

BANK RISK AND MARKET DISCIPLINE

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ABSTRACT

This paper investigates the issue of bank risk taking. Specifically we investigate two main issues: (1) determinants of bank risk, and (2) market discipline to the banks either in implicit, explicit guarantee systems, and all periods. Using Indonesian data, we find that domestic, foreign, and ownership concentration have positive impact on bank risk. Bank shareholders engage in entrenchment behaviour, rather than convergence behaviour. We further find that charter value and compliance to regulation have negative impact on bank risk. Next, we find that market disciplines the banks. Market disciplines the banks at the same degree in implicit and explicit deposit guarantee systems. Our findings highlight the importance of paying close attention to banks ownership, charter value, and compliance to regulation. Furthermore, since we find that market disciplines the Banks at the same degree in explicit and implicit guarantee systems, we need to investigate this issue further. This finding highlights research potential in the future: to investigate disciplining behaviour from various types of depositors.

Keywords: *bank ownership, market discipline, risk, entrenchment, convergence, and deposit insurance*

INTRODUCTION

We investigate issue of risk taking in Indonesian banking. Unique role of banking in a society has been noted in finance literature. Douglas (1984) suggests that banks act as delegated monitoring for their depositors. Banks play a disciplinary role for corporations. The speciality of banks naturally leads

to the need to specially monitor the banks.¹

¹ Fama (1985), however, argues that banks are special because we treat them specially, not because banks have uniqueness. From this perspective, banks are not unique corporations that merit special attention. However, most literature and especially view from policy makers consider that banks play special role in society that merit special attention.

Unlike non-bank companies, banks experience close monitoring from the society, especially from regulatory authorities. Who should and what kinds of bank monitoring we should exercise have been subject to discussion in the literature. Prowse (1997) shows that there are several mechanisms to monitor the banks.

Our paper attempts to investigate the issue of disciplining the banks. Discipline function for the banks may come from the bank internal and bank external. For internal bank discipline, we attempt to investigate the role of ownership on bank risk taking. For external bank discipline, we attempt to investigate whether the market –defined in this paper as depositors– disciplines the banks.

Bank internal discipline covers various mechanisms such as the role board of commissioners (Pathan, 2009) and the role of organization form (Esty, 1997). In this paper, we focus on the role of ownership for following reason. Indonesian banking authority (Indonesian Central Bank) pays close attention to bank ownership. The Central Bank issues several regulations related to bank ownership. For example, on May 19, 2003, Bank Indonesia (BI) issued a risk management framework (PBI No. 5/8/PBI/2003) for commercial banks. In regards to corporate governance, BI also issued a governance framework as of January 2006 (Rule No. 8/4/PBI/2006). This framework regulates the independencies and transparencies of board of commissioners and directors, committees, obedience function, portfolio allocations, interests conflict management, and the self-evaluation of corporate governance. On August 2006, BI issued the Single Presence Policy (SPP) in order to enhance bank governance through ownership consolidation. In the most recent rules (Rule number 12/23/PBI/2010), dated on December 29, 2010, Indonesian Central Bank requires that a bank declare its key stockholders. This stockholder signs agreement with Indonesian Central Bank to take ultimate responsibility for the bank. The Central Bank seems to

believe that bank ownership is an important component for bank soundness.

We investigate bank ownership along two ownership dimensions: types of ownership and ownership concentration. Bank ownership covers various types of ownership such as domestic, foreign, state, and private ownerships. The effect of various types of ownership on bank risk taking is still controversial. Demirguc-Kunt & Huizinga (2000) argue that foreign ownership in banks opens up more access to international market and improves profitability and prudential bank behaviour. However, Weller (2000) argues differently. He shows that foreign bank ownership has destabilizing effect because foreign banks finance riskier projects in foreign countries. Claessen *et al.* (2002) argue that foreign banks in developing countries produce higher interest margin than domestic banks, since foreign banks finance riskier projects.

Similar to foreign ownership role, domestic ownership does not guarantee prudential bank behaviour. When deposit insurance exists, domestic ownership may induce moral hazard at the expense of Deposit Insurance Corporation. Gunarsih (2002) finds that, in developing countries, domestic ownership represents their own interest at the expense of minority stockholders. Domestic ownership increases risks. This finding is consistent with La Porta *et al.* (2003), who find that banks controlled by domestic ownership tend to place loans in related companies, making the loans are less efficient and increasing the risks. In similar fashion, Taboada (2008) also finds that domestic ownership is associated with poor performance. Ownership changes from government to private investors decrease asset quality and profitability. We believe that the controversy over the role of foreign and domestic investors boils down to the need for empirical test of the effect of foreign and domestic ownership in Indonesian banking.

The effect of bank ownership concentration on bank risk taking remains unclear.

Demsetz & Lehn (1985) argue that ownership concentration tends to limit diversification and risk tolerance. Higher ownership concentration increases moral hazard problem for stockholders when deposit insurance exists and when bank charter value is low. High ownership concentration also increases probability of agency conflict between majority and minority shareholder, and between stockholders and bondholders. Cebonayan *et al.* (1999) argue that majority stockholders may maximize their benefits, such as investing in risky projects, at the expense of depositors. On the other side, majority stockholders may force the managers to take prudential behaviour. This situation occurs when bank charter value is high. Several authors argue that ownership concentrations provide benefits for the banks. For example, Aghion & Tirole (1997) show that ownership concentration may improve monitoring to managers, and may improve prudential bank behaviour.

We also consider the role of deposit insurance, charter value, and bank compliance to regulation, in bank risk taking behaviour. Deposit insurance may weaken market discipline since monitoring function to the bank is partially transferred to the deposit insurance. This situation is exacerbated when a country applies implicit (full) guarantee and flat insurance premium. Flat deposit insurance premium does not differentiate between healthy and risky banks. This condition may increase moral hazard by bank stockholders, and less prudent or disciplining behaviour from depositors. Indonesia is especially suitable to investigate the effect of implicit guarantee on bank risk taking. Indonesia changed from implicit guarantee to limited guarantee under the Indonesian Deposit Insurance Corporation in mid of year 2000. Thus Indonesian experience provides natural experiment of the changes in guarantee scheme on bank risk taking behaviour.

Compliance to regulation may increase or decrease bank risk taking. The compliance

may increase bank risk taking, since the bank will invest in riskier projects to compensate a loss in utility as a result of compliance to regulation (Koehn & Santomero, 1980). However, Calem & Robb (1999) argue that compliance may lead the banks to diversify and reduce bank risks.

We also consider bank charter value. Charter value reflects market value for the bank. We believe that charter value affects bank risk taking in the framework of agency theory. Stockholders of banks with high charter value basically hold more valuable asset, and vice versa. Since stockholders of banks with low charter value hold less valuable asset, the incentive for the stockholders to transfer risk to bondholders increases. Thus, banks with low charter value tend to increase bank risk taking, resulting in lower bank value. Keeley (1990) and Brewer & Strahan (1996) find negative relationship between charter value and bank risk. However, both papers do not investigate joint effect of ownership and charter value on bank risk taking. We believe that investigating the effect of ownership and charter value jointly is important. Low charter value may exacerbate the effect of ownership on bank risk taking.

We find that domestic, foreign, and private ownership increase bank risk. Ownership concentration increases bank risk, while bank charter value and compliance to regulation have negative effect on bank risk. Next, when we investigate market discipline, we find that market disciplines Indonesian bank. Depositors charge higher interest rate to and withdraw deposit from banks with high risk. Market discipline holds either in periods of implicit guarantee and explicit guarantee. This result is comforting, since market seems to play disciplinary role in any periods. On the other hand, this result may suggest that deposit guarantee programs are not credible enough. We organize our paper as follows. In the next section, we discuss relevant literature in agency conflict and market discipline for

banks. Section 3 discusses research methodology, while section 4 discusses empirical findings. Last section concludes.

AGENCY THEORY AND MARKET DISCIPLINE

1. Agency Theory and Monitoring To the Banks

Monitoring to the banks can be explained using agency theory. Agency theory states that source of agency conflict is information asymmetry between various parties, such as between principal and agent. In that situation, principal could not effectively monitor the agent. As a result, principals do not receive fair treatment from the agent. Information asymmetry can be extended into various agency relationship, such as agency conflict between shareholders and bondholders or depositors in the case of banks, between banks and debtors, and between shareholders and regulator. The information asymmetry will be exaggerated in weak regulatory environment, weak bank loan officer and weak bank risk assessment (Hahm & Miskhin, 2000), and the absence of independent rating agency (Marciano, 2008).

Agency conflict may result in either entrenchment argument or convergence argument. In convergence argument, shareholders control managers to act in accordance with shareholders' interest. The larger the ownership percentage, or the more concentrated of the ownership, the powerful the monitoring of the shareholders to the managers. As a result, agency conflict can be reduced (Dodd & Warner, 1983). Convergence argument leads to bank control hypothesis (Demsetz *et al.* 1997), in which shareholders control managers to reduce bank risk.

Opposite to convergence argument is entrenchment argument. This argument states that large ownerships tend to abuse their power to maximize their own benefits at the expense of minority shareholders, depositors,

or Deposit Insurance Corporation (Stulz, 1988). This action of shareholders is called moral hazard or wealth transfer hypothesis (Anderson & Fraser, 2000). Demsetz *et al.* (1997) argue that the shareholders' incentive to converge or entrench is affected by bank charter value². In other words, charter value affects shareholders' incentive for taking risk. As argued before, the lower bank charter value, the less valuable the banks, the higher the incentive for shareholders to transfer risk to other parties, resulting in higher risk taking. Keeley (1990) finds negative relationship between charter value and bank risk. Similarly, Brewer & Strahan (1996) find negative relationship between charter value and bank risk. However, these authors do not investigate the role of ownership in the relationship between charter value and bank risk. We believe that the role of ownership is important. Investigating this issue can be expected to provide insight on the complex relationship between charter value and bank risk taking. Ownership may increase or decrease the effect of charter value of bank risk. Thus, in banks with low charter value, large ownership has higher incentive to take higher risk, since large ownership possesses larger control over the banks.

2. Agency Conflict of Debt, Market Discipline, and Representativeness Argument

Agency conflict of debt in bank context is large, since banks operate under very high leverage. On one side, this situation increases incentive to transfer risk from shareholders to other parties increases, but on the other side, this situation creates incentives to monitor banks by other parties. Depositors, bondholders, Deposit Insurance Corporation have incentive to monitor banks. Thus market disci-

² Anderson & Fraser (2000) argue that charter value is identical to bank health or bank future prospect as a result of bank ability to protect market share, reputation, economies of scale, and efficiency.

pline emerges in this situation³, in which market refers to the stakeholders of the banks (Berger, 1991). If banks engage in higher risk taking, depositors penalize banks using several measures, such as increasing required interest rate or withdrawing depositor's fund. Effective market discipline can be expected to create healthy banking environment. Aside from bank regulator, market discipline provides an important role in creating healthy banking environment.

Market discipline does not always work well. For example, in a situation where third party protect depositors' fund, such as Deposit Insurance Corporation, depositors' sensitivity to bank risks may decrease. Weaker market discipline may drive bank stockholders to transfer their risk to depositors and Deposit Insurance Corporation. Demsetz & Saldenber (1997) call this situation as moral hazard of the banks to the depositors and Deposit Insurance Corporation. Cebenoyan *et al.* (1999) call this situation as wealth transfer hypothesis. If deposit protection applied partially such as in explicit guarantee system, market can still be expected to exercise its monitoring to the banks. Demirguc-Kunt & Huizinga (2003) and Demirguc-Kunt *et al.* (2008) argue that the larger the level of fund protection, the weaker the market discipline, and vice versa. If the level of fund protection is lower, then only less fund will be protected by Deposit Insurance Corporation. The incentive to monitor the banks increases, since the depositors' stake in the banks is higher.

Effective market discipline can be expected to reduce the role of regulator in bank monitoring. If market discipline is weak, the role of regulator increases. Prowse (1997) argues that the strongest bank monitoring comes from regulation. Koehn & Santomero, (1980) argue that compliance to regulation may have negative impact on bank risk. Thakor (1996),

Passmore & Sharpe (1994) argue that compliance to regulation forces banks to shift loan portfolio into securities portfolios which have lower risk. However, compliance to regulation may force the banks to invest in riskier portfolio to obtain higher return as compensation for higher cost from complying with regulation.

Regulator attempts to protect depositors. Depositors generally do not have good access and enough economies of scale to monitor banks. The role of the regulator becomes important. The regulator acts as a representative for depositors. Dewatripont & Tirole (1994) call this argument as representative hypothesis. Compliance to regulation may serve as signals that banks attempt to reduce bank risks. Calem & Robb (1999) argue that compliance to regulation may drive the banks to diversify and reduce risks. Similarly, Furfine (2002) shows that compliance to regulation shifts bank productive portfolio from riskier portfolio to less risky portfolio. Saunders & Cornett (2006) argue that control to the banks involves not only stockholders, but also regulatory control.

RESEARCH METHODOLOGY

1. Data and Sample

We select Indonesian commercial banks that report complete financial statements from year 2002 to 2010. We obtain 821 observations from Indonesian Banking Directory.

2. Variable Definition

Definition for the variables used is as follows. We define domestic investors as percentage of ownership held by domestic investors and similarly for foreign ownership. Ownership concentration is calculated using Herfindhal Index for listed bank ownership. Compliance to regulation, Charter Value, and Bank Risk need more discussion since we measure these variables indirectly.

³ Market discipline of course includes monitoring by public stockholders

We measure compliance to regulation as follows. First, we run regression of the following model:

$$\text{Compliance}(i) = a_0 + a_1 \text{ CAR}(i) + a_2 \text{ Ratio of Liquid Assets to Liquid Liabilities}(i) + a_3 \text{ LDR}(i) + a_4 \text{ Percentage of Loan to Affiliated Parties}(i) + a_5 \text{ Percentage of Loan to Micro and Small Business Enterprises}(i) + e_i \quad (1)$$

Compliance to regulation has value of 1 for Banks that comply to regulation and 0 otherwise. The regulation we consider are minimum capital adequacy ratio, reserve for bad loans, ratio of liquid assets to liquid liabilities, loan to deposit ratio, maximum loans allocated to affiliated parties, maximum loans allocated to one party (to measure loan concentration), minimum percentage of loans allocated to small business. If banks meet all requirements set by central banks on these regulations, then we include them as banks that comply with regulation, and give them value of 1 for compliance to regulation. If the banks do not meet in at least one of these regulations, we assign value of 0 for these banks. We then calculate compliance score (predicted dependent variable) with the set of regression coefficients we obtain in equation (1). Compliance score can be interpreted as a capacity to comply with regulation given banks' fundamental characteristics.

For charter value, we perform similar technique. Specifically, we perform the following regression for all Banks in our sample (Keeley, 1990; and Demsetz *et al.* 1997):

$$\text{Market to Book Value}(i) = a_0 + a_1 \text{ Loan to Total Asset}(i) + a_2 \text{ Ratio of Total Deposit to Total Liabilities}(i) + a_3 \text{ Ratio of Operational Cost to Operational Revenue}(i) + a_4 \text{ Natural Log of Total Assets}(i) + e_i \quad (2)$$

We then calculate predicted dependent variable (market to book value) given regression

coefficients we obtain. We can interpret the score we obtain as banks potential value given their fundamental characteristics.

Finally, for the bank risk, we perform factor analysis to the set of banks' fundamentals: non performing loan, equity to total asset, investment on securities to total loan, and off balance sheet risk (Knop & Teal, 1996; Hao, 2003; Agrawal *et al.* 2000; Deng & Jia, 2007). The loading factor obtained is used as a measure for bank risk.

EMPIRICAL RESULTS

1. The Effect of Ownership, Charter Value, and Compliance to Regulation on Bank Risk

Table 1 summarize determinants of bank risk. All variables, except for total asset, show significant results, and the signs are consistent with the expectation.

The finding for domestic ownership shows that the domestic ownership tends to increase risk taking. This result is consistent with Stulz (1988) and Taboada (2008). Stulz (1988) shows that domestic ownership is positively associated with poor performance. La Porta *et al.* (2003) show that banks controlled by domestic owners tend to provide loans to affiliated companies, reducing bank efficiency and increasing bank risk. Entrenchment argument explains domestic ownership behaviour in bank risk taking.

Interestingly, foreign ownership also shows similar result. Foreign ownership increases bank risk. This finding is consistent with Weller (2000) and Demircuc-Kunt & Huizinga (2003), who show that foreign ownership has destabilizing effect since the banks allocate loans to riskier projects. Foreign banks, using their international network, finance the projects with fund obtained from other countries. Claessen *et al.* (2001) argue that foreign banks in developing countries produce higher interest margin than domestic banks. This pattern seems to indicate

that foreign banks place their loan in riskier projects. Similar to domestic ownership, entrenchment argument seems to explain foreign ownership behaviour.

Table 1. The Effect of Domestic, Private, Ownership Concentration, Charter Value, and Compliance to Regulation on Bank Risk

We perform regression on the following model: $Risk(i) = a_0 + a_1 \text{ Domestic Ownership}(i) + a_2 \text{ Foreign Ownership} + a_3 \text{ Ownership Concentration}(i) + a_4 \text{ Compliance to Regulation}(i) + a_5 \text{ Charter Value}(i) + a_6 \text{ Natural Log of Total Asset}(i) + e_i$. Risk is composite risk variables obtained from factor analysis. Domestic Ownership is calculated as percentage of ownership by domestic investors, Foreign Ownership is calculate as percentage of ownership by foreign investors, Ownership Concentration is calculated using Herfindhal Index of Ownership Percentage. Compliance to Regulation, Charter Value, and Risk are calculated using techniques explained in the text. T-values are in parenthesis. *** denotes significance at 1%. ** denotes significance at 5%.

Variables	Regression Coefficients
Intercept	-0.036 (8.923)
Domestic Ownership	0.698 *** (8.923)
Foreign Ownership	1.355 *** (13.656)
Ownership Concentration	0.673 *** (5.689)
Compliance to Regulation	-0.402 ** (-2.077)
Charter Value	-0.334 *** (-5.408)
Natural Log of Total Asset	-0.022 (-1.246)
R-square	0.324
Adjusted R-Square	0.319
F-value	64.920 ***

The positive coefficient for ownership concentration suggests that behaviour of concentrated ownership is consistent with entrenchment theory. Concentrated ownership seems to expropriate minority shareholders; they gain their own benefits at the expense of other shareholders' interests. Put differently, majority shareholders engage in moral hazard, instead of controlling the banks. This action is harmful to minority shareholders (DeAngelo & DeAngelo, 1995). Our finding is not consistent with Aghion & Tirole (1997), who argue that ownership concentration results in active monitoring and control for managers to behave prudentially, by taking low risk activities. Our finding is more consistent with Cebonayan *et al.* (1999), who find that majority shareholders maximize their own benefits by increasing leverage, and place the fund in riskier assets, at the expense of depositors and Federal Deposit Insurance Corporation.

Table 1 shows that compliance to regulation reduces bank risk. Our finding is not consistent with Koehn & Santomero (1980), but our finding is consistent with Thakor (1996), Passmoe & Sharpe (1994). Compliance to regulation drives the banks to shift their investment from loans to securities with low risk. Calem & Robb (1999) and Furfine (2002) show that compliance to regulation shifts banks' portfolio of productive assets. Banks reduce loan portfolio and increase low risk assets. Bank asset quality increases as a result. Thus, compliance to regulation decreases bank risk.

Our negative coefficient for charter value is consistent with Keeley (1990), Demsetz *et al.* (1997), and Cebenoyan *et al.* (2000). Low charter value drives the banks to increase risks at the expense of depositors and deposit insurance corporation, resulting in wealth transfer to the shareholders.

2. Does Market Discipline Banks? Is Market Discipline Different in Implicit and Explicit Guarantee Systems?

This section investigates whether market disciplines the banks. Table 2 summarizes the results whether market disciplines the banks. Table 3 summarize the results whether market discipline differs in different deposit guarantee systems.

We predict positive regression coefficient for risk variable in column (2) and negative regression coefficient in column (3). Table 2 shows signs as predicted. These results suggest that depositors discipline bank risk taking. Depositors require higher interest rate for riskier banks. Depositors also withdraw their deposits from riskier banks.

We proceed further to investigate whether market discipline is different between implicit and explicit deposit guarantee systems. In 2005, Indonesian regulatory authority introduced deposit insurance corporation to replace implicit deposit guarantee. Under the old system, government guarantees 100% of depositors' fund. Under the new system, deposit insurance corporation guarantees up to Rp100 million (one hundred million Rupiah) of depositors' fund. We expect regression coefficient for variable Risk in explicit guarantee system to be stronger than in implicit guarantee system. Under new regulation, depositors will be more careful in investigating banks fundamental, hence they will be more sensitive to bank risk.

Table 2. Market Discipline

This table shows regression coefficients from the following model: Interest(i) = a0 + a1 Risk(i) + ei, in column (2), and Changes in Deposit Fund (i) = a0 + a1 Risk(i) + ei, in column (3). Risk is taken from loading factor from factor analysis of various risk variables: Non Performing Loan, Equity to Total Asset, Investment on Securities to Total Loan, and Off Balance Sheet Risk, as explained in the text. Changes in Deposits are calculated as (Dep(t) – Dep(t-1)/Dep(t-1)). Interest is calculated as interest expense divided by total depositor at period t. T-values are in parenthesis. *** denotes significance at 1%. ** denotes significance at 5%.

(1) Variable	(2) Dependent Variable: Interest	(3) Dependent Variable: Changes in Depositors' Fund
Intercept	0.106 *** (4.189)	0.144 * (1.674)
Risk	0.007 (2.053) **	-0.051 *** (-4.246)
Ln of Asset	-0.002 (-1.218)	0.002 (0.404)
R-square	0.007	0.022
Adjusted R-square	0.005	0.020
F-value	2.958*	9.184***

Table 3. Market Discipline in Implicit, Explicit Guarantee Systems, and All Periods

This table shows regression coefficients from the following model: Changes in Deposit Fund (i) = $a_0 + a_1 \text{Risk}(i) + a_2 \text{Ln Asset}(i) + e_i$. Risk is taken from loading factor from factor analysis of various risk variables: Non Performing Loan, Equity to Total Asset, Investment on Securities to Total Loan, and Off Balance Sheet Risk, as explained in the text. Changes in Deposits are calculated as $(\text{Dep}(t) - \text{Dep}(t-1))/\text{Dep}(t-1)$. Implicit period is a period where government guarantees 100% of all deposits. Explicit period is a period when government introduces Deposit Insurance Corporation that guarantee depositors fund up to Rp100 million. The corporation is established in 2005. All periods cover both implicit and explicit periods. T-values are in parenthesis. *** denotes significance at 1%. ** denotes significance at 5%.

(1) Variable	(2) All Periods	(3) Implicit Period	(4) Explicit Period
Intercept	0.144 (1.674)	0.185 (1.609)	0.112 (0.650)
Risk	-0.051 *** (-4.246)	-0.040 (-2.751)	-0.089 (-2.740)
Ln of Asset	0.002 (0.404)	0.001 (0.07)	0.003 (0.287)
R ²	0.022	0.015	0.025
Adjusted R ²	0.020	0.011	0.018
F-value	9.184***	3.785**	3.923**

Table 3 shows that regression coefficients for risk are negative and significant in both periods. This result suggests that depositors discipline bank risk taking in both periods. Casual observation shows that regression coefficient for risk in explicit period is higher than that in implicit period. Depositors seem to be more sensitive in explicit period than in implicit period. Depositors seem to be more cautious in explicit period as expected. We further test differences in the regression coefficients using Chow test. The Chow statistic follows F distribution with degree of freedom k and (n_1+n_2-2k) for nominator and denominator respectively. The Chow value for the table above is 2.99 which is lower than the table value. There is no significant difference between regression coefficient in the implicit and explicit periods. Market discipline banks in both implicit and explicit periods at the same degree.

Our finding is not consistent with Demirguc-Kunt & Huizinga (2003) and Demirguc-Kunt *et al.* (2008). They show that the larger the value of depositors' protection, the lower

the market discipline, and vice versa. Depositors always have incentive to monitor banks in our finding. Depositors' behaviour is consistent across different depositor insurance systems. The good news from our finding is that depositors always monitor banks in all systems. The bad news is that this result may suggest that the explicit system may not credible enough. Depositors have incentive to monitor the banks even in the explicit guarantee system.

CONCLUSION

We conclude this paper by first summarizing our findings. In first part of our paper, we find that domestic as well as foreign ownership have positive impact on bank risks. Foreign and domestic investors seem to follow moral hazard and entrenchment behaviour, rather than reducing bank risk. Furthermore, ownership concentration also has positive impact on bank risks. Charter value has negative impact on bank risk, suggesting that in more valuable banks, stockholders take less risky behaviour, resulting in higher value. Bank

compliance to regulation has negative effect on bank risks. Banks that comply with regulation tend engage in less risky behaviour. In second part of our paper, we find that market disciplines bank risk taking. Depositors require higher interest rate in riskier banks. Depositors also withdraw their fund at faster rate in riskier banks. When we investigate further into different deposit guarantee regimes, we find that market discipline banks at same degree in explicit and implicit guarantee systems.

Our paper shows that bank ownership affect bank risk taking. Hence, extensive Central Bank policy on bank ownership seems to be justified. Charter value has negative effect on bank risk. Regulator should pay extra attention to banks with lower value. In this situation, the incentive to shift the risk from shareholders to depositors seems to increase. Our paper also shows that market disciplines banks. This finding is important since the burden of regulator in monitoring the banks can be alleviated with the presence of market discipline. It seems important to have market that is always aware of bank risk taking and penalize unhealthy banks. Our puzzling result is that market discipline banks in both explicit and implicit periods. However, this result may reveal further research potential. The source of indifference merits further investigation. Depositors consist of various types, such as small and large, institutions and individuals. The various types of depositors may have different behaviour, thus the disciplining behaviour of the various types of depositors may be different. We believe that this issue warrants further investigation.

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