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Siti Maria (Indonesia)**, Rizky Yudaruddin** (Indonesia)**, Yanzil Azizil Yudaruddin** (Indonesia)

COVID19 AND BANK STABILITY IN INDONESIA BANKING

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Abstract

In comparison to the 2008–09 Global Financial Crisis (GFC), the COVID-19 pandemic has probably had a more negative impact on the global economic sector and financial system. This study examines the influence of the COVID-19 pandemic and banking stability by differentiating bank core capital size and ownership. The data from monthly financial reports of 100 commercial banks in Indonesia from March 2020 to August 2020 showed that the COVID-19 pandemic had a negative and statistically significant impact on stability, especially in small and private banks. These results show the tremendous impact of COVID-19 pandemic on the stability of banks in Indonesia. Furthermore, large and government-owned banks take steps to deal with the potential effect of the COVID-19 pandemic. Meanwhile, small banks need to increase capital and protection for state-owned banks through capital injection. These findings contribute to the bank stability literature and have important policy implications for the banking sector during the COVID-19 pandemic.

Keywords: COVID-19, Banks, Stability, Capital and Ownership Structure.

JEL Classifications: G01, G20, G21, G28, G32

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INTRODUCTION

The 2019 Corona Virus Disease (Covid-19) pandemic has had a tremendous impact on the dynamics of the world economy 2020, including Indonesia. Covid-19 spreads to nearly 178 countries in the world and infected more than 85 million people, bringing more than 1.8 million deaths during 2020. This condition then not only causes a health and humanitarian crisis, but also results in an economic crisis and increases poverty in different countries. This unfavourable development for the global economy cannot be avoided as a result of the implementation of mobility restriction policies to reduce the spread of Covid-19.

Indonesia has become the country with the highest number of active COVID-19 cases in Asia, surpassing India, which has been able to flatten its transmission curve. Based on Worldometers data as of Tuesday (2/1/2021), Indonesia has 175,349 active cases, while India only has 164,278 active cases. Active cases are the number of people who are still tested positive for Covid-19. Indonesia also ranks first with most of the number of confirmed cases in Southeast Asia, and 19th with the number of confirmed cases at the global level (https://www.worldometers.info/coronavirus).

Various efforts have been made by the government to deal with COVID-19 pandemic. The government has strengthened the policy mix to ensure economic stability and promote economic recovery that was suppressed due to the impact of the Covid-19 pandemic. In this context, the policy direction of the Central Bank of Indonesia is placed on the conception of a close relationship that is complementary and mutually reinforcing between economic growth and stability, including financial system stability. Policy responses will continue to be directed at maintaining economic stability, particularly external stability, which was subject to considerable pressure due to uncertainty on global financial markets. Policies are also directed at ensuring financial system stability is maintained, including safeguarding bank stability.

Indonesian banking plays an important role in influencing global banking performance and stability. This is because it outweighs that of Asia-Pacific's banking industry, which also outperformed global banking

for many years in terms of profitability (Dahl et al., 2019). Specifically, the return on average equities (ROAE) in Indonesian banking reached 13.2% in 2018, while ROAE in banking in the Asia-Pacific region, including developed and emerging markets, only had 10.1% on average. In this regard, Indonesian banking may affect global banking stability. This means that assessing the impact of the COVID-19 pandemic on Indonesian banking stability is vital.

Government-owned banks have a reputation for taking more risks. As a result, shareholders do not bear the full brunt of the negative effects because the government will foot the bill for taking excessive risks. Meanwhile, large capital will help bigger banks mitigate the negative effects that happened during the crisis. As a result of the aforementioned issues, this article investigates the relationship between the COVID-19 epidemic and Indonesian bank stability by separating its core capital size and ownership.

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1. LITERATURE REVIEW

COVID-19 pandemic has certainly given more depressing impact on the economic sector and financial system worldwide compared with the situation when Global Financial Crisis (GFC) happened during 2008–09. As this pandemic spread, every region has been subjected to substantial growth downgrades and economic uncertainty. These downturns have increased the banking sector's systemic vulnerability, leading to a new financial crisis (Rizwana et al., 2020). The pandemic's great uncertainty and its associated economic losses have made markets highly volatile and unpredictable (Ali & Rizvi, 2020; Zhang et al., 2020; Baker et al., 2020) and this results to greater economic uncertainty that leads to higher bank risk (Wu et al., 2020)

Much of the existing literature on the COVID-19 pandemic indicates that COVID-19 have a significant impact on the financial systems. A growing body of empirical literature of COVID-19 has influenced market reactions and stock returns. Heyden & Heyden (2020) & Schell et al. (2020) focus on the reactions of the financial market to the COVID-19 pandemic using even study, find stocks react significantly negatively to the COVID-19 pandemic. Salisu et al. (2020) find negative market reaction more on emerging market stocks than on developed market stocks. Salisu & Vo (2020) find that health news has a negative and statistically significant effect on stock returns during the COVID-19 period. Erdem (2020) finds that the increase in of Covid-19 cases growth on the decline in stock returns is lower in countries with a high freedom index than in countries with a low freedom index. Narayan, et al. (2020) find the relationship between COVID-19 related government policies—namely, country lockdown, stimulus packages, and travel bans and negative stock market returns. Baek et al. (2020) and Alfaro, et al. (2020) show that COVID-19 has had significant impact on stock market return and volatility.

Meanwhile, numerous studies have examined the role of COVID-19 on stock returns. Ashraf (2020) focus on stock market returns from 64 countries, find that total confirmed cases by COVID-19 have negative effects on stock market returns. Al-Awadhi, et al. (2020) focus on Chinese stock market, find indicate that both the daily growth in total confirmed cases and in total cases of death caused by COVID-19 have significant negative effects on stock returns across all companies. Topcu & Gulal (2020) focus on emerging stock markets, find that negative impact of pandemic COVID-19 on stock returns. Mazur, et al (2020) investigate the US stock market performance, find stock markets respond negatively to the COVID-19 pandemic particularly petroleum, real estate, entertainment, and hospitality sectors. He et al. (2020) investigate on Chinese stock market, find transportation, mining, electricity & heating, and environment industries have been adversely impacted by the pandemic. Cepoi (2020) find the relationship between COVID-19 related news and negative stock market returns. Anh & Gan (2020) shows that negative relationship between COVID-19 pre-lockdown and Vietnam's stock returns.

Recently, the growing literature has focused on the role of COVID19 in the banking sector. However, studies on the impact of pandemic on banking stability are very limited. Rizwana, et al. (2020) find a

sharp increase in systemic risk in the financial systems during the COVID-19 period. Li, et al. (2020) develop a down-and-out option model of the equity of the bank. They show that show that the COVID-19 outbreak reduces the optimal bank interest margin, government capital injections enhance the margin, and both the outbreak and capital injections harm the efficiency gain from shadow banking. COVID-19, as such, makes the bank more prone to risk-taking, thereby adversely affecting banking stability. Demirguc-Kunt, et al. (2020) examine how COVID-19 impacted different conditions on stock return. Wu & Alson (2020) suggest that in the short term, COVID-19 has negative impact on the asset quality of state-owned banks and joint-stock banks than small and medium-sized banks. Furthermore, in the long term, COVID-19 provides the greater pressure on credit risks. Only Ozsoy et al. (2020) examine a closely related issue by investigating the impact of the COVID-19 pandemic on bank stability where the COVID-19 pandemic is negatively linked to bank stability. In their study, liquidity injections role has play important.

The global financial crisis (2008/2009) has similarities to the COVID-19 pandemic because it has contagious financial and economic distress effects. Caballero & Simsek, (2009) shows that like a pandemic, the global financial crisis has a contagious impact. Aldasoro et al. (2020) noted that COVID-19 as a disease pandemic produces a complex and varied set of consequences for banks and threatens the stability of the banking system. A large number of studies show the different impacts of the global financial crisis on banking stability depend on bank size and ownership structure. Therefore, ownership structure and bank size are important in explaining bank risk (Barry et al., 2011; Iannotta, et al., 2013). There are differences in the impact of the global financial crisis on bank stability between large and small banks. Large banks are more stable than small banks (Berger & Bouwman, 2013; Varmaz et al., 2015; Vallascas, et al. 2017; de Haan & Kakes, 2019). Meanwhile, government-owned banks are also more stable than private banks (Cornett et al. 2010, Kamarudin et al. 2016).

This study also examines several bank-specific control and macroeconomic variables as control variables. First, bank concentration (HHI) measures the Herfindahl Hirschman index of banks' assets. The relationship between bank concentration and financial stability was analyzed in various studies with two different views. The concentration-stability hypothesis assumes that a bank with a low ratio concentration is more susceptible to financial crisis/instability compared those with a higher ratio of concentration (Tabak et al., 2012; Yeyati & Micco, 2007) and support the competition-fragility (Beck et al., 2013; Uhde & Heimeshoff, 2009; Berger et al., 2009). The second variable is the bank size (SIZE), where larger banks are stable than small banks because they diversify better (Allen, 1990; Yusgiantoro et al., 2019).

The third variable is the ratio of total banks' third-party funds to total assets (DEPO). Higher DEPO tends to increase bank liquidity. Asset liquidity directly enhances stability by encouraging banks to reduce the risk of balance sheets in crisis times (Wagner, 2007). The fourth variable is the ratio of loans to total assets (LTA). Higher credit growth is riskier for banks because of the decline in loan and collateral standards, especially when the loan is given excess (Foos et al., 2010). The fifth variable is the Non-interest income to total assets (NII). Altunbas et al. (2011) and Demirgüc-Kunt & Huizinga (2010) reported an increase in non-interest income increased bank stability, particularly in small banks. The sixth variable is the ratio of operating expenses to operating income (OEOI). According to Berger & DeYoung (1997), Altunbas et al. (2007), and Fiordelisi et al. (2011), inefficient banks take more risk and have higher capital.

The seventh variable is the Bond Yield (OBL). According to von Borstel et al. (2016), sovereign bond yields have a greater impact on the long term than short-term lending rates. Banks take long-term government bond yields as reference benchmarks for their fixed rates on long-term lending to private non-banks (van Leuvensteijn et al., 2013). The movements in sovereign spreads affect the credit default swap (CDS) spreads of banks as a proxy for bank risk and bank funding costs (Zoli, 2013). In a bad

equilibrium, higher funding costs hinder the accumulation of bank net worth, leading to a persistent drop in investment and output (Ari, 2017). The eighth variable is the exchange rate (EXG). Faia et al. (2019) examined the 15 European banks and established that the impact of foreign expansion on risk is always negative and significant for most individual and systemic risk metrics. Exchange rate volatility could lead to market uncertainty, volatility in traders' profits, increase in risk, inflation uncertainty, unfavorable balance of trade, and impacts on production and transaction cost (Juhro & Phan, 2018). Therefore, exchange rate flexibility can help insulate the banks from shocks to their funding and investments (Eichengreen, 1998).

H1: There is a negative association between COVID-19 and Bank Stability
H2: The relationship between COVID-19 and Bank Stability is different in large banks and small banks.
H3: The relationship between COVID-19 and Bank Stability is different in government-owned banks and private banks.

2. METHOD

This study examines the effects of change in COVID-19 confirmed cases on bank stability in Indonesia. Data on bank-specific variables was collected from monthly financial reports (balance sheets and income statements) of 100 commercial banks (including 11 Islamic banks) from the Indonesian Financial Services Authority (Otoritas Jasa Keuangan/OJK) between March 2020 and August 2020. The outbreak started when the first COVID-19 case was confirmed in Indonesia on 2 March 2020 in the Ministry of Health's website (https://www.kemkes.go.id/).

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Two dependent variables reflect bank stability (Z-Score). Following Demirgüç-Kunt & Huizinga (2010), Lepetit & Strobel (2013) and Yusgiantoro et al. (2019), in constructing two measures of Z-Score for bank i at year t based on the following formula:

$$ZROA = \frac{ROA_i + EQTA_{i,t}}{SDROA_i}$$

$$ZROE = \frac{ROE_i + EQTA_{i,t}}{SDROA_i}$$

where ROA and ROE are the bank *i*'s return on assets and return on equity from March 2020 and August 2020. EQTA is the ratio of total equity to total assets, while SDROA is the standard deviation of the bank's return on assets during the March 2020 and August 2020 period. Higher ZROA and ZROE are associated with a higher level of the soundness of the bank. Alternatively, a lower value denotes the bank's higher exposure to insolvency risks.

In terms of explanatory variables of interest, COVID-19 is used as an independent variable. Similar to the existing literature, the COVID-19 measure relates to the monthly growth in COVID-19 confirmed cases. The measurement of this indicator is also used by previous studies, although the period of the outbreak in each country varies depending on when the first COVID-19 case was confirmed (Ashraf, 2020; Al-Awadhi et al., 2020; Anh & Gan, 2020). This study also examines several bank-specific control (bank concentration, bank size, total banks' third-party funds to total assets, the ratio of loans to total assets, the non-interest income to total assets, the ratio of operating expenses to operating income and macroeconomic variables (the Bond Yield and exchange rate volatility).

Regarding the econometric methodology, regressions run in two stages. In the first stage, the equation of COVID-19 measured by the monthly growth in confirmed cases and a set of control variables simultaneously as in Eq. (1) is regressed. The previous stage is repeated in the second stage, though the sample is broken down between large and small banks and government-owned and private banks. The following model is used to predict bank stability:

$$BS_{i,t} = \beta_0 + \beta_1 COVID19_t + \beta_2 HHI_{,t} + \beta_3 SIZE_{i,t} + \beta_4 DEPO_{i,t} + \beta_5 LTA_{i,t} + \beta_6 NII_{i,t} + \beta_7 OEOI_{i,t} + \beta_7 OBL_{i,t} + \beta_7 EXG_{i,t} + \varepsilon_{i,j} \quad (1)$$

where *i* refers to an individual bank, *t* refers to a month, and bank stability (BS) represents the dependent variable. The COVID-19 pandemic represents the independent variable. Similarly, HHI, SIZE, DEPO, LTA, NII, OEOI, OBL, and EXG represents industry-specific and bank-specific control variables. Also, εi,t is the error terms at the bank level. Following Al-Awadhi et al. (2020), Anh & Gan (2020), and Ashraf (2020), this study adopts the panel-data regression approach. Panel data analysis extracts both cross-sectional and time-series variation from the underlying panel data and minimizes various problems, such as multicollinearity, heteroscedasticity, and estimation bias (Baltagi, 2008; Woolridge, 2010). Similar to Al-Awadhi et al. (2020), the least square method of fixed effects model (FEM) was used. The opportunity to use fixed effects rather than random effects regression model was tested with the Hausman test. Using panel data, the fixed-effect model produces unbiased and consistent estimates of the coefficients (Wooldridge, 2010). As a robustness check, the regression models were performed using random effects model (REM) and Fixed-effects models with Driscoll-Kraay standard errors.

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3. RESULT

Table 1 shows the average descriptive statistics for variables between March 2020 and August 2020. The average ZROA and ZROE for the sample banks are 207.47 and 226.35, while the standard deviation is 373.71 and 378.49, respectively. The monthly credit growth (GLOAN) mean is 163.45 percent, while the standard deviation is 151.25 percent. Table 2 shows the correlation structure of variables. Since no notable correlation was observed between all independent variables considered in this study, multicollinearity issues are less likely to occur.

Table 1. Statistic Descriptive

Variables	Definition	Obs	Mean	Std. Dev.
ZROA	Z-score = (ROA + EQTA)/SDROA; ROA represents the return on assets; EQTA is the ratio of total equity to total assets, SDROA is the standard deviation of the return-to-assets ratio	606	207.47	373.71
ZROE	Z-score = (ROE + EQTA)/SDROA; ROA represents the return on assets; EQTA is the ratio of total equity to total assets, SDROA is the standard deviation of the return-to-assets ratio	606	226.35	378.49
COVID19	Growth in confirmed cases (%)	505	163.45	151.25
HHI	Herfindahl Hirschman index of banks' assets	606	679.08	17.496
SIZE	The logarithm of total assets bank	606	17.000	1.4629
DEPO	The ratio of total banks' third-party funds to total assets (%)	606	70.028	14.290
LTA	The ratio of loans to total assets (%)	606	58.570	14.735
NII	Non-interest income to total assets (%)	606	1.3898	3.4511
OEOI	The ratio of operating expenses to operating income (%)	606	88.300	23.062
OBL	Indonesia 3-Year Bond Yield (%)	606	6.1367	0.6529
EXG	Indonesian Rupiah to US Dollar Exchange Rate	606	14844	686.76

Table 2. Correlation Matrix

	COVID19	HHI	SIZE	DEPO	LTA	NII	OEOI	OBL	EXG

COVID19	1.0000								
HHI	-0.4064	1.0000							
SIZE	-0.0029	-0.0091	1.0000						
DEPO	-0.0173	-0.0066	-0.0003	1.0000					
LTA	0.0395	0.0155	0.0725	0.0137	1.0000				
NII	0.0241	0.0415	0.0886	-0.3509	-0.0792	1.0000			
OEOI	0.0636	-0.0789	-0.2743	-0.0573	-0.1565	-0.0188	1.0000		
OBL	0.7479	-0.2583	-0.0073	-0.0345	0.0632	0.0514	0.1061	1.0000	
EXG	0.6682	-0.5636	0.0004	0.0057	0.0163	-0.0173	0.0175	0.3471	1.0000

The regression analysis proceeds as follow. First, the relationship between the COVID-19 pandemic and bank stability is examined. The first stage is repeated in a second step, though the sample is also broken down between large and small banks and government-owned and private banks. Months fixed effects are also controlled by using months dummies. In the next step, the robustness of the main results is checked in three ways.

Table 3. Covid19 and Bank Stability – Baseline Regression

Expl. Variables	**Dependent Variables:**			
	ZROA		**ZROE**	
	(1)	**(2)**	**(3)**	**(4)**
COVID19	-0.0277**	-0.2165***	-0.0304**	-0.2104***
	(-2.52)	(-3.73)	(-2.89)	(-3.90)
HHI		-29.647***		-28.161***
		(-3.73)		(-3.79)
SIZE		100.74		131.76
		(0.54)		(0.76)
DEPO		-3.5261		-3.2343
		(-1.10)		(-1.07)
LTA		0.8706		1.3014
		(0.23)		(0.38)
NII		-0.5271		-0.3875
		(-0.60)		(-0.45)
OEOI		0.1219		0.0471
		(0.93)		(0.37)
OBL		-711.82***		-676.8***
		(-3.52)		(-3.57)
EXG		-0.5548***		-0.5317***
		(-3.65)		(-3.74)
Constant	219.32***	31656.99***	235.35***	29531.3***
	(41.62)	(4.00)	(46.31)	(4.00)
Time Effect	Yes	Yes	Yes	Yes
R-Square	0.0114	0.0597	0.0302	0.0782
N Bank	101	101	101	101
N Obs	505	505	505	505

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

Table 3 shows the baseline regression results focusing on the relationship between the COVID-19 pandemic and bank stability. The pandemic is measured using monthly growth in the number of confirmed cases (COVID19). From all regression, the results indicate a negative and statistically

significant impact of the COVID-19 pandemic on bank stability (Models 1 – 4). This is because COVID-19 leads to a decline in bank stability. The results reveal a statistically significant decline in bank stability during the COVID-19 pandemic period.

The results are in line with recent papers that analyzed the impact of the COVID-19 pandemic on bank lending. Li et al. (2020) developed a model that shows banks are more prone to loan risk-taking, adversely affecting their stability during the pandemic. With different measurements, Rizwana et al. (2020) obtain similar findings. They showed that the COVID-19 pandemic is sharply increasing systemic risk in the banking sector's financial systems. Wu and Alson (2020) reported a negative relationship between COVID-19 and asset quality of banks in the short term and the greater pressure on credit risks in the long term.

Among control variables, bank concentration (HHI) is negatively significant on bank stability, which is in line with Beck et al. (2013), Uhde & Heimeshoff (2009), and Berger et al. (2009). This result supports the competition-fragility. There is also a negative and significant effect of Bond Yield (OBL), which is in line with von Borstel et al. (2016), van Leuvensteijn et al., (2013), Zoli, (2013), and Ari, (2017). Moreover, there was a negative and significant effect of the exchange rate (EXG) on bank stability. This shows that exchange rate volatility could potentially lead to market uncertainty, volatility in profits of traders, increase in risk, inflation uncertainty, unfavorable balance of trade, and impacts on production and transaction cost, in line with Faia et al. (2019), Juhro & Phan, (2018), Eichengreen, (1998).

Table 4. Covid-19 and Bank Stability – Large vs Small Banks

Expl. Variables	**Dependent Variables**			
	ZROA		**ZROE**	
	Large Banks	**Small Banks**	**Large Banks**	**Small Banks**
	(1)	**(2)**	**(3)**	**(4)**
COVID19	-0.00136	-0.2197***	-0.0031	-0.2109***
	(-0.46)	(-3.63)	(-0.77)	(-3.76)
HHI	0.0193	-30.071**	-0.0267	-28.460***
	(0.66)	(-3.28)	(-0.66)	(-3.33)
SIZE	-70.683**	143.79	-34.51	174.80
	(-2.61)	(0.55)	(-0.82)	(0.71)
DEPO	-0.5295	-5.0838	-0.249	-4.8612
	(-1.55)	(-1.15)	(-0.57)	(-1.16)
LTA	-0.4131	1.1944	-0.0993	1.6350
	(-0.78)	(0.29)	(-0.16)	(0.43)
NII	0.1457	-1.5751	0.407	-1.6342
	(1.02)	(-0.46)	(1.69)	(-0.45)
OEOI	-0.0915	0.2136	-0.188	0.1316
	(-1.25)	(0.72)	(-1.56)	(0.46)
OBL	-2.5767	-729.98***	-7.3883***	-690.60***
	(-1.35)	(-3.07)	(-2.89)	(-3.11)
EXG	0.00119	-0.5653***	-0.0043	-0.5397***
	(0.51)	(-3.24)	(-1.22)	(-3.31)
Constant	1474.5**	31748.98***	940.44	29503.7***
	(2.92)	(3.80)	(1.18)	(3.80)
Time Effect	Yes	Yes	Yes	Yes
R-Square	0.3653	0.0774	0.4686	0.0937
N Bank	33	68	33	68
N Obs	165	340	165	340

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

The sample is split into large and small banks and government-owned and private banks in the next stage. Table 4 shows the impact of the COVID-19 pandemic on bank stability is unaltered for banks with different sizes of core capital. According to Table 6, the negative and significant impact of the COVID-19 pandemic on bank stability only holds for small banks. There is no significant impact of the COVID-19 pandemic on large bank stability, supporting H2. This is in line with previous studies that support large banks' advantage (*too big to fail*) during the global financial crisis with contagious financial and economic distress. For instance, Varmaz et al. (2015) established that conjectural "*too big to fail"* guarantees prevent large banks' negative effects in financial distress during the global financial crisis. According to Berger & Bouwman (2013), capital improves a bank's survival probability for small banks during the global financial crisis.

Table 5. Covid-19 and Bank Stability – Government vs Private Banks

Expl. Variables	**Dependent Variables**			
	ZROA		**ZROE**	
	Government Banks	**Private Banks**	**Government Banks**	**Private Banks**
	(1)	**(2)**	**(3)**	**(4)**
COVID19	0.0017	-0.2491**	0.0043	-0.2337**
	(0.88)	(-2.54)	(0.98)	(-2.55)
HHI	-0.0158	-32.433**	-0.0383	-30.078**
	(-1.00)	(-2.50)	(-1.04)	(-2.47)
SIZE	-44.940**	191.57	53.242	189.09
	(-2.29)	(0.68)	(0.92)	(0.71)
DEPO	0.0545	-4.7853	0.3168	-4.5552
	(0.68)	(-1.13)	(1.36)	(-1.13)
LTA	0.0128	1.3979	1.2594	1.5455
	(0.04)	(0.32)	(1.48)	(0.37)
NII	0.7719**	-0.6026	2.2992***	-0.4984
	(2.55)	(-0.57)	(3.11)	(-0.49)
OEOI	-0.0697*	0.1550	-0.1703	0.0772
	(-1.78)	(1.00)	(-1.26)	(0.52)
OBL	-0.7162	-784.21**	-6.0744***	-726.85**
	(-0.85)	(-2.43)	(-2.99)	(-2.40)
EXG	-0.0014	-0.6138**	-0.0069**	-0.5713**
	(-1.29)	(-2.46)	(-2.38)	(-2.43)
Constant	878.08**	33488.97***	-754.50	30925.1***
	(2.36)	(2.82)	(-0.68)	(2.78)
Time Effect	Yes	Yes	Yes	Yes
R-Square	0.4718	0.0857	0.5132	0.0967
N Bank	31	70	31	70
N Obs	155	350	155	350

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

Table 5 shows empirical results on whether the effects of the COVID-19 pandemic on bank stability are different in government-owned and private banks. The pandemic has a great negative impact on bank stability which implies that a high number of confirmed cases lower bank stability (model 2 and 4), especially in private banks. However, there is no significant impact between the COVID-19 pandemic and government-owned bank stability, supporting H3. These findings are in line with Cornett et al. (2010), which showed that state-owned banks' credit quality was significantly greater than that of privately-owned banks.

To ensure accurate and steady results, several additional tests were conducted. Following Khan et al. (2017) and Chen et al. (2015), the dependent variable was first replaced by alternative bank stability measures frequently used in the related literature. These include return on equity (ROE) and loan loss provision to total loan ratio (LLP). Table 6 shows the estimation results. The results show that the pandemic has a significant negative impact on bank stability.

Second, the impact of the COVID-19 pandemic on bank performance was re-estimated using alternative measures shown in Table 7. Following Ashraf (2020); Al-Awadhi et al. (2020), the monthly growth in COVID-19 death cases (gDEATH) were used as the independent variable. As expected, these robustness tests' results further validate the main findings that there is a negative relationship between the monthly growth in COVID-19 death cases (gDEATH) and bank stability.

An alternative estimator reported in Table 8 was also used. Following Al-Awadhi et al. (2020) and Demirguc-Kunt, et al. (2020), the Random Effects Model (REM) and Fixed-effects models with Driscoll-Kraay standard errors were used to check the validity of the results further. There is a negative and statistically significant coefficient of the COVID-19 pandemic in all models in line with general expectations. This means that the COVID-19 pandemic disturbs bank stability. Overall, this study shows that the COVID-19 pandemic negatively and significantly affects bank stability.

Table 6. Covid-19 and Bank Stability – (robustness checks with alternative measurement of bank stability)

Expl. Variables	**Dependent Variables:**			
	ROE		**LLP**	
	(1)	**(2)**	**(3)**	**(4)**
COVID19	-0.0016**	-0.0051***	-6.33e-07	0.00025***
	(-2.33)	(-6.88)	(-0.21)	(6.18)
HHI		-0.539***		-0.0001***
		(-5.27)		(-3.82)
SIZE		14.780**		-0.0099
		(2.56)		(-0.52)
DEPO		-0.0058		0.00013
		(-0.12)		(0.90)
LTA		0.1363*		0.00022
		(1.74)		(1.10)
NII		0.0669		-0.0002
		(0.96)		(-1.19)
OEOI		-0.0698**		0.00006
		(-3.18)		(0.99)
OBL		-12.756***		-0.0477***
		(-5.32)		(-6.37)
EXG		-0.0113***		-0.00008***
		(-5.85)		(-6.16)
Constant	3.4935***	366.94***	0.0372***	1.716***
	(9.61)	(2.65)	(44.45)	(4.23)
Time Effect	Yes	Yes	Yes	Yes
R-Square	0.1669	0.3368	0.0083	0.0528
N Bank	101	101	101	101
N Obs	505	505	505	505

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

Table 7. Covid-19 and Bank Stability – (robustness checks with alternative measurement of Covid19)

Expl. Variables	Dependent Variables: ZROA		ZROE	
	(1)	(2)	(3)	(4)
GDEATH	-0.0226**	-0.2041***	-0.0247***	-0.1984***
	(-2.59)	(-3.73)	(-2.94)	(-3.90)
HHI		-29.276***		-27.800***
		(-3.73)		(-3.79)
SIZE		100.74		131.76
		(0.54)		(0.76)
DEPO		-3.5261		-3.2343
		(-1.10)		(-1.07)
LTA		0.8706		1.3014
		(0.23)		(0.38)
NII		-0.5271		-0.3875
		(-0.60)		(-0.45)
OEOI		0.1219		0.0471
		(0.93)		(0.37)
OBL		-711.8***		-676.83***
		(-3.52)		(-3.57)
EXG		-0.5658***		-0.5424***
		(-3.65)		(-3.74)
Constant	214.30***	31551.5***	229.79***	29429.8***
	(66.00)	(4.00)	(72.12)	(4.00)
Time Effect	Yes	Yes	Yes	Yes
R-Square	0.0114	0.0597	0.0302	0.0782
N Bank	101	101	101	101
N Obs	505	505	505	505

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

Table 8. Covid-19 and Bank Stability – (robustness checks with alternative measurement econometric specifications)

Expl. Variables	Dependent Variables: ZROA		ZROE	
	Random Effect	FE with Driscoll-Kraay	Random Effect	FE with Driscoll-Kraay
	(1)	(2)	(3)	(4)
COVID19	-0.1922***	-0.2165***	-0.1847***	-0.2104***
	(-4.41)	(-9.12)	(-4.49)	(-9.99)
HHI	-27.079***	-29.647***	-25.606***	-28.161***
	(-3.94)	(-6.50)	(-3.92)	(-6.84)
SIZE	-17.409	100.74	-7.4362	131.76
	(-0.61)	(0.93)	(-0.25)	(1.23)
DEPO	-3.0421	-3.5261***	-2.8231	-3.2343***
	(-1.03)	(-4.91)	(-1.00)	(-4.38)
LTA	-0.2125	0.8706	-0.0717	1.3014
	(-0.06)	(0.55)	(-0.02)	(0.88)
NII	-0.5057	-0.5271***	-0.3281	-0.3875**
	(-0.68)	(-6.89)	(-0.45)	(-3.31)
OEOI	0.1540	0.1229*	0.0736	0.0470
	(1.03)	(2.14)	(0.51)	(1.39)
OBL	-649.71***	-711.8***	-614.7***	-676.83***
	(-3.75)	(-6.90)	(-3.73)	(-7.28)
EXG	-0.5036***	-0.5548***	-0.4897***	-0.5317***
	(-3.96)	(-7.19)	(-3.96)	(-7.68)
Constant	30777.2***	30067.7***	29026.1***	28024.97***
	(3.94)	(4.72)	(3.91)	(4.77)

Time Effect	Yes	Yes		Yes	Yes
R-Square	0.0527	0.0597		0.0683	0.0782
N Bank	101	101		101	101
N Obs	505	505		505	505

Notes: Authors' calculation. ***,**, and * indicate significance at the 1%, 5% and 10%, respectively. Robust z-statistics are reported in parentheses.

4. CONCLUSION

This paper examines the influence of the COVID-19 pandemic on bank stability using panel data on 101 commercial banks in Indonesia form March until August 2020. Previous literature devoted to studying the impact of the COVID-19 pandemic on bank stability was very limited, a gap filled by this paper. It contributes to the increasing number of studies pioneered by Ozsoy et al. (2020) on the importance of accounting for bank stability during the COVID-19 pandemic.

There are robust results regarding the negative impact of the COVID-19 pandemic and bank lending. These results show the tremendous impact of COVID-19 pandemic on the stability of banks in Indonesia. Even though the government has made various rescue regulations to reduce pressure from COVID-19 pandemic. This finding is more pronounced in small and private banks. Small banks have low capital and private banks do not receive stronger protection than state-owned banks. Furthermore, large and government-owned banks often take steps to deal with the potential effect of the COVID-19 pandemic, reflecting their greater anticipated role in dealing with the crisis.

This study provides various policy implications to mitigate bank stability. First, the large bank's role through increasing their capital size to deal with the shocks due to the pandemic was highlighted. Second, governance plays a more active countercyclical role in the banking system through government-owned banks. Finally, small banks need to increase capital and protection for state-owned banks through capital injection. Future research needs to focus on the causal relationship between bank stability and policy for COVID-19 responses.

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the demonstration of the idea of the article, to indicate the result and its novelty and, most importantly, what conclusions should be drawn from the result.

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