IJFS International Journal of Financial Systems

International Journal of Financial Systems
Volume 1, Number 2 (2023)
July-December 2023
Page : 133-150
P-ISSN : 3025-8480
E-ISSN : 3025-8537
DOI : https://doi.org/10.61459/ijfs.v1i2.27

Article History
Received : 10/19/2023
Revised : 11/14/2023
Accepted : 12/27/2023
Available Online : 01/17/2024

How Did Depositors React to Bank Risks During the Covid-19 Outbreak in Indonesia?

Indra Tumbelaka

ABSTRACT

The Covid-19 outbreak provides a unique setting to examine the association between deposits and bank risk, including loan risk, as both deposits and loan risk increased significantly during the outbreak. Employing dynamic regression models in datasets from the Indonesian banking industry before and during the Covid-19 outbreak, this study provides new evidence that depositor discipline is stronger during the outbreak, as depositors are more sensitive to loan risk. The findings are different from prior studies in that depositor discipline tends to diminish during the crisis period. Furthermore, this study confirms the effectiveness of the deposit insurance system implementation, as uninsured depositors exercise stronger discipline. Last but not least, this study documents that depositor discipline is weaker in government banks as those banks are perceived as having implicit guarantees from the government.

Keywords :
Bank Risk, Covid-19, Indonesia, Deposit Growth, Market Discipline

JEL Classification: G01, G21, G28

Indonesia Financial Services Authority & Monash Business School, Monash University, Australia.
Corresponding Author: indra_t@ojk.go.id

1. INTRODUCTION

The Covid-19 outbreak severed the real economy, increased borrowers' default, weakened loan growth, and increased loan risk (e.g., Berger & Demirgüç-Kunt, 2021; Colak & Öztekin, 2021; Park & Shin, 2021; Beck & Keil, 2022). On the other side, studies show that during the Covid-19 outbreak, bank deposits rose as households increased their savings and firms preserved their liquidity (Dursun-de Neef & Schandlbauer, 2022; Cooperman, Duffie, Luck, Wang, & Yang, 2023). Nevertheless, amid the increase in loan risk and deposits during the Covid-19 outbreak, studies that focus on the association between bank risk and deposits during the outbreak are still scant. Hence, to fill this research gap, this study examines depositors' reactions to bank risks, including loan risk, before and during the Covid-19 outbreak.

This study is vital for the banking industry for two main reasons. First, even though the banking industry at the macroeconomic level has not faced significant liquidity issues during the Covid-19 outbreak, banks with higher risks may suffer because of the flight to quality during the uncertainty period as their creditors rebalance their portfolios. Another factor that can affect depositors' reactions is the bank's specific characteristics, because depositors perceive some banks as more stable than others, regardless of their risks. For example, some banks are identified as too big to fail because their failure would severely damage the whole economy.

The market discipline literature shows that stakeholders, including depositors, exercise discipline toward banks with excessive risk-taking. Among others, three factors that can affect depositor discipline are the crisis period, the insurance deposit system, and bank ownership. First, prior studies showed that depositor discipline existed in the stressed period (e.g., Bennett, Hwa, & Kwast, 2015), however, several studies find that the discipline was weaker during the period (e.g., Martinez Peria & Schmukler, 2001; Cubillas, Fonseca, & González, 2012; Berger & Rima Turk-Ariss, 2015). Next, in the existence of the deposit insurance system, depositors have lower incentives to monitor bank risk-taking, as their deposits are covered by the system (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Karas, Pyle, & Schoors, 2013). Hence, depositor discipline is expected to be stronger for uninsured depositors. Another determinant factor is government ownership, which weakens the discipline, as banks owned by the government are perceived to receive implicit guarantees from the government (Distinguin, Kouassi, & Tarazi, 2013). Therefore, for further examination, this study investigates whether insured and uninsured depositors exercised discipline differently in government and non-government banks during the Covid-19 period.

This study uses the banking industry in Indonesia as a setting. Prior studies showed that depositor discipline prevails in Indonesia, amid the robust banking industry with limited deposit insurance[1] (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Trinugroho, Pamungkas, Ariefianto, & Tarazi, 2020; Saheruddin & Soedarmono, 2022). Depositors in this study are depositors for time deposits, as time deposits are the main source of funding for most of the banks. Different from current account or saving depositors, who put their money in the banks for transaction reasons, time deposit depositors place their money for investment reasons, which gives them more incentives to monitor bank risk-taking and hence are considered more sensitive to flight to quality. The Indonesian banking industry also has relatively large shares of government banks, which makes it appropriate to test the impact of government ownership on market discipline.

Employing a unique dataset of insured and uninsured depositors at the bank level in the period before and during the Covid-19 outbreak, this study finds that the Covid-19 outbreak influenced depositor discipline, and the strength of the discipline is influenced by the type of depositors and the banks' ownership. The findings indicate that depositor discipline was weaker before the Covid-19 period. However, insured depositors are more sensitive to higher loan risk before the outbreak, inconsistent with the assumption that uninsured depositors have higher incentives to monitor bank risk-taking (e.g., Karas, Pyle, & Schoors, 2013)[2]. Next, different from the diminishing of depositor discipline studies during the global financial crisis, this study shows that depositors are more sensitive to loan risks during the Covid-19 outbreak (e.g., Cubillas, Fonseca, & González, 2012; Berger & Rima Turk-Ariss, 2015). In line with prior market discipline studies in uncertainty periods, this study provides evidence that depositor discipline is stronger for uninsured depositors and in non-government banks (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Distinguin, Kouassi, & Tarazi, 2013; Saheruddin & Soedarmono, 2022).

This study contributes to the study of market discipline in several ways. First, this study confirms current studies that the Covid-19 outbreak increases bank loan risks (e.g., Berger & Demirgüç-Kunt, 2021; Colak & Öztekin, 2021; Park & Shin, 2021), as depositors become more sensitive to loan risk during the outbreak. Next, the findings of this study provide new evidence that during the

[1] The Indonesia Deposit Insurance Corporation has covered deposits up to IDR 2 billion per depositor per bank since 2008. IDR2 billion equals USD135.000 in 2021.

[2] Martinez Peria and Schmukler (2001) discussed that the credibility of the insurance deposit system and the cost related to bank failure influence the discipline exercised by insured depositors.

Covid-19 period depositor discipline increased, inconsistent with several studies of market discipline during the global financial crisis (e.g., Cubillas, Fonseca, & González, 2012; Berger & Rima Turk-Ariss, 2015). Last but not least, this study shows that during the Covid-19 period depositor discipline was stronger for uninsured depositors (e.g., Karas, Pyle, & Schoors, 2013) and in non-government banks (e.g., Distinguin, Kouassi, & Tarazi, 2013).

The remainder of this study is as follows: Sections 2 and 3 discuss literature review and methodology, respectively. Followed by section 4, the analysis, and section 5, the conclusion.

2. Literature Review

Bank loans and deposits during the Covid-19 outbreak

The unprecedented Covid-19 outbreak limited mobility, which caused a great shock to the economy as demand for goods and services tumbled. Current studies show that the banking industry is impacted by the outbreak mainly through the lending channel. Colak and Öztekin (2021) shows that the Covid-19 infection rates decrease bank lending at the country level, while Beck and Keil (2022) provides evidence that loans in the geographically lockdown areas have higher non-performing loans and provisions. Cao and Chou (2022) documents that the bank regulatory capital ratio before the outbreak influenced bank lending performance during the outbreak. At the international level, Park and Shin (2021) shows that creditors' flight to quality was influenced by the higher loan risk captured by the non-performing loans.

Studies on the bank liability side during the Covid-19 period are more limited. As firms withdrew their loan line and put it in their deposit accounts (Cooperman, Duffie, Luck, Wang, & Yang, 2023) and households increased their savings as they cut spending (Dursun-de Neef & Schandlbauer, 2022), bank deposits rose during the Covid-19 period. Consistent with the lending channels, the Covid-19 infection rates also affected the deposit side through the deposit and interbank interests (Levine, Lin, Tai, & Xie, 2021; Gao, Li, & Wen, 2023).

In Indonesia, Siregar, Gunawan, and Saputro (2021) discussed that the outbreak can deteriorate the loan quality since the real sector's performance decreases. In line, Susamto, Octavio, Risfandy, and Wardani (2023) shows that the Covid-19 outbreak decreased community banks' loans, and the impact was bigger for non-government banks. Focussing on the loan relaxation policy, Pamungkas, Arifin, Trinugroho, Lau, and Sergi (2023), who used bank data

between June 2019 and December 2020, found that the policy affected bank stability but did not affect non-performing loans.

Market Discipline

Prior studies have documented mixed evidence of depositor discipline during the crisis periods. Examining depositor discipline in three countries during banking crisis periods, Martinez Peria and Schmukler (2001) shows that depositor discipline is weaker in one country but stronger in other countries, confirming the importance of the specific country factor in the depositor discipline. An international study by Cubillas, Fonseca, and González (2012) documents that the decrease in depositor discipline during the global financial crisis was influenced by the adoption of market discipline practices by the bank authority before the crisis. Employing observations of banks in the United States and Europe, Berger and Turk-Ariss (2015) provides evidence that, in general, depositor discipline decreased during the global financial crisis, however, the discipline exists, particularly in small banks.

Next, amid the effectiveness of the insurance deposit system (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Karas, Pyle, & Schoors, 2013), prior studies showed that both insured and uninsured depositors exercise discipline (e.g., Martinez Peria & Schmukler, 2001; Bennett, Hwa, & Kwast, 2015), however, the discipline is stronger for uninsured depositors (e.g., Martinez Peria & Schmukler, 2001). In addition to the crisis and the deposit insurance system, bank-specific characteristics, including government ownership, can influence creditor discipline (Distinguin, Kouassi, & Tarazi, 2013; Lapteacru, 2018). Focussing on bank non-deposits, Lapteacru (2018) documented that during the crisis and non-crisis periods, market discipline is ineffective for government banks.

Depositor discipline exists in the Indonesian banking industry. Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011) shows that depositors demand higher interest from banks with higher loan, liquidity, and solvability risks. However, the implementation of the deposit-limited guarantee influences depositor discipline. Prior studies also showed that depositor discipline in Indonesian banks is also influenced by the type of depositor and bank (e.g., Trinugroho, Pamungkas, Ariefianto, & Tarazi, 2020; Saheruddin & Soedarmono, 2022).

3. Methodology

3.1. Data

The bank indicators in this study are from the Indonesia Financial Services Authority (OJK), while the macroeconomic indicator is from the Indonesia Statistics Bureau. Covering the periods between 2018 and 2021, the quarterly bank data consists of 95 commercial banks in Indonesia[3]. The period before the Covid-19 outbreak is from the first quarter of 2018 to the first quarter of 2020, while the period during the outbreak is between the second quarter of 2020 and the fourth quarter of 2021. Insured deposits are time deposits up to IDR2 billion, while uninsured deposits are time deposits bigger than IDR2 billion. For further analysis, this study classifies government banks as banks that are owned by state and provincial governments. Table 1 presents all the variable descriptions.

Table 1. List of Variables

No.	Variable	Description
1	*grtimedep*	Time deposit year-on-year growth
2	*grtdin*	Insured time deposit year-on-year growth
3	*grtdun*	Uninsured time deposit year-on-year growth
4	*rnpl*	Non-performing loan to total loans ratio
5	*rcashbank*	Cash and bank to total assets ratio
6	*reqta*	Equity to total assets ratio
7	*lta*	Total loan to total assets ratio
8	*size*	Natural logarithm of total assets
9	*gdp*	Gross domestic product year-on-year growth

3.2. Empirical Model

Following Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011), and Saheruddin and Soedarmono (2022), the main model in this study employs dynamic panel data in Equation 1, with the system Generalized Method of Moment (GMM) estimator from Arellano and Bover (1995), and Blundell and Bond (1998). For analysis purposes, Equation 1 is run separately for the sample before and during the Covid-19 outbreak, insured and uninsured deposits, and government and non-government banks.

[3] The final observations do not include Islamic banks and banks without complete reports during the observation period because of mergers or any other reasons.

$$grtimedep_{b,q} = \alpha_j + \beta_1 grtimedep_{b,q-1} + \beta_2 rnpl_{b,q} + \beta_3 rcas\ \ bank_{b,q} + \beta_4 reqta_{b,q} + \beta_5 lta_{b,q} + \beta_6 size_{b,q} + \beta_7 gdp_q + \varepsilon_{b,q} \quad (1)$$

In Equation 1, *grtimedep* $_{b,q}$ is the total time deposit year-on-year growth of bank *b* in quarter *q*. *grtimedep* $_{b,\ q\text{-}1}$ is the lagged variable of *grtimedep*. To examine the impact of the deposit insurance system on the depositor discipline, the dependent variables are also *grtdin* and *grtdun*, for insured and uninsured deposits, respectively. The independent variable, *rnpl* is the non-performing loan ratio to indicate loan risk. Next, *rcashbank* and *reqta* are the variables to indicate liquidity and solvability risks, respectively. The next variables, *lta* is to control bank loans, and *size* is to control total assets. The macroeconomic control variable is *gdp* to capture gross domestic product growth. Table 2 provides the expected signs and prior literature that used the variables.

Table 2. Expected Sign and Prior Literature

No.	Indicator	Expected Sign	Supported Prior Literature
1	*grtimedep*	.	Hasan, Jackowicz, Kowalewski, and Kozlowski (2013). Bennett, Hwa, and Kwast (2015). Saheruddin and Soedarmono (2022).
2	*grtdin*	.	Martinez Peria and Schmukler (2001). Bennett, Hwa, & Kwast, 2015
3	*grtdun*	.	Martinez Peria and Schmukler (2001). Bennett, Hwa, & Kwast, 2015
4	*rnpl*	-	Martinez Peria and Schmukler (2001). Berger and Turk-Ariss (2015). Saheruddin and Soedarmono (2022).
5	*rcashbank*	+	Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011). Cubillas, Fonseca, and Gonzalez (2012).
6	*reqta*	+	Hasan, Jackowicz, Kowalewski, and Kozlowski (2013). Saheruddin and Soedarmono (2022).
7	*lta*	+	Saheruddin and Soedarmono (2022).
8	*size*	+	Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011). Cubillas, Fonseca, and Gonzalez (2012). Saheruddin and Soedarmono (2022).
9	*gdp*	+	Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011). Cubillas, Fonseca, and Gonzalez (2012).

4. Analysis

4.1. Descriptive Statistics

Table 3 shows that time deposit growth increased in the Covid-19 outbreak (*grtimedep*), which is from the rise of uninsured time deposits (*grtdun*), as

depositors placed their funds in safer assets. The loan risk as captured by the non-performing loan (*rnpl*) increased during the outbreak, while the liquidity and solvability risks tended to decrease as the cash and bank to total assets ratio (*rcashbank*) and equity to total assets ratio (*reqta*) increased. In line with the economic growth slowdown (*gdp*), bank loans (*lta*) decreased during the outbreak. Table 4 reveals that, in general, there are weak correlations among the variables. Relatively strong and positive correlations exist between total, insured, and uninsured time deposits, which are run separately in Equation 1.

Table 3. Descriptive Statistics

	(1) Full sample	(2) Before Covid-19	(3) Covid-19	(4) Difference (2)-(3)	
	mean	mean	mean	b	p
grtimedep	0.12	0.10	0.13	-0.03	0.0708
grtdin	0.07	0.09	0.05	0.04	0.0024
grtdun	0.16	0.12	0.20	-0.07	0.0020
rnpl	0.03	0.03	0.03	-0.00	0.0166
rcashbank	0.17	0.17	0.18	-0.00	0.5816
reqta	0.19	0.18	0.20	-0.02	0.0025
lta	0.61	0.64	0.58	0.07	0.0000
size	16.97	16.90	17.07	-0.16	0.0313
gdp	0.03	0.05	0.01	0.04	0.0000
N	1520	855	665	1520	

Table 4. Correlation Matrix

	grtimedep	grtdin	grtdun	rnpl	rcashbank	reqta	lta	size	gdp
grtimedep	1.00								
grtdin	0.50***	1.00							
grtdun	0.89***	0.30***	1.00						
rnpl	-0.17***	-0.16***	-0.15***	1.00					
rcashbank	0.22***	0.13***	0.18***	-0.03	1.00				
reqta	0.08**	-0.04	0.13***	-0.10***	0.22***	1.00			
lta	0.07*	0.13***	0.04	-0.05*	-0.34***	-0.16***	1.00		
size	-0.09***	-0.01	-0.13***	-0.13***	-0.19***	-0.24***	0.07**	1.00	
gdp	0.07**	-0.02	0.06*	-0.06*	0.08**	-0.01	0.07**	-0.03	1.00

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.2. Result Discussion

This study investigates insured and uninsured depositor discipline before and during the Covid-19 outbreak. Table 5 provides the results of Equation 1 with total, insured, and uninsured time deposit growth for all samples, government, and non-government banks before the Covid-19 outbreak.

Table 5 shows that in all samples, only insured depositors are sensitive to loan risk (*rnpl*), as they decrease their deposits in banks with higher non-performing loans, while uninsured depositors are sensitive to liquidity (*rcashbank*) and solvency (*reqta*) risks. The results also show that time deposits increased in banks with higher loans (*lta*) and smaller assets (*size*). In government banks, only uninsured depositors are sensitive to liquidity (*rcashbank*) and solvability (*reqta*) risks, while insured depositors are not sensitive to any of the bank risks. In non-government banks, insured depositors are sensitive to loan (*rnpl*) and liquidity (*rcashbank*) risks, while uninsured depositors have a positive association with liquidity (*rcashbank*) and solvability (*reqta*) risks.

The results indicate that depositors exercised discipline in the period before the Covid-19 outbreak, and the discipline was stronger for uninsured depositors and in non-government banks. The findings support prior studies that the depositor discipline existed in the Indonesia banking industry before the Covid-19 outbreak (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Trinugroho, Pamungkas, Ariefianto, & Tarazi, 2020). The stronger discipline exercised by uninsured depositors confirms the effectiveness of the insurance deposit system in Indonesia (Hadad, et al 2011). In line with Saheruddin and Soedarmono (2022), who find that depositors are sensitive to loan risk, this study shows that the negative association is from insured depositors in non-government banks, which can be influenced by the higher loan risk in the non-government banks than in government banks. Furthermore, the weak depositor discipline in government banks is in line with Distinguin, Kouassi, and Tarazi (2013) and Lapteacru (2018) findings in European countries.

Table 5. Before the Covid-19 Outbreak

	All Samples			Government Banks			Non-government Banks		
	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z
l.grtimedep	0.659***			0.622***			0.641***		
	(158.11)			(34.16)			(133.39)		
l.grtdin		0.685***			0.634***			0.681***	
		(343.94)			(9.71)			(146.26)	
l.grtdun			0.661***			0.575***			0.660***
			(204.41)			(37.11)			(139.69)
rnpl	0.574***	-3.347***	0.376**	-1.765	0.359	-2.057	0.265**	-3.586***	0.053
	(4.19)	(-37.38)	(2.06)	(-0.60)	(0.63)	(-0.52)	(2.13)	(-41.16)	(0.15)
rcashbank	0.808***	0.152***	0.756***	0.933***	0.005	0.904***	0.719***	0.193***	0.801***
	(51.34)	(16.64)	(19.23)	(4.84)	(0.07)	(4.49)	(34.88)	(4.23)	(18.29)
reqta	0.580***	-0.052*	0.710***	1.179**	-0.131	2.242*	0.428***	-0.029	0.505***
	(22.34)	(-1.70)	(10.31)	(2.12)	(-0.36)	(1.68)	(11.42)	(-0.64)	(8.01)
lta	0.688***	0.299***	0.684***	-0.260	0.152	-0.816	0.759***	0.387***	0.852***
	(49.10)	(28.77)	(20.64)	(-0.62)	(1.47)	(-1.06)	(30.48)	(20.93)	(15.17)
size	-0.008**	-0.057***	-0.031***	0.053	-0.061	0.086	-0.007	-0.042***	-0.023***
	(-1.97)	(-18.35)	(-4.51)	(0.67)	(-0.84)	(1.36)	(-1.61)	(-15.31)	(-2.65)
gdp	0.414***	-1.511***	-0.304*	-2.063*	-0.710***	-2.582**	0.114	-2.362***	-0.041
	(3.81)	(-19.61)	(-1.80)	(-1.68)	(-4.69)	(-2.02)	(0.81)	(-13.85)	(-0.11)
constant	-0.564***	0.955***	-0.146	-0.914	1.025	-1.198	-0.561***	0.693***	-0.357**
	(-7.81)	(16.00)	(-1.06)	(-0.64)	(0.80)	(-0.97)	(-7.56)	(11.67)	(-2.16)
Wald	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$
Test	47361.81 ***	47361.81 ***	190093.16 ***	162712.39 ***	2754.94 ***	3241.90***	97782.12 ***	55266.91 ***	108952.22 ***
Sargan	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(217)$	$Chi^2(217)$	$Chi^2(257)$	$Chi^2(257)$	$Chi^2(257)$
Test	93.08267	93.08267	90.42421	94.35298	23.72248	24.27977	63.49533	62.97912	64.4716
Arr-Bond Test AR(1)	-3.3509 ***	-3.3509 ***	-3.2513 ***	-4.3758 ***	-2.4775 ***	-2.5889 ***	-2.5991 ***	-3.1173 ***	-3.4015***
Arr-Bond Test AR(2)	1.1778	1.1778	1.3045	1.7186	-.17256	.65637	1.2087	1.3165	1.508
N	758	747	757	230	230	230	528	517	527

The table presents the results from the two-step system GMM estimations. The estimation uses quarterly observations of Indonesian commercial banks from the first quarter of 2018 to the first quarter of 2020 or before the Covid-19 outbreak in Indonesia. The system GMM estimation is effective when the Sargan test and the Arrelano-Bond test AR(2) are not rejected.

* Indicate statistical significance at the 10% level.

** Indicate statistical significance at the 5% level.

*** Indicate statistical significance at the 1% level.

Table 5 provides the results of Equation 1 with total, insured, and uninsured depositors for all samples, government, and non-government banks during the Covid-19 outbreak. The results for all samples show that during the Covid-19 outbreak, total, insured, and uninsured depositors became more concerned with loan and liquidity risks as depositors decreased their exposure to banks with higher non-performing loans (*rnpl*) and lower cash and bank to total assets (*rcashbank*).

In government banks, insured depositors are not associated with any of the risk indicators, while uninsured depositors decreased their exposure in banks with higher loan risk (*rnpl*). Different from depositors in government banks, depositors in non-government banks are more sensitive to bank risks during the outbreak, as insured and uninsured depositors decreased their exposure in non-government banks with higher loan (*rnpl*) and liquidity (*rcashbank*) risks.

First, the results indicate that depositor discipline existed during the Covid-19 outbreak and the discipline is stronger for uninsured and non-government banks. Next, comparing before and during the Covid-19 outbreak, the results for the loan and liquidity risks show that depositor discipline was stronger during the Covid-19 outbreak. The findings are inconsistent with prior studies that the depositor discipline is weaker in the global financial crisis (e.g., Cubillas, Fonseca, & González, 2012; Berger & Rima Turk-Ariss, 2015). The different findings may be caused by the nature of the crises (Berger & Demirgüç-Kunt, 2021). While in the global financial crisis, liquidity and market risks were two of the main issues, in the Covid-19 outbreak, the banking industry mainly focussed on managing loan risk.

Next, the results show the discipline disparity between insured and uninsured depositors decreased during the Covid-19 outbreak as uninsured depositors are less concerned with liquidity and solvability risks in government banks. On the other side, the was an increased discipline disparity between government and non-government banks during the outbreak. The findings suggest that depositors perceive that government banks are supported by the government (Distinguin, Kouassi, & Tarazi, 2013), particularly in the stressed period. For example, during the Covid-19 outbreak in Indonesia, the government placed funds in several government banks to maintain their liquidity and boost their loans.

Table 6. During the Covid-19 Outbreak

	All Samples			Government Banks			Non-government Banks		
	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z
l.grtimedep	0.651***			0.530***			0.635***		
	(137.22)			(10.96)			(110.83)		
l.grtdin		0.554***			0.770***			0.533***	
		(277.69)			(15.35)			(171.69)	
l.grtdun			0.706***			0.620***			0.719***
			(149.42)			(26.30)			(78.12)
rnpl	-4.194***	-1.979***	-4.923***	0.920	0.457	-2.840	-5.378***	-2.479***	-6.765***
	(-33.76)	(-71.91)	(-21.79)	(0.33)	(0.50)	(-1.08)	(-21.84)	(-20.36)	(-15.62)
rcashbank	0.880***	0.285***	0.643***	0.397**	0.051	0.619*	0.786***	0.296***	0.475***
	(49.91)	(87.23)	(19.25)	(2.11)	(1.41)	(1.95)	(33.72)	(30.53)	(15.45)
reqta	-0.206***	-0.047***	-0.464***	1.043	0.076	1.548	-0.072**	-0.091***	-0.428***
	(-3.81)	(-7.19)	(-10.08)	(1.00)	(0.36)	(0.64)	(-2.11)	(-4.30)	(-10.53)
lta	0.299***	0.354***	0.444***	-1.236	0.111	-1.339	0.270***	0.385***	0.422***
	(11.81)	(54.89)	(10.05)	(-1.28)	(0.36)	(-1.36)	(8.88)	(13.34)	(5.65)
size	-0.046***	0.006***	-0.131***	-0.124	0.022	-0.013	-0.026***	-0.005	-0.128***
	(-4.50)	(3.21)	(-12.51)	(-0.70)	(0.26)	(-0.03)	(-4.37)	(-0.54)	(-11.38)
gdp	0.482***	-0.145***	0.559***	-0.150	-0.438***	-0.460*	0.465***	-0.181***	0.646***
	(13.63)	(-11.46)	(11.90)	(-1.04)	(-8.80)	(-1.79)	(10.60)	(-5.71)	(6.91)
constant	0.689***	-0.278***	2.192***	2.836	-0.471	1.004	0.395***	-0.063	2.245***
	(3.65)	(-8.50)	(13.38)	(0.76)	(-0.28)	(0.14)	(3.36)	(-0.38)	(11.39)
Wald	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$
Test	109339.37***	113678.00***	63464.60**	690.27***	886.53***	14654.43***	78339.32***	73310.37***	23844.13***
Sargan	$Chi^2(532)$	$Chi^2(532)$	$Chi^2(532)$	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(480)$	$Chi^2(471)$	$Chi^2(476)$
Test	89.80031	90.34289	87.4298	23.68266	24.51406	22.9844	57.95435	59.19829	59.30629
Arr-Bond Test AR(1)	-2.9871 ***	-1.8635 ***	-3.6054***	-1.96***	-2.3002 ***	-2.4167 ***	-2.4083 ***	-1.8263**	-2.7376***
Arr-Bond Test AR(2)	1.1986	-.1244	.52375	1.5376	.71414	1.8736	.43258	-.17324	-.91297
N	661	647	655	203	203	203	458	444	452

The table presents the results from the two-step system GMM estimations. The estimation uses monthly observations of Indonesian commercial banks from the second quarter of 2020 to the fourth quarter of 2021 or during the Covid-19 outbreak in Indonesia. The system GMM estimation is effective when the Sargan test and the Arrelano-Bond test AR(2) are not rejected.

* Indicate statistical significance at the 10% level.

** Indicate statistical significance at the 5% level.

*** Indicate statistical significance at the 1% level.

4.3. Robustness

Following Saheruddin and Soedarmono (2022), this study provides robustness tests on the samples without state-owned banks or banks owned by the central government, as they are considered big banks and have implicit guarantees from the government. Prior studies showed that market discipline in big banks is weaker than in smaller banks (e.g., Beyhaghi, D'Souza, & Roberts, 2014; Berger & Turk-Ariss, 2015), as depositors perceive that the government tends to protect big banks because of the too-big-to-fail effect. The additional test results in Tables 7 and 8 (Appendix A) are consistent with the main results, that depositor discipline exists, and the discipline is stronger for uninsured depositors and in non-government banks. In addition, this study also runs equation 1 for the samples that excluded big banks, which are categorized as banks in BUKU IV and III[4], and the results are in line with the main results. The results of the test are not presented in this study and are available upon request to the author.

5. Conclusion

This study examines the depositor discipline in Indonesia before and during the Covid-19 outbreak. Amid the stable economic growth and banking industry, which is covered by a limited deposit guarantee, Indonesia's economy and banking industry were also impacted by the outbreak. The share of government banks which is relatively large in Indonesia, provides a proper setting to investigate insured and uninsured depositor discipline in government and non-government banks.

Employing dynamic panel data with a two-step system GMM estimator, this study compares depositor discipline before and during the Covid-19 outbreak. The findings reveal that the discipline is stronger during the outbreak, for uninsured depositors and in non-government banks. First, this study supports prior studies that showed depositor discipline exists in the Indonesian banking industry (e.g., Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Trinugroho, Pamungkas, Ariefianto, & Tarazi, 2020). Next, this study's findings that depositor discipline is stronger during the outbreak are different from prior findings that showed the

[4] BUKU is a bank classification in Indonesia based on capital. BUKU 4 is a classification for a bank with capital > IDR30 trillion. BUKU 3 is a classification for a bank with capital ≤ IDR30 trillion and > IDR5 trillion Rupiah. BUKU 2 is a classification for a bank with capital ≤ IDR5 trillion and > IDR1 trillion. BUKU 1 is a classification for a bank with capital ≤ IDR1 trillion. IDR30 trillion equals USD2 billion in 2021.

diminishing of depositor discipline in the global financial crisis (e.g., Cubillas, Fonseca, & González, 2012; Berger & Rima Turk-Ariss, 2015). Furthermore, this study confirms Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011) regarding the effectiveness of the deposit insurance system implementation, as uninsured depositors exercise stronger discipline. Last but not least, this study supports the prior study's findings that depositor discipline is stronger in non-government banks since government banks are perceived as having implicit guarantees from the government (Distinguin, Kouassi, & Tarazi, 2013).

For the industry, this study confirms the implementation of market discipline as one of the pillars of the Basel framework for banking supervision, which has been adopted by the banking authority in Indonesia. Next, since this study shows that depositors are more sensitive to loan risk during the Covid-19 outbreak, this study supports the authority policy in the loan relaxation policy to maintain banks' loan risk at a lower level during the outbreak.

REFERENCES

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. Journal of econometrics, 68(1), 29-51.

Beck, T., & Keil, J. (2022). Have banks caught corona? Effects of COVID on lending in the US. Journal of Corporate Finance, 72, 102160.

Bennett, R. L., Hwa, V., & Kwast, M. L. (2015). Market discipline by bank creditors during the 2008–2010 crisis. Journal of Financial Stability, 20, 51-69.

Berger, A. N., & Demirgüç-Kunt, A. (2021). Banking research in the time of COVID-19. Journal of Financial Stability, 57, 100939.

Berger, A. N., & Turk-Ariss, R. (2015). Do depositors discipline banks and did government actions during the recent crisis reduce this discipline? An international perspective. Journal of Financial Services Research, 48, 103-126.

Beyhaghi, M., D'Souza, C., & Roberts, G. S. (2014). Funding advantage and market discipline in the Canadian banking sector. Journal of Banking & Finance, 48, 396-410.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of econometrics, 87(1), 115-143.

Cao, Y., & Chou, J. Y. (2022). Bank resilience over the COVID-19 crisis: The role of regulatory capital. Finance Research Letters, 48, 102891.

Çolak, G., & Öztekin, Ö. (2021). The impact of COVID-19 pandemic on bank lending around the world. Journal of Banking & Finance, 133, 106207.

Cooperman, H. R., Duffie, D., Luck, S., Wang, Z. Z., & Yang, Y. (2023). Bank funding risk, reference rates, and credit supply (No. w30907). National Bureau of Economic Research.

Cubillas, E., Fonseca, A. R., & González, F. (2012). Banking crises and market discipline: International evidence. Journal of Banking & Finance, 36(8), 2285-2298.

Distinguin, I., Kouassi, T., & Tarazi, A. (2013). Interbank deposits and market discipline: Evidence from Central and Eastern Europe. Journal of Comparative Economics, 41(2), 544-560.

Dursun-de Neef, H. Ö., & Schandlbauer, A. (2022). COVID-19, bank deposits, and lending. Journal of Empirical Finance, 68, 20-33.

Hadad, M. D., Agusman, A., Monroe, G. S., Gasbarro, D., & Zumwalt, J. K. (2011). Market discipline, financial crisis and regulatory changes: Evidence from Indonesian banks. Journal of Banking & Finance, 35(6), 1552-1562.

Hasan, I., Jackowicz, K., Kowalewski, O., & Kozłowski, Ł. (2013). Market discipline during crisis: Evidence from bank depositors in transition countries. Journal of Banking & Finance, 37(12), 5436-5451.

Gao, H., Li, J., & Wen, H. (2023). Bank funding costs during the COVID-19 pandemic: Evidence from China. Pacific-Basin Finance Journal, 79, 102006.

Karas, A., Pyle, W., & Schoors, K. (2013). Deposit insurance, banking crises, and market discipline: Evidence from a natural experiment on deposit flows and rates. Journal of Money, Credit and banking, 45(1), 179-200.

Lapteacru, I. (2019). Do bank activities and funding strategies of foreign and state-owned banks have a differential effect on risk-taking in Central and Eastern Europe?. Economics of Transition and Institutional Change, 27(2), 541-576.

Levine, R., Lin, C., Tai, M., & Xie, W. (2021). How did depositors respond to COVID-19?. The Review of Financial Studies, 34(11), 5438-5473.

Martinez Peria, M. S., & Schmukler, S. L. (2001). Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises. The journal of finance, 56(3), 1029-1051.

Pamungkas, P., Arifin, T., Trinugroho, I., Lau, E., & Sergi, B. S. (2023). COVID-19, stability and regulation: evidence from Indonesian banks. Studies in Economics and Finance.

Park, C. Y., & Shin, K. (2021). COVID-19, nonperforming loans, and cross-border bank lending. Journal of Banking & Finance, 133, 106233.

Saheruddin, H., & Soedarmono, W. (2022). Do board size, institutional ownership and external auditors matter to market discipline in Indonesian banking?. The Quarterly Review of Economics and Finance, 86, 389-395.

Siregar, R. Y., Gunawan, A. H., & Saputro, A. N. (2021). Impact of the covid-19 shock on banking and corporate sector vulnerabilities in Indonesia. Bulletin of Indonesian Economic Studies, 57(2), 147-173.

Susamto A. A., Octavio, D. Q., Risfandy, T., & Wardani, D. T. K. (2023). Public Ownership and Local Bank Lending at the Onset of the COVID-19 Pandemic: Evidence from Indonesia. SSRN. https://ssrn.com/abstract=4221750.

Trinugroho, I., Pamungkas, P., Ariefianto, M. D., & Tarazi, A. (2020). Deposit structure, market discipline, and ownership type: Evidence from Indonesia. Economic Systems, 44(2), 100758.

Appendix A
Table 7. Before the Covid-19 Outbreak (Exclude State-Owned Banks)

	All Samples			Government Banks			Non-government Banks		
	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z
l.grtimedep	0.656***			0.602***			0.641***		
	(164.59)			(21.69)			(133.39)		
l.grtdin		0.692***			0.651***			0.681***	
		(249.97)			(6.83)			(146.26)	
l.grtdun			0.662***			0.567***			0.660***
			(139.97)			(41.70)			(139.69)
rnpl	0.685***	-3.358***	0.279	-1.089	-0.206	0.282	0.265**	-3.586***	0.053
	(5.44)	(-29.04)	(1.33)	(-0.30)	(-0.23)	(0.12)	(2.13)	(-41.16)	(0.15)
rcashbank	0.806***	0.192***	0.787***	0.941*	-0.094	0.850*	0.719***	0.193***	0.801***
	(71.16)	(12.73)	(24.25)	(1.91)	(-1.02)	(1.71)	(34.88)	(4.23)	(18.29)
reqta	0.575***	-0.071*	0.637***	1.387	-0.853	2.892	0.428***	-0.029	0.505***
	(25.34)	(-1.95)	(10.65)	(0.96)	(-1.38)	(1.46)	(11.42)	(-0.64)	(8.01)
Lta	0.693***	0.308***	0.693***	0.008	0.177	-0.604	0.759***	0.387***	0.852***
	(29.86)	(25.19)	(21.63)	(0.01)	(1.02)	(-0.86)	(30.48)	(20.93)	(15.17)
Size	-0.012**	-0.057***	-0.044***	0.051	-0.067	0.280	-0.007	-0.042***	-0.023***
	(-2.50)	(-13.80)	(-6.14)	(0.30)	(-0.94)	(1.12)	(-1.61)	(-15.31)	(-2.65)
Gdp	0.315***	-1.607***	-0.331	-0.925	-0.493***	-1.620	0.114	-2.362***	-0.041
	(3.45)	(-18.38)	(-1.46)	(-0.71)	(-2.72)	(-1.47)	(0.81)	(-13.85)	(-0.11)
constant	-0.497***	0.936***	0.067	-1.140	1.190	-4.755	-0.561***	0.693***	-0.357**
	(-6.71)	(11.30)	(0.52)	(-0.35)	(0.98)	(-1.09)	(-7.56)	(11.67)	(-2.16)
Wald	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$
Test	72864.79***	356840.97***	288176.03***	2328.76***	380.24***	14057.80	97782.12 ***	55266.91 ***	108952.22 ***
Sargan	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(244)$	$Chi^2(201)$	$Chi^2(201)$	$Chi^2(201)$	$Chi^2(257)$	$Chi^2(257)$	$Chi^2(257)$
Test	87.27728	87.41754	88.50673	21.15069	14.7541	20.72858	63.49533	62.97912	64.4716
Arr-Bond Test AR(1)	-3.3117***	-3.2815 ***	-4.2993***	-2.2395 ***	-2.474***	-2.4433 ***	-2.5991 ***	-3.1173 ***	-3.4015***
Arr-Bond Test AR(2)	1.1665	1.3237	1.6984*	-.11617	-1.5439	.65297	1.2087	1.3165	1.508
N	726	715	725	198	198	198	528	517	527

The table presents the results from the two-step system GMM estimations. The estimation uses quarterly observations of Indonesian commercial banks from the first quarter of 2018 to the first quarter of 2020 or before the Covid-19 outbreak in Indonesia. The system GMM estimation is effective when the Sargan test and the Arrelano-Bond test AR(2) are not rejected.
* Indicate statistical significance at the 10% level.
** Indicate statistical significance at the 5% level.
*** Indicate statistical significance at the 1% level.

Table 8. During the Covid-19 Outbreak (Exclude State-Owned Banks)

	All Samples			Government Banks			Non-government Banks		
	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z	Total Time Deposit b/z	Insured Time Deposit b/z	Uninsured Time Deposit b/z
l.grtimedep	0.647***			0.431***			0.635***		
	(135.53)			(3.56)			(110.83)		
l.grtdin		0.554***			0.874***			0.533***	
		(217.28)			(14.76)			(171.69)	
l.grtdun			0.710***			0.575***			0.719***
			(147.16)			(16.88)			(78.12)
rnpl	-4.166***	-1.958***	-4.878***	0.105	1.591*	-1.140	-5.378***	-2.479***	-6.765***
	(-39.88)	(-52.59)	(-24.07)	(0.04)	(1.80)	(-0.27)	(-21.84)	(-20.36)	(-15.62)
rcashbank	0.874***	0.282***	0.660***	0.197	-0.006	0.233	0.786***	0.296***	0.475***
	(41.90)	(68.26)	(22.39)	(0.60)	(-0.08)	(0.53)	(33.72)	(30.53)	(15.45)
reqta	-0.145***	-0.057***	-0.525***	2.042**	0.449	1.553	-0.072**	-0.091***	-0.428***
	(-4.19)	(-7.73)	(-8.96)	(2.04)	(1.56)	(0.91)	(-2.11)	(-4.30)	(-10.53)
Lta	0.326***	0.351***	0.474***	-1.392	0.317	-1.795	0.270***	0.385***	0.422***
	(7.79)	(53.62)	(10.39)	(-1.62)	(1.14)	(-1.33)	(8.88)	(13.34)	(5.65)
Size	-0.024***	0.000	-0.118***	0.188	0.054	0.175	-0.026***	-0.005	-0.128***
	(-3.00)	(0.04)	(-12.32)	(0.43)	(0.81)	(0.69)	(-4.37)	(-0.54)	(-11.38)
Gdp	0.564***	-0.123***	0.591***	0.089	-0.414***	-0.504	0.465***	-0.181***	0.646***
	(17.02)	(-8.71)	(9.95)	(0.39)	(-5.65)	(-1.37)	(10.60)	(-5.71)	(6.91)
constant	0.281*	-0.165***	1.953***	-2.429	-1.214	-1.830	0.395***	-0.063	2.245***
	(1.83)	(-3.61)	(12.60)	(-0.32)	(-0.95)	(-0.40)	(3.36)	(-0.38)	(11.39)
Wald	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$	$Chi^2(7)$
Test	269650.23***	108132.39***	85443.69***	128.07***	350.66***	7570.95***	78339.32***	73310.37***	23844.13***
Sargan	$Chi^2(532)$	$Chi^2(531)$	$Chi^2(532)$	$Chi^2(216)$	$Chi^2(216)$	$Chi^2(216)$	$Chi^2(480)$	$Chi^2(471)$	$Chi^2(476)$
Test	85.41252	83.06512	85.53422	19.8786	20.46386	21.40906	57.95435	59.19829	59.30629
Arr-Bond Test AR(1)	-2.9667***	-1.8487***	-3.5641 ***	-1.7099 ***	-1.9245***	-2.2824 ***	-2.4083***	-1.8263 ***	-2.7376***
Arr-Bond Test AR(2)	1.2375	-.1151	.54792	1.5822	.54848	1.8759	.43258	-.17324	-.91297
N	633	619	627	175	175	175	458	444	452

The table presents the results from the two-step system GMM estimations. The estimation uses quarterly observations of Indonesian commercial banks from the second quarter of 2020 to the fourth quarter of 2021 or during the Covid-19 outbreak in Indonesia. The system GMM estimation is effective when the Sargan test and the Arrelano-Bond test AR(2) are not rejected.

* Indicate statistical significance at the 10% level.

** Indicate statistical significance at the 5% level.

*** Indicate statistical significance at the 1% level.