Appendix

Table A.1. Distribution of the Banks by Country

Country	Number of Banks	Percent	Cumulative Percent
Australia	5	1.55	1.55
Austria	5	1.55	3.10
Bahrain	6	1.86	4.95
Belgium	1	0.31	5.26
Brazil	4	1.24	6.50
Canada	8	2.48	8.98
Chile	6	1.86	10.84
China	7	2.17	13.00
Croatia	1	0.31	13.31
Denmark	5	1.55	14.86
Egypt, Arab Rep.	6	1.86	16.72
France	6	1.86	18.58
Germany	3	0.93	19.50
Indonesia	8	2.48	21.98
Israel	6	1.86	23.84
Italy	13	4.02	27.86
Japan	48	14.86	42.72
Jordan	9	2.79	45.51
Kuwait	7	2.17	47.68
Malaysia	8	2.48	50.15
Mexico	4	1.24	51.39
Morocco	3	0.93	52.32
Norway	3	0.93	53.25
Pakistan	8	2.48	55.73
Peru	4	1.24	56.97
Philippines	8	2.48	59.44
Poland	8	2.48	61.92
Portugal	2	0.62	62.54
Qatar	8	2.48	65.02
Singapore	3	0.93	65.94
South Africa	5	1.55	67.49
Spain	5	1.55	69.04
Sri Lanka	5	1.55	70.59
Sweden	4	1.24	71.83
Switzerland	14	4.33	76.16
Thailand	4	1.24	77.40
Turkey	9	2.79	80.19
United Arab Emirate	8	2.48	82.66
United Kingdom	5	1.55	84.21
United States	51	15.79	100.00
Total	323	100	

Table A.2. Description of Variables

Variable Name	Definition	Source
Dependent Variables (Bank Level):		
Delta-CoVaR (ΔCoVaR)	Bank i's yearly contribution to systemic risk as defined by Adrian and Brunnermeier (2016). It is measured as the difference of the Value at Risk (VaR) of the system's market value of total assets conditional on the distress of a particular bank (5 percent worst outcomes) and the VaR of the system's market value of total assets conditional on the median state of the bank (median outcomes). ΔCoVaR is estimated using the quantile regression method for an empirical specification where the system's market value of total assets is regressed on each bank's market value of total assets and on a set of market indices that captures the exposure of financial institutions to common factors. The common factors are (i) the daily return of MSCI World index; (ii) the volatility index (VIX); (iii) the daily real estate sector return (MSCI World Real Estate) in excess of the banking-sector return (MSCI World Banks); (iv) the change in the three-month T-bill rate; (v) the spread between three-month repo rate and three-month T-bill rate; (vi) the spread of change in 10-year bond yield and three-month T-bill rate; and (vii) the change in the spread of Moody's Baa corporate bond yield and 10-year bond yield. System is defined as the market value of total assets of the sample. The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations
Normalized SRISK (NSRISK)	The loss of the bank i within a year conditional by the whole system being in distress (5 percent worst outcomes of the market capitalization) per unit of market capitalization. SRISK is determined using the GJR-GARCH method with two-steps quasi-maximum likelihood (QML) estimation as in Acharya, Engle, and Richardson (2012) and Brownlees and Engle (2017), and we divide it by bank i's market capitalization to get NSRISK. SRISK is expressed in USD as well as market capitalization. System is defined by the MSCI World Financials Index. Higher values are associated with greater systemic importance.	Own Calculations

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
Marginal Expected Shortfall (MES)	Yearly marginal expected shortfall, defined by Acharya et al. (2017) as the average return on an individual bank's stock on the days the MSCI World Financials Index experienced its 5 percent worst outcomes. Conditional volatilities of the equity returns are modeled using asymmetric GJR-GARCH models with two-steps quasi-maximum likelihood (QML) estimation, whereas time-varying conditional correlation is modeled using the dynamic conditional correlation (DCC) framework of Engle (2002). System is defined by the MSCI World Financials Index. The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations
Exposure-ΔCoVaR (eΔCoVaR)	Bank i's yearly exposure to systemic risk as defined by Adrian and Brunnermeier (2016). It is measured as the difference of the Value at Risk (VaR) of market value of total assets of a particular bank i conditional on the distress of the system (5 percent worst outcomes) and the VaR of the bank i's value of total assets conditional on the median state of the system (median outcomes). eΔCoVaR is estimated using the quantile regression method for an empirical specification where the system's market value of total assets is regressed on each bank's market value of total assets and on a set of market indices that captures the exposure of financial institutions to common factors. The common factors are (i) the daily return of MSCI World index; (ii) the volatility index (VIX); (iii) the daily real estate sector return (MSCI World Real Estate) in excess of the banking-sector return (MSCI World Banks); (iv) the change in the three-month T-bill rate; (v) the spread between three-month repo rate and three-month T-bill rate; (vi) the spread of change in 10-year bond yield and three-month T-bill rate; and (vii) the change in the spread of Moody's Baa corporate bond yield and 10-year bond yield. System is defined as the market value of total assets of the sample. The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
Leverage (LVG, Market Leverage)	Market leverage computed as the ratio of the quasi-market value of assets divided by market value of common equity, where the quasi-market value of assets is book value of assets minus book value of common equity plus market value of common equity as in Acharya et al. (2017).	Own Calculations
Systemic Expected Shortfall (SES)	Bank propensity to be undercapitalized when the system as a whole is undercapitalized, which increases in its leverage, volatility, correlation, and tail dependence. SES is computed as in Acharya et al. (2017), based on MES and LVG for each bank i in year t: $\text{SES}_{i,t} = 0.02 - 0.15 \times \text{MES}_{i,t-1} - 0.04 \times \text{LVG}_{i,t-1}$. The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations
Systemic Factor2	Principal-component factor computed using factor analysis based on ΔCoVaR and NSRISK similar to Berger, Roman, and Sedunov (2020). The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations
Systemic Factor3	Principal-component factor computed using factor analysis based on ΔCoVaR, NSRISK, and SES similar to Berger, Roman, and Sedunov (2020). The indicator is expressed as a positive number, higher values being associated with greater systemic importance.	Own Calculations
Value at Risk (VaR)	The maximum possible loss as a percent of the total market equity that a bank could register for a given confidence level (95 percent). The loss is found in the left tail corresponding to 95 percent confidence level of the returns distribution function. The indicator is expressed as a positive number, higher values being associated with greater individual risk.	Own Calculations
Beta	Dynamic conditional beta computed using the dynamic conditional correlation (DCC) framework of Engle (2002) to capture the conditional co-movement between each bank and the market (MSCI World Financials Index), where the GJR-GARCH process is employed to account for the conditional heteroskedasticity.	Own Calculations

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
Data Used for Systemic Risk (Bank Level):		
Market Equity	Market Capitalization in U.S. Dollars	Datastream
Total Assets	Book Value of Total Assets	Worldscope
Book Equity	The Book Value of Common Equity	Worldscope
Market Assets	Total Assets × (Market Equity/Book Equity)	Own Calculations
MSCI World Financials Index (Market)	Log-Returns of MSCI World Financials Index	Datastream
Bank-Level Variables:		
Size	Natural Logarithm of Total Assets in U.S. Dollars	Worldscope
Credit Risk Ratio	Non-performing Loans/Total Loans	Worldscope
Profitability (ROA)	Net Income/Total Assets	Worldscope
Capitalization	Common Equity/Total Assets	Worldscope
Funding Structure	Total Deposits/Total Liabilities	Worldscope

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
Macro/Banking System Level Variables		
Central Bank Independence Index	Updated version of Cukierman, Webb, and Neyapti's (1992) index by Bodea and Hicks (2015). The index has four components that we use in our analysis relating to (i) appointment, dismissal, and term of office for the head of the central bank (personnel independence), (ii) the resolution of conflicts between the executive branch and the central bank (policy independence), (iii) the objectives of the central bank (central bank objectives), and (iv) the rules limiting lending to the government (financial independence). The indices range between 0 and 1, higher values being associated with greater independence.	Bodea and Hicks (2015) and Garriga (2016)
Real GDP Growth	Annual percentage growth rate of gross domestic product based on constant local currency. Aggregates are based on constant 2010 U.S. dollars.	WDI
Inflation	Inflation as measured by the change in consumer price index, reflecting the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	WDI
Bank Concentration	Assets of three largest banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations, and other assets.	WDI
Financial Intermediation	Domestic credit provided by financial sector/GDP.	WDI
Central Bank Involvement in Supervision Index (CBIS Index)	An index that captures the roles of the central bank in supervising all, some, or none of the different financial-sector actors. CBIS index takes the maximum score of 6 in countries where all supervisory responsibilities are assigned to the central bank and the minimum score of 1 in countries where the central bank is not involved in supervision at all.	Masciandaro and Romelli (2018)

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
Variables Used in the Interaction Analyses:		
Financial Stability Mandate/Objective (FS Mandate/Objective)	Dummy variable that takes the value of 1 if the central bank has financial stability as de jure mandate/objective, and 0 otherwise.	Central Banks' Websites; IMF's FSAP Reports; CBLD; Edge and Liang (2019)
Financial Stability Report (FS Report)	Dummy variable that takes the value of 1 in the years the central bank published a stand-alone financial stability report/review, and 0 otherwise.	Central Banks' Websites; IMF's FSAP Reports; CBLD; Edge and Liang (2019)
Central Bank Role in Macruprudential Committee (CB Role in MaPru Committee)	Dummy variable that takes the value of 1 if the central bank has a primary or shared role in macroprudential committee, and 0 otherwise.	Central Banks' Websites; IMF's FSAP Reports; CBLD; Edge and Liang (2019)
High Macroprudential Index (High MaPru Index)	Dummy variable that takes the value of 1 if the macroprudential index is equal to or greater than the median of the sample, and 0 otherwise. The macroprudential index is developed by Cerutti, Claessens, and Laeven (2017) based on 12 dimensions: (i) loan-to-value ratio caps; (ii) debt-to-income ratio; (iii) dynamic loan loss provisioning; (iv) general countercyclical capital buffer; (v) leverage ratio; (vi) capital surcharges on systemically important financial institutions (SIFIs); (vii) limits on interbank exposures; (viii) concentration limits; (ix) limits of foreign currency loans; (x) foreign exchange and/or countercyclical reserve requirements; (xi) limits on domestic currency loans; and (xii) levy/tax on financial institutions. The index takes values from 0 to 12, higher values being associated with a greater use of macroprudential policies.	Cerutti, Claessens, and Laeven (2017)

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
High Quality of Microprudential Supervision (High Quality of MiPru Supervision)	Dummy variable that takes the value of 1 if the microprudential supervision index is greater than or equal to the median of the sample, and 0 otherwise. The microprudential index is constructed following the methodology of Anginer et al. (2014b) based on the bank regulation and supervision survey from the World Bank. The index takes values from 0 to 14, higher values being associated with high quality of microprudential supervision.	World Bank's Bank Regulation and Supervision Surveys; Anginer et al. (2014b)
Low Real GDP/Capita	Dummy variable that takes the value of 1 if the PPP GDP/capita in constant 2017 international $ is less than the median of the sample, and 0 otherwise.	WDI
Low Financial Freedom Index	Dummy variable that takes the value of 1 if the financial freedom index is less than the median of the sample, and 0 otherwise. The financial freedom index is a measure of banking efficiency and independence from government control and interference in the financial sector. It takes values from 0 to 100, higher values being associated with negligible government interference.	Heritage Foundation
High Financial Markets Index	Dummy variable that takes the value of 1 if the financial markets index is equal to or greater than the median of the sample, and 0 otherwise. The financial markets index is based on financial markets depth, access, and efficiency, and follows the methodology of Sahay et al. (2015). The index takes values from 0 to 1, higher values being associated with more developed financial markets.	Sahay et al. (2015)
High Financial Institutions Index	Dummy variable that takes the value of 1 if the financial institutions index is equal to or greater than the median of the sample, and 0 otherwise. The financial institutions index is based on financial institutions depth, access, and efficiency, and follows the methodology of Sahay et al. (2015). The index takes values from 0 to 1, higher values being associated with more developed financial institutions.	Sahay et al. (2015)

(*continued*)

Table A.2. (Continued)

Variable Name	Definition	Source
High Financial Development Index	Dummy variable that takes the value of 1 if the financial development index is equal to or greater than the median of the sample, and 0 otherwise. The financial development index is based on financial markets and institutions indices, and follows the methodology of Sahay et al. (2015). The index takes values from 0 to 1, higher values being associated with increased financial development.	Sahay et al. (2015)
Crisis	Dummy variable which takes the value of 1 if the period is between 2007 and 2013, and 0 otherwise.	Own Calculations
High Market Power	The values of Lerner index greater than or equal to the median of the sample. Lerner index is defined as the difference between output prices and marginal costs (relative to prices). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries.	WDI
Rigid Exchange Rate Regime	Dummy variable that takes the value of 0 if the exchange regime in a country is either floating or free floating, and 1 otherwise.	IMF

Note: CBLD stands for Central Bank Legislation Database; WDI stands for World Development Indicators; and IMF's PSAP stands for International Monetary Fund's Financial Sector Assessment Program.

Table A.3. Summary Statistics

	Mean	St. Dev.	p25	Median	p75	Min.	Max.	Obs.
ΔCoVaR	1.247	0.892	0.591	1.178	1.804	−2.39	5.484	3,327
NSRISK	23.350	87.948	−14.675	0.316	36.879	−70.019	2,841.164	3,284
CBI Index	0.565	0.194	0.472	0.475	0.775	0.173	0.954	3,293
Personnel Independence	0.553	0.159	0.438	0.582	0.707	0.063	0.832	2,936
CB Objectives	0.559	0.227	0.400	0.600	0.600	0.000	1.000	2,936
Policy Independence	0.549	0.328	0.268	0.668	0.750	0.000	1.000	2,936
Financial Independence	0.587	0.290	0.329	0.626	0.891	0.013	1.000	2,936
Size	24.204	1.716	23.148	24.011	25.06	18.568	29.011	3,327
Credit Risk Ratio	3.600	3.900	1.000	2.600	4.800	0.000	53.500	3,270
Profitability	1.300	1.400	0.500	1.200	1.800	−25.800	12.800	3,226
Capitalization	8.400	4.300	5.500	7.600	10.100	1.100	61.000	3,263
Funding Structure	74.900	19.300	63.800	79.900	90.900	0.000	100.400	3,327
Real GDP Growth	2.800	3.400	1.400	2.400	4.200	−5.700	26.200	3,327
Inflation	2.846	3.823	0.803	2.27	3.393	−4.863	54.4	3,327
Bank Concentration	55.41	21.283	36.97	46.319	74.84	23.113	100	3,318
Financial Intermediation	165.619	90.878	85.909	156.385	227.188	15.171	346.489	3,321
CBIS Index	2.009	1.109	1.000	2.000	3.000	1.000	6.000	3,105

Note: These figures correspond to the actual number of observations that entered the estimation model. Statistics for control variables are based on ΔCoVaR estimation with CBI index as the main explanatory variable. A complete description of variables is given in Table A.2 from the appendix.

Table A.4. Correlation Matrix of the Regressors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) CBI Index	1.000														
(2) Personnel Indep.	0.189*	1.000													
(3) CB Objectives	0.592*	0.218*	1.000												
(4) Policy Indep.	0.561*	0.358*	0.419*	1.000											
(5) Financial Indep.	0.722*	−0.137*	0.326*	0.275*	1.000										
(6) Size	0.098*	−0.000	−0.061*	−0.091*	0.086*	1.000									
(7) Credit Risk	−0.068*	0.094*	0.017	0.263*	−0.151*	−0.218*	1.000								
(8) Profitability	0.094*	−0.088*	0.137*	0.021	0.203*	−0.147*	−0.167*	1.000							
(9) Capitalization	−0.072*	−0.082*	−0.003	−0.071*	0.122*	−0.427*	0.061*	0.457*	1.000						
(10) Funding Structure	−0.307*	0.192*	0.101*	−0.145*	−0.464*	−0.390*	0.138*	−0.219*	0.062*	1.000					
(11) Real GDP Growth	−0.032*	−0.057*	0.074*	−0.048*	0.114*	−0.144*	0.017	0.325*	0.269*	0.030*	1.000				
(12) Inflation	0.069*	−0.078*	0.037*	0.168*	0.180*	−0.210*	0.089*	0.333*	0.248*	−0.119*	0.274*	1.000			
(13) Bank Concentration	0.063*	−0.092*	0.082*	0.186*	0.102*	−0.033*	0.094*	0.113*	−0.032*	−0.335*	0.215*	0.118*	1.000		
(14) Financial Intermediation	−0.304*	0.091*	−0.071*	−0.262*	−0.455*	0.211*	−0.149*	−0.432*	−0.348*	0.333*	−0.477*	−0.487*	−0.448*	1.000	
(15) CBIS Index	−0.105*	−0.217*	−0.239*	0.087*	0.176*	−0.145*	0.192*	0.093*	0.314*	−0.159*	0.220*	0.204*	0.185*	−0.470*	1.000

Note: * denotes statistical significance at the maximum level of significance of 10 percent. These figures correspond to the actual number of observations that entered the estimation model, based on ΔCoVaR as dependent variable and CBI index as the main explanatory variable in the case of control variables.

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