Deposit Insurance and Bank Liquidity: Does Ownership Structure Matter?

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INDONESIAN
CAPITAL MARKET REVIEW

Deposit Insurance and Bank Liquidity: Does Ownership Structure Matter?

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We examine how the level deposit insurance coverage affects bank liquidity. We also test the role of ownership in the relationship between deposit insurance coverage and bank liquidity. This study uses quarterly data of Indonesian banks from Q1:2002 - Q2:2008. We argue that the presence of explicit deposit insurance changes a bank's behavior in liquidity management in the form of decreasing asset liquidity. We find some evidence on the negative impact of deposit insurance coverage on bank liquidity. However, little is found on the role of ownership structure. The credibility of deposit insurance system and implicit guarantee are the main policy implications.

Introduction

As financial intermediary institutions, banks encounter maturity mismatch problem, receiving deposit in the short term but providing long-term credit. Thus a liquidity shock triggered by a number of deposits withdrawal and loan commitments drawdown can lead to a bank run, where depositors rush to withdraw their deposits because they expect the bank to fail (Diamond & Dybvig, 1983). It is therefore imperative for banks to properly manage their liquidity position, that is, to meet obligations when they come due without incurring unacceptable losses. There must be a balance between short-term assets and short-term liabilities and proper management of the liquidity of asset portfolios in response to depositors' behavior (Franck & Krausz, 2007; Sawada, 2010).

In this study, we argue that the presence of explicit deposit insurance changes a bank's behavior in liquidity management in the form of decreasing asset liquidity. We present three related reasons behind the argument. First, it is generally known that the initial objective of an adoption of banking deposit insurance is to minimize the likelihood of bank runs (Diamond & Dybvig, 1983; Pennachi, 2006). We thus argue that banks reduce their costly attention in the balancing of their liquidity. It is supported by our second reason; several studies have previously found that deposit insurance provides positive benefit for the banking system in improving financial intermediation, achieved

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[1] The views expressed in this paper are the authors' only and do not necessarily reflect those of the Indonesia Deposit Insurance Corporation

through increased deposit-taking and confidence of bank depositors (Chernykh & Cole, 2011; Diamond & Dybvig, 1983). Third, we use the risk-taking hypothesis to explain the impact of explicit deposit insurance on decreasing bank liquidity. Deposit insurance leads to excessive risk-taking by creating an incentive for banks to shift the risk to guarantors of their creditors (Angkinand & Wilhborg, 2010). Chernykh and Cole (2011) find evidence of moral hazard in deposit insurance adoption in the form of increased risk-taking, as measured by financial risk (ratio of equity to total assets) and operating risk (ratio of loans to total assets). We thus argue that the increase of loans as a risk-taking behavior would reduce bank liquidity.

The second objective of this study is to test the role of ownership[2] in the relationship between deposit insurance coverage and bank liquidity by examining the two opposing arguments. First, we attempt to address the different effects of the presence of explicit deposit insurance in state-owned banks. There are two main theories related to state-owned banks. In social or development theory, state-owned banks are found to be less profitable because their main objective is to drive the development of a country. As such, they often finance unprofitable investments. Whereas the political theory of government ownership of banks explains that state-owned banks are less profitable because they serve the interests of politicians (La Porta, López-de-Silanes, & Shleifer, 2002), thus influencing the bank behavior in the form of lending behavior (Dinc, 2005; Micco, Panizza, & Yanez, 2007). Both theories imply that state-owned banks provide more loans either in view of the development purposes or to serve political motives. Thus, with or without the presence of deposit insurance, state-owned banks incur high proportion of loans in their assets and low proportion of liquid assets. Therefore, the effect of deposit insurance on bank liquidity should be lower in state-owned banks than in other banks. Second, we examine the effect of deposit insurance on bank liquidity in foreign banks. Foreign banks have more diversified sources of liquidity (Freixas & Holthausen, 2005) and have reduced risk of aggregate liquidity shortages in emerging economies (Dinger, 2009). Because of their broad sources of funding, efficient liquidity management and excellent reputation, the presence of deposit insurance regulation would not dramatically change the behavior of foreign banks. Therefore, the effect of deposit insurance on bank liquidity should be lower in foreign banks than in other banks.

Indonesian banks are found to be suitable objects for this study as they have experienced a number of different levels of deposit insurance coverage set by the government. The existence of formal deposit insurance scheme in Indonesia was confirmed by Act No. 24 of 2004 concerning the Deposit Insurance Agency (LPS)[3], an agency which is assigned to perform banking deposit insurance (Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Nys, Tarazi, & Trinugroho, 2015)[4]. Initially, the maximum insured deposits were all deposits (blanket guarantee), then successively reduced to 5 billion Rupiah and 1 billion Rupiah. Beginning March 2007, deposits were guaranteed a maximum savings of 100 million Rupiah. Because of the financial crisis in 2008, maximum guaranteed deposits were raised to 2 billion Rupiah (Annual report of Indonesian Deposit Insurance Agency, 2009).

This paper contributes to the literature in the following ways. First, according the nature of the data, we use five dummy variables to represent each period of the changes of deposit insurance coverage. The most used measure of deposit insurance in previous studies is the dummy variable, the value of which is 1 for

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[2] We define the bank ownership based on the type of ownership. In Indonesian banking, Commercial banks, based on type of ownership, are classified into five categories, those are regional development banks, state-owned banks, foreign banks, joint venture banks and private domestic banks. However, in this study we divide into three categories state-owned banks (including regional development banks), foreign banks (including joint venture banks) and private domestic banks

[3] Before that, the Indonesian government applied the blanket guarantee scheme (BGS) for only domestic banks (Hadad et al., 2011; Nys et al., 2015) since January 1998.

[4] In the Act, it is explained that the functions of Deposit Insurance Agency (LPS) are to guarantee deposits and to actively participate in maintaining the stability of the banking system in accordance with its authority.

bank insuring deposits and 0 otherwise. Second, by using a bank's financial statement quarterly data, we can capture the more rigorous effect of the level of deposit insurance coverage on bank liquidity than by using annual data. Third, we employ difference-in-difference model to test the difference effect of deposit insurance coverage on bank liquidity between state-owned banks and non-state-owned banks and between foreign banks and non-foreign banks.

Literature Review

Our literature review commenced with the causes, definition and data of bank liquidity. Banks collect funds from surplus spending units with a certain cost and distribute it to deficit spending units by imposing a certain interest rate as the banks' earning. Other than deposit interest cost, banks also face contemporaneous transaction costs on both its assets' and its liabilities' side. Imposing these costs will lead to an interdependent relationship between assets and liabilities, which meant a change in assets will lead to a change in liabilities and vice versa (Elyasiani, Kopecky, & Hoose 1995). Liquidity refers to the ability to meet obligations when they are due without incurring unacceptable losses. The decline in the amount of deposit will cause banks to raise liquid asset, since higher liquidity of assets allows banks to liquidate more easily in a crisis. Ennis and Keister (2006) points out that a bank will choose to hold an amount of liquid reserves exactly equal to the withdrawal demand if a run does not occur. Kasyap, Rajan, and Stein (2002)[5] conclude that there is a positive correlation between transaction deposits[6] (as measured by the ratio of transaction deposit to total deposit) and (liquid assets proxied by ratio of cash plus securities to total assets and ratio of securities to total assets). Wagner (2006) explains that higher asset liquidity directly benefits stability by encouraging banks to reduce the risks on their bal-

ance sheets and by facilitating the liquidation of assets in a crisis. Sawada (2010) finds that in banking systems without deposit insurance, banks react to the liquidity shock sensitively through an increase in their cash holdings. The cash holdings are increased not by liquidating bank loans but by selling securities in the financial market.

As explained above, banks are required to maintain sufficient funding and liquid assets to accommodate such changes and funding demands as they occur from time to time. We argue that the presence of explicit deposit insurance will change a bank's behavior in liquidity management. The benefits of adopting explicit deposit insurance have been illustrated in literature. On one hand, explicit deposit insurance reduces the likelihood of bank runs as long as the guarantees remain credible. Diamond and Dybvig (1983) argue that deposit insurance enhances the stability of the financial system by reducing the risk of bank runs, raising the confidence of depositors. Pennachi (2006) explains that a bank can hedge liquidity shocks using deposit insurance. Chernykh and Cole (2011) find that the longer a bank has entered into a deposit insurance system, the greater is the deposit and ratio of deposit to assets. Thus, many studies show that deposit insurance improves the financial intermediation of banks. On the other hand, several studies provide evidence of negative impact of deposit insurance. Demirguc-Kunt and Detragiache (1997) find a pronounced positive partial correlation between explicit deposit insurance and systemic banking insolvencies. Demirguç-Kunt and Detragiache (2002) and Barth et al. (2004) find that explicit deposit insurance increases moral hazard incentives and results in increasing financial fragility, thus increasing the likelihood of banking crises. Chernykh and Cole (2011) conclude that the implementation of deposit insurance increases the bank's risk-taking behaviour, as reflected by increased financial risk (ratio of equity to

[5] They propose a simple and convincing risk-management rationale for a defining characteristic of a commercial bank, namely a financial intermediary that combines demand deposits with loan commitments and lines of credit, they build the theoretical framework in the relationship between two traditional activities of deposit-taking and lending. They conclude that there will be synergies between these two activities that require banks to hold large balances of liquid assets.

[6] Transaction deposits could sometimes expose banks to liquidity risk when consumers withdraw deposits, for their own consumption or because they have lost confidence in the banking system.

total assets) and increased operating risk (ratio of loans to total assets). Related to bank liquidity, both the mentioned benefits and costs of the adoption of deposit insurance support our argument that deposit insurance leads to decreasing liquid assets and increasing loans.

The role of state-owned banks or government banks in a banking system has been studied in several perspectives: in particular, state-owned banks in emerging countries (Micco et al., 2007). State-owned banks in emerging countries tend to be less profitable and more costly than private banks. According to social or development theories, state-owned banks are often inefficient because they play a role as an agent of development. Sometimes they are assigned to fund unprofitable government or state-owned enterprises' projects. The political theory of government ownership of banks explains that state-owned banks are less profitable because they have to serve the interest of politicians (La Porta et al., 2002). They tend to have a weak supervisory function and face quite complicated agency problems, thus influencing bank behavior in the form of lending behavior (Dinc, 2005; Micco & Panizza, 2006; Micco et al., 2007; Sapienza, 2004).

Related to the deposit insurance system in place and liquidity, it could be argued that the effect of deposit insurance on liquidity should be lower for state-owned banks for several reasons. First, those banks, especially in the context of Indonesia, are benefitted by its status as they are perceived as less risky by depositors (Nys et al., 2015). Therefore, they have a larger financing source mostly from depositors. Second, both theories explained earlier advance the proposition that state-owned banks provide more loans because they either strive for a development purpose or serve a political motive. Thus, regardless the deposit insurance system in place, state-owned banks incur high proportion of loans in their assets and low proportion of liquid assets.

It is generally accepted that foreign banks in emerging countries have positive economic impacts on the host country in terms of resources allocation and higher efficiency (Claessens, Kunt, & Huizinga, 2001; Trinugroho, Agus-

man, & Tarazi, 2014). Freixas and Holthausen (2005) find that transnational banks have more diversified sources of liquidity. Dinger (2009) finds that transnational banks' presence significantly reduces the risk of aggregate liquidity shortages in emerging economies. Therefore, because of their broad sources of funding, efficient liquidity management and excellent reputation, the presence of deposit insurance system would not dramatically change the behavior of foreign banks.

Research Methods

Based on the background and literature review, we formulate the following three hypotheses of this research:

H1 : The level of deposit insurance coverage negatively affects bank liquidity
H2a : The effect of the level of deposit insurance coverage on bank liquidity is lower in state-owned banks than in other banks
H2b : The effect of the level of deposit insurance coverage on bank liquidity is lower in foreign banks than in other banks

As written in the literature review, the LPS guarantee deposits for all conventional and Islamic banks operating in Indonesia. The conventional banks covered include both commercial banks (regional development banks, state-owned banks, foreign-owned banks, joint-venture banks and domestic-private banks) and rural banks. However, in this study, we exclude Islamic banks and rural banks from our sample because of different intermediation method used by Islamic banking and different characteristics of rural banks. The data on the number of Indonesian banks based on the type of ownership can be seen in Table 1.

To test these hypotheses, we employ quarterly data from Q1:2002 – Q2:2008 from 109 commercial banks operating during this period. After making adjustment to the data set (i.e. cleansing and filtering), we run our model with 2,726 eligible observations making it an unbalanced panel data set.

Table 1. Number of sample based on type of ownership

Type of Ownership	Number of Banks
State-Owned Banks (including Regional Development Banks)	30
Foreign Banks (including Joint Venture Banks)	25
Private Domestic Banks	54
Sample	109

Model

To test the effect of the level of deposit insurance coverage on bank liquidity, we use the following equation:

$$LIQ_{i,t} = \alpha_0 + \alpha_1 D1_{i,t} + \alpha_1 D2_{i,t} + \alpha_1 D3_{i,t} + \alpha_1 D4_{i,t} + \alpha_1 D5_{i,t} + \alpha_2 LISTED_{i,t} + \alpha_3 TA_{i,t} + \alpha_4 EQTA_{i,t} + \varepsilon_{i,t} \qquad (1)$$

While, to test the specific effect of the level of deposit insurance coverage on the liquidity of state-owned banks and in foreign banks, we use the difference in difference estimator.

Bank Liquidity

To measure bank liquidity (LIQ), we use several proxies. (1) Liquid assets (LATA), is the ratio of liquid asset to total asset, (2) Ratio of liquid asset to deposits (LADEP). We modify the proxy used by Dinger (2009), the ratio of liquid assets to customer and short term funding. The numerators of the variable include: cash, placement with Bank Indonesia, government bonds and net interbank market. The denominator is total assets. It is based on the composition of asset in balance sheet of Indonesian banks. The others proxy of bank liquidity, we employ the variables used by Sawada (2010) as follows: (3) Ratio of cash to total assets (CTA), (4) Ratio of loans to total assets (LTA). We expect that the level of insured deposits negatively affect the ratio of liquid asset to total assets, ratio of liquid assets to deposits and the ratio of cash to total assets, but positively influence the ratio of loans to total assets.

Deposit Insurance

To measure the deposit insurance coverage, we use dummy variable for each period of the different deposit insurance schemes as follows:

D1 is the period when there was no formal deposit insurance (Q1:2002 – Q3:2005). However, in this period, the Indonesian government applied the blanket guarantee scheme (BGS) for domestic banks (Hadad et al., 2011; Nys et al., 2015), 2) D2 is the period when the all deposits are insured (Q4:2005 – Q1:2006), D3 is the period when the maximum deposit insurance coverage was 5 Billion Rupiah (Q2:2006 – Q3:2006), D4 is the period when the maximum deposit insurance coverage was 1 Billion Rupiah (Q4:2006 – Q1:2007), and D5 is the period when maximum deposit insurance coverage was 100 Million Rupiah (Q2:2007 – Q2:2008).

Bank Ownership

In this study, based on ownership type, banks are divided into three categories. State-owned Banks (SOB) are banks owned fully or owned in a majority proportion by central government or regional (province) government. Foreign Banks (FOB) are private commercial banks which are representative (branch office) of parent banks in their home country or commercial banks that were established jointly by one or more commercial banks based in Indonesia and was established by citizens and/or Indonesian legal entity wholly owned by Indonesian citizens, with one or more bank domiciled abroad. Private Domestic Banks (PDB) are domestic banks owned fully or owned in a majority proportion by private or non-government institutions.

Control Variables

We include bank size and capitalization as bank controls. A bank's size can be an important determinant of liquidity position because it affects both the costs and availability of liquidity. It could be argued that a bank's capitalization level is expected to have an impact on its

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Table 2. Descriptive Statistics for the Variables (Full Sample)

This table presents the descriptive statistics for the variables of all observations. LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is ratio cash to total assets. LTA is a ratio of loans to total assets. LISTED is dummy variable the value of 1 is banks listed in stock exchange and 0 otherwise. LnTA is log natural of total assets. EQTA is ratio of equity to total assets.

Variables	Statistics (Full Sample)				
	Mean	Md	Min	Max	St.Dev
Ratio of Liquid Assets to Total Assets (LATA)	0.41	0.38	0.05	0.99	0.2
Ratio of Liquid Assets to Deposits (LADEP)	0.6	0.53	0.03	8.95	0.44
Ratio of Cash to Total Assets (CTA)	0.02	0.01	0.00004	0.14	0.02
Ratio of Loans to Total Assets (LTA)	0.51	0.52	0.004	0.95	0.19
Listed Banks (LISTED)	0.14	0	0	1	0.34
Ln Total Assets (LnTA)	14.58	14.48	9.39	19.53	1.86
Equity to Total Assets (EQTA)	0.14	0.11	0.0001	0.94	0.1
Number of Observation	2726	2726	2726	2726	2726

Table 3. Descriptive Statistics for Variables Based on Type of Ownership

This table presents the descriptive statistics for variables based on type of ownership. LATA is ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is ratio of liquid assets to deposits. CTA is ratio cash to total assets. LTA is ratio of loans to total assets. DEPINS is percentage of insured deposits to total deposits. LISTED is dummy variable the value of 1 is banks listed in stock exchange and 0 otherwise. LnTA is log natural of total assets. EQTA is ratio of equity to total assets.

Variables	State-owned Banks					Foreign Banks					Private Domestic Banks				
	Mean	Md	Min	Max	St.Dev	Mean	Md	Min	Max	St.Dev	Mean	Md	Min	Max	St.Dev
Ratio of Liquid Assets to Total Assets (LATA)	0.52	0.52	0.15	0.85	0.14	0.4	0.37	0.05	0.99	0.21	0.35	0.3	0.05	0.99	0.19
Ratio of Liquid Assets to Deposits (LADEP)	0.69	0.65	0.22	3.42	0.31	0.76	0.6	0.09	5.34	0.54	0.47	0.37	0.03	8.95	0.74
Ratio of Cash to Total Assets (CTA)	0.05	0.04	0.002	0.14	0.03	0.004	0.002	0.00004	0.02	0.004	0.01	0.01	0.0003	0.06	0.009
Ratio of Loans to Total Assets (LTA)	0.43	0.42	0.13	0.82	0.14	0.53	0.53	0.004	0.95	0.22	0.56	0.6	0.005	0.93	0.19
Listed Banks (LISTED)	0.08	0	0	1	0.28	0	0	0	0	0	0.23	0	0	1	0.42
Ln Total Assets (LnTA)	15.24	14.94	11.98	19.53	1.64	15.05	15.01	12.34	17.66	1.24	13.99	13.51	9.39	19.21	2.02
Equity to Total Assets (EQTA)	0.11	0.09	0.03	0.34	0.05	0.17	0.17	0.0001	0.75	0.12	0.15	0.12	0.0009	0.94	0.11
Number of Observation	754	754	754	754	754	621	621	621	621	621	1351	1351	1351	1351	1351

Table 4. Descriptive Statistics for Variables Based on the Difference Deposit Insurance Coverage

This table presents the descriptive statistics for variables based on difference in deposit insurance coverage. LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is the ratio cash to total assets. LTA is the ratio of loans to total assets. DEPINS is the percentage of insured deposits to total deposits. LISTED is a dummy variable, where the value is 1 for banks listed in stock exchange, and 0 otherwise. LnTA is the natural logarithm of total assets. EQTA is the ratio of equity to total assets.

Variables	D1 (Blanket guarantee only for domestic banks)					D2 (Full Coverage)					D3 (5 Billion Rupiah)				
	Mean	Md	Min	Max	St.Dev	Mean	Md	Min	Max	St.Dev	Mean	Md	Min	Max	St.Dev
Ratio of Liquid Assets to Total Assets (LATA)	0.42	0.42	0.05	0.99	0.2	0.38	0.36	0.08	0.95	0.18	0.4	0.36	0.08	0.97	0.19
Ratio of Liquid Assets to Deposits (LADEP)	0.62	0.55	0.03	4.93	0.41	0.54	0.48	0.1	2.52	0.33	0.57	0.51	0.09	2.84	0.37
Ratio of Cash to Total Assets (CTA)	0.02	0.01	0.0001	0.14	0.02	0.02	0.01	0.00004	0.1	0.02	0.02	0.01	0.0001	0.08	0.02
Ratio of Loans to Total Assets (LTA)	0.5	0.5	0.004	0.94	0.2	0.54	0.55	0.004	0.93	0.19	0.52	0.54	0.006	0.95	0.19
Listed Banks (LISTED)	0.12	0	0	1	0.33	0.14	0	0	1	0.35	0.15	0	0	1	0.36
Ln Total Assets (LnTA)	14.32	14.22	9.39	19.38	1.85	14.73	14.62	9.92	19.35	1.8	14.79	14.7	9.91	19.32	1.86
Equity to Total Assets (EQTA)	0.14	0.11	0.0004	0.62	0.09	0.13	0.11	0.003	0.59	0.09	0.14	0.11	0.003	0.59	0.1
Number of Observation	1544	1544	1544	1544	1544	215	215	215	215	215	216	216	216	216	216

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Table 4. Descriptive Statistics for Variables Based on the Difference Deposit Insurance Coverage (Continued)

Variables	D4 (1 Billion Rupiah)					D5 (100 Million Rupiah)				
	Mean	Md	Min	Max	St.Dev	Mean	Md	Min	Max	St.Dev
Ratio of Liquid Assets to Total Assets (LATA)	0.41	0.38	0.09	0.97	0.19	0.38	0.35	0.06	0.97	0.19
Ratio of Liquid Assets to Deposits (LADEP)	0.6	0.55	0.12	5.35	0.45	0.59	0.48	0.03	8.95	0.56
Ratio of Cash to Total Assets (CTA)	0.02	0.01	0.0001	0.1	0.02	0.02	0.01	0.0001	0.09	0.02
Ratio of Loans to Total Assets (LTA)	0.51	0.53	0.03	0.94	0.19	0.54	0.56	0.02	0.95	0.18
Listed Banks (LISTED)	0.15	0	0	1	0.36	0.16	0	0	1	0.36
Ln Total Assets (LnTA)	14.91	14.85	9.93	19.36	1.83	15.05	15.02	9.84	19.53	1.8
Equity to Total Assets (EQTA)	0.13	0.11	0.003	0.54	0.09	0.16	0.12	0.0001	0.94	0.13
Number of Observation	215	215	215	215	215	534	534	534	534	534

Table 5. Correlation Matrix

This table is the correlation matrix. LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is the ratio of cash to total assets. LTA is the ratio of loans to total assets. LISTED is a dummy variable, where the value is 1 for banks listed in stock exchange, and 0 otherwise. LnTA is the natural logarithm of total assets. EQTA is the ratio of equity to total assets.

Variables	LATA	LADEP	CTA	LTA	LISTED	LnTA	EQTA
Ratio of Liquid Asset to Total Assets (LATA)	1						
Ratio of Liquid Asset to Deposits (LADEP)	0.687	1					
Ratio of Cash to Total Assets (CTA)	0.243	-0.012	1				
Ratio of Loans to Total Assets (LTA)	-0.885	-0.625	-0.186	1			
Listed Banks (LISTED)	0.001	-0.005	-0.089	-0.089	1		
Ln Total Assets (LnTA)	0.047	0.039	-0.079	-0.088	0.409	1	
Equity to Total Assets (EQTA)	0.053	0.345	-0.108	0.011	-0.188	-0.385	1

liquidity position, because the owners of higher-capitalized banks may avoid exposing their banks to excess liquidity risk (Dinger, 2009). To account for these arguments, we include log of total assets (TA) and equity to total assets (EQTA) as control variables. We also take into account publicly-listed and non publicly-listed banks, using a dummy variable to control it (LISTED), the value of 1 is for banks listed in Indonesia Stock Exchange, and 0 for otherwise. We suppose that non-listed banks in the stock market will experience more difficulty to access funding sources, affecting their liquidity position.

We estimate our empirical model using OLS regression technique. We could not employ fixed effect panel data because our control variable (listed banks) are mostly time invariant. However, for robustness checks, we exclude the dummy variable of listed banks enabling us to estimate the empirical model using individual fixed effect. Similarly, time effect could not be taken into account due to our variables of interest (deposit insurance coverage) are individual invariant.

Results and Discussions

Descriptive Statistics and Correlation Matrix

Table 2 to 4 report the descriptive statistics of the variables used in this study. Overall sample statistics are reported in Table 2 while the descriptive statistics for the variables based on type of ownership is reported in Table 3. Table 4 report the descriptive statistics of variables based on the difference deposit insurance coverage. While Table 5 exhibits the correlation matrix of variables.

There are some notable differences in interested variables such as LATA, LADEP, and CTA. Nevertheless, whether they have significant impact will be verified by more robust empirical scheme.

Estimation Results

Table 6 reports the estimated regression using OLS with various liquidity measures: LATA, LADEP, CTA, and LADEP. We find that as expected, the impact of deposit insurance coverage is generally negative and significant to

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The Impact of Deposit Insurance Coverage on Bank Liquidity

Table 6. OLS regression of the impact of deposit insurance coverage on bank liquidity

This table presents the coefficients of OLS regression of the impact of the level of insured deposit on bank liquidity. The dependent variable is LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is the ratio cash to total assets. LTA is the ratio of loans to total assets. LISTED is a dummy variable, where the value is 1 for banks listed in stock exchange, and 0 otherwise. EQTA is the ratio of equity to total assets. LnTA is the natural logarithm of total assets. The value in the parentheses is standard error. *, ** and *** indicate significance of difference at the 10%, 5%, and 1% levels, respectively.

	LATA					LADEP				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.19544***	0.25432***	0.25336***	0.25343***	0.23207***	-0.48858***	-0.35472***	-0.35665***	-0.35671***	-0.40321***
	(0.03822)	(0.03655)	(0.03657)	(0.03658)	(0.03678)	(0.07759)	(0.07428)	0.07432	(0.07435)	(0.07474)
D1	0.0386***					0.08789***				
	(0.00775)					(0.01573)				
D2		-0.0307**					-0.06378**			
		(0.01402)					(0.02849)			
D3			-0.01245					-0.03789		
			(0.014)					(0.02845)		
D4				0.00326					0.00291	
				(0.01404)					(0.02854)	
D5					-0.04223***					-0.09101***
					(0.00967)					(0.01966)
Listed	-0.01201	-0.01086	-0.01064	-0.01063	-0.01173	-0.01592	-0.01327	-0.01279	-0.0128	-0.01505
	(0.01204)	(0.01208)	(0.01209)	(0.01209)	(0.01205)	(0.02444)	(0.02455)	(0.02457)	(0.02458)	(0.02449)
EQTA	0.18397***	0.1593***	0.16031***	0.16017***	0.18683***	1.85459***	1.79858***	1.80082***	1.80037***	1.85844***
	(0.04016)	(0.04002)	(0.04005)	(0.04006)	(0.04039)	(0.08153)	(0.08135)	(0.08139)	(0.08142)	(0.08208)
LnTA	0.0114***	0.00929***	0.00925***	0.00916***	0.01097***	0.05337***	0.04847***	0.04843***	0.04822***	0.05213***
	(0.0024)	(0.0023)	(0.00237)	(0.00237)	(0.00239)	(0.00488)	(0.00481)	(0.00482)	(0.00482)	(0.00487)
Observations	2726	2726	2726	2726	2726	2726	2726	2726	2726	2726
Adj-R²	0.02	0.01	0.01	0.01	0.01	0.16	0.15	0.15	0.15	0.16

Table 6. OLS regression of the impact of deposit insurance coverage on bank liquidity (continued)

	CTA					LTA				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.04186***	0.04619***	0.04615***	0.04601***	0.04592***	0.69529***	0.63763***	0.63864***	0.63873***	0.65871***
	(0.0043)	(0.0041)	(0.0041)	(0.0041)	(0.00414)	(0.03755)	(0.0359)	(0.03593)	(0.03594)	(0.03615)
D1	0.00285***					-0.03776***				
	(0.00087)					(0.00761)				
D2		-0.00181					0.03179**			
		(0.00157)					(0.01377)			
D3			-0.00313**					0.00971		
			(0.00157)					(0.01375)		
D4				-0.00333**					0.00139	
				0.00157					(0.01380)	
D5					-0.00047					0.0395***
					(0.00109)					(0.00951)
Listed	-0.00499***	-0.0049***	-0.00488***	-0.00491***	-0.00491***	-0.0353***	-0.03643***	-0.03666***	-0.03665***	-0.03562***
	(0.00135)	(0.00135)	(0.00135)	(0.00135)	(0.00135)	(0.01183)	(0.01187)	(0.01188)	(0.01188)	(0.01184)
EQTA	-0.03463***	-0.03644***	-0.03636***	-0.03641***	-0.03613***	-0.0778**	-0.05364	-0.05465	-0.05452	-0.07959**
	(0.00452)	(0.00449)	(0.00449)	(0.00449)	(0.00455)	(0.03946)	(0.03932)	(0.03935)	(0.03936)	(0.0397)
LnTA	-0.00119***	-0.00135***	-0.00134***	-0.00133***	-0.00134***	-0.00983***	-0.00774***	-0.00767***	-0.00764***	-0.00931***
	(0.00027)	(0.00026)	(0.00026)	(0.00026)	(0.00027)	(0.00236)	(0.00232)	(0.00233)	(0.00233)	(0.00235)
Observations	2726	2726	2726	2726	2726	2726	2726	2726	2726	2726
Adj-R²	0.04	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.02

various proxies of liquidity measures. Using the first proxy of liquidity (LATA), we reveal that the deposit insurance categorical variables to be negative and significant (at 5% level of sig-nificance) for D2 and D5. Nevertheless dummy variable D1 is positive and significant. Turning to the second proxy (LADEP), we find a similar pattern with LATA in which D2 and D5 are both

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Difference-in-Difference Estimation

I. State-owned Banks vs Non State-owned Banks

Table 7. Difference-in-difference estimation for the difference effect of deposit insurance coverage on bank liquidity between state-owned banks and non-state-owned banks

This table reports the difference-in-difference estimation for the difference effect of deposit insurance coverage on bank liquidity between state-owned banks and non-state-owned banks. Panel A is the difference in the period between D1 (no deposit insurance coverage) and D2 (full coverage). Panel B is the difference in the period between D2 (full coverage) and D3 (max. coverage is 5 billion Rupiah). Panel C is the difference in the period between D3 (max. coverage is 5 billion Rupiah) and D4 (max. coverage is 1 billion Rupiah). Panel D is the difference in the period between D4 (max. coverage is 1 billion Rupiah) and D5 (max. coverage is 100 million Rupiah). LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is the ratio cash to total assets. LTA is the ratio of loans to total assets. The value in the parentheses is standard error.

Panel A: D1 - D2

	SOB			Non SOB			Difference-in-differences
	D1	D2	Change	D1	D2	Change	
LADEP	0.727857	0.626102	-0.101755	0.574139	0.502881	-0.071258	-0.030497
	(0.377978)	(0.154965)	(-0.223013)	(0.408423)	(0.37036)	(-0.038063)	(-0.18495)
LATA	0.523572	0.510019	-0.013553	0.382942	0.330561	-0.052381	0.038828
	(0.13808)	(0.141683)	(0.003603)	(0.212057)	(0.17411)	(-0.037947)	(0.04155)
CTA	0.052082	0.041604	-0.010478	0.010889	0.009978	-0.000911	-0.009567
	(0.029386)	(0.023167)	(-0.006219)	(0.009189)	(0.008481)	(-0.000708)	(-0.005511)
LTA	0.425378	0.434593	0.009215	0.530666	0.585001	0.054335	-0.04512
	(0.135629)	(0.140318)	(0.004689)	(0.213257)	(0.190476)	(-0.022781)	(0.02747)

Panel B: D2 - D3

	SOB			Non SOB			Difference-in-differences
	D2	D3	Change	D2	D3	Change	
LADEP	0.626102	0.670018	0.043916	0.502881	0.530778	0.027897	0.016019
	(0.154965)	(0.210673)	(0.055708)	(0.37036)	(0.406135)	(0.035775)	(0.019933)
LATA	0.510019	0.559536	0.049517	0.330561	0.336327	0.005766	0.043751
	(0.141683)	(0.150135)	(0.008452)	(0.17411)	(0.170473)	(-0.003637)	(0.012089)
CTA	0.041604	0.035113	-0.006491	0.009978	0.010491	0.000513	-0.007004
	(0.023167)	(0.018982)	(-0.004185)	(0.008481)	(0.00886)	(0.000379)	(-0.004564)
LTA	0.434593	0.4006	-0.033993	0.585001	0.568167	-0.016834	-0.017159
	(0.140318)	(0.141787)	(0.001469)	(0.190476)	(0.185315)	(-0.005161)	(0.00663)

Panel C: D3 - D4

	SOB			Non SOB			Difference-in-differences
	D3	D4	Change	D3	D4	Change	
LADEP	0.670018	0.698995	0.028977	0.530778	0.56891	0.038132	-0.009155
	(0.210673)	(0.179132)	(-0.031541)	(0.406135)	(0.517454)	(0.111319)	(-0.14286)
LATA	0.559536	0.574989	0.015453	0.336327	0.350595	0.014268	0.001185
	(0.150135)	(0.14505)	(-0.005085)	(0.170473)	(0.167014)	(-0.003459)	(-0.001626)
CTA	0.035113	0.035235	0.000122	0.010491	0.010128	-0.000363	0.000485
	(0.018982)	(0.019772)	(0.00079)	(0.00886)	(0.008544)	(-0.000316)	(0.001106)
LTA	0.4006	0.390807	-0.009793	0.568167	0.560634	-0.007533	-0.00226
	(0.141787)	(0.142604)	(0.000817)	(0.185315)	(0.181526)	(-0.003789)	(0.004606)

Panel D: D4 – D5

	SOB			Non SOB			Difference-in-differences
	D4	D5	Change	D4	D5	Change	
LADEP	0.698995	0.613324	-0.085671	0.56891	0.576703	0.007793	-0.093464
	(0.179132)	(0.184334)	(0.005202)	(0.517454)	(0.644856)	(0.127402)	(-0.1222)
LATA	0.574989	0.500873	-0.074116	0.350595	0.338314	-0.012281	-0.061835
	(0.14505)	(0.150821)	(0.005771)	(0.167014)	(0.179326)	(0.012312)	(-0.006541)
CTA	0.035235	0.039959	0.004724	0.010128	0.010595	0.000467	0.004257
	(0.019772)	(0.020092)	(0.00032)	(0.008544)	(0.008837)	(0.000293)	(2.7E-05)
LTA	0.390807	0.464175	0.073368	0.560634	0.568355	0.007721	0.065647
	(0.142604)	(0.152046)	(0.009442)	(0.181526)	(0.184268)	(0.002742)	(0.0067)

negative and significant. However, the categorical variable D1 is positive and significant.

We find a different pattern when we use CTA and LTA. Employing CTA, we find that

II. Foreign Banks vs Non Foreign Banks

Table 8. Difference-in-difference estimation for the difference effect of deposit insurance coverage on bank liquidity between foreign banks and non-foreign banks

This table reports the difference-in-difference estimation for the difference effect of deposit insurance coverage on bank liquidity between foreign banks and non-foreign banks. Panel A is the difference in the period between D1 (no deposit insurance coverage) and D2 (full coverage). Panel B is the difference in the period between D2 (full coverage) and D3 (max. coverage is 5 billion Rupiah). Panel C is the difference in the period between D3 (max. coverage is 5 billion Rupiah) and D4 (max. coverage is 1 billion Rupiah). Panel D is the difference in the period between D4 (max. coverage is 1 billion Rupiah) and D5 (max. coverage is 100 million Rupiah). LATA is the ratio of liquid assets (cash, placements in central bank, government bonds, and net interbank deposits) to total assets. LADEP is the ratio of liquid assets to deposits. CTA is the ratio cash to total assets. LTA is the ratio of loans to total assets. The value in the parentheses is standard error.

Panel A: D1 - D2

	FOB			Non FOB			Difference-in-differences
	D1	D2	Change	D1	D2	Change	
LADEP	0.778944	0.722372	-0.056572	0.569171	0.481176	-0.087995	0.031423
	(0.470091)	(0.483044)	(0.012953)	(0.372487)	(0.241081)	(-0.131406)	(0.144359)
LATA	0.42937	0.378734	-0.050636	0.419406	0.38122	-0.038186	-0.01245
	(0.215427)	(0.205915)	(-0.009512)	(0.201083)	(0.177516)	(-0.023567)	(0.014055)
CTA	0.003942	0.003322	-0.00062	0.027548	0.023495	-0.004053	0.003433
	(0.003826)	(0.003207)	(-0.000619)	(0.026321)	(0.020643)	(-0.005678)	(0.005059)
LTA	0.515901	0.549502	0.033601	0.497548	0.541064	0.043516	-0.009915
	(0.234351)	(0.230941)	(-0.00341)	(0.189496)	(0.176543)	(-0.012953)	(0.009543)

Panel B: D2 – D3

	FOB			Non FOB			Difference-in-differences
	D2	D3	Change	D2	D3	Change	
LADEP	0.722372	0.769306	0.046934	0.481176	0.510817	0.029641	0.017293
	(0.483044)	(0.552657)	(0.069613)	(0.241081)	(0.266994)	(0.025913)	(0.0437)
LATA	0.378734	0.378852	0.000118	0.38122	0.404044	0.022824	-0.022706
	(0.205915)	(0.193423)	(-0.012492)	(0.177516)	(0.192846)	(0.01533)	(-0.027822)
CTA	0.003322	0.003331	9E-06	0.023495	0.021438	-0.002057	0.002066
	(0.003207)	(0.002897)	(-0.00031)	(0.020643)	(0.016804)	(-0.003839)	(0.003529)
LTA	0.549502	0.538902	-0.0106	0.541064	0.51655	-0.024514	0.013914
	(0.230941)	(0.215173)	(-0.015768)	(0.176543)	(0.181767)	(0.005224)	(-0.020992)

Panel C: D3 – D4

	FOB			Non FOB			Difference-in-differences
	D3	D4	Change	D3	D4	Change	
LADEP	0.769306	0.816477	0.047171	0.510817	0.541194	0.030377	0.016794
	(0.552657)	(0.778604)	(0.225947)	(0.266994)	(0.261879)	(-0.005115)	(0.231062)
LATA	0.378852	0.38121	0.002358	0.404044	0.422915	0.018871	-0.016513***
	(0.193423)	(0.188073)	(-0.00535)	(0.192846)	(0.189914)	(-0.002932)	(-0.002418)
CTA	0.003331	0.003065	-0.000266	0.021438	0.021398	-4E-05	-0.000226
	(0.002897)	(0.002919)	(2.2E-05)	(0.016804)	(0.017154)	(0.00035)	(-0.000328)
LTA	0.538902	0.534744	-0.004158	0.51655	0.506724	-0.009826	0.005668
	(0.215173)	(0.212081)	(-0.003092)	(0.181767)	(0.179563)	(-0.002204)	(-0.000888)***

Panel C: D4 – D5

	FOB			Non FOB			Difference-in-differences
	D4	D5	Change	D4	D5	Change	
LADEP	0.816477	0.720054	-0.096423	0.541194	0.550168	0.008974	-0.105397
	(0.778604)	(0.618543)	(-0.160061)	(0.261879)	(0.53759)	(0.275711)	(-0.435772)
LATA	0.38121	0.362649	-0.018561	0.422915	0.391046	-0.031869	0.013308
	(0.188073)	(0.194215)	(0.006142)	(0.189914)	(0.185586)	(-0.004328)	(0.01047)
CTA	0.003065	0.003204	0.000139	0.021398	0.023768	0.00237	-0.002231***
	(0.002919)	(0.00367)	(0.000751)	(0.017154)	(0.01858)	(0.001426)	(-0.000675)
LTA	0.534744	0.549985	0.015241	0.506724	0.536362	0.029638	-0.014397***
	(0.212081)	(0.203192)	(-0.008889)	(0.179563)	(0.176205)	(-0.003358)	(-0.005531)

the dummy variables D3 and D4 are both negative and significant. Again the dummy variable of D1 is positive and significant. Using the last proxy (LTA), we document that the categorical variables D1 and D2 are negative and signifi-

cant; however, D5 is positive and significant.

In table 7 and 8 we report the difference in difference of insurance estimation results. Only little evidence is found here. That is to say that the study could not find robust (statistically

meaningful) evidence on the difference effect of deposit insurance scheme on liquidity according to the ownership structure of the banks.

Analysis and Discussion

The empirical results provide partial support to our hypotheses outlined above. Primarily, we could say that the deposit insurance scheme negatively affects bank liquidity. Banks in Indonesia tend to hold lower liquidity (and increase risky asset held) in the presence of formal deposit insurance. Second we could not find a robust statistically significantly difference on the relationship between deposit insurance scheme and liquidity holding between various ownerships: both in the case of SOB versus other banks and in the case of foreign banks versus other banks.

We have taken some notes to explain the empirical findings. Beginning with the relationship between deposit insurance scheme and bank liquidity, though the findings could generally be said to confirm the hypotheses nevertheless its robustness is less than our expectation (based on Adjusted R^2).

Two arguments could be put forward in explaining this finding. First, banks in Indonesia were generally still risk averse during 2002-2005 (half of the observation periods). Banks annual loan growth were only around 10%-15%, aligned with deposit growth (they were around 25% during 2005-2008, outpacing deposit growth that is only 15%) hence liquidity proxies were high and stable. Banks' liquidity is not particularly responsive to changing deposit insurance scheme in this situation.

Why are banks risk averse? There are two reasons. One is the trauma of the 1998 Indonesia financial crisis that caused many banks to be heavily recapitalized using taxpayer fund. The attitude of regulators, managers and owners (including the government, as some were still government banks) were naturally very reluctant to grant loans. Second, there was a high (risk free) interest rate in the environment. In the almost all observation periods, recapitalization bonds formed a substantial part of banks assets. Many of these bonds had high fixed coupon due

to its risk premium component. Hence it was only logical that banks were not incentivized to lend. Why should a bank expand to risky lending when it can obtain a (relatively risk free) high coupon rate on bonds? Most recap bonds of these types were retired during 2008-2010, leaving banks with variable coupon that was adjusted to much lower interest environment. Therefore, banks once again have to turn to traditional lending business to maintain an attractive rate of profit.

Second, though explicit deposit insurance has been established, (and especially since 2005, the scheme is run by separated and independent entity: Indonesia Deposit Insurance Corporation – IDIC), there is still the widespread implicit belief that the government would come to the rescue (i.e. will bail out) if a bank failed. This belief was substantiated in 2008 by the rescue of Bank Century. In our opinion, this has noticeably reduced the sensitivity of depositors to the changing upper limit of insured deposit (from 5 Billion Rupiah in 2006 to 100 Million Rupiah in 2007).

Though there has been a commercial bank liquidated in 2009, we think that depositors still believe in the implicit blanket guarantee. That is, government will still come to the rescue if a major failure event occurred (a large bank failure or several simultaneous failure of medium banks). Perhaps if depositors observe a large bank liquidation event they would be much more sensitive to changes of the deposit's nominal limit that is still included in the deposit insurance scheme. Since there has not been a single case of major failure event to date, our supposition is still left untested.

Difference in difference methods could not reveal robust, statistically meaningful insight of the role of ownership structure in deposit insurance scheme and banks' liquidity holding relationship. We attribute this finding to two reasons. First the establishment of deposit insurance scheme has rendered the difference of bank ownership as irrelevant. Banks are becoming similar in the eyes of depositors. Nevertheless we think this condition prevails in normal or slightly deteriorated economy condition such as those that happened in 2006 and 2008. Batu-

nanggar (2007) who studied the 1998 Indonesia crisis found evidence of flight to quality. He documents that a substantial portion of deposits has moved to SOB from private banks and some portion moved offshore.

Second, except for a few banks (e.g. Citibank, HSBC, and Standard Chartered), most of foreign banks have unique business models. There are two types of models. The first one is financing follow the trade in which foreign banks are present only to serve corporate (mostly that comes from similar country) need. The other type is investment banking, in which banks obtain most of their revenues from underwriting and trading securities. In both kinds of business model, deposits collected from domestic residents are not an important source of funds. The liquidity holding of these foreign banks is not dependent on domestic deposit funding (that might be sensitive to the deposit insurance scheme).

Conclusions and Policy Recommendation

We close the report of this study by outlining several concluding notes and policy recommendations. First, as hypothesized, deposit insurance limit does negatively affect the liquidity holdings of banks in Indonesia. Nevertheless, we should note that the finding is not as robust as expected due to some of the reasons explained earlier. Second, it would seem that implicit (blanket) guarantee is a belief still held by depositors. This runs counter to the objective of deposit insurance scheme: mitigating moral hazard. Third, regulators should exert more effort to improve the credibility of the deposit insurance scheme. A credible insurance scheme could be verified by sensitivity (and the significance) of banks' liquidity holdings. Fourth, ownership structure does not seem to have robust (statistically) significant effect on deposit insurance and banks liquidity holding. Deposit insurance has rendered the ownership of banks as irrelevant, though we should take note that this condition might be correct for normal situation and may still change under a more uncertain economic environment. Fifth, the irrelevance of ownership may be driven by the fact that deposit insurance has a positive effect and should be maintained. It helps to promote a healthier competition.

The relatively small explanatory power of the independent variables, however, could be considered as the limitations of this study.

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