Blanket guarantee, deposit insurance, and risk-shifting incentive: evidence from Indonesia

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Blanket Guarantee, Deposit Insurance, and Risk-shifting Incentive: Evidence from Indonesia

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Abstract

Indonesia established a deposit insurance system to maintain stability in its banking sector after the abolishment of blanket guarantees in 2005. Since the insurance premiums are fixed and flat, deposit insurance may create an incentive for banks to take more risks and transfer the risks to the deposit insurer. Using an option pricing based model of deposit insurance, we compute the fair deposit insurance premiums for all banks listed on the Indonesian stock exchange. We find evidence that banks shifted their risks to the deposit insurer. The magnitude of risk-shifting incentives under the deposit insurance regime is higher than under the blanket guarantee regime, as Indonesian depositors seem to lack awareness in monitoring bank performance.

Keywords: *Deposit Insurance, Fair Premium, Option-based Pricing, Moral Hazard, Indonesia*

1. Introduction

During a financial crisis, the government is often forced to bail out financial institutions to avoid further economic destruction. One of the common bailout scenarios during financial market turmoil is to guarantee bank deposits with blanket guarantees or to increase the deposit insurance cap.

In the 1997/1998 financial crisis, the Indonesian government provided a blanket guarantee for bank deposits to prevent further deposit runs which began after the liquidation of 16 private banks. In the 2008 global financial crisis, the government decided to increase the deposit insurance cap per depositor per bank from 100 million rupiah to 2 billion rupiah without any change to premium rates after some neighbor countries announced blanket guarantees. The 2 billion rupiah cap has prevailed to the present.[1]

Blanket guarantees, or more generous deposit protections, during crisis are aimed to revive public confidence in the banking sector. Diamond and Dibvig (1983) argue that low confidence about a specific bank's condition during a crisis, combined with the first-come-first-serve nature of demand deposits, which implies that depositors want to obtain their funds before bank liquidity runs dry, could lead depositors to panic and massively withdraw their deposits. If a series of bank runs happen, liquidity in the banking system could be drained and the whole financial system could collapse.

Even though blanket guarantees and deposit insurance could effectively revive depositor confidence, moral hazard problems can arise. Since protections and premium rates are the same regardless of the financial health or management behavior of each bank, there is an incentive for banks to take more risk to increase the value of the deposit protection to the banks, even though such action can increase banks default probabilities. More generous deposit protection will create bigger incentives for banks to shift their risks to the guarantor/insurer. This is similar to the classic moral hazard problem in the insurance market due to asymmetric information.

The moral hazard problem in the deposit insurance/guarantee system with uniform premium rates is well understood by policy makers. The Basel Committee on Banking Supervision (BCFS) and the International Association of Deposit Insurers (IADI) in June 2009 issued *Core Principles for Effective Deposit Insurance System* which placed "mitigating moral hazard" as the second principle after the establishment of policy objectives. A deposit insurance system should avoid installing

[1] In the end of October 2008, $ 1 USD was equal to 10,869.6 rupiah. Therefore, 100 million rupiah is $ 9,200 USD and 2 billion rupiah is equal to $ 184,000 USD.

features that can promote moral hazard in the banking system. However, most deposit insurers, including the insurer in Indonesia, still apply a flat deposit insurance premium which indirectly induces irresponsible bank behavior.

The theoretical literature clearly suggests that fixed rate deposit insurance can induce moral hazard in the banking sector. However, empirical studies show mixed results regarding the relation between deposits insurance and bank risk shifting incentives.

There are several empirical studies that support the theory. Duan, Moreau, and Sealey (1992), and Grossman (1992) argue that the establishment of deposit insurance in the U.S. led to bank risk-shifting behavior. Demirguc-Kunt and Detragiache (2000), using panel data from 61 countries for 1980-97, argue that deposit insurance increases bank risk-taking incentives and consequently increases the likelihood of a banking crisis. Wagster (2007) finds that establishing explicit deposit insurance increased risk-shifting incentives for Canadian banks and trust companies. Guizani and Watanabe (2010) confirm that banks insured by the deposit insurance in Japan are engaged in risk-shifting. However, public recapitalization and implementation of tougher bank regulations after the establishment of deposit insurance in Japan could prevent an acceleration of risk-shifting. They also find that the deposit insurance premium is much lower than a fair premium. [2]

However, several studies argue against the theory. Gropp and Vesala (2004) study bank behavior in the European Union area. They find that deposit insurance can reduce bank incentives to take excessive risk because unguaranteed deposit owners will monitor banks more closely. Without the introduction of a deposit insurance system, depositors tend to assume that governments will assist any bank which experiences liquidity problems (implicit guarantee). Therefore, there is no incentive for depositors to actively monitor their bank performance. As well, Karels and McClatchey (1999) find that the establishment of deposit insurance in the U.S. credit union industry did not lead to increased risk-taking behavior. Gueyie and Lai (2001) argue that the establishment of official deposit insurance in Canada did not provide more incentives for banks to conduct risk-shifting.

Another potential problem in the existing mandatory deposit insurance system is that the risk profile of the premium rate is flatter than the risk profile of the actuarially fair premium rate[3]. As a result, deposit insurers could not compensate all deposits when a major bank or some banks are liquidated.

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[2] Oda (1999) also find that the fair premium is much higher than the official deposit insurance premium in Japan.

[3] Fair premium rate is a premium rate which allows an insurance company to reach a break-event point.

It leads to the creation of a contingent liability in the government budget. In this case, governments will be forced to help deposit insurers, which require an indirect bail out of financial institutions.

In this paper, we find evidence that Indonesian banks shifted their risks to the deposit insurer. The magnitude of risk-shifting incentives under the deposit insurance regime is higher than under the blanket guarantee regime, as Indonesian depositors seem to lack awareness in monitoring bank performance. We also find that Indonesian deposit insurance premiums are much lower than the fair premiums.

2. Blanket Guarantee and Deposit Insurance in Indonesia

The 1997 Asian financial crisis began in early July 1997 in Thailand with rapid depreciation of the baht and then spread to neighboring countries, including Indonesia. To prevent further rupiah depreciation, Indonesia asked for assistance from the IMF and officially signed a Letter of Intent (LoI) on October 31, 1997, to conduct stabilizing economic reforms and revive public confidence as an IMF credit condition. One IMF recommendation was to close unhealthy private banks, and the government liquidated 16 banks on November 1st, 1997. At that time, Indonesia did not have any explicit deposit guarantee/insurance system. The bank closings stimulated panic among Indonesian depositors, instigating a massive bank run for almost all banks. [4]

To prevent further deterioration, the government on January 15, 1998, announced the policy to give blanket guarantees to all bank debts, including deposits. The policy effectively calmed the public and stopped bank runs, but the cost was massive. By the end of 1999, the government had issued government bonds valued at 198.3 trillion rupiah (excluding recapitulation cost), about 18 percent of Indonesian GDP, to finance the bailout.

In 2004, the government enacted Law No. 40 regarding the Deposit Insurance Institution. The law obliged the government to establish the Indonesian Deposit Insurance Corporation (IDIC) and terminate the existing blanket guarantee. IDIC is an independent institution operating directly under the president's office. In September 2005, the IDIC officially began operations and the blanket guarantee was terminated.

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[4] Before the crisis, the rupiah was stable at around 3,400/dollar. When Thailand's baht rapidly depreciated in July 1997, the rupiah slightly depreciated to 3,531/dollar. At the time the government asked for IMF assistance, the rupiah had depreciated by 44%. A massive bank run together with political turmoil triggered rupiah to continuously depreciate, reaching its lowest rate in June 1998 at 19,840/dollar.

IDIC's initial capital of 4 trillion rupiah came from the government budget. If capital falls below the initial capital, the government should inject further capital into the IDIC. IDIC revenue comes from the premiums of participating banks. According to the law, banks should pay the premium twice a year. The premium rate is fixed at 0.1 percent and is independent of a bank's financial health or performance. The premium is calculated based on the six month average of the balance of deposits held by a bank.

The law set the maximum deposit insured at 100 million rupiah per depositor per bank. The IDIC gradually lowered the ceiling to this level. In the first stage, the IDIC guaranteed all bank deposits. The only difference from the government blanket guarantee is that the IDIC did not guarantee bank debts. The first stage was in effect from September 2005 to March 2006. The second stage was in effect from March to September 2006. In this stage, the maximum amount of deposit insured was 5 billion rupiah per depositor per bank. The third stage was in effect from September 2006 to March 2007. The maximum amount of deposit insured was 1 billion rupiah per depositor per bank. Since March 2007, the IDIC guarantees a maximum 100 million rupiah per depositor per bank.

The 2008 global financial crisis forced some neighboring countries to increase their insurance coverage limit. Australia, Thailand, Hong Kong, Taiwan, and South Korea removed their deposit insurance caps. Singapore and Malaysia moved further by providing blanket guarantees. Indonesia was indirectly affected by these changes because capital could flow from Indonesia to these countries. As a result, the government later increased the deposit insurance cap from 100 million rupiah to 2 billion rupiah in October 2008. To maintain public trust in the national banking system, the government through IDIC bailed out Century Bank, a small bank which collapsed in the middle of the global financial crisis because of management fraud and most likely its condition was not related to the global financial crisis. A summary of the history of the Indonesian deposit insurance/guarantee system is provided in Figure 1.

3. Methodology

We follow the empirical methodology of Duan, Moreau, and Sealey (1992), who calculate risk-adjusted deposit insurance premiums bases on methods developed by Merton (1977), and who value bank assets based on an option pricing method developed by Ronn and Verma (1986).

3.1. Estimate Risk-adjusted Deposit Insurance Premiums

Merton (1977) demonstrates that the flat deposit insurance can be associated with a put option in which the deposit insurer (IDIC) is viewed as the put issuer.

Without any deposit insurance, the amount of money received by depositors at time T when bank is liquidated is:

$$\text{Min } [FV(B_1), V_T(\frac{B_1}{B_1+B_2})] \quad (1)$$

Where FV(.) is future value operator, B_1 is the face value of deposits, B_2 is the face value of other bank debts, and V_T is the value of bank assets at time T. Depositors will get $FV(B_1)$ if the bank is solvent, and will get a proportional share of bank assets $[V_T(\frac{B_1}{B_1+B_2})]$, if not solvent.

If deposits are insured, depositors will be guaranteed to receive $FV(B_1)$ when the bank is liquidated. If the bank is insolvent, the deposit insurer should pay the difference between $FV(B_1)$ and the asset share of insured deposits. The obligation of the deposit insurer can be expressed as:

$$\text{Max } [0, FV(B_1) - V_T(\frac{B_1}{B_1+B_2})] \quad (2)$$

Merton (1977) shows that the value of the insurance premium (IP) can be calculated using the Black-Scholes option pricing formula as the present value of equation (2):

$$IP = B_1 N(y + \sigma_V\sqrt{T}) - \frac{(1-\delta)^n B_1}{B} N(y) \quad (3)$$

Where:

$$y = \frac{\ln\left(\frac{B}{(1-\delta)^n V}\right) - \sigma_V^2 \frac{T}{2}}{\sigma_V . \sqrt{T}};$$

B = $B_1 + B_2$;

σ_V = instantaneous standard deviation of the return on V;

N(.) = cumulative normal distribution function;

δ = dividends per monetary unit of assets;

n = the number of dividend payments per period.

Finally, by scaling down equation (3) with B_1, the premium per dollar of insured deposit, IPP, can be estimated as follows:

$$IPP = N\left(y + \sigma_V\sqrt{T}\right) - \frac{(1-\delta)^n V}{B} N(y) \qquad (4)$$

3.2. Valuing Bank Assets

Calculating IPP requires two variables, V and σ_V, which are not directly observable but can be estimated. Ronn and Verma (1986) estimate them using the Black-Scholes proportion, which says that the equity of a levered firm can be valued as an option on the firm's assets.

Let T be the maturity of bank debt and E_T be the equity value at time T. If the bank is liquidated, the bank's owner will get the difference between the total asset value and debt value, but will get nothing when a bank is undercapitalized. However, usually the bank is not immediately liquidated when its equity is negative. It will be liquidated when the value of its assets is sufficiently smaller than the value of its liabilities (ρB). Mathematically, it can be expressed:

$$E_T = max\,[0, V_T - FV(\rho B)] \qquad (5)$$

Using the Black-Scholes option pricing formula, the present value of equation (5) can be expressed as:

$$E = VN(x) - \rho BN(x - \sigma_V\sqrt{T}) \qquad (6)$$

Where:

$$x = \frac{\ln\left(\frac{V}{\rho B}\right) + \sigma_V^2 \frac{T}{2}}{\sigma_V\sqrt{T}}$$

According to Ito's lemma, the following equation holds:

$$\sigma_E = \frac{VN(x)\sigma_V}{E} \qquad (7)$$

Where σ_E is the instantaneous standard deviation of the return on E. Finally, equation (6) and (7) together can be combined to estimate V and σ_V.

3.3. Regression Model

We modify regression equations developed by Duan, Moreau, and Sealey (1992) to control the effect of other exogenous variables:

$$\frac{B_{ij}}{V_{ij}} = \alpha_1 + \beta_1 \sigma_{Vij} + \theta_k X_{ij} + \varepsilon_{ij} \qquad (8)$$

$$IPP = \alpha_2 + \beta_2 \sigma_{Vij} + \theta_l X_{ij} + \varepsilon_{ij} \qquad (9)$$

Where i represents banks, j represents time, ε represents the error term, and X represents control variables.

We are interested to analyze coefficients $\beta_1$and β_2, which can be interpreted as:

$$\beta_1 = \frac{d(B/V)}{d\sigma_V} \text{ and } \beta_2 = \frac{dIPP}{d\sigma_V} = \frac{\partial IPP}{\partial \sigma_V} + \frac{\partial IPP}{\partial (B/V)} \beta_1$$

If β_1 is positive, increasing asset risk does not restrain banks from increasing leverage, and if β_2 is positive, banks have a risk-shifting incentive.

To observe bank behaviors under different regimes, we modify Equation (8) and (9):

$$\frac{B_{ij}}{V_{ij}} = \alpha_1 + \beta_1 \sigma_{Vij} + \gamma_{t-1} D_{ij} \sigma_{Vij} + \theta_k X_{ij} + \varepsilon_{ij} \qquad (10)$$

$$IPP = \alpha_2 + \beta_2 \sigma_{Vij} + \vartheta_{t-1} D_{ij} \sigma_{Vij} + \theta_l X_{ij} + \varepsilon_{ij} \qquad (11)$$

In which D are dummy variables for regime.

4. Data and Parameters

We use semiannual data for all banks listed on the Indonesian stock exchange (IDX) in 2010 and listed for more than 2 years by mid-2010. The observed period is from 2000 to mid-2010.

Banks assets, debts, equities, dividends, and market capitalizations are extracted from bank financial reports. Annual financial reports are collected from the Indonesian Capital Market Directory (ICMD) and semiannual financial reports are collected from Bank Indonesia. Market capitalization does not appear in the semiannual financial report; we estimate it by multiplying market capitalization at year end by the ratio of adjusted stock price at the end of June to adjusted stock price at year end. Meanwhile, data for bank deposit account composition is collected from the IDIC's annual reports and the IDIC's monthly deposit account reports.

Daily bank stock price and Indonesian composite index are collected from Yahoo Finance. Yahoo Finance only reports the historical data for banks which are currently listed in the stock exchange. As a result, we cannot obtain data for closed banks or pre-merger individual bank data.

Finally after dropping incomplete observations, we have 346 observations from 29 banks. By 2010, Indonesia has 122 general banks. Our sample represents 23.8 percent of the total number of banks. However, banks in our data set have total assets of 1,862 trillion rupiah at the end of 2009, or 73.5 percent of total Indonesian commercial bank assets.

To estimate the market value of assets, we must assign values to three parameters: T, ρ, and n. Following previous literature (Ronn & Verma, 1986; Duan, Moreaue, & Sealey, 1992; Guizani & Watanabe, 2010), we set T to be one year and ρ to be 0.97. Since we use semiannual data and banks only pay dividends once within six months, we set n to be 1.

5. Results

5.1. Qualitative analysis

Table 1 provides summary statistics. According to the book value, Indonesian banks are relatively healthy because the value of assets is sufficiently higher than the amount of debts. Banks seemingly prefer not to pay dividends very often as the dividend payoff ratio is only about 0.02 percent on average. This policy is regarded as appropriate to strengthen bank capital and increase room for expanding the bank's business. The market value of the equity on average is about three times the book value of equity. Thus, financial markets are strongly confident about current bank financial conditions and future performance. However, the bank inherent risk is considered higher than overall economic risk, which can be observed from the larger instantaneous standard deviation of bank stock returns compare to stock market returns.

Table 2 provides a summary of the estimated variables. On average, the market value of assets (V) is slightly higher than the book value of assets. The leverage ratio based on market value of assets (D/V) is 1.36, on average, which is very high. This is because a few troubled banks have a very low market value of assets which will drive up the leverage ratio. The median value for the leverage ratio is 0.9, which is essentially the same as average and median leverage ratios based on book value.

Figure 2 shows leverage ratio trends based on both book and market values, which are aggregated in each period by the market value of assets. The leverage ratio based on market value is more volatile than that based on book value, since most assets are recorded based on their historical prices and cannot be adjusted by current prices. The leverage ratio based on book value is mostly higher than the leverage ratio based on market value, meaning that the market prices bank goodwill.

The mean of the estimated instantaneous standard deviation of asset market value (σ_V) is 0.47, which is lower than the instantaneous standard deviation of equity market value, but higher than instantaneous standard deviation of stock market returns. Risk on bank assets is considered lower than risk on bank equity, but higher than the risk of the market.

The mean of IPP is very high at 13 percent which is driven up by the IPP of some troubled banks. However, IPP has a moderate median value of 2.7 percent.

Figure 3 shows IPP aggregated each period using market value and book value of assets as a weight. Until 2004, the IPP aggregated using the market value of assets as a weight is much more volatile than the IPP aggregated using the book value of assets as a weight. After 2004, the two measures are almost the same, showing that market valuations are closer to company records. Under market efficiency, the close valuation can indicate improvement in the quality of banks disclosures. IPP spikes dramatically in 2004 from two factors. First, massive redemptions on Indonesian mutual funds in 2004 affected bank performance and financial market conditions. Second, a general election in Indonesia provided the first direct voting for the President and House of Representatives. The election process lasted for almost a year, increasing the business risk in Indonesia. An increasing IPP can also be observed in 2009, when Indonesia held a general election. In the middle of global financial crisis in 2008, IPP was decreasing. The reason is that Indonesian banks had no direct exposure to U.S. toxic assets and the Indonesian economy was relatively resilient from the global financial crisis. Banks may also have been restrained from investing in risky assets during the financial crisis, which indirectly decreased insolvency risk.

Figure 4 shows the trends of adjusted IPP and IDIC premiums. Adjusted IPP is the fair insurance premium to insure deposits below the insured deposit cap. Adjusted IPP is calculated to capture the change of deposit insurance cap by multiplying IPP by the ratio of insured deposits to total deposits. Until June 2008, IPP experienced a declining trend due to the gradual decrease in the insured cap and/or IPP. However, adjusted IPP began to increase in December 2008 because the government increased the insured cap from Rp.100 million to Rp.2 billion per account. The increase of adjusted IPP is partially also caused by increasing IPP itself.

Adjusted IPP is much higher than the IDIC premium, such that the government and IDIC subsidize banks indirectly. The government will have a contingent liability on IDIC, because IDIC cannot handle the collapse of any major banks. Such a situation could be prevented from the beginning if the IDIC could charge premiums at the fair rate. However, it seems implausible since the fair insurance rate is still too high. A more realistic approach is to strengthen regulations and enforcement to reduce overall bank risks. Previous literature (Guizani & Watanabe, 2010, etc) shows that strong regulation and monitoring also can restrain banks from risky behavior and lead to the reduction of the IPP.

On the depositor side, theoretically, there is an incentive for depositors to move their money to safer instruments. When a bank's IPP increases or the government reduces the insurance cap, depositors will divide their accounts to keep all accounts below the insurance cap.

However, Indonesian depositors seemingly did not respond to the change in the IPP or insured caps. Table 3 shows the composition of bank deposit accounts based on account values. Over time, composition of the number and value of accounts is almost constant, even though the government made drastic changes repeatedly. We believe this is connected with the common belief in Indonesia that all banks and bank deposits are safe. The majority of Indonesians believe there is no need to divide accounts to be eligible for complete deposit insurance.

5.2. Regression result

Table 4, columns 2 and 4, provide baseline regressions for a leverage ratio test with random effect and fixed effect FGLS regressions. Both provide almost the same results.

In this regression, we test that bank leverage is not constrained by asset risks. The coefficient β_1 in the baseline regression is positive at the 1 percent significance level, implying that an increase in asset risk does not restrain Indonesian banks from increasing their leverage.

The coefficient sign and significance level do not change even after we control for market risk, bank size, and a time trend. We use the instantaneous standard deviation of the Indonesian stock exchange as the proxy for market risk and the book value of assets as the proxy for bank size. Column 3 and 5 in Table 4 provide regression results with the controlling variables. Market risk and bank size are not statistically significant. Leverage ratios are not different across bank size, such that small banks and major banks have no difference in their financing structure. Meanwhile, the market trend coefficient is negative at the 5 percent significance level. Bank leverage is decreasing over time. Decreasing leverage will strengthen bank capital and make Indonesian banks healthier.

Table 5, columns 2 and 4, provide a baseline regression for the risk-shifting incentive test with random effect and fixed effect FGLS regressions, respectively. The coefficient for β_1 in the two regressions is positive and statistically significant at the 1 percent level, meaning that banks experience risk-shifting incentives. Banks try to maximize profits by investing in the riskier assets and shifting the risk to the deposit insurer.

Columns 3 and 5 show the regression results after controlling for market risk, bank size, and a time trend. The result does not change, and these additional variables are not statistically significant.

Table 6 shows a leverage constraint test for different regimes. We run same regression as in Table 5, but we also add the interaction between σ_V and an indicator variable for whether a blanket guarantee is in effect.

The coefficient γ, which captures the interaction, has a positive value, but it is not statistically significant. Meanwhile, β_1 provides the same result as before. Asset risk constrains bank leverage by about the same level in both regimes the blanket guarantee and the deposit insurance regimes. The result does not change even after we control for market risk, bank size, and a time trend.

Table 7 provides regression results for testing risk-shifting incentives in the blanket guarantee and deposit insurance regimes. The coefficient γ, which captures the interaction between a regime dummy and σ_V, has a negative value and is statistically significant at 1 percent. This means the risk-shifting incentive in the blanket guarantee regime is less than the risk-shifting incentive in the deposit insurance regime. This result is not consistent with previous studies. Guizani and Watanabe (2010) find that the magnitude of risk shifting incentives is about the same in the blanket guarantee regime and the deposit insurance regime in Japan. Gropp and Vesala (2004) find that introducing deposit insurance reduced bank moral hazard in the EU countries which previously applied explicit/implicit blanket guarantees. Their main argument is that deposit insurance will encourage all depositors to monitor bank performance. Depositors will punish riskier banks by moving their deposits to other banks.

Our finding clearly contradicts Gropp and Vesala. In Indonesia, depositors seem more apathetic. We can see that they even do not respond to changes in deposit insurance caps. Therefore, it is difficult to involve them in monitoring bank performance, unlike in the Europe.

In Indonesia, the central bank (Bank Indonesia) has authority to monitor and supervise banks. Under the blanket guarantee regime, the government also has incentives to monitor banks as well. Meanwhile, in the deposit insurance system, practically only the central bank will monitor bank performance, since the government has less incentive and depositors seemingly do not care.

The result does not change after we control for other variables, such us market risk, bank size, and a time trend. Market risk is not statistically significant, but bank size and the time trend are significant. The coefficient of asset size is negative and significant at 5 percent. The IPP decreases with asset size. Fair insurance premiums for bigger banks are less than fair insurance premiums for smaller banks. The time trend is also negative and statistically significant at 1 percent IPP is decreasing over time and risk for Indonesian banks is decreasing.

6. Conclusion

IDIC premiums are much lower than the fair value. Indirectly, IDIC subsidizes banks and IDIC cannot able to manage the collapse of a major bank. This condition creates contingent liabilities for the government budget, because the government should inject capital to the IDIC whenever its capital falls below the initial capital. Charging fair premiums is currently not a viable solution since the fair premium is still too high. Previous studies show that tougher regulations and monitoring can reduce risky bank behavior, which then decreases the fair premium. Therefore, the appropriate short-run policy is to strengthen regulations, such as implementing Basel III, and empowering monitoring activities which can detect in advance any improper bank activities.

There is evidence for risk-shifting incentives in the Indonesian banking system. Banks have shifted the risk to the insurer (IDIC/government). Furthermore, an increase in asset risk does not restrain banks from increasing their leverage.

The magnitude of risk-shifting incentives is greater under the deposit insurance regime than under the blanket guarantee regime. We argue that the main reason is the failure to communicate and educate depositors to be more involved in monitoring bank performance.

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APPENDIX

Figure 1
History of Indonesian Deposit Insurance/Guarantee

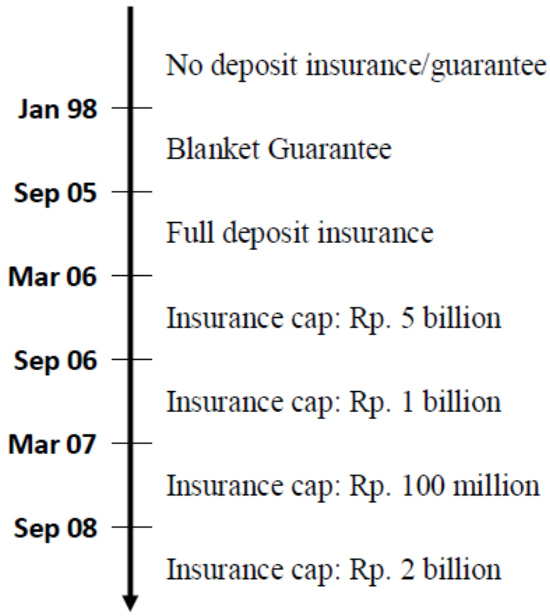
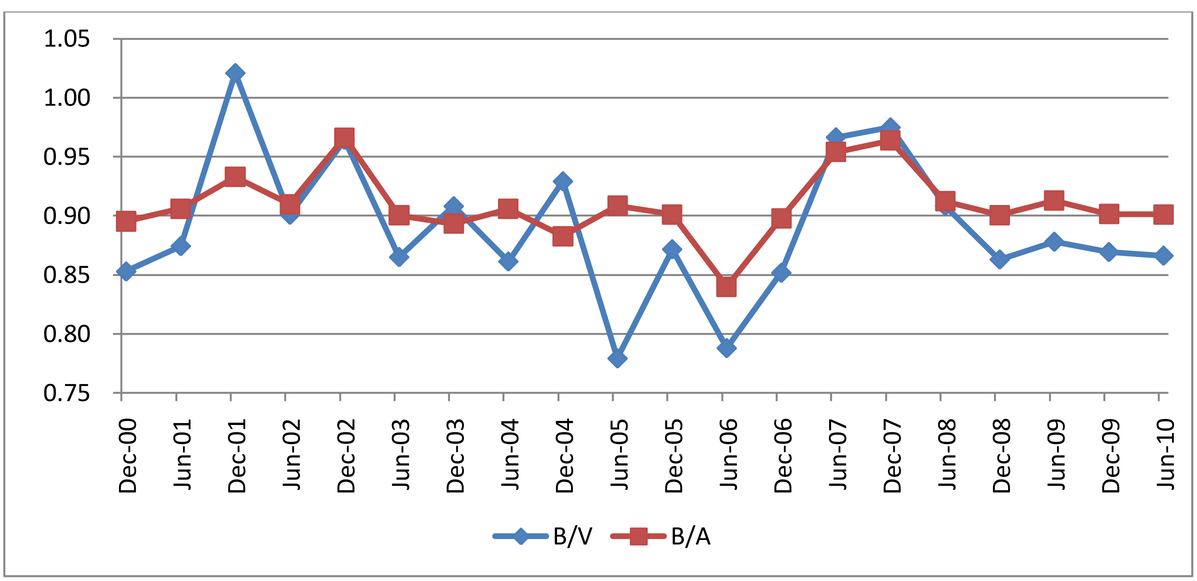


Figure 2
Leverage Ratio*



**aggregated each period and weighted by market price of assets, V.*

Figure 3
Premium per Dollar of Insured Deposit, IPP

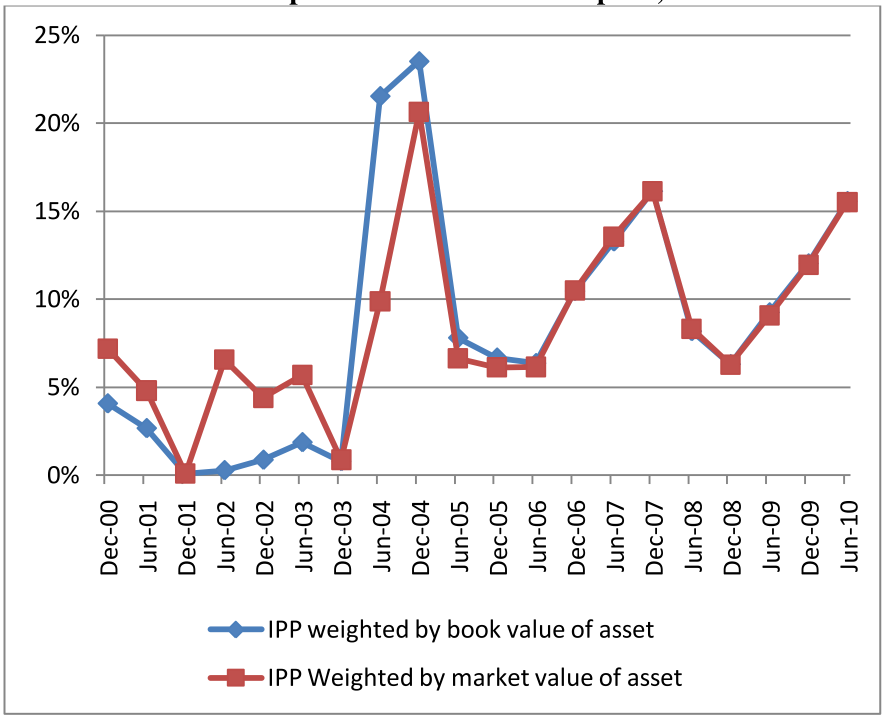
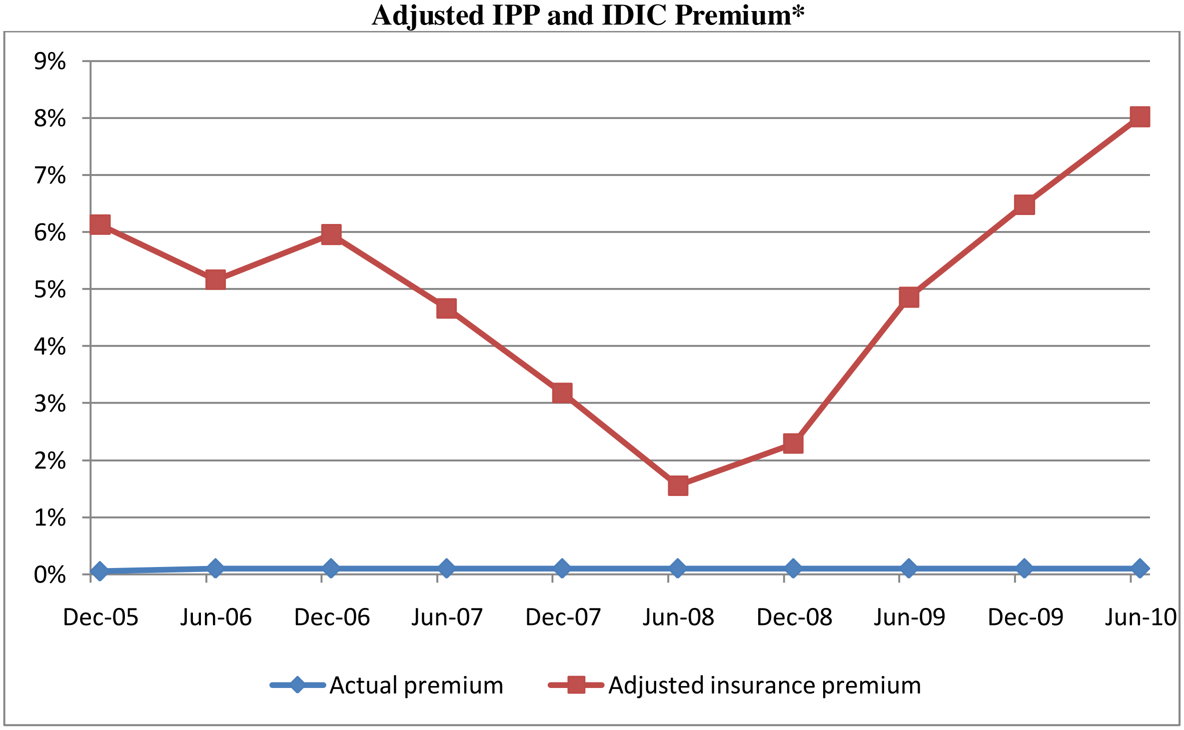


Figure 4
Adjusted IPP and IDIC Premium*



**Adjusted IPP is calculated by multiplying IPP by the ratio of insured deposits to total deposits.*

Table 1
Descriptive Statistics for Banks

	Mean	Std.	Min	Max
Total assets (billion Rp.)	49,599	79,384	258	402,804
Total liability, B (billion Rp.)	44,689	71,853	98	365,575
Total equity (billion Rp.)	4,910	7,883	-3,916	42,389
Dividend, δ (billion Rp.)	174	503	0	3,912
Market value of Equity, E (billion Rp.)	12,529	24,096	8	146,772
instantaneous standard deviation of the return on E, σ_E	1.09	1.01	0	7.27
instantaneous standard deviation of the return on IDX	0.24	0.08	0.15	0.46

Table 2
Descriptive Statistics for Estimated Variables

	Mean	Median	Std.	Min	Max
Market value of assets, V (billion Rp.)	51,797	13,455	82,672	20	426,850
instantaneous standard deviation of the return on V, σ_V	0.47	0.17	0.97	0	7.44
Leverage ratio, B/V	1.36	0.90	3.09	0.05	42.85
Leverage ratio on book value, B/A	0.90	0.91	0.065	0.38	1.44
IPP	0.13	0.027	0.24	0	0.99

Table 3
Composition of Bank Deposit Accounts

	% of Accounts					% Value of Accounts				
Value in Rp.	0-100 M	100 M -1 B	1-2 B	2-5 B	>5 B	0-100 M	100 M -1 B	1-2 B	2-5 B	>5 B
Dec-05	98.28	1.37	0.18		0.17	21.94	28.17	17.63		32.26
Dec-06	98.26	1.57	0.14		0.03	20.69	27.39	17.37		34.55
Dec-07	97.97	1.83	0.17		0.03	19.69	27.12	17.49		35.70
Dec-08	97.68	2.09	0.13	0.06	0.04	18.69	26.85	8.58	9.02	36.85
Jun-09	97.71	2.06	0.13	0.06	0.04	18.81	26.36	8.31	9.08	37.43
Dec-09	97.61	2.14	0.14	0.07	0.04	18.67	26.94	8.54	9.56	36.29
Jun-10	97.69	2.05	0.15	0.07	0.04	17.93	25.65	8.07	9.10	39.24

Table 4
Leverage Constraints Test

$$\frac{\boldsymbol{B_{ij}}}{\boldsymbol{V_{ij}}} = \boldsymbol{\alpha_1} + \boldsymbol{\beta_1}.\boldsymbol{\sigma_{Vij}} + \boldsymbol{\theta_k}.\boldsymbol{X_{ijk}} + \boldsymbol{\varepsilon_{ij}}$$

Variables	**Random Effect**		**Fixed Effect**	
Instantaneous standard deviation of the return on V, σ_V	1.3393*** (0.1563)	1.3034*** (0.1571)	1.3889*** (0.162)	1.3540*** (0.1628)
Instantaneous standard deviation of the market return		1.2162 (2.0415)		1.1718 (2.0318)
Book Value of Asset		-0.000002 (0.000002)		0.000006 (0.000007)
Time trend		-0.0590* (0.0335)		-0.0898** (0.0408)
Constant	0.7313*** (0 .1676)	1.3396** (0.5622)	0.7081*** (0.1658)	1.2985** (0.5929)

****; **; and * to be statically significant at level of 1 percent; 5 percent; and 10 percent respectively.*

Table 5
Risk-shifting Incentive Test

$$\boldsymbol{IPP} = \boldsymbol{\alpha_1} + \boldsymbol{\beta_1}.\boldsymbol{\sigma_{Vij}} + \boldsymbol{\theta_k}.\boldsymbol{X_{ijk}} + \boldsymbol{\varepsilon_{ij}}$$

Variables	**Random Effect**		**Fixed Effect**	
Instantaneous standard deviation of the return on V, σ_V	0.2183*** (0.0064)	0.2192*** (0.0065)	0.2158*** (0.0065)	0.2168*** (0.0065)
Instantaneous standard deviation of the market return		0.0004 (0.0819)		-0.008 (0.0815)
Book Value of Asset		-0.000000105 (0.000000111)		0.000000101 (0.000000281)
Time trend		0.0016 (0.0014)		0.0022 (0.0016)
Constant	0.0284*** (0.0094)	0.0117 (0.0245)	0.0323*** (0.0066)	-0.00003 (0.0238)

****; **; and * to be statically significant at level of 1 percent; 5 percent; and 10 percent respectively.*

Table 6
Leverage Constraints Test for Different Regimes

$$\frac{B_{ij}}{V_{ij}} = \alpha_1 + \beta_1.\sigma_{Vij} + \gamma_{t-1}.D_{ijt}.\sigma_{Vij} + \theta_k.X_{ijk} + \varepsilon_{ij}$$

Variables	Random Effect		Fixed Effect	
Instantaneous standard deviation of the return on V, σ_V	1.0436*** (0.3984)	1.3519*** (0.4234)	1.1917*** (0.4166)	1.5332*** (0.4536)
(Blanket guarantee dummy) x (σ_V)	0.3282 (0.4068)	-0.0551 (0.4465)	0.2174 (0.423)	-0.2014 (0.4756)
Instantaneous standard deviation of the market return		1.2188 (2.044)		1.1816 (2.0347)
Book Value of Asset		-0.00000249 (0.00000196)		0.000006 (0.000007)
Time trend		-0.0606* (0.0362)		-0.0974** (0.0446)
Constant	0.7863*** (0.181)	1.3528** (0.573)	0.7452*** (0.181)	1.3616** (0.6121)

****; **; and * to be statically significant at level of 1 percent; 5 percent; and 10 percent respectively.*

Table 7
Risk-shifting Incentive Test for Different Regimes

$$IPP = \alpha_2 + \beta_2 . \sigma_{Vij} + \vartheta_{t-1} . D_{ijt} . \sigma_{Vij} + \theta_l . X_{ijl} + \varepsilon_{ij}$$

Variables	Random Effect		Fixed Effect	
Instantaneous standard deviation of the return on V, σ_V	0.3465*** (0.0145)	0.37*** (0.0154)	0.3415*** (0.0148)	0.3576*** (0.0161)
(Blanket guarantee dummy) x (σ_V)	-0.142*** (0.0148)	-0.17*** (0.0162)	-0.1386*** (0.015)	-0.1583*** (0.0169)
Instantaneous standard deviation of the market return		0.0102 (0.0722)		-0.0003 (0.0721)
Book Value of Asset		-0.000000178** (0.0000001)		0.000000097 (0.00000025)
Time trend		-0.004*** (0.0013)		-0.0037** (0.0016)
Constant	0.0037 (0.009)	0.0604*** (0.0215)	0.0087 (0.0064)	0.0495** (0.0217)

****; **; and * to be statically significant at level of 1 percent; 5 percent; and 10 percent respectively.*