Journal of Multinational Financial Management 67 (2023) 100784

Contents lists available at ScienceDirect

Journal of Multinational Financial Management

journal homepage: www.elsevier.com/locate/mulfin

COVID-19 pandemic impact on banking sector: A cross-country analysis

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ARTICLE INFO

JEL Classification:
C23
G01
G21
G28
L50

Keywords:
COVID-19 pandemic
Bank stability
Bank performance
Global banking

ABSTRACT

This study examines the effects of the COVID-19 outbreak on the performance and stability of the banking sector. Our sample consists of 2073 banks in 106 countries from 2016Q1 to 2021Q2. We employ several alternative bank performance and stability measures for a comprehensive analysis and robustness. The findings show that the COVID-19 outbreak has significantly reduced bank performance and stability. These results are consistently observed across several geographical regions and countries' income classifications. Additional analysis shows that the adverse impact of COVID-19 depends on the characteristics of the bank and market structure. While a better regulatory environment, institutional quality, and financial development have significantly increased the strength and resilience of banks. These findings provide practical implications for regulators and policymakers in the face of unprecedented uncertainty caused by the COVID-19 pandemic.

1. Introduction

In December 2019, Wuhan City, China, witnessed the origin of the novel coronavirus (COVID-19) first and then has spread globally (Gautam et al., 2022; Zhou et al., 2021). The World Health Organization (WHO) announced COVID-19 as a global pandemic on March 11, 2020, and declared a public health emergency(Gautam et al., 2022). This COVID-19 pandemic suddenly appeared in a world unprepared for such an event, wreaking havoc on countries worldwide and affecting the global economy grievously and at a pace (Duan et al., 2021; Fernandes, 2020), and its losses exceed those of 2008 global financial crisis (GFC) (Hanif et al., 2021). It has not only had a devastating effect on public health but has also caused severe turmoil and significant losses to the global economy, putting intense pressure on financial markets and institutions worldwide (Feyen et al., 2021). However, earlier studies related to bank risk/stability suggest that such shocks (e.g., the 2008 GFC) lead to an increase in the tail comovements of banks, which may trigger the collapse of whole financial systems (Duan et al., 2021). But, due to the unique nature of this crisis (i.e., this pandemic is significantly different from previous crises such as the GFC 2008 and the European debt crisis; it was triggered by a global pandemic that rapidly turned into an economic crisis), it is difficult to estimate the impact on the financial stability of the banking sector. Therefore, we cannot generalize the earlier finding on the bank's risk/stability of the crisis caused by this pandemic (Duan et al., 2021).

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https://doi.org/10.1016/j.mulfin.2023.100784
Received 16 July 2022; Received in revised form 17 December 2022; Accepted 21 January 2023
Available online 3 February 2023

Table 1
Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ZSC	37,232	4.899	1.737	-0.431	9.192
NPL	37,232	0.801	1.455	-12.276	3.929
ORK	37,232	-0.746	1.714	-11.735	-0.002
LRK	37,232	-4.326	9.312	-65.490	-0.018
PRK	37,232	0.445	0.879	0.002	5.841
ROAA	37,170	1.206	2.462	-8.585	13.087
ROAE	37,678	9.262	13.981	-44.731	77.256
NIM	37,024	4.371	4.228	-1.656	24.474
CIN	37,440	62.862	29.52	6.314	215.874
COVID-19	45,606	0.136	0.343	0	1
SIZ	34,106	7.813	2.664	1.879	13.766
CAP	34,069	15.163	13.958	5.016	82.052
LIQ	33,910	27.937	18.822	15.947	71.305
LTA	32,974	57.117	20.338	0.381	92.781
DIV	31,561	37.247	26.723	-27.427	121.392
CON	45,012	53.532	17.011	17.164	91.107
GDPpc	39,072	0.769	3.731	-11.234	7.521
INF	38,716	3.419	3.612	-1.248	19.629
RES	44,726	7.491	2.018	3	12
CRI	37,774	7.634	6.016	2	10
OSP	42,394	10.821	2.674	6	14
PMI	42,548	8.039	1.487	5	11
GEF	45,606	0.414	0.876	-1.658	1.937
PST	45,606	-0.168	0.853	-2.528	1.248
RQL	45,606	0.308	0.904	-1.976	1.912
COC	45,606	0.123	0.995	-1.488	2.24
ROL	45,606	0.197	1.002	-2.237	1.985
FDI	39,600	0.503	0.233	0.116	0.902
FID	39,600	0.551	0.267	0	1
FIA	39,600	0.393	0.291	0.031	1
FIE	39,600	0.647	0.093	0.262	0.783
FOB	40,018	20.546	20.572	0	91.321
GOB	40,568	24.131	21.913	0	75.241

This table shows summary statistics for the variables used in this study.

The pandemic has disrupted the lives of all communities and countries and has devastating global economic activity in 2020 beyond anything experienced in nearly a century (Samitas et al., 2022; Gautam et al., 2022). All the economic players (consumers, suppliers, financial intermediaries, etc.) have faced an extraordinary crisis during the massive global transmission of this coronavirus (Elnahass et al., 2021). In particular, financial markets worldwide have experienced significant stress and volatility in the face of the COVID-19 pandemic and related shutdowns (Samitas et al., 2022; Demir and Danisman, 2021).

Therefore, some researchers have analyzed the response of financial markets during the COVID-19 pandemic. In this regard, one stream of this research examines how COVID-19 affects stock markets. The empirical evidence indicates that COVID-19 adversely affected stock market return (Samitas et al., 2022; Ashraf, 2020; Demir and Danisman, 2021; Demirgüç-Kunt et al., 2021; Topcu and Gulal, 2020; Wang and Enilov, 2020; Al-Awadhi et al., 2020) and raise stock return volatility (Baker et al., 2020; Zaremba et al., 2021), due to the panic-sold out by the investors (Dharani et al., 2022). Topcu and Gulal (2020) examine the impact of COVID-19 on emerging stock markets. They showed that the adverse effect of the COVID-19 pandemic on emerging stock markets has gradually dropped. This negative impact is comparatively lesser in emerging markets where governments took required measures and announced larger stimulus packages. Shanaev et al. (2020) highlighted the importance of fundamental (e.g., COVID-19 case numbers and infection peak), policy (e.g., fiscal and monetary policy measures), and sentiment (e.g., Google trends search volume for COVID-19) components of the COVID-19 impact on stock returns in 51 countries. They show that all factors have severely affected the return of the stock, and the severity of the effects varies considerably. The main reason for the decline in stock returns was the extent of policy interventions. Similarly, Ashraf (2020) reported that the stock markets have negatively reacted to the increase in the number of confirmed cases of COVID-19, and the response varies over time. Wang and Enilov (2020) documented that the number of confirmed COVID-19 cases has led to a significant decline in stock market returns in Canada, France, Germany, Italy, and the United States. Al-Awadhi et al. (2020) reported the adverse effects of the increase in the daily cases and deaths from COVID-19 on the stock returns of Chinese firms. Baker et al. (2020), and Zaremba et al. (2021) indicated that COVID-19 leads to a considerable stock market volatility rise.

On the other hand, few researchers have determined the effects of COVID-19 on the banking sector. Çolak and Öztekin (2021) examine the pandemic's impact on global bank lending and analyze the different bank and country characteristics that increase or decrease the impact of the spread of the disease on bank credit. They have shown that in response to the pandemic shocks, the growth of bank loans has slowed down and this adverse impact on the growth of bank loans largely depends on the severity of the pandemic in the country. Duan et al. (2021) examine the effects of COVID-19 on systemic risk across 64 countries during the COVID-19 pandemic. They documented that COVID-19 raises systemic fragility across countries through government policies and bank default risk

Table 2
Impact of the COVID-19 pandemic on bank performance and bank stability: A global perspective.

	Panel A: Bank performance				**Panel B: Bank stability**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.357 * **	-1.489 * *	-0.685 * **	-0.383 * **	0.414 * **	0.047	0.315 * **	1.261 * **	0.116 * **
	(0.114)	(0.603)	(0.117)	(0.075)	(0.025)	(0.051)	(0.084)	(0.449)	(0.041)
SIZE	0.499 * **	3.143 * **	-0.156 * **	-11.846 * **	0.092 * **	0.137 * **	0.177 * **	1.211 * **	0.338 * **
	(0.150)	(1.128)	(0.017)	(.326)	(0.003)	(0.007)	(0.008)	(0.196)	(0.005)
CAP	0.078 * **	0.219 * **	0.097 * **	-0.202 * **	-0.034 * **	-0.010 * **	-0.015 *	-0.147 * **	-0.003 * *
	(0.012)	(0.049)	(0.014)	(0.003)	(0.006)	(0.003)	(0.008)	(0.040)	(0.001)
LIQ	0.021	0.338	0.377	-11.224 * **	-0.155	-0.163	-0.015	-0.255	-0.384 * *
	(0.219)	(1.178)	(0.173)	(2.158)	(0.145)	(0.112)	(0.161)	(0.84)	(0.182)
LTA	0.094 * **	0.311 * **	-0.002	-0.241 * **	-0.007 * **	-0.018 * **	-0.006 * **	-0.025 * **	-0.008 * **
	(0.001)	(0.011)	(0.002)	(0.019)	(0.002)	(0.001)	(0.002)	(0.009)	(0.001)
DIV	0.012 * **	0.070 * **	0.041 * **	-0.203 * **	-0.091 * **	-0.002 * **	-0.001 * *	-0.007 * *	-0.001 * **
	(0.001)	(0.005)	(0.001)	(0.009)	(0.001)	(0. 000)	(0.001)	(0.004)	(0. 000)
CON	0.010 * **	0.098 * **	0.012 *	-0.152 * **	-0.003 *	-0.003 * *	0.002	0.029	-0.008 * **
	(0.003)	(0.034)	(0.007)	(0.030)	(0.002)	(0.002)	(0.002)	(0.022)	(0.001)
GDPpc	0.012 *	0.224 * **	0.104 * **	-0.174 * *	0.013 * **	0.007 * *	0.027 * **	0.054 * *	0.015 * **
	(0.007)	(0.055)	(0.005)	(0.069)	(0.003)	(0.003)	(0.006)	(0.027)	(0.003)
INF	-0.321 * **	-0.381 * **	-0.133 * **	-0.356 * **	0.005	-0.003	0.020	0.011	0.031
	(0.008)	(0.041)	(0.006)	(0.075)	(0.005)	(0.003)	(0.016)	(0.029)	(0.023)
α_0	-4.515 * **	-23.924 * *	1.002	149.472 * **	-3.173 * **	3.126 * **	2.064 * *	15.355 * *	0.557
	(1.357)	(9.789)	(1.983)	(4.728)	(0.794)	(0.915)	(0.903)	(6.813)	(0.532)
Observations	24,953	24,601	24,940	24,906	22,781	12,602	24,270	23,729	23,838
R-squared	0.144	0.133	0.184	0.151	0.162	0.124	0.123	0.122	0.132
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows the results for the baseline regression on analyzing the effect of the COVID-19 pandemic on bank performance and stability. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and otherwise zero. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3
Role of bank heterogeneity.

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Bank size effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-1.078 * **	-1.205	-1.695 * **	6.202 * **	0.922 * **	0.115	1.041 * **	3.888 * **	0.313 * **
	(0.222)	(0.981)	(0.209)	(0.997)	(0.125)	(0.099)	(0.156)	(0.729)	(0.068)
COVID-19 * SIZE	0.090 * **	0.221 * **	0.143 * **	-0.589 * **	-0.066 * **	-0.007 * **	-0.092 * **	-0.338 * **	-0.026 * **
	(0.020)	(0.015)	(0.020)	(0.009)	(0.012)	(0.000)	(0.014)	(0.066)	(0.006)
SIZE	0.479 * **	3.384 * **	0.082	-11.515 * **	-0.132 * **	-0.166 * **	-0.224 * *	-1.418 * **	-0.053
	(0.149)	(1.125)	(0.247)	(0.598)	(0.001)	(0.021)	(0.103)	(0.119)	(0.063)
Controls variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.018 * **	-29.052 * **	4.476 * *	171.908 * **	-2.831 * **	3.415 * **	2.585 * **	17.678 * *	1.036 *
	(1.426)	(9.800)	(2.025)	(5.109)	(0.805)	(0.895)	(0.932)	(6.977)	(0.552)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.054	0.042	0.201	.043	0.068	0.027	0.030	0.026	0.036
Panel (ii): Bank capitalization effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.191 * *	-1.16 * *	-0.14 * *	-0.793	-0.344 * **	0.008	-0.190 * **	-0.774 * *	-0.089 * *
	(0.093)	(0.498)	(0.071)	(0.890)	(0.062)	(0.038)	(0.068)	(0.352)	(0.035)
COVID* CAP	-0.035 * **	-0.127 * **	-0.037 * **	-0.149 * **	0.004 * **	0.004 * *	0.008 * **	-0.029 * **	-0.001 *
	(0.002)	(0.012)	(0.002)	(0.023)	(0.002)	(0.002)	(0.002)	(0.009)	(0.001)
CAP	0.082 * **	0.222 * **	0.096 * **	-0.221 * **	-0.034 * **	0.006 * *	0.016 * **	-0.144 * **	0.003 * **
	(0.003)	(0.019)	(0.003)	(0.034)	(0.002)	(0.003)	(0.003)	(0.014)	(0.001)
Controls variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-4.902 * **	-28.477 * **	4.347 * **	172.056 * **	-2.987 * **	3.422 * **	2.396 * **	16.922 * **	0.973 * **
	(0.596)	(3.255)	(0.467)	(5.871)	(0.392)	(0.374)	(0.441)	(2.306)	(0.222)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.061	0.042	0.199	0.044	0.064	0.027	0.025	0.024	0.034
Panel (iii): Bank liquidity effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.435 * **	-1.778 * *	-0.806 * **	2.067 * **	-0.501 * **	0.171 * *	-0.529 * **	-2.055 * **	-0.117 * *
	(0.126)	(0.703)	(0.132)	(0.659)	(0.088)	(0.070)	(0.096)	(0.520)	(0.047)
COVID-19 *LIQ	0.054 * *	0.015 * **	0.884 * **	-0.029 * **	-0.351 * **	-0.451 * **	-0.819 * **	-3.200 * *	-0.318 * **
	(0.025)	(0.000)	(0.244)	(0.000)	(0.098)	(0.044)	(0.257)	(1.306)	(0.039)
LIQ	0.078 * **	0.214	-0.547 * **	-0.242 * **	-0.034 * **	-0.072	-0.659 * *	-2.840 *	-0.387 * *
	(0.012)	(2.181)	(0.139)	(0.009)	(0.000)	(0.267)	(0.259)	(1.530)	(0.158)
Controls variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.287 * **	-28.825 * **	4.090 * *	173.681 * **	-3.014 * **	3.422 * **	2.361 * *	16.748 * *	0.959 *
	(1.424)	(9.776)	(1.966)	(5.871)	(0.810)	(0.884)	(0.949)	(6.975)	(0.548)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838

(*continued on next page*)

Table 3 (*continued*)

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Bank size effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
R-squared	0.051	0.042	0.193	0.042	0.064	0.029	0.026	0.024	0.034
Panel (iv): Asset structure effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.330 * **	-1.098	-0.080	-0.745	-0.337 * **	-0.248 * **	0.281 * **	-0.383	-0.068
	(0.125)	(0.668)	(0.096)	(1.209)	(0.082)	(0.054)	(0.091)	(0.474)	(0.046)
COVID* LTA	-0.001	-0.009	-0.008 * **	-0.04 * **	-0.004 *	0.001	-0.007	0.019	-0.001
	(0.002)	(0.008)	(0.001)	(0.015)	(0.003)	(0.001)	(0.005)	(0.026)	(0.001)
LTA	0.004 *	0.013	0.000	-0.252 * **	-0.007 * **	-0.019 * **	-0.003 *	-0.021 * *	-0.008 * **
	(0.002)	(0.013)	(0.002)	(0.024)	(0.002)	(0.001)	(0.002)	(0.009)	(0.001)
Controls variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.32 * **	-29.089 * **	3.834 * **	174.721 * **	-3.062 * **	3.659 * **	2.077 * **	16.138 * **	0.941 * **
	(0.599)	(3.257)	(0.469)	(5.88)	(0.393)	(0.374)	(0.440)	(2.308)	(0.222)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.051	0.042	0.193	0.042	0.064	0.031	0.028	0.023	0.034
Panel (v): Bank diversification effect									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.486 * **	-2.984 * **	-0.848 * **	3.226 * **	-0.421 * **	0.129 * *	-0.417 * **	-1.571 * **	-0.135 * **
	(0.128)	(0.714)	(0.123)	(0.910)	(0.084)	(0.059)	(0.090)	(0.520)	(0.046)
COVID-19 *DIV	0.013 * **	0.040 * **	0.008 * **	-0.045 * **	-0.034 * **	-0.003 * **	-0.003 * **	-0.146 * **	-0.003 * *
	(0.000)	(0.013)	(0.002)	(0.012)	(0.000)	(0.001)	(0.001)	(0.008)	(0.001)
DIV	0.012 * **	0.061 * **	-0.042 * **	-0.192 * **	-0.001	-0.001 * *	0.001	0.005	-0.001 * **
	(0.000)	(0.002)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.004)	(0.000)
Controls variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.328 * **	-29.272 * **	3.961 * *	174.194 * **	-3.037 * **	3.501 * **	2.286 * *	16.438 * *	0.952 *
	(1.424)	(9.759)	(1.978)	(5.87)	(0.808)	(0.889)	(0.944)	(6.983)	(0.547)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.051	0.043	0.193	0.043	0.064	0.029	0.024	0.023	0.034

This table illustrates how a bank with diverse attributes responds to the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4
Bank performance and stability during the COVID-19 pandemic. The moderating role of the regulatory environment.

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Bank activity restrictions									
	(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.348 *	0.305	-0.849 * **	0.426 * **	0.067 * **	0.013 * *	0.063 * **	0.209 * **	0.012 * *
	(0.191)	(1.038)	(0.165)	(0.029)	(0.004)	(0.003)	(0.007)	(0.011)	(0.005)
COVID-19 *RES	0.032 *	0.094 * **	0.051 * **	0.244 * **	-0.877 * **	-0.049	-0.803 * **	-1.900 * **	-0.193 * **
	(0.018)	(0.010)	(0.005)	(0.013)	(0.131)	(0.100)	(0.144)	(0.720)	(0.063)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-1.575 * **	-6.162 * *	7.285 * **	177.865 * **	-1.703 * **	2.404 * **	2.614 * **	18.802 * **	1.550 * **
	(0.548)	(2.875)	(0.799)	(5.882)	(0.321)	(0.446)	(0.343)	(2.273)	(0.152)
Obs.	24,381	24,031	24,701	24,744	22,234	12,260	23,658	23,122	23,819
R^2	0.239	0.380	0.369	0.441	0.357	0.123	0.129	0.335	0.339
Panel (ii): Capital stringency									
	(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	0.038	0.611	-0.642 * **	0.369 * **	0.491 * **	0.152	0.515 * **	1.702 * **	0.126 * **
	(0.142)	(0.702)	(0.126)	(0.009)	(0.083)	(0.123)	(0.093)	(0.500)	(0.046)
COVID-19 *CRI	-0.002	0.094 *	0.010	-0.018	0.005	0.028 *	0.001	-0.036	0.001
	(0.012)	(0.052)	(0.010)	(0.052)	(0.006)	(0.015)	(0.006)	(0.036)	(0.004)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-1.373 * *	-4.573	6.836 * **	175.595 * **	-2.718 * **	1.580 * **	1.749 * **	14.414 * **	1.504 * **
	(0.545)	(2.838)	(0.840)	(6.196)	(0.312)	(0.443)	(0.352)	(2.420)	(0.169)
Obs.	20,424	20,080	20,572	20,726	18,698	9273	19,900	19,373	19,963
R^2	0.352	0.446	0.342	0.437	0.670	0.259	0.360	0.285	0.365
Panel (iii): Official supervisory power									
	(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.611 * **	-1.872 * **	-1.008 * **	0.281 * **	0.087 * **	0.058	0.089 * **	0.276 * **	0.019 * **
	(0.185)	(0.157)	(0.163)	(0.081)	(0.010)	(0.089)	(0.010)	(0.057)	(0.005)
COVID-19 *OSP	0.051 * **	0.203 * *	0.055 * **	0.268 * **	-1.230 * **	-0.187 * **	-1.186 * **	-3.895 * **	-0.276 * **
	(0.013)	(0.092)	(0.013)	(0.033)	(0.119)	(0.009)	(0.137)	(0.728)	(0.059)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-1.122 * *	-4.015	7.077 * **	164.187 * **	-1.609 * **	2.225 * **	2.556 * **	20.703 * **	1.409 * **
	(0.518)	(2.881)	(0.760)	(6.195)	(0.306)	(0.473)	(0.339)	(2.392)	(0.168)
Obs.	22,963	22,615	23,123	23,306	21,235	11,842	22,277	21,745	22,292
R^2	0.500	0.542	0.363	0.370	0.201	0.360	0.381	0.483	0.383
Panel (iv): Private monitoring index									
	(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.863 * **	0.225	-2.318 * **	0.377 * **	0.143 * **	0.027 * *	0.211 * **	0.571 * **	0.015 * *
	(0.282)	(1.433)	(0.209)	(0.087)	(0.018)	(0.013)	(0.025)	(0.112)	(0.007)
COVID-19 *PMI	0.088 * **	0.152 * **	0.211 * **	0.150 * **	-1.494 * **	-0.281 * *	-1.982 * **	-5.758 * **	-0.260 * **
	(0.032)	(0.009)	(0.022)	(0.037)	(0.158)	(0.132)	(0.204)	(0.994)	(0.073)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-1.098 * *	-4.642	11.260 * **	196.635 * **	-1.641 * **	3.480 * **	2.522 * **	16.985 * **	1.168 * **
	(0.512)	(2.936)	(0.822)	(6.149)	(0.328)	(0.412)	(0.312)	(2.276)	(0.137)
Obs.	23,036	22,745	23,195	23,378	20,989	11,856	22,348	21,880	22,362
R^2	0.633	0.499	0.386	0.455	0.492	0.247	0.399	0.339	0.325

This table reports the country's regulatory environment's role during the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. CV indicates the conditional variables that are activity restrictions (RES), capital requirements (CRI), supervisory power (OSP), and private monitoring (PMI), which capture the regulatory aspects based on Barth et al. (2013). We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5
Bank performance and stability during the COVID-19 pandemic. The moderating role of institutional quality.

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Government effectiveness									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.468 * **	-1.715 * **	-0.658 * **	1.862 * **	0.441 * **	0.018 * **	0.403 * **	1.644 * **	0.116 * **
	(0.028)	(0.173)	(0.032)	(0.277)	(0.020)	(0.000)	(0.024)	(0.178)	(0.044)
COVID-19 *GEF	0.174 * **	-0.224	0.240 * **	-0.219	-0.075 * **	0.026	-0.178 * **	-0.968 * **	0.025
	(0.019)	(0.259)	(0.077)	(0.701)	(0.011)	(0.041)	(0.012)	(0.093)	(0.017)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.451 * **	-29.531 * **	4.023 * **	174.363 * **	-3.084 * **	3.499 * **	2.186 * **	16.058 * **	0.951 * **
	(0.467)	(3.088)	(0.371)	(4.311)	(0.289)	(0.199)	(0.167)	(1.602)	(0.190)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.542	0.045	0.194	0.243	0.464	0.527	0.327	0.426	0.234
Panel (ii): Political stability									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.354 * **	-1.777 * **	-0.512 * **	1.805 * *	0.380 * **	0.061	0.269 * **	1.024 * **	0.109 * **
	(0.059)	(0.321)	(0.010)	(0.301)	(0.012)	(0.090)	(0.033)	(0.109)	(0.019)
COVID-19 *PST	0.152 * **	0.638 *	0.309 * **	0.683 * *	-0.130 * **	-0.007	-0.250 * **	-0.753 * **	0.001
	(0.016)	(0.364)	(0.013)	(0.318)	(0.009)	(0.218)	(0.010)	(0.008)	(0.201)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.026 * **	-29.244 * **	4.449 * **	173.859 * **	-2.918 * **	3.593 * **	2.583 * **	15.958 * **	0.875 * **
	(0.431)	(2.671)	(0.265)	(5.011)	(0.210)	(0.198)	(0.299)	(1.969)	(0.189)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.392	0.402	0.195	0.242	0.650	0.327	0.328	0.425	0.334
Panel (iii): Regulatory quality									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.394 * **	-1.518 * **	-0.596 * **	1.377	0.453 * **	0.025	0.402 * **	1.473 * **	0.117 * **
	(0.051)	(0.391)	(0.036)	(0.995)	(0.021)	(0.051)	(0.037)	(0.187)	(0.012)
COVID-19 *RQL	0.124 * **	0.821 * **	0.266 * **	0.177 * **	-0.218 * **	-0.045 * **	-0.345 * **	-1.380 * **	-0.039 * **
	(0.020)	(0.010)	(0.021)	(0.020)	(0.010)	(0.011)	(0.015)	(0.112)	(0.010)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.265 * **	-28.957 * **	4.194 * **	171.672 * **	-3.226 * **	3.516 * **	1.999 * **	16.052 * **	0.953 * **
	(0.421)	(2.561)	(0.270)	(5.011)	(0.210)	(0.198)	(0.298)	(1.922)	(0.182)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.352	0.343	0.195	0.292	0.267	0.327	0.231	0.227	0.334
Panel (iv): Control of corruption									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.357 * **	-1.394 * **	-0.560 * **	1.657 * **	0.392 * **	0.030	0.290 * **	1.198 * **	0.112 * **
	(0.046)	(0.231)	(0.039)	(0.349)	(0.021)	(0.059)	(0.027)	(0.281)	(0.020)
COVID-19 *COC	0.149 * **	0.477 * **	0.289 * **	0.242 * **	-0.132 * **	0.008	-0.249 * **	-0.889 * **	0.005
	(0.019)	(0.109)	(0.011)	(0.017)	(0.012)	(0.030)	(0.008)	(0.098)	(0.020)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.283 * **	-29.650 * **	4.141 * **	173.812 * **	-3.000 * **	3.680 * **	2.351 * **	16.887 * **	0.960 * **
	(0.419)	(3.001)	(0.289)	(4.461)	(0.213)	(0.189)	(0.280)	(1.923)	(0.181)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.192	0.283	0.396	0.272	0.466	0.128	0.230	0.326	0.364
Panel (v): Rule of law									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.382 * **	-1.486 * **	-0.608 * **	1.588 *	0.423 * **	0.040	0.370 * **	1.374 * **	0.118 * **
	(0.045)	(0.229)	(0.039)	(0.350)	(0.020)	(0.060)	(0.022)	(0.271)	(0.019)
COVID-19 *RUL	0.143 * **	0.581 * **	0.330 * **	0.199 * **	-0.136 * **	0.015	-0.283 * **	-0.974 * **	0.016
	(0.018)	(0.113)	(0.012)	(0.017)	(0.012)	(0.028)	(0.011)	(0.011)	(0.014)

(*continued on next page*)

Table 5 (*continued*)

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Government effectiveness									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.235 * **	-29.229 * **	4.188 * **	173.882 * **	-2.981 * **	3.595 * **	2.434 * **	17.070 * **	0.964 * **
	(0.401)	(2.791)	(0.277)	(4.460)	(0.213)	(0.189)	(0.280)	(1.922)	(0.179)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.252	0.223	0.197	0.142	0.276	0.372	0.291	0.286	0.434
Panel (vi): Voice and accountability									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.277 * **	-1.652 * **	-0.425 * **	1.744 * *	0.362 * **	0.049	0.241 * **	1.029 * **	0.112 * **
	(0.039)	(0.227)	(0.037)	(0.341)	(0.021)	(0.059)	(0.024)	(0.201)	(0.017)
COVID-19 *VOA	0.178 * **	0.237	0.251 * **	0.571	-0.149 * **	-0.046 * **	-0.237 * **	-0.746 * **	-0.042 * **
	(0.017)	(0.490)	(0.014)	(0.618)	(0.010)	(0.012)	(0.023)	(0.120)	(0.012)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.239 * **	-28.564 * **	4.165 * **	172.827 * **	-3.142 * **	3.516 * **	2.162 * **	15.811 * **	0.872 * **
	(0.399)	(2.989)	(0.271)	(4.430)	(0.200)	(0.189)	(0.279)	(2.011)	(0.151)
Obs.	24,531	24,180	24,723	24,906	22,381	12,273	23,793	23,257	23,838
R-squared	0.212	0.312	0.195	0.242	0.267	0.328	0.229	0.426	0.350

This table reports the country's institutional quality role during the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. CV indicates the conditional variables (i.e., institutional strength), which are captured through the Worldwide Governance Indicators (WGI), which contain six different aspects of institutional quality such as government effectiveness (GEF), political stability (PST), regulatory quality (RQL), control of corruption (COC), the rule of law (RUL), voice and accountability (VOA). We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

channels. However, this adverse effect varies across the bank and country heterogeneity. Similarly, Elnahass et al. (2021) examined the effects of COVID-19 on banking stability and found that the outbreak of COVID-19 has detrimental effects on the bank's financial performance and financial stability. Demirgüç-Kunt et al. (2021) studied the impact of financial sector policy announcements on bank stocks worldwide during the onset of the COVID-19 crisis. They state that liquidity support, borrower assistance programs, and monetary easing moderated the adverse impact of the crisis, but their impact varied considerably across banks and countries.

Although during the COVID-19 pandemic, the banking sector has played an important role in supporting households and businesses and effectively channeling credit into the broader economy. However, this unprecedented shock of COVID-19 affects banks in different aspects. For instance, the sudden outbreak of the COVID-19 pandemic and its worldwide spread have paralyzed national and international economic activity, leading to severe turbulence and considerable losses (Hanif et al., 2021). To avoid the spread of COVID-19 and support the real economy, governments have formed and enforced numerous health-related and non-health-related policies and strategies according to the financial situation of the country and the severity of the cases (Samitas et al., 2022). For example, they have imposed several restrictions such as social distancing, travel bans, border closures, and the closing of non-essential businesses. These, in turn, lead to an adverse economic impact on firms and households (Duan et al., 2021). It has undermined the performance of businesses' activities in all sectors and enhanced costs, and households have faced job losses and reduced income (Demir and Danisman, 2021; Duan et al., 2021; Foglia et al., 2022). Thus, firms and households cannot service their debt, raising the probability of default (Duan et al., 2021; Foglia et al., 2022). These effects will likely spread to banks, resulting in lost revenue and a surge in non-performing loans, negatively affecting banks' capital, profits, and solvency (Beck and Keil, 2021; Demir and Danisman, 2021; Duan et al., 2021; Foglia et al., 2022). Acharya and Steffen (2020) stated that the increasing speed of credit line drawdowns, especially riskier firms, damage bank balance sheets and reduce their capital adequacy ratios. It jeopardizes their stability and constrains future intermediation with potential spillovers to the real economy. Furthermore, the COVID-19 pandemic has severely damaged banking operations in various nations and has provoked a precautionary response from depositors (Elnahass et al., 2021), which lowers the demand for capital, reduces non-interest income and bank profitability (Beck and Keil, 2021). As a result, banks may face higher credit risks, leading to increased systemic fragility.

This study examines how the COVID-19 outbreak affects the banking sector's performance and stability; we use a sample of 2073 listed and unlisted banks in 106 countries from 2016Q1 to 2021Q2. We use numerous alternative bank performance and stability measures for a comprehensive analysis and robustness. The findings indicate that the COVID-19 outbreak adversely impacts bank

Table 6
Bank performance and stability during the COVID-19 pandemic. The moderating role of financial development.

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Financial development									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.623 * **	-1.905 * *	-0.801 * **	0.244 * **	0.304 * **	0.107 *	0.408 * **	1.904 * **	0.114 * *
	(0.131)	(0.776)	(0.138)	(0.023)	(0.097)	(0.061)	(0.094)	(0.543)	(0.051)
COVID-19 *FDI	0.529 * **	0.762	0.517 * **	-0.261	-0.168 * **	-1.405 * *	0.175	-0.074	0.014
	(0.118)	(0.987)	(0.142)	(1.261)	(0.042)	(0.611)	(0.301)	(0.090)	(0.053)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-4.779 * **	-26.464 * **	5.213 * **	154.529 * **	-1.457 * **	4.991 * **	2.374 * *	17.197 * *	1.172 * *
	(1.504)	(9.997)	(2.020)	(7.536)	(0.213)	(0.987)	(1.025)	(7.314)	(0.581)
Obs.	24,511	24,160	24,700	24,883	22,366	12,273	23,778	23,242	23,820
R-squared	0.522	0.425	0.154	0.223	0.304	0.307	0.325	0.401	0.344
Panel (ii): Financial institutions depth									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.376 * **	-2.346 * **	-0.326 * *	0.246 * **	0.162 *	0.192 * **	0.134 * **	1.077 * *	0.076 * **
	(0.118)	(0.672)	(0.132)	(.023)	(0.093)	(0.055)	(0.034)	(0.522)	(0.019)
COVID-19 *FID	-0.136	0.447	0.404	0.959	-0.550 * **	-0.280 * **	-0.635 * **	-0.764	-0.116 * *
	(0.146)	(0.825)	(0.631)	(1.143)	(0.113)	(0.075)	(0.111)	(0.591)	(0.052)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.405 * *	-13.985 * **	3.058 * **	160.832 * **	-2.145 * *	2.901 * **	3.324 * **	22.558 * **	1.695 * **
	(1.456)	(3.001)	(0.292)	(6.782)	(0.868)	(0.961)	(0.943)	(6.967)	(0.559)
Obs.	24,511	24,160	24,700	24,883	22,366	12,273	23,778	23,242	23,820
R-squared	0.376	0.402	0.175	0.232	0.290	0.300	0.323	0.401	0.324
Panel (iii): Financial institutions access									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.576 * **	-1.471 * *	-0.857 * **	0.205 * **	0.477 * **	0.083 * **	0.481 * **	1.855 * **	0.141 * **
	(0.131)	(0.690)	(0.117)	(.034)	(0.083)	(0.016)	(0.095)	(0.488)	(0.043)
COVID-19 * FIA	0.589 * **	0.153 * **	0.840 * **	0.319 * **	-0.199 * *	-0.079 * **	-0.467 * **	-1.842 * **	-0.089 * *
	(0.106)	(0.016)	(0.101)	(0.032)	(0.097)	(0.019)	(0.079)	(0.490)	(0.036)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-5.249 * **	-28.859 * **	4.129 * *	169.748 * **	-3.024 * **	3.425 * **	2.350 * *	16.732 * *	0.965 *
	(1.424)	(9.778)	(1.980)	(6.773)	(0.808)	(0.900)	(0.943)	(6.969)	(0.548)
Obs.	24,511	24,160	24,700	24,883	22,366	12,273	23,778	23,242	23,820
R-squared	0.331	0.443	0.176	0.253	0.299	0.300	0.331	0.299	0.324
Panel (i): Financial institutions efficiency									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.886 * **	-3.852 *	-0.476 * **	8.214 * **	0.540 *	0.356 * *	0.796 * **	0.085	0.112
	(0.308)	(2.156)	(0.081)	(2.917)	(0.288)	(0.159)	(0.269)	(1.424)	(0.134)
COVID-19 *FIE	1.938 * **	9.448 * **	0.807 * *	14.612 * **	-1.358 * **	-0.590 * **	1.388	-2.060	-0.086
	(0.440)	(2.964)	(0.389)	(4.008)	(0.398)	(0.229)	(1.264)	(1.939)	(0.177)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-6.501 * **	-43.453 * **	4.410 * *	179.323 * **	-3.112 * **	3.554 * **	1.489 * **	13.223 *	0.258
	(1.519)	(9.896)	(2.111)	(6.294)	(0.858)	(0.954)	(0.075)	(7.468)	(0.589)
Obs.	24,511	24,160	24,700	24,883	22,366	12,273	23,778	23,242	23,820
R-squared	0.212	0.273	0.236	0.255	0.346	0.298	0.332	0.346	0.314

This table reports the role of financial development during the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. CV indicates the conditional variables (i.e., financial development), which is captured the overall financial development of the country through four different indexes such as financial development index (FDI), financial institution depth (FID), financial institution access (FIA), and financial institution efficiency (FIE) taken from IMF. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7
Alternative methodology.

	Panel A: Bank performance				Panel B: Bank stability				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	EFF	ZSC	NPL	PRK	LRK	ORK
$Perf_{t-1}$	0.563 * **	0.572 * **	0.791 * **	0.551 * **					
	(0.026)	(0.029)	(0.024)	(0.032)					
$Risk_{t-1}$					0.659 * **	0.723 * **	0.492 * **	0.484 * **	0.417 * **
					(0.015)	(0.079)	(0.038)	(0.039)	(0.032)
COVID-19	-0.165 * *	-0.027 * **	-0.076 *	0.013 * **	0.079 * **	0.047 * **	0.206 * **	0.229	0.356 * *
	(0.058)	(0.007)	(0.041)	(0.001)	(0.004)	(0.001)	(0.008)	(1.278)	(0.171)
SIZE	0.287 * **	1.683 *	0.094	-6.219 * **	0.462 * **	0.018	0.104	-0.024	0.112 * *
	(0.106)	(0.972)	(0.166)	(1.654)	(0.077)	(0.045)	(0.114)	(0.663)	(0.052)
CAP	0.059 * **	0.134 * **	0.031 * **	0.068	-0.031 * **	0.005	-0.014 * *	-0.068 * *	0.005
	(0.008)	(0.044)	(0.007)	(0.088)	(0.005)	(0.004)	(0.007)	(0.035)	(0.004)
LIQ	0.159	0.173	-0.078	-2.794	0.006	0.165	0.217	2.563 * *	-0.141
	(0.262)	(1.479)	(0.222)	(4.617)	(0.186)	(0.141)	(0.196)	(1.136)	(0.137)
LTA	0.008 * *	0.013	0.003	-0.101 *	0.003	-0.003	0.003	-0.031 *	-0.005 * **
	(0.004)	(0.019)	(0.003)	(0.055)	(0.002)	(0.002)	(0.003)	(0.017)	(0.002)
DIV	0.008 * **	0.041 * **	-0.012 * **	-0.147 * **	0.001	0.001	-0.002	-0.008	0.003
	(0.002)	(0.010)	(0.002)	(0.042)	(0.001)	(0.002)	(0.002)	(0.007)	(0.005)
CON	0.002	0.022	0.016 * **	0.081 * *	-0.002	0.004	-0.007 *	-0.037 * *	-0.003 *
	(0.004)	(0.022)	(0.003)	(0.041)	(0.003)	(0.007)	(0.004)	(0.015)	(0.002)
GDPpc	0.008	0.121 * **	0.001	-0.098	0.023 * **	0.005 * *	-0.012 *	0.074 * **	0.012 * **
	(0.006)	(0.034)	(0.005)	(0.075)	(0.006)	(0.002)	(0.006)	(0.025)	(0.003)
INF	-0.001	0.029	0.008	-0.225 * **	0.028 * **	0.005 *	-0.002	-0.076 * *	0.012 * **
	(0.008)	(0.051)	(0.007)	(0.086)	(0.006)	(0.003)	(0.007)	(0.037)	(0.004)
α_0	-3.382 * **	-15.508 *	0.636	83.438 * **	-1.991 * **	0.178	1.034	-4.217	-0.405
	(1.028)	(8.735)	(1.478)	(13.945)	(0.701)	(0.528)	(1.033)	(6.095)	(0.492)
Observations	16,636	16,388	16,575	16,789	15,752	8312	21,218	20,549	21,257
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.181	0.271	0.268	0.151	0.269	0.226	0.128	0.287	0.361
Hansen	0.437	0.581	0.369	0.328	0.362	0.526	0.218	0.281	0.245

This table shows the effect of the COVID-19 pandemic on bank performance and stability using the System GMM. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. Robust standard errors are reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

performance and stability. More specifically, we find that bank performance and stability are most negatively affected by the COVID-19 outbreak in smaller, undercapitalized, less diversified, foreign, and government-owned banks. Moreover, additional analysis shows that a better regulatory environment, institutional quality, and financial development have significantly increased the strength and resilience of banks. As a result, it has enabled them to play a positive role in providing financial support and smoothing access to capital. Our key findings remain consistent across alternative model specifications, such as GMM, which capture the potential endogeneity issues. These outcomes are persistently seen across several geographical regions and countries' income classifications.

We contribute to the literature in the following ways. Firstly, COVID-19's duration, broad scope, and ponderance are far beyond any previous financial crisis and emergencies in the last decade. Its effects on the global financial market, especially in the banking sector, are more complex and unpredictable. However, a few researchers (when we start the study) have examined the impact of the Covid-19 pandemic on banks differently. For example, Çolak and Öztekin (2021) examine the effect of the pandemic on international bank lending. They found that bank and country characteristics amplify or weaken the impact of the disease outbreak on bank credit. Özlem Dursun-de Neef and Schandlbauer (2021) investigate how European banks adjusted lending at the onset of the pandemic depending on their local exposure to the COVID-19 outbreak and capitalization. Duan et al. (2021) explored the pandemic's effect on bank systemic risk and found that the pandemic had increased systemic risk across countries. Elnahass et al. (2021) examined the effect of Covid-19 on banking stability. Berger et al. (2020) investigate whether relationship customers fare better or worse than other borrowers during the COVID-19 crisis and document harsher loan contract terms for the former. Demirgüç-Kunt et al. (2021) found adverse effects of the pandemic on bank stock returns. Beck and Keil (2021) find that banks that are geographically more exposed to the pandemic and lockdowns saw increased loan-loss provisions and more non-performing loans. Therefore, relatively few studies consider the detailed effect of COVID-19 on the banking sector's performance and stability from a global perspective. So this study fills this gap and analyzes the impact of the COVID-19 outbreak on financial performance across various financial performance indicators (i.e., accounting-based and market-based performance measures) and bank stability (i.e., accounting-based and market-based bank risk measures). Because studying the impact of COVID-19 and macroeconomic policy's response on the banking sector is of great theoretical and practical importance to help understand the effect mechanism of emergencies on the banking sector and to accurately grasp the direction and strength of macro policy tools. Secondly, this study comparatively assesses and identifies the pandemic's effect on different banking business models, such as conventional and Islamic banks. Thirdly, to better understand the drivers and heterogeneity of bank risk-taking patterns, we investigate the various bank-specific (e.g., bank size, liquidity, capital, and diversification) and

Table 8
Bank performance and stability during the COVID-19 pandemic. Across the different regions.

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): East Asia & Pacific									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-2.489 *	-1.398 * *	-0.418 * **	3.244 * *	1.278 * **	0.225 * **	1.254 * **	0.281 * **	2.002 * **
	(1.440)	(0.602)	(0.110)	(1.518)	(0.178)	(0.076)	(0.461)	(0.078)	(0.483)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	8.662 * **	6.905 * *	11.867 * **	170.722 * **	-12.188 * **	-0.120	-2.012 * *	-10.851 *	0.151
	(1.300)	(6.917)	(1.272)	(17.623)	(2.133)	(0.951)	(0.933)	(5.788)	(0.589)
Obs.	4133	4133	4251	4251	3539	3521	3951	3951	4048
R-squared	0.114	0.113	0.336	0.580	0.280	0.310	0.270	0.270	0.450
Panel (ii): Europe & Central Asia									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.515 * **	-0.631 * *	-1.127 * **	0.043	0.799 * **	0.047 * **	1.111 * **	4.114 * **	0.230 * **
	(0.178)	(0.296)	(0.115)	(0.123)	(0.100)	(0.009)	(0.139)	(0.668)	(0.058)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-8.235 * **	-51.684 * **	9.746 * **	233.287 * **	-4.183 * **	6.682 * **	1.302	0.708	1.038 * **
	(1.099)	(5.513)	(0.739)	(9.204)	(0.604)	(0.629)	(0.845)	(4.099)	(0.353)
Obs.	10,695	10,609	10,843	10,862	9758	2524	10,372	10,284	10,432
R-squared	0.272	0.264	0.226	0.101	0.285	0.126	0.490	0.350	0.690
Panel (iii): Latin America & Caribbean									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-3.547 * **	-1.387 * **	0.644 * **	-2.007	0.622 * **	0.028 *	0.264 * *	0.029 * **	0.685 * *
	(0.162)	(.508)	(0.249)	(2.229)	(0.187)	(0.016)	(0.106)	(0.009)	(0.283)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-7.626 * **	-61.007 * **	-7.984 * **	158.619 * **	-3.228 * **	3.031 * **	2.151 * **	21.162 * **	-2.816 * **
	(0.956)	(6.509)	(1.631)	(14.579)	(1.213)	(0.788)	(0.714)	(5.012)	(0.909)
Obs.	2792	2792	2800	2800	2663	2490	2766	2766	2771
R-squared	0.187	0.178	0.321	0.3321	0.126	0.640	0.440	0.480	0.372
Panel (iv): Middle East & North Africa									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-1.277 * **	-7.080 * **	-0.430 * **	-4.999 * **	0.490 * **	0.342 * **	0.476 * **	1.118 *	0.125 * *
	(0.204)	(0.841)	(0.088)	(1.112)	(0.165)	(0.054)	(0.140)	(0.621)	(0.062)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-17.097 * **	-54.337 * **	5.413 * **	147.036 * **	6.672 * **	5.875 * **	2.301	17.783 * *	0.503
	(2.297)	(9.739)	(1.117)	(25.422)	(1.851)	(0.789)	(1.645)	(7.626)	(0.751)
Obs.	2352	2339	2281	2421	2206	1628	2249	2237	2183

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Table 8 (*continued*)

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): East Asia & Pacific									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
R-squared	0.186	0.249	0.427	0.123	0.321	0.208	0.378	0.431	0.514
Panel (v): North America									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-1.482 * **	-2.942 * **	-1.725 * **	0.218	2.278 * **	0.754 *	0.597 * *	8.511 * **	0.485 * **
	(.299)	(0.825)	(0.254)	(0.146)	(0.416)	(0.453)	(0.252)	(1.826)	(0.128)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	11.895	369.317 * *	62.165 * **	-202.055 * **	30.873	61.429 * *	-10.556	43.395	20.04 * **
	(15.676)	(180.228)	(14.609)	(35.042)	(24.467)	(24.902)	(14.584)	(103.655)	(7.375)
Obs.	1793	1617	1796	1796	1550	1142	1781	1431	1791
R-squared	0.119	0.106	0.224	0.121	0.124	0.355	0.288	0.281	0.109
Panel (vi): South Asia									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.596 * *	-3.677 * *	-0.643 * *	-0.031 * *	1.095 * **	2.676 * **	1.685 * **	3.579 * **	0.331 * **
	(0.278)	(1.837)	(0.309)	(0.012)	(0.267)	(0.283)	(0.283)	(1.113)	(0.126)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	9.485 * **	99.601 * **	14.305 * **	67.103	-10.006 * **	5.318 * *	1.725	16.809	5.639 * **
	(3.281)	(22.067)	(3.502)	(42.113)	(2.124)	(2.136)	(2.042)	(13.739)	(1.564)
Obs.	1948	1879	1986	1989	1942	502	1909	1830	1904
R-squared	0.261	0.208	0.215	0.268	2.173	0.323	0.257	0.147	0.119
Panel (vii): Sub-Saharan Africa									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.245 * **	-7.063 *	-1.107 * **	-7.275 *	1.075 * **	0.351 * **	0.816 * **	0.608 * **	0.606 * **
	(0.061)	(3.897)	(0.308)	(4.268)	(0.013)	(0.071)	(0.015)	(0.152)	(0.189)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	5.976	84.662 * *	6.905 * *	154.447 * **	10.765 * **	-1.458	4.042	12.806	2.491
	(5.361)	(36.925)	(2.765)	(38.951)	(3.252)	(2.572)	(3.368)	(23.407)	(1.653)
Obs.	818	811	766	787	723	466	765	758	709
R-squared	0.146	0.119	0.467	0.298	0.181	0.237	0.396	0.265	0.247
Panel (viii): Higher COVID-19 growth rate									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.804 * **	-3.647 * **	-0.779 * **	-0.341 * *	1.482 * **	0.597 * **	0.746 * **	-0.521 * *	-2.125
	(0.188)	(1.113)	(0.012)	(0.159)	(0.481)	(0.153)	(0.049)	(0.251)	(1.531)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Table 8 (*continued*)

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): East Asia & Pacific									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
α_0	-10.744 * **	-59.073 * **	2.071	-149.018 * **	-2.852 * *	4.000 * **	2.016	17.693 *	-0.195
	(1.683)	(10.704)	(2.456)	(35.004)	(1.188)	(0.977)	(1.367)	(9.471)	(0.586)
Obs.	11,299	12,351	12,065	12,221	10,442	11,299	11,735	11,443	11,793
R-squared	0.033	0.023	0.030	0.083	0.062	0.192	0.067	0.033	0.033
Panel (xi): Lower COVID-19 growth rate									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.551 * **	-1.309 * *	-0.184 * *	-0.226 * **	0.219 * **	0.146 * **	0.224 * **	-0.019 * *	1.344 *
	(0.149)	(0.598)	(0.089)	(0.048)	(0.057)	(0.040)	(0.057)	(0.008)	(0.747)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-6.363 * **	-24.638 * *	3.503	-148.037 * **	-2.817 * *	3.263 * **	3.466 * **	22.835 * **	0.835
	(1.500)	(10.293)	(2.304)	(36.009)	(1.111)	(0.984)	(1.201)	(8.740)	(0.561)
Obs.	10,351	10,065	10,221	10,442	10,299	10,735	9443	9793	9735
R-squared	0.078	0.052	0.191	0.067	0.031	0.022	0.030	0.068	0.035

This table shows the results for the baseline regression on analyzing the effect of the COVID-19 pandemic on bank performance and bank stability across the different regions. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. We have divided the countries into the following seven regions according to the world bank: (1) East Asia & Pacific, (2) Europe & Central Asia, (3) Latin America & Caribbean, (4) the Middle East & North Africa, (5) North America, (6) South Asia, and (7) Sub-Saharan Africa. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9
Bank performance and stability during the COVID-19 pandemic. Across the different income levels.

	Panel A: Bank performance				**Panel B: Bank stability**				
High income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.789 * **	-4.766 * **	-0.377 * **	-2.986	0.217 *	0.143 * **	0.334 * **	0.908 * *	0.085 * **
	(0.007)	(0.473)	(0.058)	(6.366)	(0.115)	(0.051)	(0.053)	(0.384)	(0.026)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-8.149 * **	-46.189 * **	-3.699 * **	148.472 * **	-6.419 * **	5.612 * **	2.95 * **	3.048	-4.659 * **
	(0.704)	(4.967)	(0.597)	(10.607)	(0.924)	(0.667)	(0.547)	(3.999)	(0.352)
Observations	9002	8822	9134	9153	7875	5937	8685	8330	8720
R-squared	0.118	0.127	0.116	0.271	0.273	0.338	0.358	0.334	0.113
Upper middle income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.418 * *	-0.016 * **	-0.986 * **	-0.592	0.041 * *	0.129 * **	0.966 * **	0.096 * *	0.418 * **
	(0.164)	(0.001)	(0.114)	(1.367)	(0.019)	(0.039)	(0.125)	(0.043)	(0.056)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-9.51 * **	-60.195 * **	10.012 * **	210.755 * **	-3.008 * **	3.721 * **	2.326 * **	20.788 * **	1.647 * **
	(1.085)	(5.329)	(0.767)	(9.453)	(0.577)	(0.507)	(0.828)	(3.767)	(0.359)
Observations	10,175	10,094	10,183	10,323	9665	4195	9926	9845	9939
R-squared	0.171	0.171	0.242	0.264	0.296	0.361	0.349	0.333	0.364
Low income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.316 * **	-0.228 * **	0.093 * **	3.986 * **	4.409 * *	2.033 * **	2.351 * **	1.116 * **	2.033 * **
	(0.073)	(0.037)	(0.005)	(1.066)	(1.803)	(0.658)	(0.071)	(0.015)	(.658)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 9 (*continued*)

	Panel A: Bank performance				**Panel B: Bank stability**				
High income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-30.041 * *	-56.383	-27.423 * *	53.242 * **	5.811	12.045 * *	39.591 * *	211.483 *	-0.462
	(14.566)	(80.231)	(13.009)	(12.293)	(20.225)	(5.327)	(19.877)	(112.256)	(11.332)
Observations	132	132	143	143	117	127	117	117	127
R-squared	0.461	0.424	0.624	0.432	0.194	0.477	0.522	0.463	0.474
Lower middle income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.546 * *	-2.308 * **	-3.821 * **	4.237 * **	1.317 * **	1.166 * **	2.166 * **	2.144 * **	3.029 * **
	(0.213)	(0.240)	(0.418)	(1.114)	(0.136)	(0.296)	(0.332)	(0.801)	(1.039)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	3.316 * **	33.142 * **	8.082 * **	146.932 * **	-1.188	0.344	3.742 * **	20.419 * **	3.824 * **
	(1.173)	(6.949)	(1.015)	(12.124)	(0.758)	(1.082)	(0.733)	(4.525)	(0.456)
Observations	5222	5132	5263	5287	4724	2014	5065	4965	5052
R-squared	0.142	0.193	0.279	0.228	0.217	0.369	0.337	0.356	0.361

This table shows the results for the baseline regression on analyzing the effect of the COVID-19 pandemic on bank performance and bank stability across the different regions. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. we categorized our sampled banks into the following four groups (i.e., high-income, upper-middle-income, low-income, and lower-middle-income countries) according to the World Bank's classification. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 10
Bank performance and stability during the COVID-19 pandemic. Across the different types of banks.

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Foreign banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.291 * **	-2.476 * **	-0.456 * **	0.064 * **	0.669 * **	0.314 * **	0.678 * **	2.993 * **	0.087
	(0.035)	(0.582)	(0.152)	(0.007)	(0.075)	(0.082)	(0.075)	(0.412)	(0.107)
COVID*FOR	-0.647 * **	-0.475 * *	0.001	0.431 * **	-0.008 * **	-0.001	-0.017 * *	-0.009	-0.002 * **
	(0.001)	(0.163)	(0.003)	(0.014)	(0.001)	(0.001)	(0.007)	(0.007)	(0.001)
FOR	-0.016 * **	-0.046	0.124	0.066 * **	-0.006 * **	0.205	0.035	0.329	-0.001 * **
	(0.001)	(0.021)	(0.251)	(0.009)	(0.001)	(0.172)	(0.218)	(1.178)	(0.000)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.431 * **	-13.599 * **	8.007 * **	130.283 * **	3.951 * **	2.482 * **	-.843 * **	-10.89 * **	1.244 * **
	(0.178)	(0.976)	(0.256)	(1.938)	(0.127)	(0.144)	(0.125)	(0.693)	(0.059)
Observations	21,832	21,541	22,076	22,119	20,025	11,280	21,224	20,755	21,312
R-squared	0.178	0.198	0.295	0.162	0.292	0.149	0.194	0.271	0.158
Panel (ii): Government Bank									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.206 * **	-1.055 *	-0.357 * *	0.205 * **	0.241 * **	0.143 * **	0.382 * **	1.691 * **	0.541 * **
	(0.009)	(0.611)	(0.172)	(0.037)	(0.079)	(0.009)	(0.078)	(0.428)	(0.097)
COVID*GOV	-0.007 * **	-0.035	-0.329	-0.032 *	0.012 * **	0.095 * **	0.008 * **	0.036 * **	0.003 * **
	(0.003)	(0.218)	(1.178)	(0.019)	(0.003)	(0.017)	(0.001)	(0.007)	(0.001)
GOV	-0.003 * **	0.001	-0.003 * *	0.053 * **	0.002 * **	0.013 * **	0.006 * **	0.015 * **	0.003 * **
	(0.001)	(0.004)	(0.001)	(0.009)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.396 * **	-12.114 * **	8.626 * **	132.216 * **	4.163 * **	2.488 * **	-.448 * **	-9.735 * **	1.122 * **
	(0.177)	(0.979)	(0.258)	(1.937)	(0.128)	(0.139)	(0.124)	(0.691)	(0.059)
Observations	22,168	21,877	22,414	22,457	20,188	11,622	21,557	21,088	21,644
R-squared	0.176	0.193	0.382	0.165	0.197	0.185	0.192	0.181	0.164
Panel (iii): conventional banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.092***	-0.147***	-0.392 *	0.075	0.177***	0.653 * *	0.252 * *	0.129	0.910
	(0.006)	(0.032)	(0.202)	(0.152)	(0.017)	(0.260)	(0.116)	(0.182)	(0.632)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	36.047 * **	16.945 * *	17.408 * *	7.496 * **	225.485 * **	18.329 * **	16.350 * **	23.846 * **	7.726 * **
	(5.326)	(8.464)	(8.460)	(1.629)	(24.589)	(5.583)	(5.384)	(1.177)	(1.629)
Observations	13,792	13,727	11,752	11,704	15,087	15,087	12,427	12,337	12,388
R-squared	0.213	0.213	0.210	0.158	0.220	0.232	0.177	0.191	0.181
Panel (iv): Islamic banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK

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Table 10 (*continued*)

	Panel A: Bank performance				**Panel B: Bank stability**				
Panel (i): Foreign banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.560***	-0.383 * *	-0.133 * *	0.035	0.112 * **	0.381 * *	-0.178	-0.346	0.210
	(0.071)	(0.177)	(0.051)	(0.064)	(0.010)	(0.193)	(0.346)	(0.256)	(0.303)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	19.771 * *	-21.394 *	8.224	15.919 *	15.919 *	33.839 * **	-7.872 * **	-1.791 * **	4.695 * **
	(8.544)	(11.436)	(10.170)	(8.779)	(8.792)	(11.771)	(0.089)	(0.126)	(1.801)
Observations	1539	1455	1624	1706	2308	2933	2308	2308	2308
R-squared	0.212	0.226	0.219	0.217	0.262	0.306	0.213	0.207	0.207
Panel (v): Listed banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.125 * *	-0.137 * *	-0.042 * *	0.137	0.110 * *	0.023 * *	0.799 *	0.138	0.437
	(0.058)	(0.059)	(0.017)	(0.132)	(0.052)	(0.011)	(0.430)	(0.131)	(2.849)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-21.64 * **	-3.227 * *	-22.99 * **	7.408 * *	-4.541	-26.46 * **	-24.31 * **	-22.35 * **	-23.04 * **
	(5.156)	(1.294)	(6.508)	(3.146)	(2.762)	(7.048)	(6.069)	(6.869)	(6.544)
Observations	13,763	13,763	13,760	13,700	13,763	13,763	13,110	13,003	13,503
R-squared	0.374	0.378	0.364	0.325	0.311	0.214	0.224	0.121	0.144
Panel (vi): Unlisted banks									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.704 * **	-0.873 * *	-0.146 * *	0.243	0.266 * **	0.133 * **	0.073 * *	0.100 *	0.147
	(0.108)	(0.364)	(0.064)	(0.181)	(0.002)	(0.048)	(0.033)	(0.051)	(0.116)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	3.872 * **	3.846 * **	3.841 * **	4.143 * **	-18.99 * **	-21.64 * **	-3.227 * *	-22.99 * **	-11.123 * **
	(0.609)	(0.580)	(0.583)	(0.614)	(6.844)	(5.156)	(1.294)	(6.508)	(2.133)
Observations	5637	5637	5417	5257	6671	6670	5907	5711	5711
R-squared	0.321	0.202	0.257	0.244	0.155	0.138	0.135	0.136	0.137

This table shows the results for the baseline regression on analyzing the effect of the COVID-19 pandemic on bank performance and bank stability across the different bank types. The sample comprises 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11
Bank performance and stability during the COVID-19 pandemic. The role of Government policy responses.

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Income support									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.072 * **	-0.126 * **	-0.132 * **	-2.986	0.217 *	0.143 * **	0.334 * **	0.908 * *	0.085 * **
	(0.026)	(0.027)	(0.026)	(6.366)	(0.115)	(0.051)	(0.053)	(0.384)	(0.026)
COVID19 *Income support= 1	0.012 * *	0.285 *	-0.007	0.109	0.007 * *	0.005 *	0.030	0.020	1.811
	(0.005)	(0.155)	(0.377)	(0.347)	(0.004)	(0.003)	(0.117)	(0.016)	(1.728)
COVID19 *Income support= 2	0.376 * **	0.423 * *	0.234	-1.510	0.095 * **	0.106 *	-0.003	-0.284	-0.351
	(0.081)	(0.202)	(0.170)	(3.021)	(0.008)	(0.058)	(0.002)	(0.245)	(0.270)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-9.410 * **	-10.048 * **	-9.194 * **	-6.968 * **	-4.065 * **	-9.219 * **	-1.439 * *	-1.044	-2.684 * **
	(1.231)	(1.258)	(1.274)	(1.542)	(1.734)	(1.869)	(0.680)	(0.640)	(0.651)
Observations	6760	5498	4969	3953	6888	5579	5097	3953	4731
R-squared	0.273	0.292	0.169	0.170	0.168	0.137	0.133	0.132	0.216
Panel (ii): Debt contract									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.198 * **	-0.456 * **	-0.291 * **	0.664 *	-0.455 * **	0.165 * *	-0.027 * **	-0.076 *	-0.001
	(0.071)	(0.036)	(0.053)	(0.380)	(0.073)	(0.058)	(0.007)	(0.041)	(0.008)
COVID19 *Debt Contract relief= 1	0.004 *	0.005 * *	0.014 * *	0.007	0.320 * *	0.006 * *	0.001	-0.098	0.022
	(0.002)	(0.002)	(0.007)	(0.007)	(0.151)	(0.002)	(0.005)	(0.075)	(0.022)
COVID19 *Debt Contract relief= 2	0.011	0.015	0.019	0.015	0.021 *	0.167 * *	0.016	0.005	0.051
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.071)	(0.041)	(0.040)	(0.041)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.111 *	-397.340 * *	5.503 * **	5.991 * **	4.878 * **	9.909 * **	-2.238 * **	-2.137 * **	512.807
	(1.552)	(172.407)	(0.289)	(0.307)	(0.423)	(1.398)	(0.476)	(0.475)	(985.337)
Observations	3872	3872	3872	3872	3953	3953	3953	3953	3934
R-squared	0.100	0.141	0.523	0.326	0.187	0.187	0.112	0.144	0.144
Panel (iii): Fiscal measures									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.623 * **	-0.376 * **	0.537 * **	0.886 * **	0.070 * **	0.069 * **	0.070 * **	0.068 * **	-0.017 * *
	(0.106)	(0.103)	(0.092)	(0.298)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
COVID19 *Fiscal measures	0.213 * *	0.016 * *	-0.671 *	0.009	0.004 * *	0.069 * **	0.003	0.013	0.671 *
	(0.085)	(0.009)	(0.380)	(0.048)	(0.002)	(0.005)	(0.018)	(0.012)	(0.380)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-0.490	148.133 * **	108.496 * **	-6.084 * **	-4.160 * **	-9.221 * **	-2.160 * **	-111.229 *	-138.407 *
	(1.033)	(23.237)	(12.289)	(1.242)	(0.582)	(0.589)	(0.582)	(67.229)	(71.727)
Observations	5431	5429	5430	5429	5428	5428	5428	5428	4127
R-squared	0.326	0.224	0.351	0.382	0.469	0.261	0.399	0.482	0.427
Panel (iv): Monetary stimulus									

(*continued on next page*)

Table 11 (*continued*)

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Income support									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.468 * **	-0.354 * **	-0.394 * **	0.161 * **	0.690 * *	0.466 * **	0.201 * **	0.159 * **	0.129 * **
	(0.086)	(0.085)	(0.085)	(0.041)	(0.347)	(0.014)	(0.002)	(0.015)	(0.013)
COVID19 *Monetary stimulus	0.071 * *	0.006 * *	-0.006 *	.004	0.077 * **	0.014	0.034	0.030	0.028
	(0.035)	(0.003)	(0.004)	(.005)	(0.003)	(0.011)	(0.035)	(0.035)	(0.035)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	5.861 * **	1.626 * **	1.657 * **	6.896 * **	5.356 * **	11.225 * **	3.892 * **	3.957 * **	12.48 * **
	(1.444)	(0.335)	(0.401)	(1.531)	(1.588)	(2.087)	(0.605)	(0.666)	(2.211)
Observations	3718	3718	3718	3799	3799	3799	4965	4951	4982
R-squared	0.129	0.096	0.102	0.132	0.095	0.122	0.096	0.110	0.129

This table shows the role of Government policy responses during the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. The government policy response data for the sample countries are retrieved from Hale et al. (2020). The income support index equals 0 if there is no income support, 1 if the government replaces less than 50% of lost salary, and 2 if the government replaces 50% or more of lost salary. Debt contract relief equals 0 if there is no such relief; equals 1 if there is a narrow relief specific to one kind of contract; equals 2 if there is a broad debt/contract relief. Fiscal measures show the monetary value USD of fiscal stimuli adopted in a country, including spending or tax cuts. The monetary stimulus is a binary indicator that equals one for countries with above-median values of central bank assets to GDP. We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12
Bank performance and stability during the COVID-19 pandemic. The role of national Culture.

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Uncertainty avoidance									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.530 * **	-3.352 * **	-0.093 * **	0.034 * **	0.414 * **	0.147 * **	0.007 * **	0.018 * **	0.211 * **
	(0.148)	(1.120)	(0.012)	(0.006)	(0.075)	(0.040)	(0.002)	(0.003)	(0.057)
UAI	0.233 * **	0.389 * **	0.342 * **	0.168	0.420 * **	0.049	0.945 * *	0.060	0.179 * **
	(0.028)	(0.043)	(0.052)	(0.299)	(0.052)	(0.041)	(0.438)	(0.422)	(0.067)
COVID19 *UAI	0.259 * **	0.156 * *	0.765 * *	0.684	0.367 * **	0.021	0.059	0.055	-0.130 *
	(0.092)	(0.067)	(0.361)	(0.454)	(0.051)	(0.019)	(0.063)	(0.073)	(0.076)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	No	No	No	No
α_0	-5.299 * **	-28.868 * **	4.035 * *	16.514 * *	-3.035 * **	3.459 * **	2.307 * *	3.563 * **	2.466 * **
	(1.426)	(9.775)	(1.991)	(6.960)	(0.807)	(0.897)	(0.940)	(0.471)	(0.441)
Observations	23,531	23,180	23,723	21,732	22,381	22,273	23,793	23,257	23,257
Adjusted R2	0.151	0.142	0.191	0.162	0.164	0.126	0.124	0.123	0.090
Panel (ii): Power distance									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.455 * **	-1.521 * **	-0.041 * **	0.070 * **	0.379 * **	0.149 * *	0.170 * **	0.033 * *	0.015 *
	(0.088)	(0.476)	(0.003)	(0.013)	(0.052)	(0.067)	(0.051)	(0.015)	(0.008)
PDI	0.166 * **	0.342 * **	0.180 * *	-0.462	0.220 * **	0.038	-0.046	-0.002	0.266 * *
	(0.051)	(0.052)	(0.075)	(0.335)	(0.034)	(0.043)	(0.078)	(0.057)	(0.117)
COVID19 *PDI	1.635 * **	1.483 * **	0.266 * *	0.296	0.227 * *	0.029	-0.026	0.065	0.013 *
	(0.238)	(0.350)	(0.117)	(0.354)	(0.089)	(0.019)	(0.097)	(0.074)	(0.007)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	No	No	No	No
α_0	-4.515 * **	-23.924 * *	1.002	15.355 * *	-3.173 * **	3.126 * **	2.064 * *	-3.275 * **	-1.484 * **
	(1.357)	(9.789)	(1.983)	(6.813)	(0.794)	(0.915)	(0.903)	(0.033)	(0.346)
Observations	23,953	23,601	23,940	21,180	22,781	22,602	23,270	23,729	23,239

(*continued on next page*)

Table 12 (*continued*)

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Uncertainty avoidance									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
Adjusted R2	0.144	0.133	0.184	0.159	0.162	0.124	0.123	0.122	0.132
Panel (iii): Individualism									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19	-0.372 * **	-1.868 * **	-0.078 * **	0.220 * **	0.171 * *	0.433 * **	0.136 * *	-0.155	0.040
	(0.051)	(0.320)	(0.012)	(0.048)	(0.069)	(0.053)	(0.067)	(0.221)	(0.072)
IDV	-0.257 * **	-0.211 * **	-0.296	-0.032	0.116 * **	0.078 *	0.283 * **	0.020	0.244 * **
	(0.033)	(0.034)	(0.305)	(0.100)	(0.021)	(0.042)	(0.078)	(0.040)	(0.030)
COVID19 *IDV	-0.172 * *	-0.144 * *	0.045	0.064	0.190 * *	0.103	0.011	-0.452	0.101 *
	(0.081)	(0.067)	(0.069)	(0.048)	(0.076)	(0.070)	(0.024)	(0.335)	(0.059)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	No	No	No	No
α_0	-5.635 * **	-26.999 * **	4.437 * **	17.786 * **	-3.257 * **	-3.510 * **	-2.367 * **	-2.063 * **	-1.046 * **
	(1.357)	(8.189)	(1.041)	(5.722)	(0.887)	(0.955)	(0.584)	(0.311)	(0.069)
Observations	23,253	23,201	23,140	20,330	20,123	20,432	21,710	21,249	21,239
Adjusted R2	0.149	0.143	0.192	0.154	0.151	0.119	0.119	0.110	0.111

This table shows the role of national culture during the COVID-19 pandemic. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and 0 otherwise. To capture the national culture, we use the three cultural dimensions, namely, uncertainty avoidance (UAI), power distance (PDI), and Individualism versus collectivism (IDV) from Hofstede's (2001). We also control several bank-specific and country-specific factors, time (quarter) fixed effects, and bank-fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

country-level factors (e.g., regulatory environment, institutional quality, financial development, and market structure) that may attenuate or intensify the effects of the COVID-19 pandemic shock on bank performance and stability. Finaly, as COVID-19 spreads globally, governments impose several restrictions, containment and health measures, monetary, fiscal, and regulatory policy responses. We take advantage of a new database and retrieve government policy response data from the OxCGRT compiled by Hale et al. (2020) and then analyzed which types of policy responses have helped to mitigate the adverse impact of COVID-19 on bank performance and stability.

This paper proceeds as follows. Section 2 presents a review of the relevant literature. Section 3 describes our variables and sample, and empirical model. Section 4 explains our empirical results and discussion. The conclusion is in Section 5.

2. Literature review and hypothesis development

COVID-19 arises in late December 2019 and early 2020 and spread quickly worldwide, posing a considerable threat to public health and economic development (Zhou et al., 2021). COVID-19 is the third more significant outbreak of a novel coronavirus in the 21st century, following SARS in 2003 and MERS in 2012(Keogh-Brown et al., 2020). This disease has increased uncertainty and risks and severely declined global activity (Padhan and Prabheesh, 2021).

However, studies examining the impacts of COVID-19 have emerged quickly in recent months. Fernandes (2020) stated that COVID-19 had decreased global demand and supply. Eichenbaum et al. (2021) examine the impacts of COVID-19 on economic activities and find an inevitable tradeoff between the recession's severity and the number of deaths. McKibbin and Fernando (2021) explore the effects of different epidemiological scenarios from COVID-19 and show greater adverse impacts of COVID-19 in less developed countries where the population density is higher and the healthcare systems are less developed. Liu et al. (2020) and Yue et al. (2020) showed a decline in consumption and investment. Devpura and Narayan (2020) and Narayan (2020) found that COVID-19 cases and deaths exacerbated oil price fluctuations. Gubareva (2021) and Çolak and Öztekin (2021) analyze the output and credit contraction due to COVID-19. Akhtaruzzaman et al. (2021) investigate the role of gold as a hedge during the COVID-19 pandemic crisis. Moreover, COVID-19 also adversely affects different firms and industries' performances (Fu and Shen, 2020; Shen et al., 2020) and the insurance sector (Wang et al., 2020).

2.1. Theoretical framework and research hypotheses

The COVID-19 pandemic has also severely affected the financial system, increasing financial risks (Al-Awadhi et al., 2020; Phan and Narayan, 2020). COVID-19 has adversely affected the stock market in uncertainty and reduced stock return worldwide, reducing capital flows. This decline due to stock market uncertainty ultimately created obstacles in the availability of liquidity and investment in the global financial system (Padhan and Prabheesh, 2021).

The Prospect theory, established by Kahneman and Tversky (1979), emphasizes that investors set and decide the portfolio under risk. Existing literature supports that investors avoid risk if they prefer investments with certain risk prospects in expected value. Prospect theory concerns risk-averse investors' behavior and anomalies, which explains the negative correlation between risk and return. Barberis et al. (2016) confirmed this phenomenon. Goodell (2020) confirmed that the downturn in the stock market during the pandemic resulted from investors' delay in investment decisions. Guedhami et al. (2021) reported that multinational firms suffered considerably higher stock price declines than domestic firms during the pandemic. They also point out that strengthening the country's financial system moderates these negative performance effects. Accordingly, prospect theory can be the explanation for the phenomenon of stock returns and the pandemic's negative relationship.

Moreover, some researchers analyzed the impact of COVID-19 on the bank sector. Elnahass et al. (2021) affirmed that the COVID-19 crisis devastated many banks worldwide. Governments worldwide have taken many important steps to reduce the spread of the virus. They have suddenly implemented de-globalization by locking down their borders between many countries. This has severely affected economic activities, trade and services, leading to declining business and household incomes and revenues. It reduces the ability to repay loans and the demand for banking services (Beck and Keil, 2021; Duan et al., 2021). Li et al. (2021) provide strong empirical evidence that the pandemic resulted in tightened credit standards and reduced demand for many types of loans. They find revenue diversification is positively linked to performance but adversely associated with risk.

Çolak and Öztekin (2021) determined the impact of the pandemic on bank lending. They observed that bank loan growth reduced globally in response to the pandemic shock. In comparison, the reduction in bank credit growth has largely depended on the severity of the pandemic in the country. Moreover, Duan et al. (2021) evaluate the effect of the pandemic on bank systemic risk. They find that the pandemic has enhanced the systemic risk across countries. While this negative effect is higher for large, highly leveraged, riskier, high loan-to-asset, undercapitalized, and low network centrality banks. Elnahass et al. (2021) find that the COVID-19 outbreak has had detrimental impacts on the global banking sector's performance and financial stability. However, some studies reported a significantly positive shock to the demand for U.S. bank loans at the beginning of the pandemic (e.g., Li et al., 2020). At the same time, Acharya and Steffen (2020) reported that firms reduced their bank credit lines and higher their cash levels due to uncertainty and increased risk. Therefore, based on this analysis, we hypothesized that:

H_1. : COVID-19 outbreak has adversely impact bank performance and stability.

3. Data and methodology

3.1. Data and sample selection

To analyze the impact of COVID-19 on the banking sector, we obtained quarterly balance sheet data of 2073 listed and unlisted banks in 106 different countries from the Bankscope database for 2016Q1 to 2021Q2.[1] Quarterly frequency data is preferred for the following basis: (a) The most important reason is that daily and monthly data is not available for financial and accounting data; (b) the COVID-19 period covers only two quarters. Hence, our frequency is driven by current financial and accounting data availability in 2020–21. Country-specific variables such as GDP per capita, inflation, and bank concentration are taken from IMF and World Bank. The country's regulatory environment and institutional quality data are collected from Barth (2013) and the world governance indicator (WGI). Appendix A reports a detailed explanation of all variables and sources. Table 1 displays the summary statistics of the variables of interest.

3.2. Measurements of variables

3.2.1. Bank performance measurement

It is challenging to evaluate and capture a bank's overall performance using a single measure (Baselga-Pascual and Vähämaa, 2021). Therefore, we followed the previous studies of Elnahass et al. (2021), Adesina (2021), and Dan Dang and Huynh (2021), used four alternative accounting-based measures in our analysis as a dependent variable to evaluate the bank's performance. These accounting-based measures return on average total assets (ROAA), return on average equity (ROAE), the cost to income ratio (CIN), and net interest margin ratio (NIM). These are considered the banking sector's most accepted financial performance measures, providing better sustainability predictions (Simpson and Kohers, 2002).

3.2.2. Bank stability measurement

Numerous risk measures have been used in the existing literature as proxy indicators for bank stability. Therefore, for a comprehensive analysis, we employ a series of alternative bank stability proxies in this study. Firstly, we followed the earlier studies of Laeven and Levine (2009), Elnahass et al. (2021), and Shabir et al. (2021) and used the Z-score as the proxy for bank default risk. The Z-score determines the bank's distance to insolvency (Roy, 1952), and it is assumed to be an unbiased bank risk indicator based on accounting data. The *Z*-score shows the number of standard deviations below the expected value of a bank's ROA at which equity is depleted and the bank is insolvent (Baselga-Pascual and Vähämaa, 2021; Bond et al., 1993; Boyd & Runkle, 1993). The Z-score is an inverse proxy for a firm's probability of failure, combining profitability, leverage, and return volatility into a single measure (Lee et al., 2014). Therefore, this index can be interpreted as an inverse measure of the probability of insolvency, i.e., a higher *Z*-score implies that a bank incurs fewer risks and is more stable (Baselga-Pascual et al., 2015; Köhler, 2015; Shabir et al., 2021). The Z-score is calculated as follows:

$$\text{Zscore}_{it} = \frac{\text{ROA}_{it} + \text{E}_{it}/\text{TA}_{it}}{\sigma\text{ROA}_{it}} \tag{1}$$

Where ROA_{it} donates and σROA_{it}[2] are respectively, the ratio return on assets and its standard deviation, $\text{E}_{it}/\text{TA}_{it}$ is equity to total assets ratio. we computed the standard deviations for ROA using a three-year rolling window. Moreover, in this study, following Elnahass et al. (2021), and Shabir et al. (2021), we use the Z-score's natural logarithm transformation to decrease skewness.

Secondly, following the previous studies of Elnahass et al. (2021), Shabir et al. (2021), and Danisman and Demirel (2019), we used the non-performing loan ratio as a proxy for bank credit risk and denoted by NPL. It is a backward-looking measure of credit risk, as NPLs can only be reported after they occur (Abuzayed et al., 2018). A higher value of NPLs indicates the weak ability of banks to manage credit risk (Abuzayed et al., 2018; Beck et al., 2013). As noted by Abedifar et al. (2013) and Beck et al. (2013), these credit risk indicators only partly reflect the loan portfolio quality since variation across banks may be due to different internal policies regarding problem loan classification, reserve requirements and write-off policies.

Thirdly, we used the volatility of net interest margin as a proxy for bank operational risk (Shabir et al., 2021; Danisman and Demirel, 2019) and denoted by (ORK), which indicates the level of risk in a bank's operations (Houston et al., 2010). Higher volatility in net interest margin results from a riskier lending strategy.

Finally, to further analyze the impact of COVID-19 on bank performance and stability, we decompose the Z-score into two different components (Danisman and Demirel, 2019; Shabir et al., 2021). The first one is the portfolio risk as a proxy by the ROA divided by the standard deviation of ROA and denoted by (PRK). At the same time, the second component of the Z-score is used as the proxy for the leverage risk of the bank, which is the equity-to-assets ratio divided by the standard deviation of ROA and denoted by (LRK). Furthermore, we multiplied the Z-Score, PRK, and LRK by (−1) in our analysis for the ease of comparability with other bank risk measures so that higher values now indicate increased bank risk. These risk measures reflect the banking sector's overall financial stability (Elnahass et al., 2021).

[1] We choose this sample of banks because of the quarterly availability of data on the Bankscope database.
[2] We following the existing literature and measure the σROA by using rolling windows (Shabir et al., 2021).

3.2.3. COVID-19 indicators

In this study, we follow Elnahass et al. (2021) and Çolak and Öztekin (2021) and use a time dummy to separate pre-and post-Covid-19 periods, which equals 1 for the first three quarters of 2020 and zero otherwise.

3.2.4. Bank and country-specific variables

In addition to COVID-19, we have included several banks and country-specific control variables in our model to address the potential omitted variables problem. The bank-specific control variables are bank size, capitalization, liquidity, asset structure, and diversification. Bank size (SIZE) is calculated through the natural logarithm of a bank's total assets. Capitalization (CAP) is measured as equity to total assets. The ratio of liquidity assets to total assets has been used as the proxy for bank liquidity (LIQ). We measure the bank's asset structure (LTA) as the share of the net loan to total assets. Bank diversification (DIV) is measured by the ratio of non-interest income to net operating income. While the country-specific control variables are GDP per capita, inflation, and bank concentration. The earlier literature has documented that the country's economic situation and industry structure can also impact the banking sectors' performance and stability (Baselga-Pascual and Vähämaa, 2021). We use GDP per capita and inflation rates to control business cycles' overall effects, unobserved factors that vary across countries (Wu et al., 2020). Finally, the bank Concentration (CON) controls the country's market structure. Concentration in the banking industry is another factor that can significantly impact bank risk /stability and is measured as the share of the assets of the three largest banks in an economy.

3.3. Empirical framework

In this study, we follow Duan et al. (2021) and Elnahass et al. (2021) and build an empirical model to examine the impact of the COVID-19 pandemic on bank performance and stability using individual bank-level data globally. Thus our baseline model is shown as follows

$$Y_{ijt} = \alpha + \beta_1 Covid19_t + \gamma_1 X_{it} + \delta_k Z_{jt} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Where i indicates the bank in country j at quarter t. $Y_{ijt}$is represents our dependent variables (i.e., bank performance and bank stability). Bank performance is measured as ROAA, ROAE, CIN, and NIM, while bank stability is measured as ZSC, NPL PRK, LRK, and ORK. $Covid-19_t$ Our primary explanatory variable represents the pandemic period (2016Q1 to 2021Q2). X_{it} is a vector of our bank-level control variables. Z_{jt} Is a vector of country and market structure control variables. $\beta,\delta,$ andγ are the parameters of the model. Moreover, μ_i, and λt are the bank and time effects and ε_{it} is the error term. We estimate Eq. (2) with the fixed-effects model, which incorporates the correlations among the time-invariant bank-related control variables and the other explanatory variables (Wu et al., 2020).[3]

4. Results and discussion

4.1. Empirical results

Our main objective is to examine the potential effects of the COVID-19 pandemic on bank performance and stability across the global perspective. Table 2 reports the results of estimating Eq. (2). Overall, our findings highlight the significant negative effects of the COVID-19 pandemic on the banking system's profitability, efficiency, and stability in the sampling countries. Panel A, Table 2 shows that COVID-19 coefficients are statistically significant with a negative (positive) sign in ROAA, ROAE, and NIM (CIN) of bank performance measures. This finding is consistent with Elnahass et al. (2021) and shows that the outbreak of COVID-19 has significantly decreased the banking sector's profitability. Economically, compared to the pre-crisis period, bank profits fell around 0.38% (1.61%, 0.58%, 1.66%) for ROAA (ROAE, NIM, and CIN) during the pandemic period.

Regarding the first set (bank-specific) of control variables, we find that the bank size (SIZE) coefficients are statistically significant and positively (negatively) linked with ROAA, ROAE, and NIM (CIN) for the global banking sector. This result aligns with earlier studies of Adesina (2021) and Dang and Huynh (2021) and shows that large banks have high ROAA, ROAE, NIM, and reduced cost/income ratios. According to the economies of scale theory, larger banks are expected to be more profitable (Goddard et al., 2004) because they have conducted business activities in various products and countries, have better risk management teams, and are more efficient in pricing and utilizing inputs for certain outputs, which leads to a reduce cost of operations and enhances bank profitability. Similarly, capitalization (CAP) also positively impacts ROAA, ROAE, and NIM, negatively related to CIN. These outcomes supported the empirical finding of Adesina (2021), and Chortareas et al. (2012), suggesting that better-capitalized banks are highly efficient than those with a lower capital base. Moreover, the coefficients of asset structure (LTA) significantly positively (negatively) affects with ROAA, ROAE, and NIM (CIN), which show that a better bank asset structure improves the bank's profitability and efficiency. Lastly, bank diversification is positively (negatively) associated with ROAA, ROAE, and NIM (CIN). These results support the bank diversification advantage and show that reliance on non-interest revenue sources increases bank profitability. These results support the bank's diversification advantage and show that reliance on sources of non-interest income enhances the bank's profits. At the same time, bank liquidity (LIQ) has less substantial effects on bank performance. Concerning the country-specific control variables. The bank

[3] Hausman test suggests that the fixed-effects estimator is more appropriate compared to the random-effects estimator in our study

concentration coefficient is positively (negatively) connected with ROAA, ROAE, and NIM (CIN). This outcome indicates greater concentration enhances the banking sector's performance and efficiency. The GDP per capita coefficients show a significant positive relationship with bank performance. At the same time, the estimated inflation coefficients show a negative and highly significant relationship in all bank performance measures.

Regarding examining the bank's stability in Panel B, the estimated results show that the banks have experienced a significant rise in bank risks, which severely influenced their stability during the outbreak of the COVID-19 pandemic. Especially the COVID-19 coefficients are statistically significant and positively related to the ZSC, NPL, PRK, LRK, and ORK. This means that banks have faced higher default, credit, portfolio, leverage, and operational risk, indicating less bank stability during this uncertainty.

Turning to control variables at the bank level. The coefficients of bank size (SIZE) are significantly positively associated with all bank risk reassures (i.e., ZSC, NPL, PRK, LRK, and ORK), which shows that a larger bank size takes a higher risk. These results are consistent with Fu et al. (2014) and Laeven and Levine (2009). Capitalization (CAP) is highly significant and negatively related to the ZSC, NPL, PRK, LRK, and ORK. This shows that capital is perceived as an effective shield against unforeseen losses, which is inextricably linked to low bank risk. These findings align with prior evidence that capital buffers reduce banks' risk (Baele et al., 2007; Laeven et al., 2016). Many researchers had pointed out that more capital before the crisis enhanced the probabilities of survival and increased the bank's performance during the crisis (Berger and Bouwman, 2013; Vazquez and Federico, 2015). Therefore, the strict capital requirements announced by Basel III have moulded the banking system more secure (Soenen and Vander Vennet, 2021). The coefficients of asset structure (LTA) and income diversification (DIV) are significantly negatively connected for the ZSC, NPL, PRK, LRK, and ORK. This indicates that high asset quality and income diversification can significantly reduce the bank's risk, increasing bank stability. This finding is consistent with the Markowitz (1952) portfolio theory and suggests that diversification of higher bank income reduces the bank's risk. Concerning the country-specific control variable. The bank concentration (CON) coefficient is negative and significant for the ZSC, NPL, and ORK. The results show that an increase in the concentration of the banking market has a positive effect on the financial stability of banks, which is consistent with the "concentration stability" approach. The GDP per capita coefficients show a negative and significant relationship with ZSC, NOL, LRK, and ORK, which shows that economic development will decrease bank risk. However, estimating results show that inflation does not affect bank risk.

4.2. Bank heterogeneity

Furthermore, we extend our basic analysis to examine how bank characteristics shape the effects of COVID-19 shocks on bank performance and stability. Existing literature has shown that bank characteristics such as bank size, capitalization, liquidity, asset structure, and diversification have significantly affected bank performance and stability (Altunbas et al., 2012; Shabir et al., 2021). The "too big to fail" theory represents that the failure of large banks leads to more significant economic losses than the failures of smaller banks; therefore, larger banks are engaged in more risk (Adrian and Brunnermeier, 2016). Furthermore, De Jonghe (2010) reveal that large banks are more likely to be involved in potentially increasing risk, reducing market discipline, and generating competitive turmoil because they know they will be bailed out if they face an extreme crisis. Altunbas et al. (2012) and Berger and Bouwman (2013) high levels of capital help banks withstand losses and increase their likelihood of survival and profitability during a crisis. Baselga-Pascual and Vähämaa (2021) argue that long-term bank mismanagement in asset structures leads to higher risk and insolvency. High bank asset liquidity significantly improves bank stability by decreasing risks on their balance sheets, helping liquidate assets during a crisis, making crises less costly for banks (Wagner, 2007). Recently several researchers have found that bank diversification can decrease financial distress's expected costs by reducing risks via increasing activities over various sectors and geographic regions (Adesina, 2021), gaining economies of scope, enhance income quality (Baele et al., 2007; Hamdi et al., 2017). Therefore, to estimate the heterogeneity across the bank, we estimate the following regression model:

$$Y_{ijt} = \alpha + \beta_1 Covid19_t + \rho Covid19_t * X_{it} + \gamma_1 X_{it} + \delta_k Z_{jt} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

In Eq. (3), we include $Covid19_{jt} * X_{it}$ to observe the interactive impact of Covid-19 and bank-specific characteristics. Hence, we mainly concentrate on the interaction terms between COVID-19 *and* bank characteristics (coefficients ρ). The rest of the specifications and variables are the same as our baseline models (2).

We estimated Eq. (3) and reporting the results in Table 3. Panel A in Table 3, we find that the coefficients on the interaction term of COVID-19 with Size, liquidity, and diversification are positive (negative) and statistically significant with ROAA, ROAE, and NIM (CIN). The interactions of Covid-19 with capitalization are significantly negative with all bank performance measures (i.e., ROAA, ROAE, NIM, and CIN). Besides, the interaction term of COVID-19 and assets structure has a negative and significant coefficient with NIM and CIN. However, Panel B in Table 3 shows that the coefficients on the interaction terms of COVID-19 with size, diversification, and liquidity are significantly negative for all bank risk measures (i.e., ZSC, PRK, LRK, NPL, and ORK). The interactions of COVID-19 with capitalization are significantly positive (negative) with ZSC, NPL, and PRK (LRK and ORK).

4.3. Role of the country regulatory environment, institutional strength, and financial development

Banks will be affected by the country's overall environment in which they operate. Numerous recent studies have shown that various aspects of the formal and informal institutional environment significantly affect a bank's profitability and risk levels, such as the country's banking regulation, institutional strength, and financial development. Beck et al. (2006) analyze the effects of a bank's concentration, regulation, and institutions on the probability of a country facing a banking crisis. They showed that economies with a

less concentrated banking sector are more prone to crises, while the regulatory policies and institutions are linked to the banking system's stability. Klomp and De Haan (2014) find that stricter regulation and supervision significantly decrease bank risk. While, Dietrich et al. (2011) indicate that governance at the country-level is a key factor in internet margins, which are significantly different in all countries. Moreover, existing empirical and theoretical studies provide strong evidence that the development of the financial sector has a constructive impact on economic activity by improving the performance of financial services, capital allocation, technological innovation, the efficiency of resource distribution, risk management, and reducing the risk of crises (Levine, 1997; Vithessonthi and Tongurai, 2016). However, financial development can cause financial institutions to take on more risk in the short term, which encourages lending, accelerates credit, and even the financial crisis (Detragiache and Demirgüç-Kunt, 1998; Levine, 1997). It can enhance the severity of risk in the financial system (Vithessonthi and Tongurai, 2016). Therefore for a more comprehensive analysis, we further determine how the banking regulatory environment, institutional strength, and financial development affect the sensitivity of bank performance and risks during the COVID-19 pandemic. We reestimate the following regression

$$Y_{ijt} = \alpha + \beta_1 Covid19_t + \Omega_2 Covid19_t * CV_{jt} + \beta_3 CV_{jt} + \gamma_1 X_{it} + \delta_k Z_{jt} + \theta_i + \lambda_t + \varepsilon_{it} \quad (4)$$

CV is a vector of conditional variables (i.e., bank regulation, institutional strength, and financial development). We create indices for activity restrictions (RES), capital requirements (CRI), supervisory power (OSP), and private monitoring (PMI) to capture the regulatory aspects based on Barth et al.'s (2013) survey results. The institutional strength is captured through the Worldwide Governance Indicators (WGI), which contains six different aspects of institutional quality. While analyzing the role of financial development level, we use the financial development index (FDI) from IMF, which summarizes how developed the financial institution in terms of their depth (FID), access (FIA), and efficiency (FIE). So, in Eq. (4), we mainly concentrate on the interaction terms between COVID-19 and conditional variables (coefficients Ω). θ_i are bank-fixed effects that take the cross-sectional impacts of the conditioning variables (CV_{jt}). λ_t Time fixed effects (quarter) control for any unobservable time-varying factors. The rest of the specifications and variables are the same as our baseline models (2).

Table 4 shows the results of bank regulations. Panel A and B in Table 4 find that the coefficients on the interaction terms of COVID-19 with activity restrictions, supervisory power, and private monitoring are positive (negative) and statistically significant with all measures of bank performance (stability). This suggests that banks operating in countries with a higher quality regulatory environment are less damaged by COVID-19 shocks. This may be because the tight regulatory restriction on bank activities, powerful supervision, and higher private monitoring divert bank resources to traditional banking activities, increasing credit growth and improving bank performance and stability. In contrast, we do not find evidence that capital regulations form a link between pandemics and bank performance. Overall, the result shows that the banking sector was well-prepared to deal with COVID-19-related uncertainty and entered into this crisis in a far better position than the global financial crisis due to regulatory reforms taken during the last decade. It has shown that they are well-prepared to deal with COVID-19-related uncertainty.

The quality of institutions becomes more vital during the financial crisis (Fazio et al., 2018; Klomp and De Haan, 2014). Table 5 examines the role of the country's institutional quality (i.e., government effectiveness, political stability, regulatory quality, control of corruption, rule of law, and accountability) in improving the performance and stability of the bank in response to COVID-19 pandemics. Panel A in Table 5 shows that the coefficients on the interaction terms of COVID-19 with political stability, regulatory quality, control of corruption, and rule of law are significantly positive with all bank performance measures. However, interaction terms of COVID-19 with government effectiveness and voice and accountability are significant only ROAA and NIM. While regarding Panel B in Table 5, the interaction terms of COVID-19 with regulatory quality and voice and accountability are significantly negative with all bank stability proxies. However, interaction terms of Covid-19 with government effectiveness, political stability, control of corruption, and the rule of law are significant only ZSC, PRK, and LRK. This indicates that countries with high institutional quality and better governance environments have responded successfully to COVID-19, developed and implemented better policies, and dealt more effectively with the negative impact of the COVID-19 pandemic on the performance and stability of the bank.

Table 6 examines whether the financial development (financial development, financial institutions depth, financial institutions access, financial institutions efficiency) of a country's banking system mitigates the pandemic's adverse effect on bank performance and stability. Panel A in Table 6 shows that the coefficient of pandemic indicators COVID-19 stays significantly negative (positive) in ROAA, ROAE, and NIM(CIN). At the same time, the interaction terms for all financial development measures are significantly positive (negative) ROAA, ROAE, and NIM(CIN). While panel B in Table 6 indicates that the interaction terms of COVID-19 are only significant with FID and FIA in all bank risk indicators. However, this interaction term with FDI and FIE is only significant with ZSC and NPL. These findings consistently show that banks in countries with more financial development are less vulnerable to COVID-19 shocks on bank performance and stability than other countries.

5. Robustness checks

5.1. Alternative methodology

Our model may have possible endogeneity issues due to reverse causality, omitted variable, and control variable. Therefore, we are following the prior studies and reestimating our baseline regression model using the two-step System Generalized Method of Moments (System GMM) proposed by (Blundell and Bond, 1998) as robustness to test our main outcomes are sensitive to estimation approaches. The two-step system GMM approach is appropriate to deal with possible endogeneity issues and is more reliable even in the presence of reverse causality, omitted variables, and measurement errors (Bond and Hoeffler, 2001). The System GMM approach account first

Table 13
Impact of the COVID-19 pandemic on bank performance and bank stability.

	Panel A: Bank performance				Panel B: Bank stability			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tobin's Q				Distance-to-default			
COVID-19	-0.145 * **	-0.814 *	-0.607 * *	-0.519 * *	-0.021 * **	-0.004 * *	-0.041 *	-0.055 * *
	(0.017)	(0.468)	(0.275)	(0.247)	(0.007)	(0.002)	(0.023)	(0.028)
SIZE		0.264 * **		0.607 * *		0.344 * **		0.121 * **
		(0.003)		(0.275)		(0.061)		(0.031)
CAP		0.238 * **		0.017 * **		-0.054 * **		-0.005 *
		(0.051)		(0.003)		(0.012)		(0.003)
LIQ		0.148		0.042		-0.005 *		-0.009 * *
		(0.117)		(0.064)		(0.003)		(0.004)
LTA		0.027 * **		0.519 * *		-1.921 * *		-0.008
		(0.004)		(0.247)		(0.784)		(0.009)
DIV		0.075 * *		0.814 *		0.125 * *		0.137 * *
		(0.037)		(0.468)		(0.058)		(0.059)
CON			0.222 * *	0.363 * **			-0.026	0.042 * *
			(0.081)	(0.001)			(0.018)	(0.017)
GDPpc			0.004 * *	-0.017 * *			-0.164	-0.123 *
			(0.002)	(0.007)			(0.146)	(0.061)
INF			-0.035 * *	-0.051 * **			-0.067	-0.019
			(0.014)	(0.009)			(0.051)	(0.033)
α_0	7.982 * **	5.274 * **	3.464 * **	8.094 * **	5.386 * **	3.576 * **	8.278 * **	5.570 * **
	(0.433)	(0.433)	(0.433)	(0.414)	(0.414)	(0.414)	(0.400)	(0.400)
Observations	11,422	17,911	14,142	18,604	11,026	16,214	14,023	17,340
R-squared	0.241	0.219	0.184	0.098	0.298	0.158	0.217	0.232
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows the results for the baseline regression on analyzing the effect of the COVID-19 pandemic on bank performance and stability. The sample consists of 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as Tobin's Q. Panel B shows the bank stability measure as Distance-to-default. COVID-19 is our primary explanatory variable of interest which equals one during the first three quarters of 2020 and otherwise zero. Robust standard errors are reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

difference in removing the expected correlation between the lagged dependent variable and the error term, whereas dealing with endogeneity through instrumenting the endogenous and predetermined variable with their lags. The reliability of the GMM system is due to the assumption that the term error is not autocorrelated. Therefore, the system GMM model is based on two essential conditions. Firstly, to confirm the validity of the instruments, the Hansen test for over-identification restrictions is used. At the same time, the second test applies to validate the non-autocorrelation hypothesis. However, the presence of the first-order auto-correlation didn't show inconsistencies in the measure. This one was confirmed by second-order autocorrelation. Table 7 reported the outcomes of the System GMM. we find that our baseline finding in Table 2 is still consistent even we are considering unobserved heterogeneity, simultaneity, and dynamic endogeneity.

5.2. Additional analysis

5.2.1. Comparisons between the region

It is clear that COVID-19 has affected almost all countries but not equally. Economically, the effects of the crisis are different in all regions (Cuesta and Pico, 2020; OECD, 2020; UNDP, 2021). Therefore, we further expand our analysis to examine the impacts of COVID-19 on bank performance and stability, especially during the peak of the pandemic for our sample banks, located in the most affected region compared to the areas less severely infected COVID-19. We have divided the countries into the following region according to the world bank: (1) East Asia & Pacific, (2) Europe & Central Asia, (3) Latin America & Caribbean, (4) the Middle East & North Africa, (5) North America, (6) South Asia, and (7) Sub-Saharan Africa. Table 8 shows results from examining the effects of COVID-19 on the performance and stability of the bank across different regions. The results show that COVID-19 pandemics have severely affected bank performance and stability in all regions (except CIN) with varying severity. Moreover, following the studies of Hou and Wang (2013), Khan et al. (2016), and Olivero et al. (2011), we further split the sample countries into two groups one is higher growth rate of infected people and lower growth rate of infected people. A country with a value greater than the sample median is classified as higher growth rate of infected people. A country with a value equal to or less than the sample median is classified as low higher growth rate of infected people. The results are reported in Panel (viii) and Panel (xi) in Table 8. The results show that COVID-19 pandemics have adversly affected bank performance and stability (except ORK) in higher COVID-19 growth rate countries than lower growth rate countries.

5.2.2. Comparisons between low and high-income-generating countries

In addition, the World Bank has classified economies into four income groups for analytical purposes. Therefore, we further

Table 14
Impact of the COVID-19 pandemic on bank performance and bank stability: Alternative independent variable measures.

	Panel A: Bank performance				Panel B: Bank stability				
Panel (i): Confirmed COVID-19 death growth									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19-V1	-0.316 * **	-0.071 * **	-0.028 * **	-0.349 *	0.752 * **	0.439 * **	-0.314	0.012	0.184 * *
	(0.089)	(0.020)	(0.007)	(0.192)	(0.253)	(0.087)	(0.213)	(0.034)	(0.073)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.371 * **	-13.782 * **	6.653 *	-2.547 * **	-3.597 * **	11.250 * **	8.276 * **	11.621 * **	2.183 *
	(1.213)	(2.559)	(3.441)	(0.698)	(1.336)	(1.746)	(1.729)	(2.275)	(1.137)
Obs.	26,377	26,772	26,209	26,209	25,856	25,836	25,634	25,023	25,453
R-squared	0.337	0.320	0.336	0.313	0.359	0.318	0.325	0.318	0.349
Panel (ii): Confirmed COVID-19 cases growth									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROAA	ROAE	NIM	CIN	ZSC	NPL	PRK	LRK	ORK
COVID-19-V2	-0.409 * **	-0.258 * **	-0.126 * *	-0.256 * *	0.569 * **	0.323 * *	-0.141	0.271	0.247 * *
	(0.118)	(0.063)	(0.055)	(0.100)	(0.108)	(0.156)	(0.107)	(0.170)	(0.117)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
α_0	-3.032 * **	-16.496 * **	5.914 * *	-4.214 * **	-3.429 * *	12.262 * **	8.356 * **	11.779 * **	2.522 * *
	(1.127)	(2.607)	(2.595)	(1.359)	(1.403)	(1.583)	(1.788)	(2.783)	(1.205)
Obs.	26,746	26,753	26,233	26,314	23,528	25,336	25,053	25,641	25,530
R-squared	0.346	0.339	0.358	0.388	0.392	0.351	0.350	0.348	0.332

This table shows how bank performance and stability respond to the COVID-19 pandemic. The sample comprises 2073 banks in 106 countries from 2016 Q1 to 2021 Q2. Panel A represents the outcomes for bank performance measured as ROA, ROE, NIM, and CIN. Panel B shows the bank stability results, which are measured as ZSC, NPL PRK, LRK, and ORK. COVID-19-V1 and COVID-19-V2 are the main explanatory variables. COVID-19-V1 indicates confirmed death growth, calculated as log(1 +number of confirmed deaths in quarter t) − log(1 + number of confirmed deaths in quarter t-1). While COVID-19-V2 shows the confirmed cases growth calculated as log(1 +number of confirmed cases in quarter t) − log(1 + number of confirmed cases in quarter t-1). We also control several bank-specific and country-specific factors, country-fixed effects, and time (quarter) fixed effects. Robust standard errors are clustered at the country level and reported in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

investigate the effects of COVID-19 on the performance and stability of the bank in different classifications of income-generation economies. So in line with the World Bank's classification, we categorized our sampled banks into high-income, upper-middle-income, low-income, and lower-middle-income countries and reported the results in Table 9. Our results show that across all bank performance (except CIN), the four types of economies have been extremely and devastatingly affected by the outbreak of the COVID-19 pandemic suggesting low financial performance and efficiency. In comparison, CIN is insignificant in high-income and upper-middle-income countries. However, in Panel B, there is less variation in the overall results categories for bank risk. All bank classifications indicate a significantly higher risk profile in all risk measures. The overall results are according to the main finding, representing the significant negative effects of the pandemic on bank risk and stability, regardless of the income level of countries.

5.2.3. Comparisons between bank types (foreign and government-owned banks)

Over the last few decades, the banking sector's ownership structure in various developing and developed countries has changed drastically (Bonin et al., 2005; Shaban and James, 2018). Most countries have liberalized their financial policies and made significant reforms in their banking sector (Chen and Liao, 2011; Wu et al., 2017). They began to open their doors to foreign banks to increase their international financial activities, enhance financial liberalization, integrate and promote the domestic banking market (Chen and Liao, 2011). As a result, the market structure of the domestic banking sector transforms remarkably, leading to a significant increase in the participation of foreign banks and a decrease in the ownership of state-owned banks, regulatory and institutional growth, and benefiting domestic and foreign banks (Wu et al., 2017). This extension has amplified the domestic banking market's competitiveness by improving operating efficiency, reducing net interest margins, and bank profitability (Chen and Liao, 2011; Fang et al., 2014; Gormley, 2010; Wu et al., 2017). For instance, Claessens et al. (2001) and Gormley (2010) documented that the increase in the presence of foreign banks was linked to the reduction of volume of loans, non-interest income, profitability, and overhead costs of domestic banks.

Furthermore, some studies suggest that foreign banks benefit domestic markets through increased credit growth and strengthened financial stability during the domestic financial turmoil, improving domestic financial regulations and promoting the overall performance of banks (Fang et al., 2014; Kouretas and Tsoumas, 2016). Similarly, numerous researchers have analyzed the impact of state ownership on bank efficiency and performance. Most researchers show that state-owned banks do not work the public interest well, are highly inefficient, and riskier (Barth et al., 2001; La Porta et al., 2002). Therefore, this evidence shows that the bank ownership structure plays an important role in maintaining profitability and stability. So, we further determine foreign and government-owned banks' behavior during the COVID-19 pandemic. For this purpose, we follow recent studies of Çolak and Öztekin (2021), Duan et al.

(2021), and Wu et al. (2017)s and take the interaction of foreign banks (FOR) and government-owned (GOV) with COVID-19.

We repeat our estimations and report the results in Panel (i) and Panel (ii) of Table 10, respectively. Overall results are consistent with the main findings in Table 2 and indicate that, on average, low bank performance and higher risk during the COVID-19 period. However, the interaction term coefficients between COVID-19 and foreign banks suggest that during the COVID-19 outbreak, foreign banks indicated a slightly lower performance and less risky. At the same time, the estimated coefficient of the interaction term between COVID-19 and the government banks is negative (positive) with bank performance (stability). This finding is consistent with Çolak and Öztekin (2021) and suggests that foreign banks behave more risk-averse than domestic banks during the COVID-19 crisis. However, the adverse effect of COVID-19 on bank performance and stability in government banks is higher.

5.2.4. Comparisons between bank types (Islamic banks vs. conventional banks)

The Islamic banking sector has grown over the years and presented a remarkable uptrend, and it is considered one of the fastest-growing areas of the global financial industry(Meslier et al., 2020). Most empirical studies show that Islamic banks' success, efficiency, and stability have been attributed to the nature of their business practices, corporate governance, and institutional characteristics. Islamic banks offer various financial products complying with Shariah principles that strictly prohibit the receipt and payment of interest and support risk-sharing businesses instead of fixed-rate loans (Hasan and Dridi, 2011; Meslier et al., 2020). Numerous studies support Islamic banks for higher financing and defined that the tremendous growth of Islamic banking assets during the global financial crisis and the economic downturn has outpaced conventional banking assets(Hasan and Dridi, 2011; Ibrahim and Rizvi, 2018). Reviewing the effects of the recent global financial crisis on Islamic and conventional banks, Hasan and Dridi (2011) showed that Islamic banks' credit growth is higher than their conventional counterparts. Beck et al. (2013) reported that the intermediation ratio of Islamic banks was higher than that of conventional banks, and this difference was even more pronounced during the local crisis. While Ibrahim (2016) points out that Islamic financing is less procyclical or countercyclical than conventional lending. Ali (2011) highlight the two main reasons that helped Islamic banks keep on stable during the crisis's initial phase: (i) Islamic banks' financial activities are highly related to real economic activities compared to their traditional counterpart, and (ii) Compared to the conventional bank, Islamic bank has retained a more significant portion of their assets in liquid form. However, despite these favorable results, it is uncertain whether Islamic banks have maintained their performance and stability during the unprecedented external shock of the COVID-19 pandemic. Therefore, we further analysis the effect of the bank type (Islamic bank vs. conventional bank). For this reason, we split our sample into separately for conventional and Islamic banks.

Panels (iii) and (iv) in Table 10 report the performance and stability of conventional and Islamic banks. Overall, our findings confirm that both conventional and Islamic banks have generally experienced lower bank performance and higher instability during the COVID-19 period. However, bank performance coefficients in Islamic banks' are double as compared to conventional banks, which indicates that Islamic banks have significantly lower performance and higher operational risks than conventional banks. At the same time, the outcomes indicate that conventional banks are riskier than Islamic banks. These results are in line with previous studies by Elnahass (2021), Beck et al. (2013), and Abdul-Majid et al. (2010). They show that Islamic banks are relatively less efficient and have more operational risk than conventional banks. Beck et al. (2013) argue that there are higher costs and complexities in designing Islamic banking products to satisfy Sharia law, which reduces Islamic banks' efficiency. However, Abedifar et al. (2013), Alqahtani and Mayes (2018), and Bourkhis and Nabi (2013) stated that Islamic banks are more stable compared to conventional banks.

5.2.5. Comparisons between bank types (listed banks vs unlisted banks)

The existing literature has shown that listed banks are less risky due to capital market requirements and regulatory pressure on unlisted banks (Barry et al., 2011; Shabir et al., 2021; Tran et al., 2019). Therefore, we follow Barry et al. (2011), Köhler (2015), Shabir et al. (2021), and Tran et al. (2019) and split our sample into listed and unlisted banks. Listed banks also differ from unlisted banks for several other issues. Listed banks, for example, usually have a more dispersed ownership structure than unlisted banks(Barry et al., 2011; Shabir et al., 2021; Tran et al., 2019). This might give managers greater scope to generate private benefits of control. To protect these benefits, the managers of listed banks might take fewer risks (Barry et al., 2011; Köhler, 2015). However, listed banks are generally more closely monitored by the market than those not listed(Köhler, 2015). This might have forced the managers of listed banks to expand into more risky non-interest income activities to generate a higher return, especially if a bank underperformed its peers/controlled by institutional investors(Köhler, 2015). Such investors have more expertise in processing information and monitoring managers and can employ better control than atomistic shareholders(Köhler, 2015). This may reduce banks' default risk. Moreover, institutional investors are better diversified than families/individuals or banking institutions, which may increase their risk-taking incentives (Barry et al., 2011; Köhler, 2015). Overall, therefore, there are several reasons to uncertain that the impact of COVID-19 differs between listed and unlisted banks.

Panels (v) and (vi) in Table 10 report the impact of COVID-19 on bank performance and stability in listed and unlisted banks. Overall, our findings confirm that both listed and unlisted banks have largely experienced lower bank performance and higher instability during the COVID-19 period. However, the results confirm that COVID-19 significantly adversely impacts unlisted banks' performance and stability more than listed banks.

5.2.6. Role of the government policy responses

In this section, we investigated whether the variation in various government policy responses to COVID-19 has influenced the bank's performance and stability. For this, we followed Demir and Danisman (2021) and Çolak and Öztekin (2021) and retrieved government policy response data for the sample countries from Hale et al. (2020). The economic policy response indices from this database are our focus, including income support, debt contract relief, fiscal measures, and monetary stimulus.

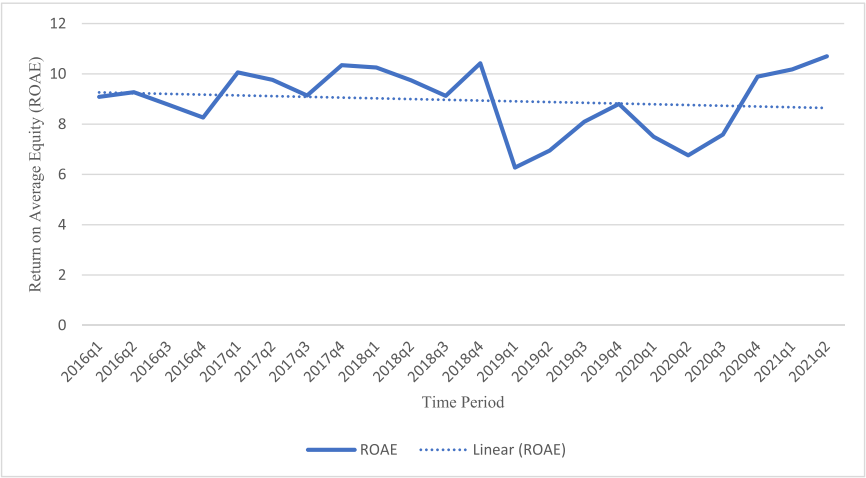

Fig. 1. Return of average equity. The figure presents the average quarterly return on equity over the sample period (2016 Q1 to 2021 Q2) for all countries.

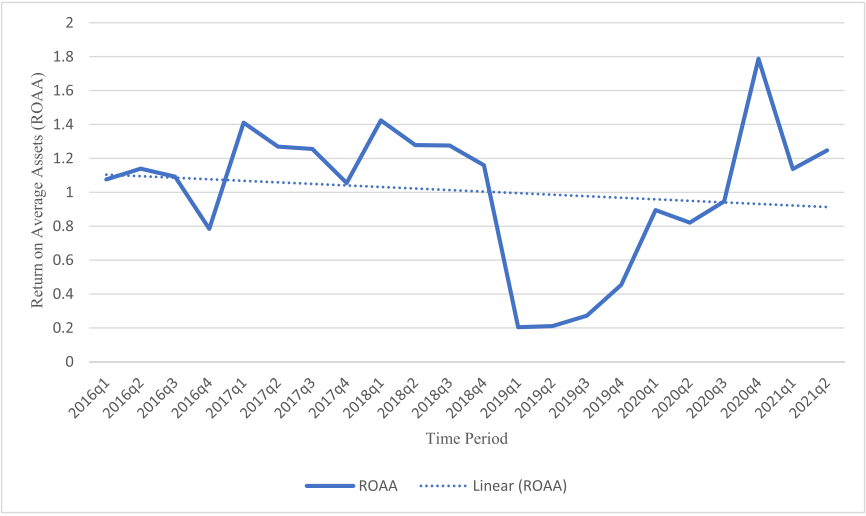

Fig. 2. Return on average assets. The figure presents the average quarterly return on assets over the sample period (2016 Q1 to 2021 Q2) for all countries.

Income support considers whether governments cover salaries or provide cash payments for people who lost their jobs during the pandemic. It is in an ordinal scale that takes a value of 0 when there is no income support, 1 if the support is less than 50% of the lost salary, and 2 if the support is more than 50% (Demir and Danisman, 2021). Debt contract relief accounts for whether governments freeze household financial obligations regarding loan repayments, water bills, banning evictions, etc. It is an ordinal measure that takes a value of 0 for no such reliefs, 1 for narrow reliefs (specific to one kind of contract), and 2 for broad reliefs (Demir and Danisman, 2021). Fiscal measures indicate the USD amount of economic stimulus policies adopted in the countries, including spending and tax cuts(Demir and Danisman, 2021). At the same time, the monetary stimulus is a binary indicator that equals one for countries with above-median values of central bank assets to GDP (Çolak and Öztekin, 2021).

Table 12 reports whether the variation in government policy responses to COVID-19 has influenced bank performance and stability. Panel 1–4 contains COVID19 with government policy response indicators sequentially because of high collinearity. Panel (i) demonstrates that the reduction in bank performance (ROAA and ROAE) and instability (ZSC and NPL) are mitigated as the income support from governments increases during the pandemic as opposed to when there is no such support. Specifically, the estimated coefficients are more significant when the support is more than 50% of the lost salary compared to less than 50%. Panel (ii) shows that as governments raise the debt and contract relief for households to narrow and broad reliefs, the adverse impact of COVID-19 on the bank performance (ROAA and ROAE) and stability (ZSC and NPL) decreases. This may be because these reliefs include loan repayments (among others), which would decline the non-performing loans and improve lending conditions during the pandemic in such countries. Panel (iii) presents COVID19 with fiscal measures, which include the USD amount of economic stimulus policies adopted in the

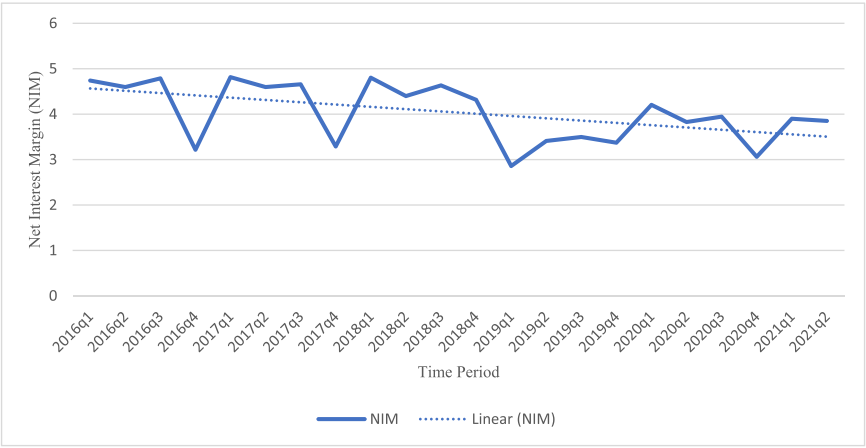

Fig. 3. Net interest margin. The figure presents the average quarterly net interest margin over the sample period (2016 Q1 to 2021 Q2) for all countries.

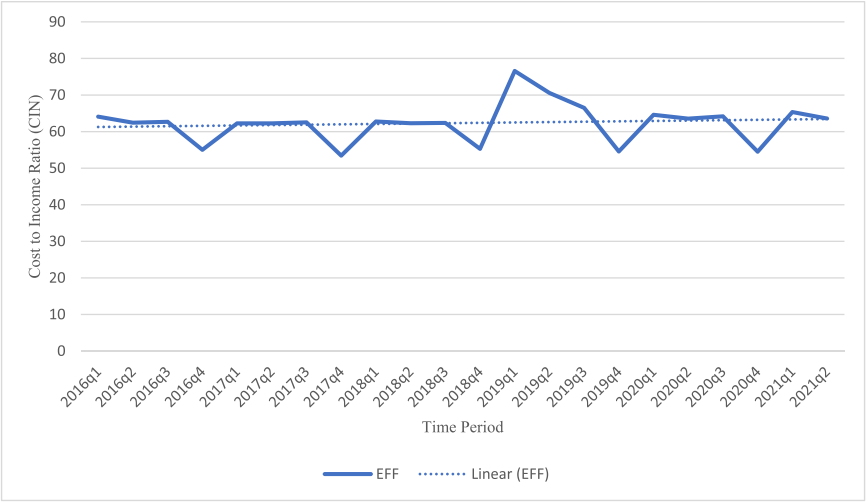

Fig. 4. Cost-to-income ratio. The figure presents the average quarterly cost-to-income ratio over the sample period (2016 Q1 to 2021 Q2) for all countries.

countries because of the pandemic (Demir and Danisman, 2021). The results show that countries that adopted higher fiscal measures, including spending and tax cuts, experienced less bank performance and stability deterioration. Panel (iv) incorporates COVID19 with monetary stimulus. The findings show that a monetary stimulus has a favorable impact on mitigating the adverse effect of COVID19 on the bank performance (ROAA, ROAE, and NIM) and stability(ZSC). **(**Table 11**)**

5.2.7. Role of national culture

Over the last few decades, numerous researchers have highlighted the importance of culture in economics and finance and documented that through its various dimensions, national culture has a significant impact on economic growth (Gorodnichenko et al., 2017), governance norms and the quality of institutions (Klasing, 2013; Licht et al., 2007), financial markets (Kwok & Tadesse, 2006). At the micro-level as well, culture is material in explaining corporate outcomes such as capital structure (Chui et al., 2002; Li et al., 2011), debt maturity choices (Zheng et al., 2012), cash holding (Chen et al., 2015), and dividend policy (Chang et al., 2020; Shao et al., 2010). Moreover, recently, some researchers have also linked national culture to banking sectors by establishing an impact on bank risk-taking (Ashraf et al., 2016; Illiashenko & Laidroo, 2020; Mourouzidou-Damtsa et al., 2019), bank performance (Boubakri et al., 2017), bank liquidity (Boubakri et al., 2022), bank deposits (Mourouzidou Damtsa et al., 2019), and bank failures (Berger et al., 2021).

National culture is generally understood as a society-level set of norms, beliefs, shared values, and expected behaviors that altogether serve as the guiding principles in people's lives (Haq et al., 2018; Illiashenko & Laidroo, 2020). The modern approach to national culture follows Hofstede's (Hofstede, 1984) model of cultural dimensions (Minkov & Hofstede, 2011), in which national culture conditions individual decision-making directly and via the development of institutions (Illiashenko & Laidroo, 2020).

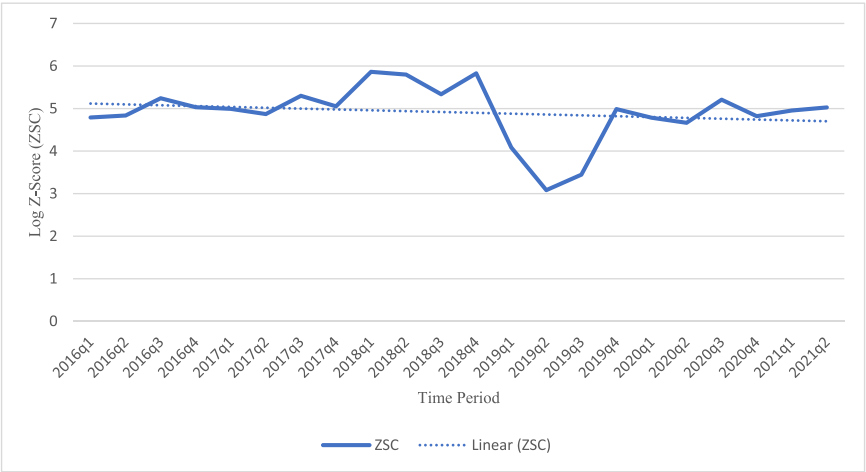

Fig. 5. Log Z- Score. The figure presents the average quarterly log Z-Score over the sample period (2016 Q1 to 2021 Q2) for all countries.

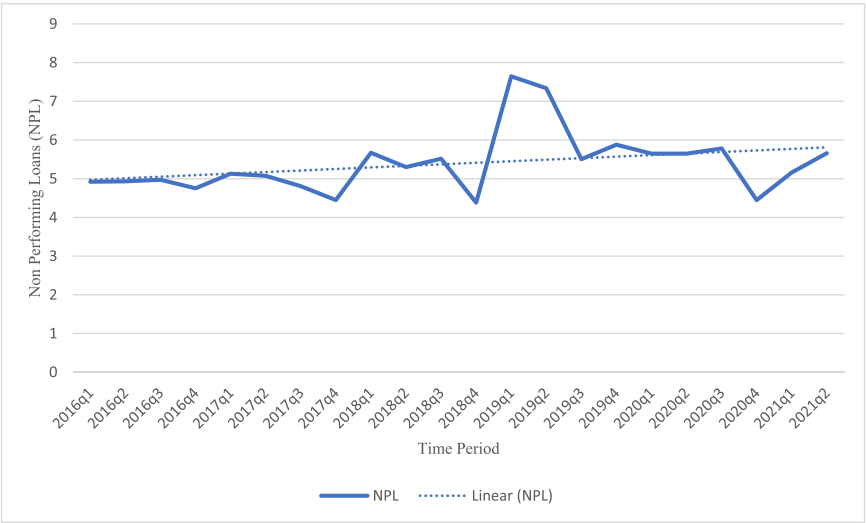

Fig. 6. Non-performing loan. The figure presents the average quarterly non-performing loan over the sample period (2016 Q1 to 2021 Q2) for all countries.

However, the recent COVID-19 pandemic has raised a heated debate on the propensity of some banks to perform poorly during the COVID-19 pandemic crisis compared to others that proved more resilient (Irresberger et al., 2015). Aebi et al. (2012) argue that bank performance during the crisis was due to failed corporate governance mechanisms and management incentives to manage risk.

Gaganis et al. (2019) highlight the importance of power distance and uncertainty avoidance in residential loans, as these cultural dimensions have an adverse effect on the ratio of total outstanding residential loans to the GDP. Banks in countries with high uncertainty avoidance and power distance have less leverage, but highly individualistic countries hold more leverage (Haq et al., 2018). Halkos and Tzeremes (2011) show that bank performance is positively influenced by femininity, low uncertainty avoidance, low power distance, and moderately individualistic values.

Furthermore, national culture has an impact on the probability of bank failure. The findings by Berger et al. (2021) suggest that Individualism and masculinity are positively associated with bank failure. Managers in individualistic countries assume more portfolio risk, whereas governments in more masculine countries allow banks to operate with less capital and liquidity. However, banks in countries with high uncertainty avoidance, collectivism, and power distance performed better during the financial crisis (Boubakri et al., 2017). Mourouzidou Damtsa et al. (2019) show that banks in countries with high trust and hierarchy scores have higher deposits than banks in countries with high Individualism, which have lower deposits. These studies support the view that culture is important in explaining cross-country variation in corporate decisions, even after controlling for the influence of formal institutions and economic development (Haq et al., 2018).

Therefore, we further determine the influence of cultural characteristics on COVID-19 and bank performance and stability nexus.

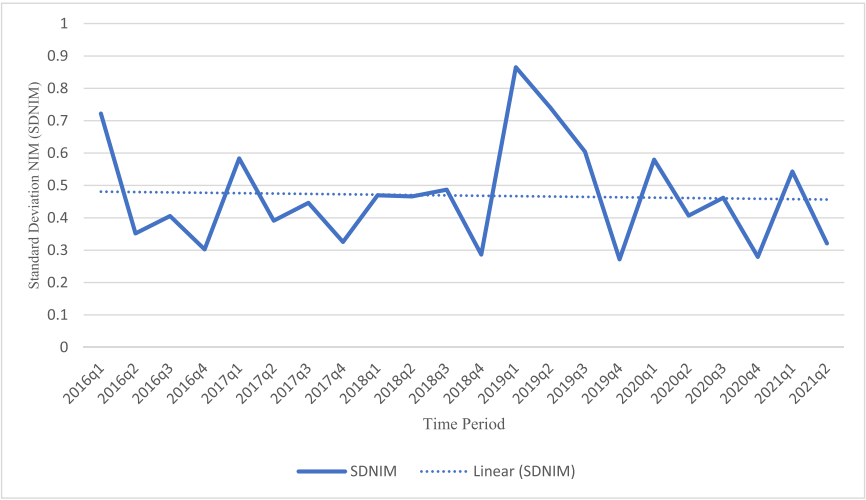

Fig. 7. Standard deviation of net interest margin. The figure presents the average quarterly Standard Deviation of net interest margin over the sample period (2016 Q1 to 2021 Q2) for all countries.

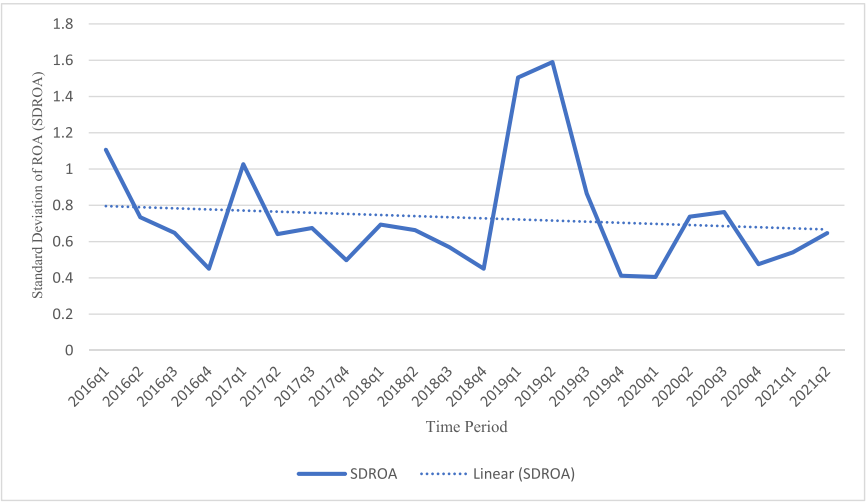

Fig. 8. Standard deviation of return on assets. The figure presents the average quarterly standard deviation of return on assets over the sample period (2016 Q1 to 2021 Q2) for all countries.

Following extensive literature (Gaganis et al., 2019; Halkos & Tzeremes, 2011; Haq et al., 2018; Illiashenko & Laidroo, 2020), we use the widely accepted Hofstede's (2001) national culture variables. Hofstede is the most widely cited author in the field, with the most methodologically supported quantification of cultural characteristics (Swierczek, 1994). In this study, we select three cultural dimensions, namely, uncertainty avoidance (UAI), power distance (PDI), and Individualism versus collectivism (IDV). UAI is defined as the extent to which the members of a culture feel threatened by uncertain or unknown situations. Power distance (PDI) specifies the extent to which the members of a nation accept hierarchy in organizational associations, where a higher value indicates lower engagement in decision-making (Swierczek, 1994). Finally, People in Individualism (IDV) societies are more self-oriented and autonomous, mainly focusing on themselves and immediate relatives. On the contrary, low scores in this dimension reveal societies that aspire to collectivism, prioritizing the 'we' versus the 'I.' Followed by Boubakri et al. (2022), Jin et al. (2022), and Mourouzidou-Damtsa et al. (2019), and we ran the panel data with the year-fixed effect.[4]

Panel A in Table 12 shows that the uncertainty avoidance and power distance coefficients and their interaction terms with COVID-19 are significantly (insignificant) positive with ROAA, ROAE, and NIM (CIN) bank performance measures. This implies that banks in

[4] Cultural variables are time-invariant. The regression model cannot include country or bank-fixed effects (Boubakri et al., 2022; Mourouzidou-Damtsa et al., 2019).

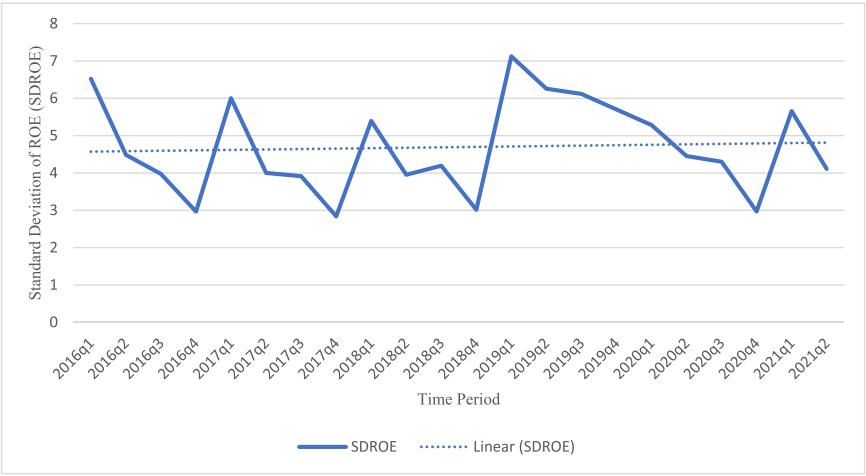

Fig. 9. Standard deviation of return on equity. The figure presents the average quarterly standard deviation of return on equity over the sample period (2016 Q1 to 2021 Q2) for all countries.

countries with high uncertainty avoidance scores and people participation in decision-making low tend to perform better during the recent pandemic and reduce the adverse impact of the COVID-19 crisis. Furthermore, we find a negative and highly statistically significant (insignificant) relation between Individualism and its interaction terms with COVID-19 with ROAA and ROAE (NIM and CIN) bank performance measures. This suggests that banks in collectivist countries with low priority for individual needs and achievements performed better during the recent COVID-19 pandemic than banks in individualistic countries. This finding supports our previous result regarding the positive effect of uncertainty avoidance on bank performance, as nations with a high-risk averse attitude are also likely to have high levels of power distance (Boubakri et al., 2017).

While regarding Panel B in Table 12, we regress the bank risk measures on dimensions of the national culture of Hofstede, including other bank and country-level control variables. The coefficients on the three cultural value variables are significant and with the predicted sign. Uncertain avoidance, power distance, and individualism coefficients are statistically positive with ZSC, PRK, and ORK. These results show that bank risk-taking is significantly higher in countries with low uncertainty avoidance, high Individualism, and low power distance dominant cultural values. At the same time, the coefficient of the interaction terms of uncertain avoidance, power distance, and Individualism with COVID-19 are statistically positive with ZSC, whereas weekly significant with ORK.

5.2.8. Alternative dependent variable

We used several bank performance and stability accounting base measures in the previous section. The validity of accounting-based models has been questioned due to the backward-looking nature of the financial statement through which these models are derived (Abuzayed et al., 2018; Ali et al., 2018). The market-based approach overcomes the criticisms of accounting-based models through the forward-looking nature of market data (Abuzayed et al., 2018; Ali et al., 2018; Chiaramonte et al., 2015).[5] Thus, we used the market base accounting measure of bank performance and stability for more comprehensive analysis and robustness.

In this regard, following the existing studies of (Fu et al., 2014; Liang et al., 2013; Liu & Sun, 2021; Ur Rehman et al., 2022), we used Tobin's Q to measure the market base bank performance. [6] Tobin's Q is calculated as the ratio market value of common equity plus the book value of debt divided by the book value of total assets (Fu et al., 2014).

Moreover, based on existing literature on default risk, this study used the distance-to-default (hereafter DD) as a proxy of default risk[7] (Abuzayed et al., 2018; Kabir et al., 2020, 2021; Nadarajah et al., 2021). DD is a market-based default risk measurement based on Merton's (1974) structural model. It measures how far a limited liability firm is from default (Kabir et al., 2021). A higher value of DD indicates a lower default risk and vice versa. Market-based indicators of bank distress have several advantages: firstly, they are generally available at high frequency, providing more observations and shorter lags than financial statements data. Secondly, they are forward-looking since they incorporate market participants' expectations. Finally, they are not subject to confidentiality biases, as may be the case for some accounting data, i.e., those reported solely to supervisory authorities(Ali et al., 2018; Chiaramonte et al., 2015; Čihák, 2007). Moreover, empirical studies such as Gharghori et al. (2016) and Hillegeist et al. (2004) find that Merton's (1974) market-based model is superior to their accounting counterparts in predicting default risk. Following Abuzayed et al. (2018), we calculate the D.D. measure as follows:

[5] We are grateful to the respected reviewer for their suggestion.

[6] For Tobin's *Q*, we only have information on listed banks. Thus, when using Tobin's *Q* as the performance measure, the sample size reduces due to data availability.

[7] This (of course) can only be calculated for listed banks.

$$P = N\left(-\frac{\ln(V_A/D) + (r - \delta - (\sigma_A^2/2))T}{\sigma_A\sqrt{T}}\right)$$

Where P is the probability of bankruptcy, N () is the cumulative normal density function, V.A. is the value of assets, D is the face value of debt proxied by total liabilities, r is the expected return, δ is the dividend rate estimated as total dividends/(total liabilities + market value of equity), T is the time of expiration taken to be one year, σ_A is the volatility of the assets,

As argued by (Abuzayed et al., 2018; Du et al., 2007), the above equation shows the distance-to-default (D.D.) as:

$$DD = \frac{\ln(V_A/D)+)R - \delta - (\sigma_A^2/2))T}{\sigma_A\sqrt{T}}$$

This measures the default by the number of standard deviations where the log value of the ratio deviates from its mean before the firm defaults (assuming that default occurs when the ratio of the value of assets to debt is less than one) (Abuzayed et al., 2018; Du et al., 2007).

The standard deviation of assets σ_A is the weighted average of the standard deviation of debt $\sigma_D$and equityσ_E. Both are calculated as follows:

$$\sigma_D = 0.05 + 0.25 * \sigma_E$$

$$\sigma_E = \sigma_{rt} * \sqrt{N}$$

Where σ_{rt} is the standard deviation of daily stock returns, and N is the average number of trading days in the year."

The results are reported in Table 13. Panel A in Table 13 reports the impact of COVID-19 on market-based bank performance. In Column (1), we included only COVID-19 and focused on the link between the country's exposure to the pandemic and bank performance. We include bank and country-specific control variables in Columns (2) and (3). In Column (4), we include both bank-specific and country-specific variables. This show that the COVID-19 outbreak has significantly reduced bank market valuations, as evidenced by a significantly negative relationship between COVID-19 and LnQ measures. This outcome is consistent with our previous finding. Similarly, panel B in Table 13 shows the impact of COVID-19 on the DD stability measure. Column (5) reports the regression results of COVID-19 on DD without control variables (i.e., bank-specific and country-specific). Columns (6) and (7) contain bank and country-specific control variables, respectively. In Column (8), we incorporate both bank-specific and country-specific variables. These results are generally consistent with the accounting stability results. As for the DD models, the coefficients on COVID-19 are negative and significant, indicating that the COVID-19 outbreak has significantly exerted an inverse impact on the market stability of the banks.

5.2.9. Alternative independent variable

Moreover, we also used the two alternative measures of our COVID-19 variable for robustness. In this regard, we followed the existing literature (Demir and Danisman, 2021; Ding et al., 2021; Duan et al., 2021) and retrieved the COVID-19 related data from Hale et al. (2020). Following Ding et al. (2021) and Hu and Zhang (2021), we measure COVID-19 by the logarithm of confirmed deaths and the logarithm of confirmed COVID-19 cases over quarter t in country j, where the bank is incorporated.

The results are reported in Table 14. Panel (i) and Panel (ii) in Table 14 report the impact of COVID-19 on bank performance. The coefficient of COVID-19-V1 and COVID-19-V2 turns out negative (positive) and significant with ROAA, ROAE, and NIM (CIN) bank performance measures, indicating that the country's exposure to the pandemic in the quarterly growth rate of the cumulative number of deaths and confirmed cases negatively influences the bank performance. These results are consistent with the earlier finding. While regarding bank stability in Panel B, our results show that the banks in our sample, on average, experienced a considerable increase in bank default, credit, and operational risks, which adversely impacted their stability during the outbreak of the Covid-19 pandemic. Especially the coefficients of COVID-19-V1 and COVID-19-V2 are statistically significant and positively related to ZSC, NPL, and PRK. This implies that banks experienced higher default, credit, and operational risk, showing low bank stability during this turmoil. These results align with the previous finding.

6. Conclusion

COVID-19 is not just a global pandemic and public health crisis. There is a widespread consensus among economists that this has devastatingly affected the financial markets and the global economy in various ways. The economic damage caused by the COVID-19 pandemic is largely due to the reductions in income and productivity, increase in unemployment, disruptions in trade, and destruction of the tourism industry. This study examines how the COVID-19 outbreak affects the banking sector's performance and stability across the world in different regions and bank types. Our sample consists of 2073 listed and unlisted banks in 106 countries from 2016Q1 to 2021Q2. We employ several alternative bank performance and stability measures for a comprehensive analysis and robustness. The findings show that the outbreak of COVID-19 has significantly decreased bank performance and stability.

We also determine whether the pandemic's impact on the performance and stability of the bank depends on the specific factors of the bank and the country. A bank's financial condition during a crisis/pandemic is an important factor in its survival. More specifically, we find that bank performance and stability are most negatively affected by the COVID-19 outbreak in smaller, undercapitalized, less diversified, foreign, and government-owned banks. We find a better regulatory environment, superior institutional quality, and higher financial development, minimizing the adverse impacts of COVID-19 on banks' performance and stability. Our primary outcomes

continue across alternative model specifications, such as GMM, which capture the potential endogeneity issues. These findings persistently appear across several geographical regions and countries' income classifications. Finally, we observed the discriminating impacts of COVID-19 on the performance and stability of different types of banks (e.g., foreign, government, Islamic banks, conventional, listed, and unlisted). These findings call for greater emphasis on the appropriate banking regulatory environment, formal institutions, and financial development in macroeconomic and financial risk-sensitive countries during extreme uncertainty.

Our empirical framework presents several limitations that we acknowledge. First, the severity of the pandemic may depend on specific country-specific policies or actions, and the measurement of cases of COVID-19 may suffer from the classic endogeneity problem. Because our sample period mostly covers the first wave of the spread of COVID-19, we believe that the measurement is less contaminated by governments' policy interventions but reflects the exogenous nature of virus spread and transmission. Second, the main focus of this study is on bank performance and stability, while the bank lending strategy is an important aspect that is not covered. However, the study on the impact of the COVID-19 outbreak on financial and banking stability is still at an early stage. Future work should seek how different policy measures implemented worldwide impacted bank lending within and across the border decisions and real economic outcomes. Another potential research area could be examining whether the COVID-19 crisis has affected bank operations, business models, and banking market structure can be assessed. Finally, it can also be seen whether COVID-19 led to bank runs or market crashes in some countries.

Ethics approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Conflict of interest

The authors declare no competing interest.

Data availability

The data relevant to this research is publicly available from the World Development Indicators, IMF, bankscope or obtained from the authors by making a reasonable request.

Appendix A. Variables definition

Variable	Definition	Source
Dependent variables		
Default risk (ZSC)	Default risk is measured by natural logarithm of Z-Score, which equals (ROA+E/A)/σROA.	Bank scope
Credit risk (NPL)	The non-performing loans to total loans at the bank level.	Bank scope
Operational risk (ORK)	The standard deviation of net interest margin.	Bank scope
Leverage risk (LRK)	Equity to assets ratio/σ(ROA).	Bank scope
Portfolio risk (PRK)	Returns on assets/σ(ROA).	Bank scope
Return on average assets (ROAA)	Net income scaled by average total assets	Bank scope
Return on average equity (ROAE)	Net income scaled by average total equity	Bank scope
Net interest margin (NIM)	Net Interest Income / Avg Interest Earning Assets	Bank scope
Cost to income (CIN)	Cost to Income ratio	Bank scope
Explanatory variables		
Covid-19 dummy (COVID-19)	A binary indicator that equals one during the pandemic, during first through third quarters of 2020, and zero otherwise.	
Size (SIZ)	Natural logarithm of bank assets	Bank scope
Capital (CAP)	Equity over total assets	Bank scope
Diversification (DIV)	Net noninterest income to net operating income ratio	Bank scope
Loan Share (LTA)	Net loan to total assets	Bank scope
Liquidity (LIQ)	Liquid assets divided by total assets	Bank scope
GDP per capita (GDPpc)	Natural logarithm of GDP per capita	IFS Data
Inflation (INF)	Inflation based on the CPI	IFS Data

(*continued on next page*)

(*continued*)

Variable	Definition	Source
Concentration ratio (CON)	Percentage of the five largest banks assets to total banks assets in the country.	GFDD
Activity restrictions (RES)	Degree to which banks can participate in various non-interest income activities (insurance, real estate, underwriting).	Barth et al. (2013)
Private monitoring (PMI)	A measure of private oversight of firms, with higher values indicating more private monitoring.	
Capital stringency (CRI)	The strength of capital regulation in a country.	Barth et al. (2013)
Official supervisory power (OSP)	Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems.	Barth et al. (2013)
The rule of law (ROL)	Perceptions of the extent to which agents have confidence in and abide by society's rules.	WGI
Political stability (PST)	Perceptions of the likelihood of political instability.	WGI
Control of corruption (COC)	Perceptions of the extent to which public power is exercised for private gain.	WGI
Government effectiveness (GEF)	Measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of developing and executing policies, and the credibility of the government's commitment to such policies.	WGI
Regulatory quality (RQL)	Measures the government's ability to develop and execute policies that promote market competition and private sector development.	WGI
Voice and Accountability (VOA)	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media.	WGI
Financial Development (FDI)	The overall index of financial development.	IMF
Financial Institutions Depth (FID)	It summarizes how developed financial institutions are in terms of their depth.	IMF
Financial Institutions Access (FIA)	It summarizes how developed financial institutions are in terms of their access.	IMF
Financial Institutions Efficiency (FIE)	It summarizes how developed financial institutions are in terms of their efficiency.	IMF
Foreign banks (FOR)	The extent to which the banking system's assets are foreign-owned	Barth et al. (2013)
Government banks (GOV)	The extent to which the banking system's assets are government-owned.	Barth et al. (2013)

This table presents detailed descriptions and sources of variables used in this study to examine the effects of COVID-19 pandemics on bank performance and stability.

Appendix B

See Figs. 1–9.

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