporary majority shareholder until divestment.⁸ On the other hand, non-governmental banks were required to increase their capital, with the majority shareholders providing the funds. These actions resulted in greater ownership concentration in the hands of the majority owners.

⁷ This intervention also considers the Too Big To Fail (TBTF) rule. Under Indonesia’s TBTF policy at the time, the government would not close a bank that would create systemic risk and jeopardize the national or regional economy. Subsequent regulation identifies a bank as TBTF if it has demand deposit accounts, savings deposits, and time deposits equal to or greater than 150,000 accounts, and/or exerts considerable influence on a regional economy or facilitates the implementation of government policy in a region.

⁸ The divestment processes began in 2002. After the liquidation of IBRA in 2004, as explained later, the divestment processes are conducted by PT. Perusahaan Pengelola Asset (PPA).

The eligibility for a bank to join the recapitalization program was mainly based on an assessment of the viability of its business plan, and the aptness and integrity of its management and controlling shareholders. The viability of the bank business plan was evaluated through a stress test, mainly to decide whether the bank could achieve certain key performance indicators including a minimum CAR of 4 percent in December 1998 and 8 percent in December 2001. Moreover, a fit and proper test was conducted of the banks' management and controlling shareholders. This test then led to major changes in banks' management. In most cases, once a bank was approved for recapitalization by the government, a new management team was appointed.

The recapitalization process involved several key steps: (1) transferring a bank's bad loans to IBRA, (2) signing the recapitalization agreement (contract between the government, Bank Indonesia and the banks' management), and (3) injecting additional capital by bank owners (new funds) and the government. Based on the IBRA annual report for the year 2000, the bank recapitalization program involved seven private banks as well as a number of state and regional banks.⁹ The bank recapitalization program dramatically changed the landscape of bank ownership during the crisis in Indonesia and had a significant impact on bank risk taking.

4. Data and research method

⁹ By the end of 2003, there were seven private recapitalized banks (Bank Lippo, Bank BII, Bank Bukopin, Bank Bali, Bank Central Asia, Bank Niaga and Bank Danamon). However, as explained later, Bank Bukopin is excluded from our sample. Only the six recapitalized banks shown in Panel D of Table 1 are included. In addition, four state-owned banks and 12 regional banks were also involved in the recapitalization program. Also, 13 private banks were taken over by the government; four were recapitalized and nine were merged into one bank. These banks are not a part of our study; however a more detailed description of these interventions may be obtained from the authors.

4.1. Data and sample

Bank ownership and financial data are from the banks' condensed published financial statements. Data for 1995-2000 are compiled by Bank Indonesia in a series of books entitled "*Direktori Perbankan Indonesia [The Indonesian Banking Directory]*" (1996-2001 Editions). The remaining banking data are obtained from *Infobank*, while the exchange rate data is from various issues of the Annual Report of Bank Indonesia.

Commercial banks hold 99 percent of total bank assets in Indonesia. Due to the banking crisis the number of commercial banks declined from 240 in 1995 to 138 in 2003. Our sample consists of 52 insured private commercial banks in Indonesia. We limit our sample to insured private banks to ensure that we can observe exclusively the impact of government intervention on non-government banks. Accordingly, we do not include state owned banks and regional development banks in our study.¹⁰ We also exclude joint venture banks and foreign banks' branch offices because they are uninsured banks.

Our study covers the period from 1995 through 2003 because we want to include the 1997/1998 crisis and observe the most dynamic and important period in the Indonesian banking history as indicated by the creation of IBRA. In 2004, however, IBRA was liquidated, but some of its functions are continued by PT. Perusahaan Pengelola Asset (PPA), a state owned enterprise in the field of asset management.

4.2. Dependent and independent variables

¹⁰ Insured banks refer to banks that joined the BGS and include both commercial banks and rural banks. However, this study only covers commercial banks. Basically, commercial banks can be classified into several categories such as private banks, state owned banks, regional development banks, joint venture banks and branch offices of foreign banks. Under the BGS, all private banks, state owned banks, and regional development banks are insured banks, whereas joint venture banks and branch offices of foreign banks are uninsured banks. We also exclude one of insured private banks (Bank Bukopin) from our sample. This is because several years before the recapitalization program, the bank has already had government ownership, among others, through the Bulog Foundation.

Accounting risk measures have been used by Jahankhani and Lyngne (1980), Mansur et al. (1993) and Shiers (1994). In this study, the three risk measures (RM) are the standard deviation of the pretax-return-on-assets estimated on a three-year moving window of annual observations (SDROA), the ratio of liquid-assets-to-total-assets (LIQATA), and the ratio of loan-loss-reserves-to-gross-loans (LLRGL). Barry et al. (2011) use similar risk measures for asset risk and credit risk. SDROA is a proxy for overall bank risk, LIQATA is a measure of liquidity risk, and LLRGL measures credit risk. Here, the higher the LIQATA of a bank, the lower the liquidity risk.

While Kim and Rhee (2000) and Kim et al. (2002) use the top five shareholders, only the largest shareholder is used here because most Indonesian banks have only two owners. The independent variable, ownership concentration (OC), is measured as the percentage of equity owned by the single largest shareholder.¹¹ If increased concentration is related to greater risk-taking, a positive relation is expected between OC and the risk measures.

To observe the impact of government intervention, we introduce a dummy variable GOVINT. Basically, this variable indicates that a bank was chosen to participate in the government's recapitalization program (1 = bank is in the recapitalization program, 0 = otherwise). Here, if government intervention is related to greater risk-taking, a positive relation is expected between GOVINT and the risk measures.

¹¹ Unfortunately, the data source does not identify the ultimate owners, particularly when a company owns the bank. Similar to Claessens et al. (2000) who indicated that the separation of management from ownership control is rare in East Asian corporations, including in Indonesia, we cannot distinguish between manager-controlled and owner-controlled banks. However, institutional shareholders like pension funds, insurance companies, investment trusts and other collective investment vehicles generally do not play an important ownership role. The absence of institutional ownership and lack of a bond market results in less informed monitoring of the banks' lending policies. Furthermore, if the banks suffer losses and require additional funds, governments are forced to intervene due to the lack of institutional investors. During a crisis, the need for a government intervention increases as institutional investors also face financial difficulties.

During the period of the study, two regulatory changes occurred, permitting a more thorough analysis of moral hazard issues. When both the BGS and the reduced CAR are in effect moral hazard issues are greater than when only the BGS is present. To observe the impact of the regulatory changes, two time dummy variables are used as control variables. The BGS was in effect throughout the 1998-2003 period while the reduced the capital adequacy requirement covered the three-year 1998-2000 period. Because of the three-year overlap, the dummy variable CAR4 represents the three years when both the reduced capital adequacy requirement and the BGS were in effect (1=1998-2000, 0=otherwise). Similarly, the dummy variable BNC4 represents the three years when the Blanket Guarantee Scheme was in effect but the lowered CAR was not (1=2001-2003, 0=otherwise).

Consistent with the moral hazard hypothesis, we expect banks to take more risks during the periods when the BGS and/or the lower capital requirement were in force. The three dummy variables should be capturing different dimensions of the government intervention. The GOVINT variable indicates which banks receive government intervention and is bank-specific and time-varying. BGS affects all banks and is used to examine whether the introduction of deposit insurance influenced risk-taking. CAR4 also affects all banks and is used to determine how the risk measures are impacted by the lowering, and then the raising of capital adequacy requirements.¹²

Two other control variables are used in this study. They include the bank's size as measured by the bank's total assets (TA) and the annual average of the rupiah/USD exchange rate (EXCHRT). Based on studies by Saunders et al. (1990) and Chen et al. (1998), a negative relation is expected between size and the risk measures. This is because larger banks have a greater potential to diversify and reduce their risk. Alternatively, as indicated by Galloway et al.

¹² We thank an anonymous referee for pointing out the different dimensions.

(1997), the presence of a too-big-to-fail (TBTF) policy will also result in a positive relation. However, Galloway et al. (1997) and Anderson and Fraser (2000) document a mixed relation between bank size and risk taking.

We include the exchange rate control variable, EXCHRT, because Kwon et al. (1997) and Crosby (2004) suggest that exchange rate movements reflect macroeconomic conditions. In addition, Indonesia's banking turmoil originated from a currency crisis. Hence, the use of EXCHRT as a control variable is justified. The relation between EXCHRT and the risk measures can be positive or negative. An increase in the exchange rate reflects deterioration in the Indonesian economy and, therefore, banks will become more risky due to the increasing rate of non-performing loans or bad assets. However, a decrease in EXCHRT indicates an improvement in the country's economy as its local currency becomes stronger. As general economic conditions improve, however, banks could approve riskier loans by relaxing their credit policies because the risk of borrower default is decreasing. Since the risk of default is decreasing, shareholder wealth increases.

During normal economic conditions, we expect that concentrated ownership will be associated with greater risk taking as measured by total risk, liquidity risk and credit risk. For Indonesia, this association will be stronger due to non-arms-length lending and the lack of a well-functioning bond market. These characteristics are conducive for moral hazard behavior.

Alternatively, during the crisis and recovery periods, the interpretation of the regression results are more complex as ownership concentration and risk taking is impacted by government intervention and cash contribution by owners. Overall bank risk changes as the more risky banks are initially taken over by the government and subsequently divested when their soundness

improves. The liquidity variable reflects the fact that both owners and government injected cash into the banks. Credit risk is modified as IBRA acquired bad loans from problem banks.

4.3. Empirical models

Based on the above discussions concerning the dependent and independent variables, we use five panel data regression models to provide evidence on Indonesian bank behavior. Model (1) tests the relation between the alternative risk measures and ownership concentration (OC), reduced CAR (CAR4), and the BGS only period (BNC4), while Model (2) replaces ownership concentration with government intervention (GOVINT). The coefficient on the GOVINT variable shows the impact of government ownership on the risk measures of the recapitalized banks. In order to examine the relative importance of ownership concentration and government intervention simultaneously, Model (2.5) includes both.

To further study the effect of government intervention on the relation between ownership and risk-taking, Model (3) includes a variable that interacts ownership concentration with government intervention (OC*GOVINT).¹³ A significant positive sign suggests that these banks were recapitalized because of their high risk and provides the rationale for government intervention. Finally, Model (4) interacts OC*GOVINT with the regulatory variable CAR4 resulting in OC*GOVINT*CAR4. This measure isolates banks with ownership concentration, government intervention, and lower capital requirements.

To summarize, the analyses are more in-depth as we move from Model (1) through Model (4) and provide unique insights into bank behavior recapitalized by government

¹³ We thank an anonymous reviewer for suggesting the inclusion of the interaction term (OC*GOVINT) which captures how government intervention (GOVINT) affects risk-taking through ownership concentration (OC).

intervention. Corresponding to the Models (1) to (2), we develop the following empirical equations.

$$RM_t = \alpha_0 + \alpha_1 OC_t + \alpha_2 TA_t + \alpha_3 EXCHRT_t + \alpha_4 BNC4_t + \alpha_5 CAR4_t + error_t \quad (1)$$

$$RM_t = \alpha_0 + \alpha_1 GOVINT_t + \alpha_2 TA_t + \alpha_3 EXCHRT_t + \alpha_4 BNC4_t + \alpha_5 CAR4_t + error_t \quad (2)$$

The difference between these two models is reflected in the variables associated with ownership concentration (OC) and government intervention (GOVINT). RM_t is the risk measure under consideration: SDROA, LIQDATA, or LLRGL. OC is a continuous variable with a possible range from 0.00 to 1.00. GOVINT is a discrete variable with a value of 1 for banks that participated in the recapitalization program and 0 otherwise. A significant positive (negative) coefficient on the OC variable indicates the risk measure is positively (negatively) related to ownership concentration and greater concentration is associated with greater (lesser) risk taking. A significant positive (negative) coefficient on the GOVINT variable indicates the risk measure is positively (negatively) related to inclusion in the recapitalization program and that participation in the program is associated with higher levels of risk. TA_t and $EXCHRT_t$ indicate the size of the individual banks and general macroeconomic conditions, respectively.

The dummy time variable BNC4 represents the three years when the BGS scheme was in place but the reduced CAR was not, while the CAR4 dummy time variable represents the years when the capital adequacy requirements were lowered to 4 percent. It is expected that both variables impact risk.

Equations (1) and (2) considered ownership concentration and government intervention separately. In order to examine the relative importance of these two variables, Equation (3) includes both. A change in the significance of either variable will provide insight as to how the risk measure is impacted by the alternatives of ownership concentration and government intervention. As before, size, economic conditions, and two periods, blanket guarantee scheme

without the lowered capital adequacy requirement and the period when both the BGS and CAR4 are in effect is considered.

$$RM_t = \alpha_0 + \alpha_1 OC_t + \alpha_2 GOVINT_t + \alpha_3 TA_t + \alpha_4 EXCHRT_t + \alpha_5 BNC4_t + \alpha_6 CAR4_t + error_t \quad (3)$$

To further examine the effect of government intervention on the relation between ownership and risk-taking, we interact the government intervention variable with the ownership concentration variable (OC*GOVINT).¹⁴ A significantly positive sign on this interaction term suggests that government intervention has a different relation for different levels of ownership concentration.

$$RM_t = \alpha_0 + \alpha_1 OC_t + \alpha_2 GOVINT_t + \alpha_3 TA_t + \alpha_4 EXCHRT_t + \alpha_5 BNC4_t + \alpha_6 CAR4_t + \alpha_7 OC*GOVINT_t + error_t \quad (4)$$

Moreover, to examine the simultaneous impact of regulatory changes and government intervention on the relation with ownership concentration, as indicated above, we interact the regulatory variable CAR4 with OC*GOVINT resulting in OC*GOVINT*CAR4.

$$RM_t = \alpha_0 + \alpha_1 OC_t + \alpha_2 GOVINT_t + \alpha_3 TA_t + \alpha_4 EXCHRT_t + \alpha_5 BNC4_t + \alpha_6 CAR4_t + \alpha_7 OC*GOVINT_t + \alpha_8 OC*GOVINT*CAR4_t + error_t \quad (5)$$

Consistent with the moral hazard hypothesis that banks will take more risks under the lower capital regime, we expect a positive sign for this interaction variable.

¹⁴ We thank an anonymous reviewer for suggesting the inclusion of the interaction term (OC*GOVINT) which captures how government intervention (GOVINT) affects risk-taking through ownership concentration (OC).

5. Empirical results

5.1. Descriptive statistics

The data shown in Panel A of Table 1 include 52 insured private national banks over the nine-year period. It should be noted that these are the banks that survived either with or without government assistance.

(Insert Table 1 here)

The proxy for overall risk, SDROA has a mean (median) of 3.82 percent (0.80 percent). The proxy for liquidity risk, LIQATA, and credit risk, LLRGL, have mean (median) values of 17.81 percent (8.07 percent) and 7.15 percent (2.82 percent), respectively. Moreover, all risk measures are highly skewed. Two of the explanatory variables, ownership concentration and the exchange rate variable show relatively normal distributions. The mean (median) of these variables are 57.03 percent (51.20 percent) and 7.09 (8.44), respectively. The distribution of total assets is also highly skewed. To address the skewness issues, all variables except OC, EXCHRT and the dummy variables, are transformed using the natural logarithm.

The correlation matrix (Table 1 Panel B) indicates that ownership concentration (OC) is significantly related to two of the three risk measures, the overall risk measure, SDROA, and the liquidity risk measure, LIQATA, but not significantly related to LLRGL. The correlations between OC and the other independent variables are also significant, except for CAR4. Although several correlations are relatively high, these are as expected such as the relation between liquidity and BNC4, the years when the BGS was in effect but the CAR was not at 4 percent. In general there is no evidence of severe multicollinearity.¹⁵

¹⁵ For a robustness check, a VIF test is also conducted. Under the general models, the two regulatory variables (BNC4 and CAR4) have VIF of above 10, indicating moderate collinearity. Because panel data methodology is being used, the collinearity among the variables will not influence the robustness of our results. See Baltagi (2001) and Hsiao (1986).

Panel C presents the year-by-year averages of each of the variables along with t-tests comparing three periods. The t-test (a) compares the pre-crisis years (1995-1997) with the crisis years (1998-2000) while t-test (b) compares the crisis years (1998-2000) with the post-crisis years (2001-2003). It is noted that SDROA and LLRGL experienced substantial increases from the pre-crisis period to the crisis period and substantial decreases in the post-crisis period. LIQATA shows increases throughout the nine year period; the significant increase from the pre-crisis period is caused by the injection of new capital and the post-crisis values reflect that infusion of capital and improving economic conditions. The change in economic conditions is reflected in the significant fluctuations in exchange rate, especially the jump from 1996 to 1998.

Ownership concentration and total asset across all banks has increased but possibly driven by the recapitalization of the selected banks. We argue that government intervention through the bank recapitalization program has a significant impact on bank ownership concentration. Table 1, Panel D presents the position of ownership concentration at the six recapitalized banks and the full sample for each individual year during 1999-2003.¹⁶ Before 1999 there was no government ownership. During the 1999-2003 period, ownership concentration increased to over 50 percent for all of these banks due to the bank recapitalization program. It should be noted that ownership concentrations of the recapitalized banks include both the majority shareholder and the percentage of the bank's shares held by IBRA. Moreover, based on the t-test and Z-test (not reported), we find that the bank recapitalization program has led to significantly more concentrated ownership at the recapitalized banks¹⁷ and the full sample of banks.

¹⁶ Our study includes all insured private recapitalized banks that survived during the study period, except for Bank Bukopin.

¹⁷ The only exception is Bank Lippo. The results of t-test and Z-test are not significant at this bank.

5.2. Regression results

Table 2 presents the panel data regression results for all three risk measures. The empirical results demonstrate that government intervention changed ownership concentration, affected the overall bank risk, altered the credit risk measure by removing bad loans from selected banks, and increased bank liquidity.¹⁸

(Insert Table 2 here)

Panel A presents the regression results when SDROA is used as the dependent variable.¹⁹ Model (1) is based on Equation (1) and the regression result shows a significant positive relation between overall risk (SDROA) and ownership concentration (OC). This suggests that banks with a more concentrated ownership exhibit higher overall risk. The finding is consistent with the positive relation between bank ownership concentration and risk reported by Laeven (2002),

In Model (2), the regression result demonstrates a significant positive relation between overall risk (SDROA) and government intervention (GOVINT). This suggests that banks that join the recapitalization program exhibit higher overall risk than banks that do not join the program. These relations persist in Model (3) when both variables are included. However, the reduced size of the OC coefficient suggests that the result in Model (1) has been substantially influenced by the high percentage of government ownership in the recapitalized banks.²⁰

¹⁸ It should be noted that the Hausman test indicates that the fixed-effects model is superior to the random-effects model for the SDROA and LLRGL, but that the random-effects model is best for the LIQATA model. A modified Wald test and the Wooldridge test identified heteroskedasticity and autocorrelation, respectively. Hence, following Arellano (1987, 2003) and Bertrand et al. (2004), cluster-robust variance and covariance estimators are used to resolve these issues.

¹⁹ The F-test and the LM test indicate that the fixed-effects and the random-effects models outperform the pooled OLS.

²⁰ It should be noted that these results are associated with the surviving banks following closures by the government.

Models (4) and (5) support the interpretation that the positive relation between ownership concentration and overall risk is largely due to the recapitalized banks. With the introduction of the dummy variable interaction terms OC*GOVINT and OC*GOVINT*CAR4 in Models (4) and (5), respectively, the coefficient for OC becomes insignificantly different from zero. That is, outside of the six banks that were recapitalized, overall risk and ownership concentration are unrelated.

However, for the recapitalized banks, the significantly positive coefficient for OC*GOVINT in Model (4) shows that overall risk increases with ownership concentration. This result should be interpreted with caution since banks with higher overall risk were more likely to be recapitalized, and following recapitalization, the OC variable reflects predominant government ownership. In addition, the significantly positive coefficient for OC*GOVINT*CAR4 in Model (5) shows that this relation occurs primarily in the period of reduced capital adequacy requirements. Supplementary analysis using the derivative of overall risk (SDROA) with respect to ownership concentration (OC) provides the sensitivity of risk to OC as a function of GOVINT (recapitalization) and CAR4. From Model 5 we obtain:

$$\frac{\partial risk}{\partial OC} = 0.170 + 2.632 \times GOVINT + 1.629 \times GOVINT \times CAR4.$$

Therefore, when: GOVINT = 0, $\frac{\partial risk}{\partial OC}$ is insignificant.

In addition, when: GOVINT = 1 and CAR4 = 0, $\frac{\partial risk}{\partial OC} = 2.802$,

and, when both GOVINT = 1 and CAR4 = 1, $\frac{\partial risk}{\partial OC} = 4.431$.

This analysis confirms that the sensitivity of total risk relative to the change in ownership concentration is high during the six-year government intervention period (GOVINT) and is highest during the three-year period of the GOVINT and lower CAR. From an economic

perspective, both GOVINT and CAR are positively related to the SDROA and suggest that these instruments are appropriate for changing the underlying risk of the banks. During the early period of the crisis when both GOVINT and CAR4 were in effect the relation between SDROA and ownership concentration is the highest. Later as the economy improved, the CAR was increased to 8 percent but deposit insurance was still operational and the effect was substantially reduced.

In all models in Panel A, the coefficients on both BNC4 and CAR4 are significantly positive, indicating that overall risk is greater during both of these intervals. The size of the coefficients for CAR4 suggests that this was most pronounced during the overlapping interval. These results are consistent with the moral hazard hypothesis that banks will take more risks when a deposit insurance scheme exists and/or a lower capital adequacy requirement is in place.

The relation between the control variable for bank size and overall risk is negative and significant in all models, indicating larger banks are less risky. As expected, the relation between the control variable for the general macroeconomic environment (EXCHRT) and overall risk is positive and significant. This is consistent with the risk of banks moving in parallel with the Indonesian economy.

We use liquidity (LIQATA) as the second risk measure and the regression results are shown in Table 2, Panel B. It should be noted that high (low) LIQATA represents low (high) liquidity risk. In Model 1, ownership concentration is significantly positively related to liquidity. However, the dummy variable GOVINT that identifies recapitalized banks, which is introduced in Models 2 and 3 is also significantly positively related to liquidity, and has the effect of reducing the size of the OC coefficient. This coefficient becomes insignificant in Models 4 and 5 when the interaction terms OCxGOVINT and OCxGOVINTxCAR4 are introduced. Therefore,

the relation between OC and liquidity is exclusive to the recapitalized banks. Notably, in Models 4 and 5, the coefficients for GOVINT are insignificant; indicating that recapitalization on its own is not associated with increased liquidity.

The significantly positive coefficients on the interaction terms OCxGOVINT and OCxGOVINTxCAR4 in Models 4 and 5, respectively, show that the positive relation between recapitalization and liquidity seen in Models 2 and 3 is a function of government equity investment. That is, for the recapitalized banks, the variable OC reflects the proportion of the ownership acquired by IBRA. This is not surprising since the proportion corresponds to the government's contribution to the funds required to recapitalize a bank.

In all models, we find that bank liquidity increases with worsening economic conditions (EXCHRT increases). Possibly, banks view liquidity risk as paramount, and curtail their normal lending activities as the economy worsens and hold funds in liquid form. Alternatively, demand for lending decreases as conditions worsen. After controlling for economic conditions, we find that bank liquidity was greatest after the more stringent capital adequacy requirements were reinstated, but while the deposit guarantee scheme was operational. The BGS was aimed at improving bank liquidity by stemming deposit withdrawals. However, with the greatest effect happening after the higher capital requirements were reinstated, it is possible that this increase may have been caused by new capital contributions themselves.

Panel C uses loan loss provisions, LLRGL, as the measure of risk. Model 1 suggests that there is no significant relation between ownership concentration and loan loss provisions. However, Models 3 – 5 reveal a significant negative relation between ownership concentration and LLRGL when the GOVINT variable, and terms interacting with this variable, are introduced. Hence, for banks that were not recapitalized, provision for loan losses decreased as a proportion

of loans as ownership concentration increased. This is consistent with improved monitoring as suggested by Shehzad, De Haan, and Scholtens (2010) and with concentrated ownership being associated with lower shareholder diversification (and therefore greater exposure) as conjectured by Barry, Lepetit, and Tarazi (2011). However, in the Indonesian context, it is plausible that lower loan loss provisions are indicative of opportunistic behavior from influential bank owners who wish to mitigate regulatory scrutiny. Moral hazard arises from lending to politically connected groups and the window dressing of banks' financial statements.

Models 2 and 3 show that GOVINT has a strong positive relation with LLRGL. Poor lending practices may have been responsible for the losses that instigated recapitalization and for the need to make provision for further loan losses. Plausibly, with recapitalization, a higher proportion of government ownership is positively associated with LLRGL. Models 4 and 5 show a negative relation between OC and LLRGL for banks that were not subject to government intervention. For the recapitalized banks, however, there is no relation as shown in Model 4. However, Model 5 provides an interesting insight showing a negative relation between LLRGL and OC*GOVINT*CAR4. Intuitively, early in the crisis, during the three-year period of the lowered CAR and GOVINT, the government reduced the amount of bad debt for the recapitalized banks.²¹

Again, supplementary analysis using the derivative of LLRGL with respect to OC shows the sensitivity of LLRGL to OC as a function of GOVINT (recapitalization) and CAR4. From Model 5 we obtain:

$$\frac{\partial LLRGL}{\partial OC} = -0.635 + 0.840 \times GOVINT - 0.526 \times GOVINT \times CAR4.$$

Therefore, when: GOVINT = 0, $\frac{\partial LLRGL}{\partial OC} = -0.635$;

²¹ See Sato (2005) for a description of IBRA's acquisition of banks' nonperforming loans.

And when $GOVINT = 1$ and $CAR4 = 0$, $\frac{\partial LLRGL}{\partial OC} = 0.205$;

Finally, when $GOVINT = 1$ and $CAR4 = 1$, $\frac{\partial LLRGL}{\partial OC} = -0.321$.

This analysis confirms that the sensitivity of LLRGL relative to the change in ownership concentration.²² From an economic perspective, GOVINT and CAR4 dampen the sensitivity of LLRGL. During the early period of the crisis when both GOVINT and CAR4 were in effect, the relation between LLRGL is negative as IBRA acquires bad loans. During the subsequent period as the economy improves, deposit insurance is in effect, the CAR has been increased to 8 percent, and bank ownership reverts to private owners, the relation between ownership concentration and LLRGL becomes positive. This occurs as owners to take on more risky loans.

In all models, we find an increase in the quality of the loan portfolio (LLRGL decreases) with bank size and with improved economic conditions (EXCHRT decreases). These results conform to intuitive expectations. After controlling for economic conditions, we find that loan portfolio quality is greatest while capital adequacy requirements were relaxed. This is consistent with the three-year period when the government was taking over the banks with the bad loans and the owners were removing their bad loans (evergreening, reclassification, and writeoffs) to avoid bank closure.

6. Conclusions

This study examines the relation between ownership concentration and bank risk-taking in Indonesia over the 1995-2003 period along with the impact of government intervention and

²² Relative to the banks that remain in government ownership, divested banks will have lower OC and correspondingly lower LLRGL.

regulatory changes. Our analysis compares banks with substantial government ownership with banks with concentrated private ownership.

Using panel data analyses on 52 insured private banks, we find that among banks that were recapitalized, the relation between ownership concentration and overall risk is significant and positive. For the remaining banks, there is no significant relation. Ownership concentration is unrelated to liquidity and therefore liquidity risk unless the bank is recapitalized. For the recapitalized banks, ownership concentration is positively related to liquidity, reflecting the increased holding of the government from the recapitalization process itself.

Credit risk is reduced by increased ownership concentration, provided banks are not recapitalized. However, when banks are recapitalized, the relation is more complex. Ownership concentration and credit risk are negatively related during the period of reduced capital adequacy requirements and the presence of BGS, but are unrelated in the period when only the BGS is in effect.

Generally, for all the banks we find that total risk and credit risk increases with reduced CAR consistent with moral hazard. During the period when both the BGS and higher capital requirements were in effect, we find higher total risk and greater liquidity. This occurs during the period when the banking system was recovering and returning to normal. Moreover, when we include the regulatory variables in our models, the results suggest that, consistent with the moral hazard hypothesis, banks tend to take more overall and credit risks when a deposit insurance scheme is present and/or when a lower capital requirement is implemented.

During a financial crisis, government regulators must selectively close some banks, take over other banks and intervene to strengthen all remaining banks. Being able to distinguish

between these banks allows us to better understand and to provide insights into the effects of the different tools of regulatory policy.

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Table 1 – Descriptive statistics**Panel A – Variables**

Variables	Mean	Median	Standard deviation	Minimum	Maximum	Skewness
SDROA	3.82	0.80	8.60	0.01	71.15	4.39
LIQATA	17.81	8.07	19.65	0.94	77.34	1.53
LLRGL	7.15	2.82	10.16	0.18	61.45	2.74
OC	57.03	51.20	25.35	10.00	100.00	0.24
GOVINT	0.06	0.00	0.24	0.00	1.00	3.72
TA	4.59	0.28	14.18	0.01	133.26	5.40
EXCHRT	7.09	8.44	2.99	2.25	10.26	-0.66
BNC4	0.67	1.00	0.47	0.00	1.00	-0.71
CAR4	0.33	0.00	0.47	0.00	1.00	0.71

This study uses annual observations of Indonesian private commercial banks over the period 1995-2003. SDROA is the standard deviation of return on assets (before taxes) estimated in a three-year moving window of annual observations, a proxy for overall risk. LIQATA is the ratio of liquid-assets-to-total-assets, a proxy for liquidity risk. LLRGL is the ratio of loan-loss-reserves-to-gross-loans, a proxy for credit risk. OC is the ownership concentration, defined as the percentage of equity owned by the largest shareholder. GOVINT is a dummy variable to indicate that a bank has received an intervention from the government in term of a recapitalization program (1=bank with the recapitalization program, 0=otherwise). TA is total assets (in Rp,billion), a proxy for bank size. EXCHRT is the annual average of exchange rate Rp/USD (scaled in Rp,000), a proxy for general macroeconomic conditions. BNC4 is a time dummy variable to indicate the existence of the Blanket Guarantee Scheme but not the lower CAR during the sub-period 2000-2003 (1=2000-2003, 0=otherwise). CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). All variables are presented in percentage, except for GOVINT, BNC4, CAR4 and EXCHRT.

Panel B – Correlation matrix

	A	B	C	D	E	F	G	H	I
A. SDROA	1	0.231***	0.466***	0.199***	0.192***	-0.019	0.441***	-0.034	0.503***
B. LIQATA		1	0.198***	0.212***	0.177***	0.284***	0.612***	0.753***	-0.167***
C. LLRGL			1	0.065	0.208***	0.206***	0.530***	-0.044	0.596***
D. OC				1	-0.014	-0.135***	0.163***	0.130***	0.033
E. GOVINT					1	0.756***	0.000	0.000	0.000
F. TA						1	0.151***	0.159***	-0.008
G. EXCHRT							1	0.544***	0.403***
H. BNC4								1	-0.500***
I. CAR4									1

*** indicates statistical significance at the 1% level (2-tailed).

Table 1 (continued)

Panel C – Variable statistics year-by-year											
	1995	1996	1997	1998	1999	2000	2001	2002	2003	t – test ^a	t – test ^b
SDROA	0.54	0.45	0.55	8.27	8.87	8.53	4.10	1.68	1.42	7.83***	5.63***
LIQATA	3.92	6.25	6.23	7.66	11.70	13.25	40.30	37.37	33.59	5.10***	13.72***
LLRGL	1.62	1.57	2.18	18.79	16.68	8.48	5.95	4.39	4.72	11.83***	8.10***
OC	51.43	50.47	53.12	54.93	57.33	61.56	62.56	62.02	59.88	2.20**	1.26
TA (billions)	1.63	2.23	3.07	3.56	4.74	5.64	6.15	6.52	7.20	1.83**	1.04
LNTA	12.37	12.65	12.76	12.84	12.96	13.14	13.30	13.43	13.56	1.88**	2.02**
EXCHRTS	2.25	2.35	4.65	10.09	7.85	8.44	10.26	9.32	8.59	48.74***	6.36***

Panel D - Ownership Concentration: Before and After the Bank Recapitalization Program

	1995	1996	1997	1998	1999	2000	2001	2002	2003	t - test	Z - test
<u>Recapitalized Banks:</u>											
1. Bank Lippo	16.10	16.10	59.82	55.94	59.53	59.26	59.25	59.25	54.72	-1.766	-0.988
2. Bank BII	49.50	51.23	51.23	51.10	57.00	57.00	56.68	93.69	51.23	-1.598	-2.252**
3. Bank Permata (Bali)	29.20	29.31	29.31	29.31	44.71	98.23	98.23	91.33	91.33	-16.994***	-2.513**
4. Bank Central Asia	23.10	23.08	23.16	23.16	92.80	70.30	59.71	52.40	51.43	-5.515***	-2.460**
5. Bank Niaga	54.10	39.90	39.51	20.00	10.00	97.15	97.15	50.99	52.82	-2.744**	-1.968*
6. Bank Danamon	64.00	47.60	48.00	48.00	99.00	99.36	99.35	99.35	61.88	-4.695***	-2.223**
<u>Full Sample:</u> Mean	51.43	50.47	53.12	54.93	57.33	61.56	62.56	62.02	59.88	-5.998***	-2.449**
Median	41.90	46.30	49.00	50.00	50.59	60.00	59.86	60.00	57.16	-6.863***	-2.460**

In Panel C t-test a (b) refers to the periods (1995-1997 to 1998-2000) and (1998-2000 to 2001-2003), respectively. In Panel D all numbers in **bold and underline** is ownership concentration **after** the implementation of the bank recapitalization program. Before the implementation of the program, all sample banks do not have government ownership. T-test is based on the independent samples test (equal variances not assumed). Z – test is based on the Mann-Whitney Non Parametric Test. For the full sample analysis, before the program is during the sub-period 1995-1998 and after the program is during the sub-period 1999-2003. Except for the results of t-test and Z-test, all numbers are presented in percentage. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively (2-tailed).

Table 2 – Regression Results**Panel A: Dependent variable: SDROA**

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	7.752*** (4.54)	9.025*** (5.72)	8.883*** (5.79)	9.193*** (5.90)	9.501*** (6.32)
OC	1.220*** (2.91)	-	0.591** (2.12)	0.198 (0.66)	0.170 (0.57)
GOVINT	-	1.686*** (8.53)	1.496*** (6.16)	-1.292 (-0.83)	-0.812 (-0.56)
TA	-0.779*** (-6.27)	-0.837*** (-6.86)	-0.849*** (-7.28)	-0.856*** (-7.21)	-0.883*** (-7.67)
EXCHRT	0.116** (2.61)	0.142*** (2.97)	0.138*** (2.89)	0.134*** (2.85)	0.148*** (2.90)
BNC4	0.792** (2.47)	0.602* (1.75)	0.599* (1.72)	0.672* (1.97)	0.658* (1.93)
CAR4	1.774*** (6.76)	1.617*** (6.18)	1.617*** (6.11)	1.650*** (6.29)	1.533*** (5.39)
OC*GOVINT	-	-	-	3.892** (2.05)	2.632 (1.36)
OC*GOVINT*CAR4	-	-	-	-	1.629** (2.27)
AR ²	0.51	0.54	0.54	0.55	0.56
N	468	468	468	468	468
<i>Specification tests:</i>					
F-test (OLS vs FEM)	7.26***	6.00***	5.97***	6.16***	6.35***
LM test (OLS vs REM)	238.51***	153.11***	148.51***	154.14***	159.61***
Hausman (FEM vs REM)	30.63***	261.87***	1287.43***	na	na
<i>Heteroskedasticity test:</i>					
Modified Wald	1061***	1045***	968***	893***	717***
<i>Autocorrelation test:</i>					
Wooldridge test	47.07***	45.47***	47.50***	49.71***	48.50***

Results of one-factor panel data regressions (fixed effects models) for the period 1995-2003. The dependent variable is SDROA [the standard deviation of return (before taxes) on assets estimated in a three-year moving window of annual observations], a proxy for overall risk. The independent variables include OC, GOVINT, TA, EXCHRT, BNC4 and CAR4. OC is the proportion of equity owned by the largest shareholder, a measure of ownership concentration. GOVINT is a dummy variable to indicate that a bank has received an intervention from the government in term of a recapitalization program (1=bank with the recapitalization program, 0=otherwise). TA is total assets, a proxy for bank size. EXCHRT is the annual average of exchange rate Rp/USD (scaled in Rp,000), a proxy for general macroeconomic conditions. BNC4 is a time dummy variable (1=2001-2003, 0=otherwise) to indicate the implementation of Blanket Guarantee Scheme during the sub-period 1998-2003 but excluding the period during which capital requirements were relaxed. CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). Fixed effects models are estimated using least squares with group dummy variables. All variables, except for OC, GOVINT, BNC4, CAR4 and EXCHRT, are transformed using the natural logarithm. T-statistics are given in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The notation “na” indicates the data fails to meet the asymptotic assumptions of the Hausman test, but generally fixed effects are sufficient.

Panel B: Dependent variable: LIQATA

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-0.018 (-0.04)	1.439*** (5.13)	1.099*** (2.88)	1.175*** (3.08)	1.223*** (3.18)
OC	0.646*** (2.69)	-	0.334* (1.68)	0.266 (1.25)	0.245 (1.12)
GOVINT	-	1.162*** (8.11)	1.047*** (6.70)	0.268 (0.65)	0.689 (2.31)
TA	0.084*** (3.19)	-0.010 (-0.49)	0.004 (0.17)	0.001 (0.05)	-0.005 (-0.24)
EXCHRT	0.047** (2.42)	0.065*** (3.73)	0.063*** (3.61)	0.061*** (3.49)	0.075*** (4.26)
BNC4	1.483*** (9.71)	1.381*** (10.02)	1.362*** (9.80)	1.381*** (9.77)	1.350*** (9.59)
CAR4	0.257* (1.87)	0.160 (1.53)	0.152 (1.40)	0.161 (1.46)	0.035 (0.35)
OC*GOVINT	-	-	-	1.077** (2.02)	-0.113 (-0.32)
OC*GOVINT*CAR4	-	-	-	-	1.647*** (10.64)
AR ²	0.72	0.75	0.75	0.75	0.77
N	468	468	468	468	468
<i>Specification tests:</i>					
F-test (OLS vs FEM)	3.15***	2.91***	3.00***	3.04***	3.29***
LM test (OLS vs REM)	54.80***	54.26***	54.77***	57.57***	68.54***
Hausman (FEM vs REM)	9.46*	1.76	4.54	4.70	5.78
<i>Heteroskedasticity test:</i>					
Modified Wald	554***	1045***	424***	337***	427***
<i>Autocorrelation test:</i>					
Wooldridge test	43.77***	40.79***	40.67***	41.21***	32.35***

Results of one-factor panel data regressions (random effects models) for the period 1995-2003. The dependent variable is LIQATA [the ratio of liquid-assets-to-total-assets], a proxy for liquidity risk. The independent variables include OC, GOVINT, TA, EXCHRT, BNC4 and CAR4. OC is the proportion of equity owned by the largest shareholder, a measure of ownership concentration. GOVINT is a dummy variable to indicate that a bank has received an intervention from the government in term of a recapitalization program (1=bank with the recapitalization program, 0=otherwise). TA is total assets, a proxy for bank size. EXCHRT is the annual average of exchange rate Rp/USD (scaled in Rp,000), a proxy for general macroeconomic conditions. BNC4 is a time dummy variable (1=2001-2003, 0=otherwise) to indicate the implementation of Blanket Guarantee Scheme during the sub-period 1998-2003 but excluding the period during which capital requirements were relaxed. CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). Fixed effects models are estimated using least squares with group dummy variables. All variables, except for OC, GOVINT, BNC4, CAR4 and EXCHRT, are transformed using the natural logarithm. T-statistics are given in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Panel C: Dependent variable: LLRGL

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	2.537*** (2.28)	2.84*** (2.44)	2.985*** (2.68)	3.019*** (2.70)	2.920*** (2.60)
OC	-0.351 (-1.10)	-	-0.601* (-1.80)	-0.644** (-1.75)	-0.635* (-1.75)
GOVINT	-	0.400** (2.67)	0.593*** (3.25)	0.283 (0.70)	0.128 (0.29)
TA	-0.188** (-2.08)	-0.228** (-2.46)	-0.215** (-2.42)	-0.216** (-2.43)	-0.208** (-2.33)
EXCHRT	0.145*** (4.48)	0.150*** (4.54)	0.153*** (4.65)	0.153*** (4.62)	0.148*** (4.53)
BNC4	0.075 (0.29)	-0.005 (-0.02)	-0.001 (-0.00)	0.003 (0.03)	0.011 (0.04)
CAR4	1.067*** (5.07)	1.004*** (4.75)	1.004*** (4.74)	1.008*** (4.73)	1.046*** (4.89)
OC*GOVINT	-	-	-	0.433 (0.81)	0.840 (1.47)
OC*GOVINT*CAR4	-	-	-	-	-0.526** (-2.52)
AR ²	0.59	0.59	0.60	0.60	0.60
N	468	468	468	468	468
<i>Specification tests:</i>					
F-test (OLS vs FEM)	4.77***	4.58***	4.76***	4.76***	4.71***
LM test (OLS vs REM)	127.39***	125.72***	124.35***	124.16***	123.14***
Hausman (FEM vs REM)	15.77***	12.81**	17.49***	18.23**	17.50**
<i>Heteroskedasticity test:</i>					
Modified Wald	893***	926***	818***	818***	760***
<i>Autocorrelation test:</i>					
Wooldridge test	9.03***	9.41***	9.10***	9.09***	9.07***

Results of one-factor panel data regressions (fixed effects models) for the period 1995-2003. The dependent variable is LLRGL [the ratio of loan-loss-reserves-to-gross-loans], a proxy for credit risk. The independent variables include OC, GOVINT, TA, EXCHRT, BNC4 and CAR4. OC is the proportion of equity owned by the largest shareholder, a measure of ownership concentration. GOVINT is a dummy variable to indicate that a bank has received an intervention from the government in term of a recapitalization program (1=bank with the recapitalization program, 0=otherwise). TA is total assets, a proxy for bank size. EXCHRT is the annual average of exchange rate Rp/USD (scaled in Rp,000), a proxy for general macroeconomic conditions. BNC4 is a time dummy variable (1=2001-2003, 0=otherwise) to indicate the implementation of Blanket Guarantee Scheme during the sub-period 1998-2003 but excluding the period during which capital requirements were relaxed. CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). CAR4 is a time dummy variable to indicate the implementation of the minimum CAR of 4 percent during the sub-period 1998-2000 (1=1998-2000, 0=otherwise). Fixed effects models are estimated using least squares with group dummy variables. All variables, except for OC, GOVINT, BNC4, CAR4 and EXCHRT, are transformed using the natural logarithm. T-statistics are given in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Appendix: A List of the Variables

<u>Variable</u>	<u>Description</u>
<u>Risk Measures</u>	
SDROA:	standard deviation of the pretax-return-on-assets estimated on a three-year moving window of annual observations; a proxy for overall bank risk.
LIQATA:	the ratio of liquid-assets-to-total-assets (LIQATA); a measure of liquidity risk.
LLRGL:	the ratio of loan-loss-reserves-to-gross-loans; a measure of credit risk.
<u>Explanatory Variables</u>	
GOVINT:	a 0-1 dummy variable indicating the six banks that were recapitalized by the government; (1 = bank is in the recapitalization program, 0 = otherwise)
OC:	ownership concentration variable that indicates the ownership share of the majority shareholder or the majority shareholder and the government. Ranges from 10 percent to 100 percent.
CAR4:	a 0-1 dummy variable representing the three years when the 4 percent capital adequacy requirement was in effect. (1 = 1998-2000, 0 = otherwise).
BNC4:	a 0-1 dummy variable representing the three years when the Blanket Guarantee Scheme was in effect but the lowered CAR was not (1 = 2001-2003, 0 = otherwise).
<u>Interaction Variables</u>	
OC*GOVINT:	a 0-1 dummy variable that interacts ownership concentration with government intervention. For the six banks that received government funds the variable will take on values of ownership concentration. For the remaining banks, the value will be zero.
OC*GOVINT*CAR4:	a 0-1 dummy variable that interacts ownership concentration, government intervention, and the capital adequacy requirement of 4 percent. For the six banks that received government funds the variable will take on values of ownership concentration during the 1998-2000 period. For the remaining banks and other time periods, the value will be zero.
<u>Control Variables</u>	
TA:	Total Assets: a measure of bank size. The natural logarithm was used.
EXCHRT:	the annual average of the rupiah/USD exchange rate.

Manuscript Highlights

Our analysis compares Indonesian banks with substantial government ownership with banks with concentrated private ownership during the Asian Financial Crisis.

- For banks that are not recapitalized, ownership concentration is unrelated to liquidity risk and is negatively related to credit risk.
- For banks that were recapitalized, the relation between ownership concentration and overall risk is significant and positive.
- Total risk and credit risk increases with reduced capital adequacy requirements consistent with moral hazard.
- Banks tend to take more overall and credit risks when a deposit insurance scheme is present and/or when a lower capital requirement is in place.