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Explicit Deposit Insurance Coverage, Ownership, and Risk Taking: Evidence from a Natural Experiment

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Abstract

Using a natural experiment of changes in explicit deposit insurance coverage limit over 2002-2011 in Indonesia, I find statistically and economically significant evidence of a positive relation between explicit deposit insurance coverage and bank risk-taking, consistent with *the moral hazard hypothesis*. More specifically, controlling for various bank-specific and macroeconomic variables, as well as bank regulations, I find that Indonesian banks' *Z-SCORE*, an inverse measure of bank risk-taking, increases on average about 19% when the government switched from blanket guarantee to limited deposit insurance. Furthermore, I find some evidence that the relation is non-monotonic at the low level of explicit deposit insurance coverage, in line with *the safety net hypothesis*. Lastly, I find that the impact of explicit deposit insurance coverage on bank risk-taking varies among different kinds of ultimate owners. In particular, family banks and politically connected banks are those that are most affected when the government switched from blanket guarantee to limited deposit insurance, suggesting that the moral hazard problem in these banks are more prominent compared to foreign banks and nonpolitically connected banks. However, foreign banks seem to increase their risk taking in response to the recent increase in explicit deposit insurance coverage, especially those that are politically connected.

Keywords: bank risk-taking, deposit insurance, coverage, ownership.

JEL Classification: G21, G28, G32

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[2] Disclaimer: The views expressed in this paper are those of the author and do not necessarily reflect the views of the Indonesia Deposit Insurance Corporation (IDIC).

1. Introduction

As one primary component of financial safety nets, deposit insurance (DI) aims to protect small depositors, promote public confidence, and enhance banking system stability (BCBS and IADI, 2009). This objective aligns with Diamond and Dybvig (1983)'s study that theorizes the risk of self-fulfilling or information-driven bank runs can be mitigated by providing an insurance scheme to depositors that guarantees their deposits money (full or partially) in case of bank defaults. Believing that DI can achieve this objective, the number of countries around the world that implement DI explicitly has been growing substantially.[3] During the recent 2008 financial crisis, many of these countries relied on their DIs (along with other bailouts and liquidity provision) to restore public confidence and prevent systemic bank runs. In particular, there were 19 countries provided full depositors guarantees, 22 countries increased the maximum caps of their explicit DI coverages (hereafter will be shortly referred as "DI coverage") permanently, and 7 countries increased their DI coverages temporarily (IADI and IMF, 2010). Anginer, Demirguc-Kunt, and Zhu (2014) show that countries with DI tend to have lower bank risk and more systemic stability during the crisis.

Despite of its increasing popularity, a large strand of previous literature shows that DI may induce a moral hazard problem. The problem arises since DI acts like a put option that limits banks' downside risk and reduces incentives for depositors to discipline their banks (e.g. Merton, 1977; Marcus and Shaked, 1984; Duan, Moreau, and Sealey, 1992; Allen and Saunders, 1993). Hence, DI creates incentives for banks to expropriate the government or tax payers by taking excessive risk (e.g. Bhattacharya and Thakor, 1993; Barth, Caprio, and Levine, 2004). The moral

[3] The International Association of Deposit Insurers (IADI) records that as of August 2016, there are 123 countries have established explicit DIs and 34 countries are considering to implement it. Back in 1974, there were only 12 countries that had explicit DIs.

hazard problem reduces the effectiveness of DI and harms banking system stability.[4] Therefore, whether DI can really benefit the banking system stability remains an open empirical question.

In terms of empirical research design, the causality between DI coverage and bank risk taking is challenging to test because there is a potential endogeneity problem due to a reverse causality between these two variables. On the one hand, an increase in DI coverage could induce more bank risk-taking as it provides banks with more protection from downside risk and erodes incentives for depositors to monitor their banks' risk (*the moral hazard hypothesis*). On the other hand, in a harsh time when bank risk is high such as the recent 2008 financial crisis, the government may react to increase DI coverage to enhance depositors' confidence to the banking system, which results in lower bank risk and greater systemic stability (*the safety net hypothesis*). Therefore, in a study of bank risk-taking on DI coverage, it is important to find an exogenous source of variation in DI coverage that is not affected by bank risk.

Moreover, bank risk-taking might depend on the ownership structure. First, there is a principal-agent problem between bank managers and shareholders. On the one hand, bank shareholders aim to maximize their shares value and therefore prefer higher risk-taking. Bank managers, on the other hand, might concern more on their job security and therefore tend to be more risk averse. Some empirical studies show that higher stock holdings by bank managers can alleviate this principal-agent problem (Saunders, Strock, and Travlos, 1990; Berger and Imbierowich, 2014). Second, not all of firms' shareholders aim to maximize the market value of equity. For example, the owners of a family firm may have a longer investment time horizon and concern more on their heirs' control to the firm (Anderson and Reeb, 2003). This means that the

[4] For example in 1980, shortly before the U.S. Saving and Loans crisis, the FDIC had increased its coverage limit from $40,000 to $100,000 per depositor per bank or approximately nine times per capita GDP. This generous coverage policy together with financial liberalization and regulatory failure are believed as the main triggers of the Saving and Loans crisis (Kane, 1992). Kane analogues the generous deposit insurance as feeding off the "zombie" S&Ls using taxpayers' money.

basic assumption of the Merton's model (1977) for DI may not be relevant for banks with different ownership structures. Surprisingly, empirical studies that relate different kinds of bank ownership and bank risk-taking under a DI scheme are still relatively sparse.

This paper aims to fill the gaps in the literature by examining the impact of DI coverage on bank-risk taking and how different kinds of bank ownership influence this relation. To overcome the endogeneity problem between DI coverage and bank-risk taking, I test the relation using a unique setting of natural experiments from the Indonesian banking industry from 2002:Q1-2011:Q4.[5] During this period, Indonesia provides two sources of exogenous variation in DI coverage. First, in September 2004, the Government of Indonesia (GOI) enacted *Law Number 24 Year 2004* to establish an explicit DI scheme by the Indonesia Deposit Insurance Corporation (IDIC).[6] The law ends the blanket guarantee (BG) scheme and puts a maximum cap on the DI coverage that is gradually reduced to IDR 100 million within 18 months of phasing out period following the effective enforcement date of the law.[7] As the law explicitly states the date and the level of maximum DI coverage for each phasing out period, banks know these information once the law is enacted. Therefore, we may expect that following the enactment date of the law, banks would alter their risk-taking in response to the changes in DI coverage and not vice-versa. During the phasing out period, changes in DI coverage are predetermined by the law and thus, are exogenous to bank risk-taking. The second exogenous variation in DI coverage occurs during the recent subprime crisis. In October 2008, considering similar responses by the US government

[5] Islamic commercial banks are excluded from the analysis since they have substantial differences in business characteristics which are based on non-usury economics.

[6] Since January 1998, the GOI had provided a blanket guarantee scheme that insured all bank liabilities (deposits and nondeposit funding, including off balance sheet activities such as derivatives) in order to restore public confidence and tame the impact of the 1997/1998 Asian financial crisis (Enoch, Baldwin, Frecaut, and Kovanen, 2001). The *GOI's Law Number 24 Year 2004* ended this BG scheme officially and substituted it with the limited DI scheme that is administered by the IDIC.

[7] More details are provided in Section 2. IDR stands for Indonesian Rupiah, the official local currency of Indonesia, which is about IDR9,113.00/USD at the end of December 2011 (Bank of Indonesia, 2011).

and neighboring countries during the crisis, the GOI decided to increase the DI coverage from IDR 100 million to 2 billion. The GOI aimed the policy to prevent the crisis to precipitate into the Indonesian economy by eroding market and public confidence. The global contagion impact was considered as a more psychological rather than a fundamental pressure because none of the Indonesian banks had direct exposures on subprime mortgage instruments (The Indonesia Ministry of Finance, 2010). Accordingly, the increase in DI coverage is also exogenous to Indonesian bank-risk taking. In addition, the IDIC does not imposed any co-insurance requirement or risk-based premium during the entire natural experiment period, which attenuates the heterogeneity bias that complicates most of empirical studies on similar topic using cross-countries data.[8]

By way of preview, I find a significant positive relation between DI coverage and bank risk-taking, consistent with the moral hazard hypothesis. More specifically, controlling for various bank-specific and macroeconomic variables as well as bank regulations, I find that Indonesian banks' *Z-score*, an inverse measure of bank risk taking, increases on average about 19% when the government switched from the blanket guarantee era to the limited deposit insurance era administered by the IDIC. This main finding aligns with the *moral hazard hypothesis* and is robust to a variety of robustness checks. In terms of mechanisms in which DI coverage influences bank risk taking, I find that a lower DI coverage is associated with lower standard deviation of profitability and higher capitalization, though it is also associated with lower bank profitability. Furthermore, I find some evidence that the relation is non-monotonic at the low level of DI coverage, in line with *the safety net hypothesis*. This finding suggests that there is an optimum range of explicit DI coverage. Finally, I find significant evidence that the impact of DI

[8] Co-insurance requirement and risk-based premium pricing are primary tools for DI to curb banks' moral hazard problem other than a limited DI coverage (Mccoy, 2008). The implementation of coinsurance and risk-based premium would make it more difficult to disentagle the effect of DI coverage on bank-risk taking.

coverage on bank risk is different across different kinds of ultimate owners. In particular, family banks and politically connected banks are those that are most affected when the government switched from the blanket guarantee era to the limited deposit insurance era, suggesting that the moral hazard problem in these banks are more prominent compared to foreign banks and nonpolitically connected banks. However, foreign banks seem to increase their risk taking in response to the recent increase in DI coverage, especially those that are politically connected

The remainder of this paper is organized as follows. Section 2 provides some institutional backgrounds on Indonesia banking industry. Section 3 reviews the previous literature and hypothesis development. Section 4 describes the data and methodology. Section 5 presents the main empirical finding and robustness checks. Section 6 concludes and discusses some policy implications.

2. Institutional background

In response to the 1997/1998 financial crisis, the GOI provided a blanket guarantee (BG) for its domestic banks in order to restore public confidence toward Indonesian banking system and mitigate bank runs.[9] The BG guaranteed all commercial banks' liabilities, excluding loan capital, subordinated debt, illegal liabilities, liabilities to the banks' related parties, and derivative transactions.[10] The BG program was funded from the government fiscal budget and from the fixed-rate premium paid by each participating bank for 0.25% of deposits per year. However, the BG was not applicable to branch offices of foreign banks and none of joint venture banks were

[9] The BG program was officially administered by an institution called the Indonesian Bank Restructuring Agency (IBRA).

[10] The BG also guaranteed for off-balance sheet items and currency swap transactions. For further details see Kusumaningtuti (1998).

willing to join the BG program. Therefore, none of the branch office of foreign banks and joint-venture bank was insured by the BG program.

In September 2004, the GOI enacted Law Number 24 Year 2004 to establish the Indonesia Deposit Insurance Corporation (IDIC) which officially began its operation on September 2005. According to the law, the membership of the IDIC's deposit insurance program is compulsory for all banks in Indonesia, including branch office of foreign banks and joint-venture banks. The law mandates the end of the BG program and gradually decreases the DI coverage within 18 months from its effective enforcement date as follows:

a. Period 9/22/2005 to 3/21/2006: Full Guarantee (FG)
b. Period 3/22/2006 to 9/21/2006: IDR 5 billion
c. Period 9/22/2006 to 3/21/2007: IDR 1 billion
d. Period 3/22/2007 and after: IDR 100 million

In the law, the GOI explicitly states that a full guarantee (FG) program will be in place of the BG from September 2005 until March 2006. Different than BG, FG does not insure bank liabilities other than deposits, but insures bank deposits fully. After March 2006, the law explicitly mandates a limit to DI coverage that will gradually decrease from IDR 5 billion (until September 2006), 1 billion (until March 2007), and 100 million respectively. As the main source of funding, the IDIC charges a semi-annual fixed-rate premium at 0.1% of the monthly average balance of total deposits for each period. No co-insurance is required from member banks.

In response to the recent subprime crisis, the GOI enacted the Government Regulation Number 66 Year 2008 to increase the DI coverage from IDR 100 million to IDR 2 billion since October 2008. Different than other countries that increase their DI coverage temporarily (e.g.

Australia, Brazil, Netherlands, New Zealand, Switzerland, Ukraine, and United States[11]), the GOI does not specify an exit strategy for this pre-emptive policy when the crisis is over. Though the increase of DI coverage was considered as one of the GOI 's public policies which has successfully restored the Indonesian banking stability during the crisis (Basri and Raharja, 2010), the amount of optimum DI coverage which effectively maintains depositors' confidence while attenuates bank moral hazard still remains unanswered.

3. Literature review and hypotheses development

3.1. Deposit Insurance Coverage and Bank Risk-Taking

A large body of literature in deposit insurance contends that a generous DI coverage may induce bank instability due to higher moral hazard problem (***the Moral Hazard hypothesis***). Early interest in the deposit insurance was initiated by the seminal article by Merton (1977), who viewed the deposit insurance as a put option issued by the government on the banks' assets. From the viewpoint of banks holding the put option, there is an incentive to increase the value of the option by surging the volatility of banks' assets and shift the losses incurred to the government or taxpayers, creating a moral hazard problem. Kane (1992) shows how a generous deposit insurance coverage may become one of primary triggers of the 1980s U.S. Savings and Loans (S&Ls) crisis. Kane blames the deposit insurance for breaking the link between what the S&Ls' assets could earn and what depositors could expect to be repaid. Cebula and Belton (1997) study the impact of federal DI coverage on the failure rate of commercial banks in the U.S. during the 1963-1991 periods and find that the higher extent of explicit DI coverage is associated with higher bank failure rate. Based on cross-section data from 61 countries in 1980-

[11] The U.S. government had increased their DI covereage temporarily from USD100,000 to USD250,000 since October 2008. However, the Dodd-Frank Act made the new DI coverage permanently since July 2010.

1997, Demirgüç-Kunt and Detragiache (2002) find that explicit deposit insurance tends to have adverse impact on bank stability and the impact is stronger as the coverage level becomes more extensive and where it is run by the government instead of the private sector. Cull, Senbet, and Sorge (2005) examine the relation between the explicit deposit insurance generosities and financial development using the data from 37 countries between 1960 and 2001. They show that generous government-funded deposit insurance has an adverse impact on financial development and growth in the long run, except in countries whose strong rule of laws and bank supervisors. By utilizing contingency table analysis to 52 countries over the period 1996-2007, Chu (2011) finds that low DI coverage beats both high and full coverage in sustaining bank stability due to better market discipline and lower moral hazard problem. Using the U.S. and 21 countries data during the pre-crisis period in 1997-2007 and the crisis and post-crisis period in 2008-2010, Berger and Turk-Ariss (2013) find that depositors' discipline decline during and after the crisis as a result of the government actions to expand the DI coverage and rescue troubled financial institutions. Still in line with the findings of the mainstream literature, Lambert, Noth, and Schüwer (2013) provide within-country evidence from the U.S. data around the introduction of the *Emergency Stabilization Act* in Q4 2008, that an increase in the amount of insured deposits triggers higher investments in risky loans, suggesting riskier behavior on affected banks. Therefore, according to *the Moral Hazard Hypothesis*, the first hypothesis to test in this paper is:

***Hypothesis 1*:** All else equal, higher DI coverage is associated with higher bank-risk taking.

On the flip side of literature, the ***Safety-Net Hypothesis*** contends that a low DI coverage is associated with higher bank-risk taking, and hence, lower bank stability. Dreyfus, Saunders, and Allen (1994) develop a theoretical model to examine the optimum caps on the scope of insured

deposits given the deposit insurer adopts a flat-rate premium system.[12] They posit that uninsured depositors tend to require higher interest rate or risk premium to their banks if the DI coverage level is too low. This may make some banks unable to retain their depositors or reduce their profit margin, and therefore, it will either increase the banks' likelihood of being insolvent or induce the banks to conduct riskier assets substitution. Based on the data of 128 banks in EU during 1991-1998, Gropp and Vesala (2004) find some evidence that high explicit DI coverage is associated with lower banks' risk-taking and that implicit guarantee of banks' creditors is relatively high when there is a low explicit protection. Meanwhile, Anginer, Demirgüç-Kunt, and Zhu (2012) examine the data from 96 countries during 2004-2009 and find that the stabilization effect tends to dominate the moral hazard effect of deposit insurance during a financial crisis, though the overall effect over the full sample remains negative. Therefore, according to *the Safety-Net Hypothesis*, the second hypothesis to test is:

***Hypothesis 2*:** All else equal, higher DI coverage is associated with lower bank-risk taking.

More recent literature in deposit insurance suggests a non-monotonic relationship between DI coverage and bank risk-taking (e.g. Angkinand and Wihlborg,2006; 2010). Angkinand and Wihlborg assume that every country having explicit deposit insurance also provides implicit guarantee. The reason why every country tends to provide implicit guarantee is that during a banking crisis, pressures to the government to bail out troubled banks or to provide blanket guarantees are very intense (Demirgüç-Kunt, Kane, and Laeven, 2008). Angkinand and Wihlborg contend that the degree of implicit guarantee will depend on the level of explicit DI coverage. When the DI coverage is too low, uninsured depositors and creditors tend to have

[12] Theory suggests that a flat deposit insurance premium rate does not provide incentive to reduce the moral hazard problem caused by excessive bank risk taking (De Long and Saunders, 2011). Hence, we may expect that under a flat premium rate regime, banks' risk-taking will change when the government alters the deposit insurance coverage.

stronger expectation that the government will respond to a banking crisis by providing a blanket guarantee or bailing out distressed banks. Accordingly, a too low DI coverage may lead to a higher bank risk-taking. With respect to this strand of literature, our third hypothesis is:

***Hypothesis 3*:** All else equal, there is a non-monotonic relation between DI coverage and bank risk-taking.

3.2. Ownership Structure, Deposit Insurance Coverage, and Bank Risk-Taking

The corporate governance literature show that ownership structure has important consequences to bank risk-taking.[13] Among the most recent literature, Laeven and Levine (2009) examine the relation between bank governance, regulation, and risk taking using the data of 10 largest publicly listed banks from 48 countries. Consistent with the previous literature (e.g. Jensen and Meckling, 1976; John, Litov, and Yeung, 2008), they find that banks having large owners with substantial cash flow (CF) rights exhibit higher risk taking. They argue that by focusing on the large shareholders' CF rights, instead of voting rights, they capture directly both the incentives of owners toward risk and the ability of owners to influence banks' risk. Further, they find that given banks having large equity owner, the presence of explicit deposit insurance is associated with higher risk taking.

Some studies have shown the importance of managerial ownership in determining bank risk-taking. For example Saunders, Strock, and Travlos (1990), Gorton and Rosen (1995), Anderson and Fraser (2000), and Sullivan and Spong (2007) find that higher shareholdings of officers and directors induces a higher bank risk-taking due to lesser degree of agency problem between banks' managers and shareholders. More specific, Berger, Imbierowicz, and Rauch (2013) find

[13] I suggest to see Berger, Imbierowicz, and Rauch (2013) for a comprehensive literature review on the influences of corporate governance to bank risk-taking or bank stability.

that high shareholding by lower-level management (e.g. vice presidents) is associated with significant increase in default risk. However, they do not find direct impact of the shareholdings by outside directors and chief officers on banks' probability of failure.

Other aspects of corporate governance that may affect bank risk-taking are foreign ownership and listing status. The presence of foreign owners in the banks tend to be associated with better performance (e.g. Claessens, Demirgüç-Kunt, and Huizinga, 2001) and less risk taking (e.g. Laeven, 1999), especially in developing countries. Foreign banks are also supervised both by the home and host regulators. Next, listed banks are expected to be more transparent and have greater market monitoring (Hadad, Agusman, Monroe, Gasbarro, and Zumwalt, 2011). Therefore, we may expect that foreign banks and listed banks have better governance and hence become more stable than domestic banks and unlisted banks.

Government ownership is also another important driver of bank risk-taking. Most of the existing literature shows that government ownership is associated with higher bank risk-taking. For example, using the sample of European commercial banks, Iannotta, Nocera, and Sironi (2007) find that government- owned banks tend to have poorer loan quality and higher insolvency risk than other type of banks. Still using the sample of European banks, Iannotta, Nocera, and Sironi (2013) find further that government-owned banks have lower credit risk but higher operating risk, indicating the presence of governmental protection that induces risk taking, and also find that the government-owned banks may serve certain political goals. However, Hossain, Jain, and Mitra (2013) find that partial state ownership of banks, specifically in the Asia-Pacific regions, helps avoid sharp losses during financial crises by restricting risky-business activities.

In terms of family ownership, its impact on bank risk- taking may vary. For example, Morck, Yavuz, and Yeung (2011) find that banking systems which are thoroughly controlled by tycoons or families have less efficient capital allocation, slower economic growth, and greater financial instability which may imply greater risk taking by the banks in such banking systems. Claessens, Djankov, and Lang (2000) and Carney and Child (2013) show that tycoons and politicians are closely related and tend to dominate the coporate structure in East Asian, including Indonesia. Micco, Panizza, and Yanez (2007) find that politically connected banks in developing countries have lower profitability and higher costs than private banks. The higher risk may result from higher incentives to expropriate non-family shareholders via tunneling or lack pools of talents (e.g. Morck, Stangeland, and Yeung, 2000; Bloom and Van Reenen, 2006). On the other hand, there is a strand of literature that finds family firms are more conservative, have superior monitoring abilities compared to widely-held firms, have longer investment horizons, and hence, tends to be more stable (e.g. Demsetz and Lehn, 1985; James, 1999; Anderson and Reeb, 2003; Barry, Lepetit, and Tarazi, 2011). Furthermore, Angkinand and Wihlborg (2010) assert that banks' quality of governance may affect the relation between explicit DI coverage and bank risk-taking. In particular, the U-shaped curvature becomes more pronounced when the quality of banks' governance is more aligned with shareholders' wealth maximization objective.

Therefore, the next hypotheses to test in this paper is:

Hypothesis 4: All else equal, the relation between DI coverage and bank risk-taking depends on the type of bank ownership.

4. Data and variables

4.1. The Sample

I test the impact of DI coverage and ownership structure on bank risk-taking using bank-level data from the Indonesian commercial banking industry. The sample starts from 2002:Q1, the earliest data available publicly from the bank regulator's website, until Q4:2011.[14] I end the sample in 2011:Q4 as the regulator implements the IFRS accounting for all banks starting from 2012:Q1 onward.[15] However, the degree of IFRS implementation for each bank might be different and is not disclosed to public. In our sample, I exclude all Islamic banks from the analysis since they have substantial differences in business characteristics from conventional banks. I obtain all the financial information from the quarterly financial reports which are mandatorily submitted by all commercial banks in Indonesia to the bank regulator. All financial information is inflation-adjusted using the GDP deflator with the year 2000 as the base year. Meanwhile, the ownership data are constructed from the annual-bank management and ownership structure reports which are also available in the bank regulator's website. I complement the ownership database with relevant information from banks', parliaments', and political parties' websites, as well as magazines, search engine, and other information sources. The macroeconomic indicators including real GDP growth, GDP deflator index, and deposit insurance rate are gathered from the Indonesian Economic and Financial Statistics (SEKI) published by the Bank of Indonesia and the Indonesian Central Statistical Bureau (BPS).

I exclude all commercial banks with negative, zero and missing gross-total assets and loan composition since these data are likely subject to errors, leaving 3,971 bank-quarter observations

[14] These data are available online via Bank of Indonesia's website, http://www.bi.go.id, the former bank regulator, or from the Indonesian Financial Service Authority (Otoritas Jasa Keuangan)'s website http://www.ojk.go.id, the new bank regulator starting on 2013 onward.
[15] Bank of Indonesia's Circulation Letter No. 11/4/DPNP.

in the final sample.[16] In order to mitigate the impact of outliers on our analysis, income statement and balance sheet-related variables are winsorized at the top and bottom 1% of the distribution, unless mentioned otherwise. Table 1 shows descriptive statistics for all variables used in our main regressions.

4.2. Bank-Risk Taking

Following Berger, Klapper, and Turk-Ariss (2009), I use the Z-score (*ZSCORE*) as the main inverse measure of bank-risk taking. The time-varying Z-score is calculated using the following formula (on Boyd, De Nicoló, and Jalal, 2006):

$$Z_i = \frac{\mu_{ROA_i} + \mu_{EQTA_i}}{\sigma_{ROA_i}} \tag{1}$$

where μ_{ROA_i}, μ_{EQTA_i}, and σ_{ROA_i} are the four quarters period-average return on gross-total assets, -average equity to gross-total assets, and –standard deviation of return on gross-total assets. Using the common definition of z-score, a bank is defined as insolvent when its $\left(EQTA_i + ROA_i\right) \leq 0$. This means that at this state, the bank does not have enough capital to absorb its losses. Hannan and Hanweck (1988) and Boyd, Graham, and Hewitt (1993) show that if *ROA* is a random variable with mean μ_{roa} and finite variance σ_{roa}^2, then the upper bound of the probability of insolvency is as follows:

$$p(ROA_i \leq -EQTA_i) \leq Z^{-2} \tag{2}$$

As the *Z-SCORE* commonly has a highly skewed distribution, I follow Laeven and Levine (2009), Houston, Lin, Lin, and Ma (2010), and Beck, Jonghe, and Schepens (2013) to use the

[16] Following Berger and Bouwman (2013), we use gross total assets (GTA) instead of total assets, which equals to total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve. The purpose of the reversal is to measure the full value of the loans financed. Helwege (1996) suggests similar measure of gross assets instead of net assets for the S&Ls.

natural logarithm of the *Z-SCORE* instead (*LNZSCORE*). To avoid truncation of data observations due to negative *ZSCORE*s, I use the following log transformation:

$$LNZSCORE = \ln(1 + |\min(ZSCORE)| + ZSCORE \quad (3)$$

Lower *ZSCORE* and *LNZSCORE* implies higher bank-risk taking.

As robustness checks, I run the base regression specification using alternative measures of bank risk-taking including the standard deviation of bank return on equity (SDROE), nonperforming loans/total loans (NPL/TL), and nonperforming loans/gross total assets (NPL/GTA).

4.3. Independent Variables

4.3.1. Explicit Deposit Insurance Coverage

To measure the different regimes of DI coverage, I use six different indicator variables that capture the transition era (*DCOV_TR*), the full deposits guarantee era (*DCOV_FG*), the IDR 5 billion DI coverage era (*DCOV_5B*), the IDR 1 billion DI coverage era (*DCOV_1B*), the IDR 100 million DI coverage era (*DCOV_100M*), and the IDR 2 billion DI coverage era (*DCOV_2B*). The base indicator variable that is omitted in the main regressions is the blanket guarantee era (*DCOV_BG*), so that the regression estimates of the other indicator variables of DI coverage regimes are interpreted relative to this base category.

4.3.2. Ownership

I use several proxies to measure different type of bank ownership. First, I use the percentage of the manager's cash flow rights (*MANCF*), i.e. the cash flow right of bank manager if the manager is one of the ultimate owners. Ultimate owners are defined as the top owners in the

bank's ownership structure that have at least 10% voting rights, following Laeven and Levine (2009) and Carney and Child (2013). Next, I measure the largest ultimate owner's cash flow right (*UCASH*) and the wedge between cash flow right and voting right of the largest ultimate owner (*WEDGE*).

For different type of ownerships, I use indicator variables for foreign, family, government, and private-politically connected banks. A foreign bank is defined as a bank that has foreign institutions as the largest ultimate owners. By this definition, all branches of foreign banks are defined as foreign banks, including joint-venture banks which satisfy this definition. A bank is defined as a family bank if the largest ultimate shareholder is a family or a family-based business group. There are two kinds of state-owned banks in Indonesia: central-government owned banks (*Bank Persero*) and regional-government owned banks (*Bank Pembangunan Daerah*). This separation follows the banks' classification by the Bank of Indonesia. Also, after the enactment of Law Number 22 and Number 25 Year 1999 concerning the local government decentralization, we may expect that the dependency of local government's budget to the local-government owned banks' incomes are higher. A central-government owned bank is defined as a bank that has the central government as the largest ultimate owner. Similarly, a local-government owned bank is defined as a bank that has the regional government as the largest ultimate owner. Finally, a private-politically connected bank is defined as a private bank with at least one of the commissioners, directors, or controlling shareholders is a current of former political party member, parliament member, or government official, following Nys, Tarazi, and Trinugroho (2015).[17]

[17] Different than the organizational structure in most of the U.S. firms, Indonesia embraces a two-tier system, where the executives (led by a CEO) conduct the operational business activities and the Board of Commissioner (led by a President Commissioner) is responsible to monitor the executives on behalf of the firm's shareholders.

4.3.3. Control Variables

I use various control variables consist of bank-level and macroeconomic-level variables. For the bank-level variables, I control for bank size (*LNGTA*) and its squared term (*LNGTA_SQ*) to account for economies of scale in managing risk (Enkhbold and Otgonshar, 2013), the assets composition (the ratio of loans to gross-total assets, *LOANGTA*, and the ratio of fixed assets to gross-total assets, *FAGTA*), cost efficiency as proxied by overhead ratio/GTA (*OHRGTA*), and income diversification ratio (*IDIV*) as in Laeven and Levine (2007). Next, I control for the role of nondeposit funding (*NDEPGTA*) as theory suggests that nondeposit funding and subordinated debts' investors may impose more market discipline on banks compared to depositors, and hence, increase the banks' stability (e.g. Berger and Turk-Ariss, 2013). I also control for bank holding company (*BHC*) and listing status (*LISTED*), as well as the external auditor's quality (BIGAUD).

Following Berger, Klapper, and Turk-Ariss (2009), I use the Lerner index as a proxy for market power. The Lerner Index measures the mark-up of price over marginal costs, as shown by the following formula.

$$Lerner_{it} = (P_{GTA_{i,t}} - MC_{GTA_{i,t}}) / P_{GTA_{i,t}} \tag{4}$$

where $P_{GTA_{i,t}}$ is the price of gross-total assets proxied by the ratio of total interest and non-interest income to gross-total assets for bank *i* at time *t*, and $MC_{GTA_{i,t}}$ is the marginal cost of gross-total assets for bank *i* at time *t*. The $MC_{GTA_{i,t}}$ is estimated using the following translog cost function:

$$\ln Cost_{it} = \beta_0 + \beta_1 \ln Q_{it} + \frac{\beta_2}{2} \ln Q_{it}^2 + \sum_{k=1}^{3} \gamma_{kt} \ln W_{k,it} + \sum_{k=1}^{3} \phi_k \ln Q_{it} \ln W_{k,it}$$

$$+ \sum_{k=1}^{3} \sum_{j=1}^{3} \ln W_{k,it} \ln W_{j,it} + \varepsilon_{it} \tag{5}$$

where Q_{it} represents a proxy for bank output, i.e. the gross-total assets of bank *i* at time *t*, and $W_{k,it}$ are three input prices of labor (the ratio of personnel expenses to gross-total assets), funds (the ratio of interest expenses to total deposits), and fixed capital (the ratio of other operating and administrative expenses to gross total assets). Year fixed effects are also added in the estimation process of the equation (5) above with robust standard errors. I winsorize $W_{1,2,3}$ at 3% level on top and bottom instead of 1% level as the latter still leave considerable numbers of outliers. Next, the $MC_{GTA_{i,t}}$ is calculated using the formula below:

$$MC_{GTA_{it}} = \frac{Cost_{it}}{Q_{it}}\left[\beta_1 + \beta_2 \ln Q_{it} + \sum_{k=1}^{3} \phi_k \ln W_{k,it}\right] \quad (6)$$

For the macroeconomic variables, I control for the real GDP growth (*EGROWTH*) and the deposit insurance rate (*DI_RATE*).[18] Finally, I control for bank regulation (*NBREG*) using the number of new bank regulations for each quarter as the main proxy.[19] I also include an indicator variable that captures a new package of monetary and bank regulations post the global financial crisis (*CRBREG*). This new regulation package is the largest since the 1998 Asian financial crisis. This new regulation package is the largest since the 1998 Asian financial crisis. In particular, *CRBREG* equals to 1 from 2011:Q1 onward, and 0 otherwise. The details of all variables used in this paper, their definition, and summary statistics are shown in Table 1.

[18] The CRISIS is a dummy variable equals to 1 during the 2008 global financial crisis and 0 otherwise. Following Berger and Bouwman (2013), we define the 2008 global financial crisis period during the period of 2007:Q3 until 2009:Q4. The deposit insurance rate is the ceiling rate of deposits' interest rate which is set by the Indonesia Deposit Insurance Corporation (IDIC) every quarter and is evaluated on monthly basis. Any deposits receive interest rate above this rate is not guaranteed by the IDIC. Hence, we may expect that higher deposit insurance rate is associated with lower bank stability (lower *Z-SCORE*, higher *NPLLOAN*, or higher *stdnplcap*).

[19] For each quarter, I track and calculate the number of new laws, BI regulations, and BI circular letters.

5. Empirical results

5.1. Correlation structure between independent variables

Table 2 presents the pairwise correlation coefficients among independent variables used in this paper. As shown by the correlation coefficients on the table, there are no pairs of independent variables which have strong linear correlations with the absolute value above 0.70. This means that our independent variables may not suffer from serious multicollinearity problems (Gujarati, 2004).

5.2. Deposit Insurance Coverage and Bank Risk-Taking

To test the relation between DI coverage and bank risk-taking, I estimate the following empirical specification using the Indonesian commercial bank-level data from 2002:Q1 to 2011:Q4.

$$Risk_{i,m,t-k+1,t} = \alpha + \sum_{m=1}^{6} \beta_m DCOV_m + \gamma BS\_Controls_{i,m,t-k} + +\delta MBR\_Controls_{m,t-k} + \gamma_i + \varepsilon_{i,m,t-k+1,t} \quad (7)$$

where *Risk* is (inverse) bank risk as measured by $LNZSCORE$, *DCOVs* are six different indicator variables as explained in Section 4.3.1, *BS_Controls* is the vector of bank-specific control variables, while *MBR_Controls* is the vector of macroeconomic and bank regulation controls as explained in Section 4.3.3. γ and ε represent bank fixed effects and error term respectively. $i, m,$ and t are indexes for bank, DI coverage regime, and time respectively. The $LNZSCORE$ is measured over *k=4* quarters from time $t-k+1$ to t, while the control variables are measured at time $t-k$ to ensure that they are predetermined relative to the $LNZSCORE$ in order to attenuate

any potential endogeneity problem.[20] A higher $LNZSCORE$ indicates lower bank risk-taking. As bank risk-taking is likely correlated within a bank over time, I use the cluster-robust standard errors (Rogers, 1993) at the bank level in the estimation.

Table 3 presents the OLS regression results of bank-risk taking on DI coverage. We can see from the table that *DCOV_TR* is not statistically significant, which suggests that there is no change in bank-risk taking in the transition period compared to the blanket guarantee era. *DCOV_FG* and *DCOV_5B* are statistically significant on several specifications, but they become not statistically significant as I control more variables. This suggests that controlling all set of control variables, there are still no change in bank-risk taking during the full deposit guarantee and the IDR 5 billion DI coverage era that attributable to the reduction in DI coverage. *DCOV_1B* is statistically significant at 99% confidence level in all regression specifications, with the coefficient magnitude about 0.209. This means that compared to the blanket guarantee era, on average banks have about 23% higher *ZSCORE* during the IDR 1 billion DI coverage era.[21] *DCOV_100M* is statistically significant at 99% confidence level in all regression specifications, with the coefficient magnitude about 0.196. This means that compared to the blanket guarantee era, on average banks have about 22% higher *ZSCORE* during the IDR 100 million DI coverage era. *DCOV_2B* is also statistically significant at 99% confidence level in most of the regression specification and at 95% when I control for macroeconomic conditions and bank regulation. The coefficient estimate is about 0.131, which means that compared to the blanket guarantee era, on average banks have about 14% higher *ZSCORE* during the IDR 2

[20] Several researchers argue that the simultaneity concern between a dependent variable and an endogenous independent variable can be mitigated by replacing the independent variable with its lagged value, for example see Gupta (2005), Duchin, Ozbas, and Sensoy (2010), and Buch, Koch, and Koetter (2013).

[21] Halvorsen and Palmquist (1980) show that the coefficient of a dummy variable (β_j) in a semilogarithmic regression equation should be interpreted as the $100(\exp\{\beta_j\} - 1)$ percentage change in Y for a discrete change in the dummy from 0 to 1.

billion DI coverage era. Compared to *DCOV_1B* and *DCOV_100M*, the coefficient estimate on *DCOV_2B* is lower, which is consistent with the moral hazard hypothesis.

5.3. Robustness Checks

Table 4 presents a variety of robustness checks on our main results. Panel A shows that our main results from Table 4 are robust to the exclusion of Too-Big-To-Fail banks, two-way cluster standard errors, using bank random effects instead of bank fixed effects, and controlling for time trend and its squared term.[22] Interestingly, when I exclude central-government owned and regional-government owned banks, *DCOV_2B* becomes not statistically significant. This suggests that controlling for bank-specific and macroeconomic variables, as well as bank regulation, private banks' *ZSCOREs* during the IDR 2 billion DI coverage era are not statistically different than the blanket guarantee era. In other words, there is some evidence of material increase in bank-risk taking by private banks when the government increases the DI coverage from IDR 100 million to IDR 2 billion.

Column (1) of Panel B shows the regression results if I use the IDR 5 billion DI coverage era as the base instead of the blanket guarantee era. The results show that *DCOV_1B*, *DCOV_100M*, and *DCOV_2B* are still positive and statistically significant, which suggest that compared to the IDR 5 billion DI coverage era, *ZSCORE*s in these eras with lower DI coverage are higher. This finding is still consistent with the moral hazard hypothesis. I am aware of a concern that the DI coverage indicators capture some variations in bank regulation. To address this concern, I run regressions on a subsample period when there are no material changes in bank regulation (2006:Q1-2010:Q4), based on the World Bank surveys on bank regulation (Barth, Caprio, and Levine, 2013). The results are shown in column (2) of Panel B, and they are still consistent with

[22] Too-Big-To-Fail (TBTF) banks defined as 15 largest banks by GTA.

our main findings. Next, I run placebo regressions by forwarding all DI coverage era time period by 3 years, as shown in column (3), and backwarding all DI coverage era time period by 3 years, as shown in column (4). The results show that none of the DI coverage era indicators are statistically significant, which confirms further the internal validity of our DI coverage measures.

Panel C shows the robustness check results by substituting *LNZSCORE* with alternative measures of bank-risk taking. I use three different measures of bank-risk, i.e. Standard Deviation of ROE (*SDROE*), Nonperforming Loans ratio (*NPL/TL*), and Nonperforming Assets ratio (*NPA/GTA*). The higher values of these ratios indicate higher bank risk. As we can see from the table, compared to the blanket guarantee era, we observe significant evidence that *SDROE*, *NPL/TL*, and *NPA/GTA* are lower during the limited DI coverage eras.

Finally, Panel D shows the robustness check results by expanding the transition period era to become 2003:Q1-2005:Q2.[23] I choose 2003:Q1 as the beginning of the extended transition period as the earliest news I find from Factiva about the phasing out of DI coverage up to IDR 100 million dated at January 30, 2003. As *LN ZSCORE* and *SD ROE* are calculated over 4 quarters, these measures start in 2002:Q4 and therefore, cannot be used in this extended transition regression setting. Therefore, we use NPL/TL and NPA/GTA as the bank risk measures. This setting aims to address the concern that banks might anticipate the phasing out of DI coverage enacted in Law No. 24/2004. If this concern is valid, we would observe changes in bank-risk taking over this extended transition period, compared to the blanket guarantee era. Our results show that none of the *DCOV_TR_E* is statistically significant, suggesting that the concern on early anticipation by banks does not confound our main findings.

[23] The formal transition era according to the Law No. 24/2004 is from 2004:Q3 - 2005:Q2.

5.4. Channels in which Deposit Insurance Coverage affects Bank Risk-Taking

Table 5 presents the regression results of DI coverage indicators on *LNZSCORE*'s components. The table shows that compared to the blanket guarantee era, bank profitability (*MU ROA*) is lower. However, this impact is countered by the increase in bank capitalization (*MU EQ/GTA*) and decrease in standard deviation of profitability (*SD ROA*).

5.5. Optimum Range of Deposit Insurance Coverage

Panel A of Table 6 presents the regression estimates of *LN ZSCORE, SD ROE, NPL/Tl*, and *NPA/GTA* on DI coverage indicator variables, controlling for bank-specific, macroeconomic, and bank regulation variables, using the IDR 1 billion coverage period (*DCOV_1B*) as the base. This strategy enables us to estimate the coefficient of DI coverage that is lower or higher than the base's coverage. The results show that compared to the IDR 1 billion coverage period, DI coverage at IDR 5 billion or more generous is associated with lower LNZSCORE, higher SDROE, higher NPL/TL, and higher NPA/GTA. This is in line with the moral hazard hypothesis. Meanwhile, at the IDR 2 billion coverage era, none of the *LNZSCORE, SD ROE, NPL/TL*, or *NPA/GTA* is statistically different than the IDR 1 billion coverage era. However, at the IDR 100 million coverage era, NPA/GTA becomes statistically higher than at the IDR 1 billion coverage era. This finding aligns with the safety net hypothesis. Therefore, the results show some evidence that the relation between DI coverage and bank-risk taking might be non-monotonic, suggesting that there is an optimum range of explicit DI coverage that sufficiently protects the depositors while curbing the banks' moral hazard problem (e.g. Angkinand and Wihlborg, 2010). In the case of Indonesia, this range might occur between IDR 1–2 billion. The

results are robust when I estimate the regressions using the subsample period when there are no material changes in bank regulation (2006:Q1-2010:Q4), as shown in Panel B of Table 6.[24]

5.6. Ownership Structure, Deposit Insurance Coverage, and Bank Risk-Taking

Table 7 presents the regression results of *LN ZSCORE* on DI coverage indicators and ownership variables for different type of ultimate shareholders, controlling for bank-specific, macroeconomic, and bank regulation variables. In general, Panel A show some evidence that the impact of explicit DI coverage on bank risk is different across different kinds of ultimate owners. In particular, family banks and politically connected banks are those that are most affected when the government switched from the blanket guarantee era to the limited deposit insurance era, suggesting that the moral hazard problem in these banks are more prominent compared to foreign banks and nonpolitically connected banks. However, Panel B shows some evidence that foreign banks seem to increase their risk taking in response to the recent increase in DI coverage from IDR100 million to IDR 2 billion, especially those that are politically connected.

6. Conclusion

This paper examines the impact of DI coverage on bank risk taking and how ownership structure affects this relation. Using a natural experiment of DI coverage changes in Indonesia from 2002:Q1-2011:Q4, I find a significant positive relation between explicit DI coverage and bank risk-taking, consistent with the moral hazard hypothesis. More specifically, controlling for various bank-specific and macroeconomic variables, as well as bank regulations, I find that Indonesian banks' *Z-SCORE*, an inverse measure of bank risk taking, increases on average about

[24] The timing of subsample period when Indonesia does not experience material changes in bank regulation is based on the data provided in the *World Bank surveys on bank regulation* (Barth, Caprio, and Levine, 2013).

19% when the government switched from the blanket guarantee era to the limited deposit insurance era. The reduction in bank risk-taking is mainly due to lower standard deviation of profitability and higher capitalization.

Next, I find some evidence that the relation is non-monotonic at the low level of explicit DI coverage, in line with the safety net hypothesis. This finding suggests that there is an optimum range of explicit DI coverage that sufficiently protects the depositors while curbing the banks' moral hazard problem. Finally, I find significant evidence that the impact of explicit DI coverage on bank risk is different across different kinds of ultimate owners. In particular, family banks and politically connected banks are those that are most affected when the government switched from the blanket guarantee era to the limited deposit insurance era, suggesting that the moral hazard problem in these banks are more prominent compared to foreign banks and nonpolitically connected banks. However, I also find some evidence that foreign banks increase their risk taking in response to the recent increase in DI coverage, especially those that are politically connected.

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Table 1. Summary Statistics

This table presents the variable names, definitions, and summary statistics of all variables used in this paper. The sample covers all Indonesian commercial banks from 2002:Q1-2011:Q4. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator.

Variable	Definition	N	Mean	St. Dev	P25	P50	P75
Main Bank Risk Measure:							
LN ZSCORE	A log inverse measure of bank *Z-score*. Calculated as *Ln (1+abs(minZscore)+Zscore)* .	3971	3.575	0.617	3.114	3.472	3.933
ZSCORE	An inverse measure of overall bank risk, calculated as $\frac{\mu(ROA)+\mu(EQ/GTA)}{\sigma(ROA)}$, where mean ($\mu$) and standard deviation (σ) are calculated over 4 quarters from time $t-3$ to time t. Gross Total Assets (GTA) are defined as bank total assets plus allowance for loans losses, following Berger and Bouwman (2013).	3971	31.635	47.759	8.921	18.610	37.456
Components of the Main Bank Risk Measure:							
MU ROA(%)	Mean of Return on Assets (Net Income/GTA), calculated from time $t-3$ to time t.	3971	1.733	1.557	0.822	1.626	2.664
SD ROA(%)	Standard deviation of ROA, calculated from time $t-3$ to time t.	3971	1.119	1.071	0.383	0.760	1.466
MU EQ/GTA(%)	Mean of Equity/GTA, calculated from time time $t-3$ to time t.	3971	13.591	8.860	8.187	10.872	16.565
Alternative Bank Risk Measures							
SD ROE (%)	Standard deviation of Return on Equity (Net Income/Total Equity), calculated over 4 quarters from time $t-3$ to time t.	3971	11.629	14.924	2.916	6.230	13.673
NPL/TL (%)	Nonperforming Loans/Total Loans	4445	4.169	5.152	1.271	2.651	4.691
NPA/GTA (%)	Nonperforming Assets/GTA	4445	2.455	2.996	0.684	1.513	2.902
Deposit Insurance Coverage:							
DCOV_TR	An indicator variable equals to 1 from 2004:Q3 - 2005:Q2, and 0 otherwise. This variable is an indicator of the transition period from the blanket guarantee era to the limited deposit insurance era, which started from the enactment date of an explicit deposit insurance (Law Number 24 Year 2004) until the effective date.	3971	0.122	0.327	0	0	0

(Continued)

Table 1—*Continued*

Variable	Definition	N	Mean	St. Dev	P25	P50	P75
DCOV_FG	An indicator variable equals to 1 from 2005:Q3 - 2005:Q4, and 0 otherwise. This variable is an indicator of the full deposits guarantee period, when the government terminated the guarantee on bank liabilities other than deposits and off-balance sheet items. In this period, all deposits were still guaranteed by the government through the Indonesian Deposit Insurance Corporation (IDIC).	3971	0.059	0.236	0	0	0
DCOV_5B	An indicator variable equals to 1 from 2006:Q1 – 2006:Q2, and 0 otherwise. This variable is an indicator of the period when the government started to set a nominal maximum limit on deposit guarantee (an explicit deposit insurance coverage), which was IDR 5 billion.	3971	0.062	0.242	0	0	0
DCOV_1B	An indicator variable equals to 1 from 2006:Q3 - 2006:Q4, and 0 otherwise. This variable is an indicator of the next phase out period when the government reduced the explicit deposit insurance coverage from IDR 5 billion to IDR 1 billion.	3971	0.052	0.223	0	0	0
DCOV_100M	An indicator variable equals to 1 from 2007:Q1 - 2008:Q3, and 0 otherwise. This variable is an indicator of the final phase out period, when the government reduced the explicit deposit insurance coverage from IDR 1 billion to IDR 100 million.	3971	0.193	0.395	0	0	0
DCOV_2B	An indicator variable equals to 1 from 2008:Q4 - 2011:Q4, and 0 otherwise. This variable is an indicator of the period when the government increases the explicit deposit insurance coverage from IDR 100 million to IDR 2 billion, following many other countries' responses to the recent global financial crisis.	3971	0.316	0.465	0	0	1
Bank Ownership Structure:							
MANCF (%)	The cash flow right of bank manager if the manager is one of the ultimate owners. Ultimate owners are defined as the top owners in the bank's ownership structure that have at least 10% voting rights, following Laeven and Levine (2009).	3927	6.210	19.185	0	0	0
UCASH (%)	The largest ultimate owner's cash flow right.	3927	72.255	28.240	48.53	80	99.8
WEDGE (%)	The wedge between cash flow right and voting right of the largest ultimate owner.	3927	0.447	2.822	0	0	0

(Continued)

Table 1—*Continued*

Variable	Definition	N	Mean	St. Dev	P25	P50	P75
Bank Ownership Types:							
UFAMILY	An indicator variable equals to 1 if the largest ultimate shareholder is a family or a family-based business group, and 0 otherwise.	3927	0.315	0.464	0	0	1
UFOREIGN	An indicator variable equals to 1 if the largest ultimate shareholder is a foreign institution, and 0 otherwise.	3927	0.326	0.469	0	0	1
POLCON	An indicator variable equals to 1 if the bank is a private politically connected bank, and 0 otherwise. I follow Nys, Tarazi, and Trinugroho (2015) to define a politically connected bank as a bank with at least one of the commissioners, directors, or controlling shareholders is a current of former political party member, parliament member, or government official.	3927	0.280	0.449	0	0	1
CSOB	An indicator variable equals to 1 if the bank is ultimately owned by the central (national) government, and 0 otherwise.	3927	0.036	0.187	0	0	0
RSOB	An indicator variable equals to 1 if the bank is ultimately owned by the regional (province) government, and 0 otherwise.	3927	0.199	0.399	0	0	0
Bank Nonfinancial Controls:							
LISTED	An indicator variable equals to 1 if a bank is publicly listed in a stock exchange, or is owned by a Bank Holding Company that is publicly listed in a stock exchange, and 0 otherwise.	3971	0.374	0.484	0	0	1
BHC	An indicator variable equals to 1 if a bank is a part of a Bank Holding Company, and 0 otherwise.	3971	0.077	0.266	0	0	0
BIGAUD	An indicator variable equals to 1 if a bank's auditor is one of the big four accounting firms, and 0 otherwise. The big four accounting firms are Ernst and Young (EY), Pricewaterhouse Coopers (PwC), KPMG, and Deloitte.	3971	0.154	0.361	0	0	0
Bank Financial Controls:							
OHRGTA (%)	Overhead ratio/GTA.	3971	4.801	4.972	3.080	4.269	5.718
NDEPGTA (%)	Nondeposits funding/GTA.	3971	1.389	3.317	0.000	0.000	1.089
IDIV (%)	Income diversification ratio, calculated as $1 - \left\lvert \frac{\text{Net Interest Income-Other Operating Income}}{\text{Total Operating Income}} \right\rvert$, following Laeven and Levine (2007)	3971	18.653	24.053	1.845	7.466	27.509

(Continued)

Table 1—*Continued*

Variable	Definition	N	Mean	St. Dev	P25	P50	P75
FAGTA (%)	Fixed assets/GTA	3971	3.484	3.375	1.518	2.562	4.116
LOANGTA (%)	Total Loans/GTA	3971	51.710	18.566	39.533	53.757	66.650
LRGTA (%)	Log natural of real Gross Total Assets	3971	7.279	1.802	5.948	7.173	8.536
RGTA (bil. IDR)	Real Gross Total Assets, calculated as bank total assets plus allowance for loans losses, following Berger and Bouwman (2013).	3971	7,713	21,549	383	1,304	5,093
Bank Competition Control:							
LERNER	Lerner Index, a measure of bank market power, calculated as $(P_{GTA} - MC_{GTA})/P_{GTA}$, where P_{GTA} is the price of *GTA* proxied by the ratio of total revenues to *GTA*, and MC_{GTA} is the marginal cost of *GTA* measured as the first derivative of the following translog cost function (Berger, Klapper, and Turk-Ariss, 2009): $lnCost_{it} = \beta_0 + \beta_1 lnQ_{it} + \frac{\beta_2}{2} lnQ_{it}^2 + \sum_{k=1}^{3} \gamma_{kt} lnW_{k,it} + \sum_{k=1}^{3} \phi_k lnQ_{it} lnW_{k,it} + \sum_{k=1}^{3}\sum_{j=1}^{3} lnW_{k,it} lnW_{j,it} + \varepsilon_{it}$ where Q_{it} is bank output proxied by GTA, $W_1$is the input price of labor (the ratio of personnel expense to GTA), W_2 is the input price of fund (the ratio of interest expense to total deposits), W_3 is the input price of fixed capital (the ratio of other operating and administrative expenses to total assets), and ε is the error term. I winsorize $W_{1,2,3}$ at 3% level on top and bottom instead of 1% level as the latter still leave considerable numbers of outliers.	3971	0.542	0.149	0.471	0.551	0.627
Macroeconomic Controls:							
EGROWTH (%)	Quarterly GDP growth	3971	5.394	0.909	4.560	5.551	6.055
DIRATE (%)	Deposit insurance rate	3971	9.735	3.052	7.187	8.538	11.667
Bank Regulation Controls:							
LN NBREG	Log natural of new bank regulations	3971	1.468	0.735	0.693	1.386	2.079
NBREG	Number of new bank regulations	3971	4.507	3.549	1	3	7
CRBREG	Equals to 1 on 2011:Q1 onward, and 0 otherwise. This is an indicator variable of the period when the government enacts a new package of monetary and bank regulations post the global financial crisis. This new regulation package is the largest since the 1998 Asian financial crisis.	3971	0.101	0.302	0	0	0

Table 2. Correlation between Independent Variables

This table presents the pairwise correlation between independent variables in each group of variable used in this paper as the right-hand side variables. The sample covers all Indonesian commercial banks from 2002:Q1-2011:Q4. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator.

Panel A. Deposit Insurance Coverage Indicators

	DCOV_TR	*DCOV_FG*	*DCOV_5B*	*DCOV_1B*	*DCOV_100M*	*DCOV_2B*
DCOV_TR	1					
DCOV_FG	-0.094***	1				
DCOV_5B	-0.096***	-0.065***	1			
DCOV_1B	-0.088***	-0.059***	-0.061***	1		
DCOV_100M	-0.182***	-0.123***	-0.126***	-0.115***	1	
DCOV_2B	-0.253***	-0.171***	-0.175***	-0.160***	-0.332***	1

Panel B. Bank Nonfinancial and Financial Characteristics

	LISTED	*BHC*	*BIGAUD*	*OHRGTA*	*NDEPGTA*	*IDIV*	*FAGTA*	*LOANGTA*	*LRGTA*	*LERNER*
LISTED	1									
BHC	0.357***	1								
BIGAUD	0.421***	0.112***	1							
OHRGTA	-0.078***	0.003	-0.047***	1						
NDEPGTA	0.105***	-0.021	0.110***	-0.051***	1					
IDIV	0.325***	0.325***	0.181***	-0.064***	0.060***	1				
FAGTA	-0.158***	-0.133***	-0.056***	0.278***	-0.117***	-0.241***	1			
LOANGTA	-0.061***	-0.160***	-0.037**	0.059***	0.030*	-0.128***	0.007	1		
LRGTA	0.526***	0.299***	0.470***	-0.135***	0.236***	0.358***	-0.432***	-0.047***	1	
LERNER	-0.188***	0.005	-0.102***	-0.370***	-0.053***	0.055***	-0.224***	-0.006	-0.036**	1

Panel C. Macroeconomic and Bank Regulation Variables

	EGROWTH	*DIRATE*	*LN NBREG*	*CRBREG*
EGROWTH	1			
DIRATE	-0.424***	1		
LN NBREG	0.165***	-0.440***	1	
CRBREG	0.308***	-0.301***	-0.198***	1

Panel D. Bank Ownership Structure Variables

	MANCF	*UCASH*	*WEDGE*
MANCF	1		
UCASH	-0.138***	1	
WEDGE	0.006	-0.158***	1

Table 3. Deposit Insurance Coverage and Bank Risk-Taking

This table presents the OLS regression estimates of *LN ZSCORE* on deposit insurance coverage indicator variables, controlling for bank-specific, macroeconomic, and bank regulation variables. Columns (1) to (7) differ in the control variables included. All columns control for bank fixed effects except for column (1). The sample covers all Indonesian commercial banks from 2002:Q1-2011:Q4. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator. All control variables are lagged at time $t-4$. Standard errors are clustered at the bank level. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are t-statistics.

	Dependent variable: *LN ZSCORE*						
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DCOV_TR	0.038	0.035	0.033	0.032	0.015	0.010	0.023
	(1.071)	(0.978)	(0.894)	(0.891)	(0.410)	(0.200)	(0.462)
DCOV_FG	0.077*	0.071	0.069	0.079*	0.059	-0.023	0.022
	(1.684)	(1.544)	(1.433)	(1.682)	(1.225)	(-0.380)	(0.381)
DCOV_5B	0.094**	0.095**	0.090**	0.099**	0.083*	-0.005	0.036
	(2.175)	(2.192)	(1.999)	(2.186)	(1.772)	(-0.083)	(0.613)
DCOV_1B	0.268***	0.252***	0.250***	0.265***	0.248***	0.192***	0.209***
	(5.123)	(4.961)	(4.782)	(5.047)	(4.772)	(3.234)	(3.484)
DCOV_100M	0.272***	0.262***	0.250***	0.254***	0.242***	0.160***	0.196***
	(5.699)	(5.454)	(5.050)	(5.055)	(4.873)	(2.772)	(3.461)
DCOV_2B	0.268***	0.241***	0.221***	0.227***	0.217***	0.148**	0.131**
	(5.648)	(5.179)	(4.592)	(4.555)	(4.354)	(2.548)	(2.150)
LISTED			0.091	0.028	0.025	0.015	0.011
			(0.691)	(0.211)	(0.190)	(0.111)	(0.077)
BHC			0.109	0.126	0.113	0.109	0.086
			(0.839)	(0.970)	(0.877)	(0.857)	(0.676)
BIGAUD			0.150***	0.162***	0.169***	0.164***	0.172***
			(2.719)	(2.634)	(2.807)	(2.712)	(2.852)
OHRGTA				-0.004**	-0.002	-0.002	-0.002
				(-2.341)	(-1.083)	(-1.332)	(-1.241)
NDEPGTA				-0.009*	-0.009*	-0.009*	-0.008*
				(-1.846)	(-1.843)	(-1.879)	(-1.665)
IDIV				-0.002***	-0.002***	-0.002***	-0.002***
				(-3.290)	(-3.541)	(-3.564)	(-4.007)
FAGTA				0.014	0.017	0.018	0.022*
				(1.205)	(1.373)	(1.436)	(1.769)
LOANGTA				-0.001	-0.001	-0.001	-0.001
				(-0.533)	(-0.507)	(-0.534)	(-0.434)
LRGTA				0.507**	0.497**	0.497**	0.543***
				(2.561)	(2.499)	(2.477)	(2.695)
LRGTA SQ				-0.035**	-0.034**	-0.035**	-0.038**
				(-2.368)	(-2.262)	(-2.294)	(-2.511)
LERNER					0.250**	0.250***	0.302***
					(2.565)	(2.627)	(3.066)
EGROWTH						0.054***	0.037**
						(4.230)	(2.602)
DIRATE						-0.003	0.002
						(-0.387)	(0.303)
LN NBREG							0.007
							(0.817)
CRBREG							0.176***
							(3.080)
Constant	3.403***	3.415***	3.364***	1.731**	1.588**	1.413*	1.234*
	(82.352)	(119.401)	(64.116)	(2.560)	(2.363)	(1.945)	(1.695)
Bank Fixed Effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,241	4,241	4,066	4,020	3,977	3,977	3,971
R-squared	0.038	0.480	0.483	0.491	0.492	0.496	0.501
N-clusters (bank)	137	137	134	134	134	134	134

Table 4. Robustness Checks

This table presents a variety of robustness checks on how deposit insurance coverage affects bank risk-taking, controlling for bank-specific, macroeconomic, and bank regulation variables. **Panel A** column (1) excludes all banks owned by the central (national) government, column (2) excludes all banks owned by central and regional (province) governments, column (3) excludes Too-Big-To-Fail (TBTF) banks defined as 15 largest banks by GTA, column (4) clusters standard errors in two-way at the bank and quarter levels, column (5) controls for bank random effects instead of fixed effects, and column (6) add time trend and its squared term as additional controls. **Panel B** column (1) starts the sample period in 2006:Q1, excluding the blanket guarantee, transition, and full deposits guarantee periods, column (2) estimates the regression on the subsample period when there are no material changes in bank regulation (2006:Q1-2010:Q4), based on the World Bank surveys on bank regulation (Barth, Caprio, and Levine, 2013), column (3) conducts a placebo test by using all deposit insurance coverage indicators forwarded by 3 years, and column (4) conducts a placebo test by using all deposit insurance coverage indicators backwarded by 3 years. The base period used in Panel B is 2006:Q1 – 2006:Q2, i.e. when the government started to set a nominal maximum limit on deposit guarantee (an explicit deposit insurance coverage), which was IDR 5 billion. **Panel C** conduct robustness checks using alternative risk measures as follows: standard deviation of *ROE* over 4 quarters (*SDROE*), the ratio of nonperforming loans to total loans (*NPL/TL*), and the ratio of nonperforming assets to GTA (*NPA/GTA*). **Panel D** conducts robustness checks by extending the transition period from 2003:Q1-2005:Q2. I choose 2003:Q1 as the beginning of the extended transition period as the earliest news I find from Factiva about the phasing out of deposit insurance coverage up to IDR 100 million dated at January 30, 2003. As *LN ZSCORE* and *SD ROE* are calculated over 4 quarters, these measures start in 2002:Q4 and therefore, cannot be used in this extended transition regression setting. The sample covers all Indonesian commercial banks for the sample period mentioned in each panel. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator. All control variables are lagged at time $t-4$ if the dependent variable is measured over 4 quarters from time $t-3$ to t, and lagged at time $t-1$ if the dependent variable is measured at time t. Standard errors are clustered at the bank level. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are t-statistics.

Panel A. Robustness Checks

	Dependent variables: *LN ZSCORE*					
Independent variables:	Excluding CSOBs (1)	Excluding CSOBs and RSOBs (2)	Excluding TBTF Banks (3)	Two-way Cluster (4)	Random Effect (5)	Controlling Time Trend (6)
DCOV_TR	0.028	0.019	0.041	0.023	0.017	0.016
	(0.562)	(0.316)	(0.762)	(0.504)	(0.338)	(0.339)
DCOV_FG	0.030	0.015	0.055	0.022	0.014	0.056
	(0.530)	(0.223)	(0.911)	(0.445)	(0.256)	(0.818)
DCOV_5B	0.048	0.047	0.058	0.036	0.022	0.099
	(0.834)	(0.691)	(0.940)	(0.759)	(0.387)	(1.299)
DCOV_1B	0.218***	0.244***	0.199***	0.209***	0.194***	0.342***
	(3.552)	(3.339)	(3.108)	(4.371)	(3.319)	(3.611)
DCOV_100M	0.189***	0.204***	0.167***	0.196***	0.184***	0.384***
	(3.262)	(2.945)	(2.718)	(3.811)	(3.328)	(3.272)
DCOV_2B	0.112*	0.099	0.139**	0.131**	0.127**	0.368***
	(1.786)	(1.337)	(2.084)	(2.176)	(2.131)	(2.622)
TIME TREND						-0.021
						(-1.285)
TIME TREND SQ						0.000
						(0.677)
Bank nonfinancial controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	No	Yes
Bank Random Effects	No	No	No	No	Yes	No
Observations	3,829	3,048	3,455	3,971	3,971	3,971
R-squared	0.509	0.495	0.513	0.501	0.110	0.501
N-clusters (bank)	130	105	122	134	134	134
N-clusters (quarter)				36		

Panel B. Robustness Checks

	Dependent variables: *LN ZSCORE*			
Independent variables:	Baseline: 2006:Q1-2011:Q4 (1)	Subsample of when no material changes in bank regulation: 2006:Q1-2010:Q4 (2)	Placebo: 3 Years Forward (2009:Q1-2011:Q4) (3)	Placebo: 3 Years Backward (2003:Q1-2005:Q4) (4)
DCOV_1B	0.162***	0.171***	-0.019	-0.021
	(3.626)	(3.738)	(-0.459)	(-0.308)
DCOV_100M	0.113**	0.121**	-0.050	-0.073
	(2.180)	(2.203)	(-0.590)	(-0.761)
DCOV_2B	0.088*	0.109*	-0.006	-0.059
	(1.724)	(1.954)	(-0.068)	(-0.340)
Bank nonfinancial controls	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,479	2,076	1,145	1,492
R-squared	0.541	0.577	0.609	0.621
N-clusters (bank)	126	126	115	133

Panel C. Robustness Checks

	Dependent variable:			
	LN ZSCORE	*SD ROE*	*NPL/TL*	*NPA/GTA*
Independent variables:	(1)	(2)	(3)	(4)
DCOV_TR	0.023	-1.172	-0.308	-0.088
	(0.462)	(-0.794)	(-0.957)	(-0.608)
DCOV_FG	0.022	-1.829	-0.615	-0.247
	(0.381)	(-1.117)	(-1.323)	(-1.046)
DCOV_5B	0.036	-1.832	-1.437***	-0.605**
	(0.613)	(-1.303)	(-2.669)	(-2.315)
DCOV_1B	0.209***	-3.067**	-1.592***	-0.604**
	(3.484)	(-2.048)	(-2.703)	(-2.008)
DCOV_100M	0.196***	-4.015**	-1.425***	-0.058
	(3.461)	(-2.134)	(-2.772)	(-0.181)
DCOV_2B	0.131**	-3.007*	-1.842***	-0.400
	(2.150)	(-1.721)	(-3.106)	(-1.086)
Bank nonfinancial controls	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	3,971	3,971	4,445	4,445
R-squared	0.501	0.514	0.490	0.524
N-clusters (bank)	134	134	137	137

Panel D. Robustness Checks

	Dependent variables:	
	NPL/TL	NPA/GTA
Independent variables:	(1)	(2)
DCOV_TR_E	-0.632	-0.266
	(-1.601)	(-1.261)
DCOV_FG	-1.069**	-0.464*
	(-2.368)	(-1.813)
DCOV_5B	-1.749***	-0.747***
	(-3.353)	(-2.725)
DCOV_1B	-1.957***	-0.771**
	(-3.438)	(-2.415)
DCOV_100M	-1.842***	-0.258
	(-3.688)	(-0.736)
DCOV_2B	-2.317***	-0.622
	(-3.946)	(-1.533)
Bank nonfinancial controls	Yes	Yes
Bank financial controls	Yes	Yes
Bank competition control	Yes	Yes
Macroeconomic controls	Yes	Yes
Bank regulation controls	Yes	Yes
Bank FE	Yes	Yes
Observations	4,447	4,445
R-squared	0.490	0.524
N-clusters (bank)	138	137

Table 5. Channels in which Deposit Insurance Coverage affects Bank Risk-Taking

This table presents the OLS regression estimates of *LN ZSCORE's* components on deposit insurance coverage indicator variables, controlling for bank-specific, macroeconomic, and bank regulation variables. Column (1) is the baseline regression using *LN ZSCORE* as the dependent variable, the same with column (7) of Table 3. Column (2), (3), and (4) use the mean profitability (*MU ROA*), standard deviation of profitability (*SD ROA*), and mean capitalization (*MU EQ/GTA*) as the dependent variable respectively. The sample covers all Indonesian commercial banks from 2002:Q1-2011:Q4. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator. All control variables are lagged at time $t-4$. Standard errors are clustered at the bank level. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are t-statistics.

	Dependent variables:			
	Baseline	*LN ZSCORE* components:		
	LN ZSCORE	*MU ROA*	*SD ROA*	*MU EQ/GTA*
Independent variables:	(1)	(2)	(3)	(4)
DCOV_TR	0.023	0.107	-0.140	-0.475
	(0.462)	(0.853)	(-1.304)	(-1.594)
DCOV_FG	0.022	-0.217*	-0.252**	-0.528
	(0.381)	(-1.657)	(-1.998)	(-1.247)
DCOV_5B	0.036	-0.360**	-0.380***	-0.300
	(0.613)	(-2.144)	(-3.066)	(-0.594)
DCOV_1B	0.209***	-0.294*	-0.481***	1.046**
	(3.484)	(-1.894)	(-3.974)	(1.982)
DCOV_100M	0.196***	-0.327***	-0.363***	1.951***
	(3.461)	(-2.781)	(-2.740)	(3.837)
DCOV_2B	0.131**	-0.445***	-0.209	3.576***
	(2.150)	(-2.717)	(-1.465)	(4.752)
Bank nonfinancial controls	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	3,971	3,971	3,971	3,971
R-squared	0.501	0.666	0.451	0.844
N-clusters (bank)	134	134	134	134

Table 6. Optimum Range of Deposit Insurance Coverage

This table presents the OLS regression estimates of *LN ZSCORE, SD ROE, NPL/Tl,* and *NPA/GTA* on deposit insurance coverage indicator variables, controlling for bank-specific, macroeconomic, and bank regulation variables, using the IDR 1 billion coverage period (*DCOV_1B*) as the base. This strategy enables us to estimate the coefficient of deposit insurance coverage that is lower or higher than the base's coverage. **Panel A** estimates the regressions on the full sample from 2002:Q1-2011:Q4. **Panel B** estimates the regressions on the subsample period when there are no material changes in bank regulation (2006:Q1-2010:Q4), based on the World Bank surveys on bank regulation (Barth, Caprio, and Levine, 2013). All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator. All control variables are lagged at time $t-4$. Standard errors are clustered at the bank level. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are t-statistics.

Panel A. Full Sample Regressions using *DCOV_1B* as the Base

	Dependent variables:			
	LN ZSCORE	*SD ROE*	*NPL/TL*	*NPA/GTA*
Independent variables:	(1)	(2)	(3)	(4)
DCOV_BG	-0.195***	2.386**	1.492***	0.575**
	(-4.208)	(2.273)	(2.795)	(2.064)
DCOV_FG	-0.191***	1.453	1.065***	0.381*
	(-3.649)	(1.631)	(2.964)	(1.739)
DCOV_5B	-0.178***	1.513*	0.138	-0.007
	(-3.943)	(1.839)	(0.668)	(-0.057)
DCOV_100M	-0.011	-1.059	0.248	0.569**
	(-0.306)	(-1.103)	(0.650)	(2.167)
DCOV_2B	-0.081	0.230	-0.183	0.223
	(-1.566)	(0.230)	(-0.351)	(0.679)
Bank nonfinancial controls	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	3,971	3,971	4,445	4,445
R-squared	0.501	0.514	0.490	0.524
N-clusters (bank)	134	134	137	137

Panel B. Regressions on the Subsample Period from 2006:Q1-2010:Q4 using *DCOV_1B* as the Base

	Dependent variables:			
	LN ZSCORE	*SD ROE*	*NPL/TL*	*NPA/GTA*
Independent variables:	(1)	(2)	(3)	(4)
DCOV_5B	-0.171***	2.153***	0.054	-0.093
	(-3.738)	(3.241)	(0.240)	(-0.710)
DCOV_100M	-0.050	-0.004	-0.239	0.626**
	(-1.385)	(-0.004)	(-0.783)	(2.217)
DCOV_2B	-0.063	0.182	-0.513	0.414
	(-1.209)	(0.158)	(-1.475)	(1.397)
Bank nonfinancial controls	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	2,076	2,076	2,202	2,202
R-squared	0.577	0.599	0.634	0.660
N-clusters (bank)	126	126	125	125

Table 7. Ownership Structure, Deposit Insurance Coverage, and Bank Risk-Taking

This table presents the OLS regression estimates of *LN ZSCORE* on deposit insurance coverage indicators and ownership variables for different type of ultimate shareholders, controlling for bank-specific, macroeconomic, and bank regulation variables. **Panel A** estimates the regressions on the full sample from 2002:Q1-2011:Q4. **Panel B** estimates the regressions on the subsample period from 2007:Q1-2011:Q4, so that we can focus on the impact of the latest increase in deposit insurance coverage from IDR 1 million to 20 billion. The government advocated the policy as a precautionary measure against the global financial crisis, following many other countries' similar responses. Column (1) shows the baseline regression estimates using all Indonesian commercial banks. Column (2) shows the regression estimates using the subsample of banks owned ultimately by foreign institutions. Column (3) shows the regression estimates using the subsample of banks owned ultimately by families or family-based business groups. Column (4) shows the regression estimates using the subsample of private banks with at least one of the commissioners, directors, or controlling shareholders is a current of former political party member, parliament member, or government official. Column (5) shows the regression estimates using the subsample of private banks that are not politically connected. Column (6) shows the regression estimates using the subsample of banks owned ultimately by foreign institutions that have political connections. Column (7) shows the regression estimates using the subsample of banks owned ultimately by families or family-based business groups that have political connections. All financial ratios are winsorized at 1% level at the top and bottom, unless specified differently. All level financial variables are denominated in billions of Indonesian Rupiah (IDR), deflated using the year 2000 implicit GDP price deflator. All control variables are lagged at time $t-4$. Standard errors are clustered at the bank level. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are t-statistics.

Panel A. Regression Estimates on the Full Sample from 2002:Q1-2011:Q4

	Dependent variable: *LN ZSCORE*						
Independent variables:	*ALL BANKS* (1)	*UFOREIGN* (2)	*UFAMILY* (3)	*POLCON* (4)	*NON POLCON* (5)	*UFOREIGN * POLCON* (6)	*UFAMILY * POLCON* (7)
DCOV_TR	0.025	0.083	-0.014	-0.007	0.021	-0.002	0.129
	(0.494)	(0.854)	(-0.146)	(-0.075)	(0.289)	(-0.013)	(1.023)
DCOV_FG	0.027	-0.064	0.078	0.073	-0.014	-0.130	0.243
	(0.455)	(-0.659)	(0.681)	(0.557)	(-0.176)	(-0.614)	(1.660)
DCOV_5B	0.046	0.061	0.109	0.157	-0.004	0.096	0.377**
	(0.774)	(0.636)	(1.076)	(1.132)	(-0.053)	(0.415)	(2.718)
DCOV_1B	0.214***	0.241**	0.340***	0.374**	0.179**	0.647**	0.618**
	(3.500)	(2.333)	(2.732)	(2.333)	(2.294)	(2.588)	(2.665)
DCOV_100M	0.208***	0.150	0.229**	0.351**	0.131*	0.515**	0.369**
	(3.509)	(1.541)	(2.211)	(2.500)	(1.724)	(2.294)	(2.127)
DCOV_2B	0.141**	0.017	0.211**	0.145	0.105	0.173	0.318**
	(2.133)	(0.143)	(2.021)	(1.009)	(1.086)	(0.617)	(2.226)
MANCF	-0.002	-0.009***	-0.002	-0.005**	0.001	-0.006	-0.004
	(-1.592)	(-2.692)	(-1.326)	(-2.551)	(0.335)	(-1.076)	(-1.624)
UCASH	-0.002	-0.002	-0.000	-0.001	-0.000	-0.003*	0.000
	(-1.544)	(-1.396)	(-0.157)	(-0.353)	(-0.297)	(-1.826)	(0.154)
WEDGE	-0.008	-0.019	-0.012***	-0.010	-0.003	-0.051***	-0.021**
	(-1.209)	(-1.270)	(-3.037)	(-0.524)	(-0.648)	(-5.506)	(-2.418)
Bank nonfinancial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,927	1,279	1,238	1,101	1,942	342	539
R-squared	0.502	0.572	0.473	0.395	0.575	0.422	0.523
N-clusters (bank)	134	55	54	38	76	17	24

Panel B. Regression Estimates on the Subsample Period from 2007:Q1-2011:Q4

	Dependent variable: *LN ZSCORE*						
Independent variables:	*ALL BANKS* (1)	*UFOREIGN* (2)	*UFAMILY* (3)	*POLCON* (4)	*NON POLCON* (5)	*UFOREIGN * POLCON* (6)	*FAMILY * POLCON* (7)
DCOV_2B	-0.048	-0.149*	-0.042	-0.239***	0.006	-0.406**	-0.157
	(-1.068)	(-1.951)	(-0.456)	(-2.768)	(0.085)	(-2.759)	(-1.544)
MANCF	-0.007**	-0.011***	-0.004	-0.010	-0.004**	-0.009	-0.003
	(-2.597)	(-2.732)	(-1.187)	(-1.677)	(-2.162)	(-1.337)	(-0.617)
UCASH	-0.001	-0.001	-0.001	0.005*	-0.001	0.001	0.005
	(-0.473)	(-0.515)	(-0.315)	(1.808)	(-0.508)	(0.373)	(1.420)
WEDGE	-0.012	-0.023***	-0.017**	-0.015	-0.015***	-0.032**	-0.011
	(-1.297)	(-3.480)	(-2.129)	(-0.957)	(-3.365)	(-2.323)	(-1.130)
Bank nonfinancial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank financial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank competition control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank regulation controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,997	743	603	611	926	235	321
R-squared	0.566	0.608	0.552	0.445	0.664	0.395	0.578
N-clusters (bank)	123	49	45	37	65	17	24