

Macprudential policy and systemic risk

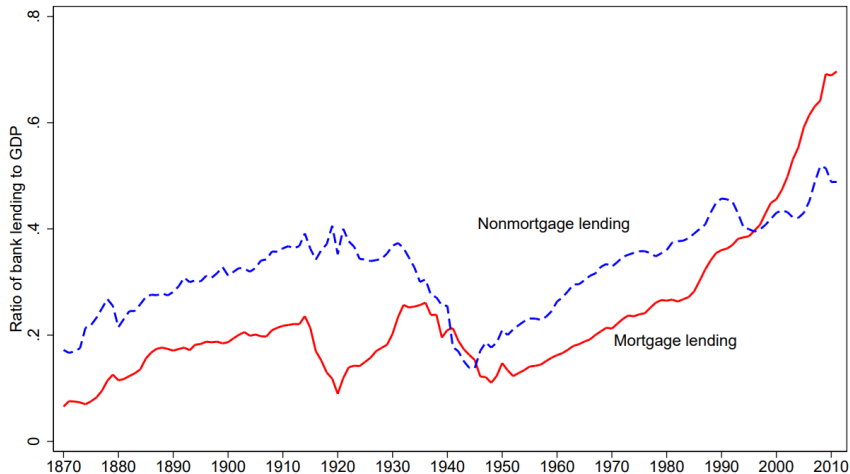
The role of corporate and household credit booms

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The great mortgaging



- The figure illustrates the evolution of average mortgage and nonmortgage lending from banks (in percent of GDP) for 17 advanced countries (Jordà et al. 2014, p. 9).

Macroprudential policy, systemic risk, and credit booms

- **Two stylized facts:**

- ▶ Large expansions in credit (particularly household credit) have been identified as a strong predictor of financial crises and the build-up of systemic risk.
- ▶ Empirical evidence suggests that macroprudential policies are effective in reducing credit growth.

- **This study aims to answer the following question:**

- ▶ Can macroprudential policies attenuate the build-up of systemic risk during credit booms, and does their effectiveness vary across different types of credit?

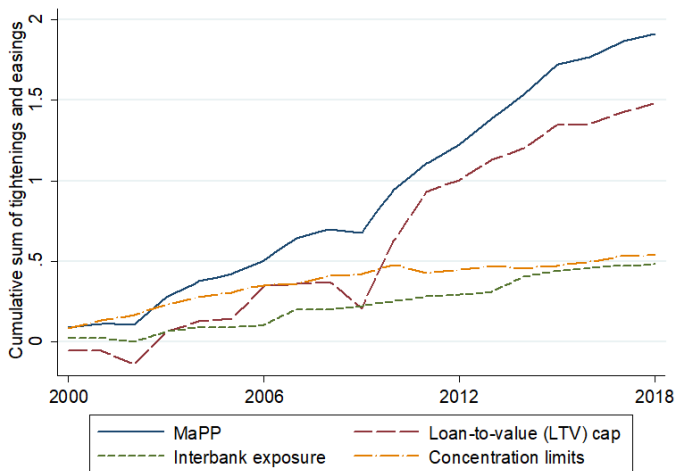
Credit booms and financial crises

- **Dell'Ariccia et al. (2016) find in their study that:**
 - ▶ 1/3 of credit booms are followed by financial crises.
 - ▶ 2/3 of booms are followed by crises or subpar GDP growth.
- **What characterizes credit booms that lead to financial crises?**
 1. Larger in size
 2. Last for a longer period
 3. Start from a higher level of credit-to-GDP ratio
 4. Strongly linked with house price booms
 5. Associated with strong growth in mortgage credit

Macroprudential policy stance

- **Three different macroprudential instruments:**
 - ▶ Loan-to-Value Caps
 - ▶ Interbank exposure limits
 - ▶ Concentration limits
- **Aggregate macroprudential policy indexes**
 - ▶ MaPP (includes all 3 macroprudential instruments)
- The macroprudential indexes measure the cumulative sum of tightenings (+1) and easings (-1) over the period 2000Q1-2018Q4.

The evolution of macroprudential policies



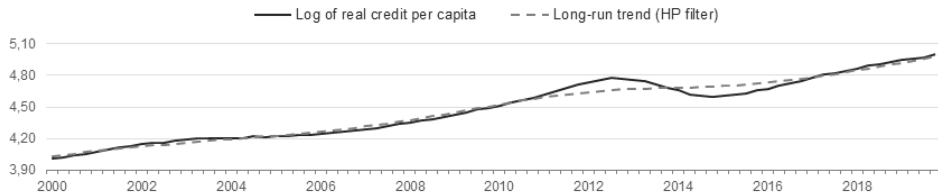
- The figure illustrates the evolution of the loan-to-value cap, interbank exposure limits, and concentration limits measured as the cumulative sum of tightenings (+1) and easings (-1).

Identification of credit booms

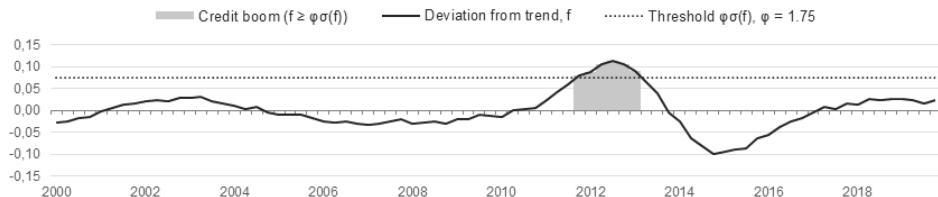
- **Identification method of booms (Mendoza & Terrones, 2008)**
 - ▶ Hodrick-Prescott (HP) filter
 - ▶ Log of real bank credit per capita
 - ▶ The deviation from the long-run trend of the credit variable is f_{it}
 - ▶ The country-specific standard deviation of f_{it} is $\sigma(f_{it})$
 - ▶ A credit boom is identified when $f_{it} \geq \varphi \sigma(f_{it})$ for one or several quarters, where φ is the threshold factor (multiple of the standard deviation)

Identification of credit booms (illustration)

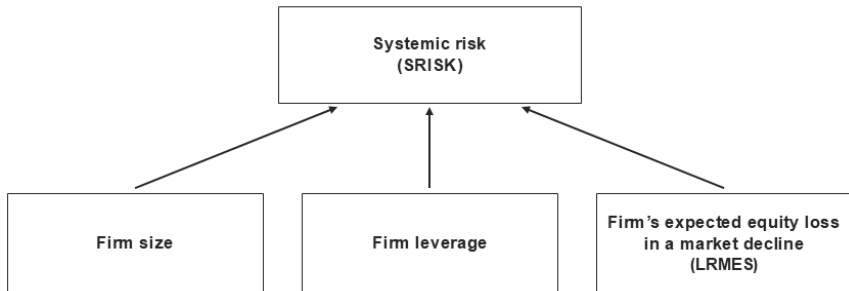
(a) Credit and its long-run trend



(b) Deviation from trend and boom threshold

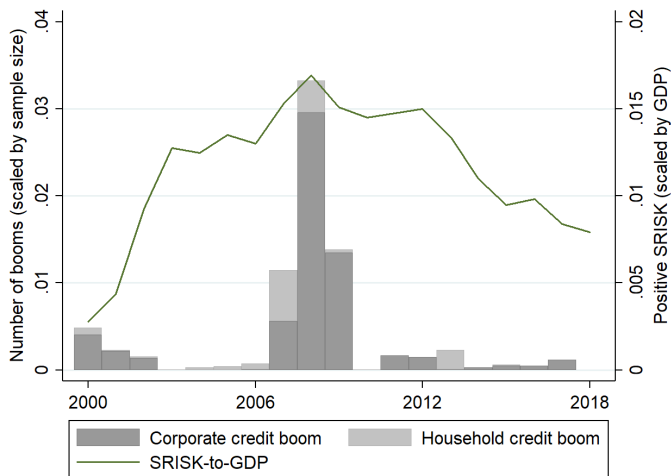


Systemic risk (SRISK)



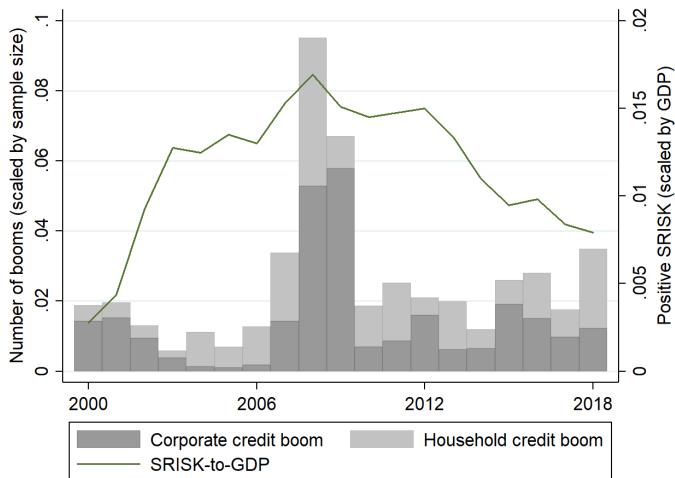
- SRISK is determined by a firm's size and leverage, as well as its expected equity loss in the event of a substantial market decline (as measured by LRMES).
- The long-run marginal expected shortfall (LRMES) is the fractional loss of a financial firm's equity in a crisis period during which the S&P index significantly declines (in this case, at least 40 percent) over 6 months.
- SRISK captures both the marginal expected shortfall (too-interconnected-to-fail) and market value of equity (too-big-to-fail).

Systemic risk and large credit booms



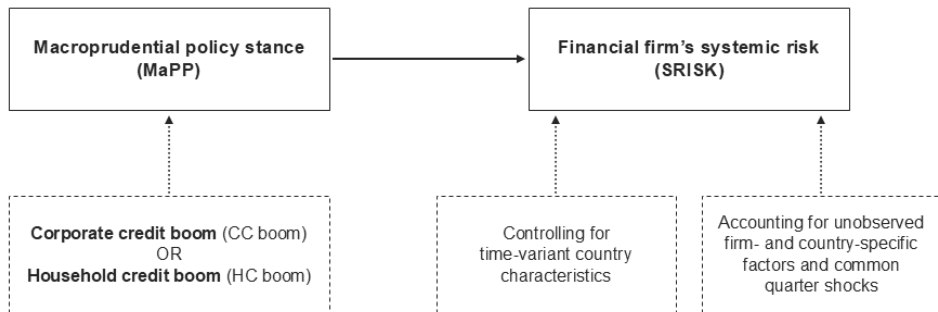
- The figure shows the number of corporate and household credit booms (threshold 1.75 s.d.) scaled by the sample size (left axis) and positive SRISK scaled by GDP (right axis).

Systemic risk and small credit booms



- The figure shows the number of corporate and household credit booms (threshold 0.5 s.d.) scaled by the sample size (left axis) and positive SRISK scaled by GDP (right axis).

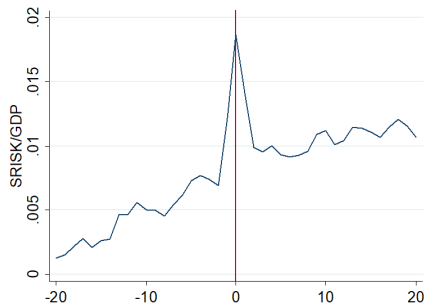
Empirical strategy



Event study - systemic risk around credit booms



(a) Firm credit booms



(b) Household credit booms

- The figures show that systemic risk (SRISK scaled by GDP) increases before a large boom in household credit, but that this is not the case for firm credit booms.

Baseline results

	Outcome variable: SRISK-to-GDP				
	(1)	(2)	(3)	(4)	(5)
MaPP	-2.768 (1.771)	-0.439 (1.392)	-2.744 (1.771)	-0.529 (1.390)	-0.449 (1.387)
CC boom	-1.332** (0.665)	-7.557*** (1.854)			-8.571*** (2.098)
HC boom			6.320* (3.460)	4.163 (4.115)	6.241 (4.281)
MaPP × CC boom	0.495 (1.067)	2.487* (1.372)			3.440** (1.499)
MaPP × HC boom			-6.430** (3.127)	-9.182** (4.033)	-12.266*** (4.550)
Country FE	Yes	Yes	Yes	Yes	Yes
Financial firm FE	No	Yes	No	Yes	Yes
Quarter FE	No	Yes	No	Yes	Yes
Observations	20720	20675	20720	20675	20675
Number of countries	37	37	37	37	37
Number of financial firms	837	792	837	792	792

Results - advanced and developing countries

	Outcome variable: SRISK-to-GDP					
	Advanced countries			Developing countries		
	(1)	(2)	(3)	(4)	(5)	(6)
MaPP	-0.386 (1.644)	-0.443 (1.652)	-0.397 (1.640)	-0.046 (0.117)	-0.048 (0.116)	-0.049 (0.118)
CC boom	-10.410*** (2.626)		-11.235*** (2.855)	0.342 (0.315)		0.330 (0.317)
HC boom		4.135 (4.531)	6.968 (4.751)		-0.119 (0.319)	-0.189 (0.312)
MaPP × CC boom	2.356 (3.275)		3.883 (3.503)	-0.146 (0.136)		-0.142 (0.140)
MaPP × HC boom		-9.987** (4.981)	-12.266** (5.340)		-0.137 (0.160)	-0.067 (0.193)
Observations	18181	18181	18181	2494	2494	2494
Number of countries	25	25	25	12	12	12
Number of financial firms	680	680	680	113	113	113
Adjusted R-squared	0.798	0.797	0.798	0.802	0.802	0.802

Results - large and small credit booms

	Outcome variable: SRISK-to-GDP					
	Full country sample			Advanced countries		
	0.5 s.d. (1)	1.5 s.d. (2)	2 s.d. (3)	0.5 s.d. (4)	1.5 s.d. (5)	2 s.d. (6)
MaPP	-0.555 (1.341)	-0.519 (1.392)	-0.427 (1.394)	-0.526 (1.599)	-0.473 (1.655)	-0.382 (1.653)
CC boom	-3.365*** (0.809)	-6.547*** (1.954)	-7.167*** (1.950)	-4.067*** (1.105)	-9.047*** (2.736)	-10.050*** (2.807)
HC boom	2.715*** (1.005)	4.245 (3.528)	4.325 (5.803)	3.042*** (1.081)	5.780 (4.084)	6.316 (6.698)
MaPP × CC boom	1.040** (0.482)	2.548 (1.619)	3.322** (1.344)	1.226** (0.562)	2.531 (2.325)	2.869 (2.239)
MaPP × HC boom	-0.972*** (0.373)	-3.725* (2.230)	-12.968 (7.878)	-1.061** (0.481)	-10.529** (4.612)	-19.409* (10.408)
Observations	20675	20675	20675	18181	18181	18181
Number of countries	37	37	37	25	25	25
Number of financial firms	792	792	792	680	680	680
Adjusted R-squared	0.798	0.798	0.798	0.797	0.798	0.798

Results - macroprudential instruments

	Outcome variable: SRISK-to-GDP		
	(1)	(2)	(3)
LTV cap $\times$ CC boom	-2.277 (3.791)		
LTV cap $\times$ HC boom	9.709 (15.554)		
Interbank exposure $\times$ CC boom		11.216* (6.680)	
Interbank exposure $\times$ HC boom		-6.018 (5.634)	
Concentration limits $\times$ CC boom			1.457 (1.695)
Concentration limits $\times$ HC boom			-9.331** (4.180)
Observations	4289	18092	20670
Number of countries	22	34	37
Number of financial firms	204	770	791
Adjusted R-squared	0.866	0.800	0.797

- The interaction term between concentration limits and the household credit (HC) boom is negative and significant. However, this is not the case for the other instruments.

Results - components of SRISK

	Outcome: log(Leverage)			Outcome: log(LRMES)		
	(1)	(2)	(3)	(4)	(5)	(6)
MaPP	0.030** (0.013)	0.030** (0.013)	0.030** (0.013)	0.020*** (0.006)	0.021*** (0.006)	0.020*** (0.006)
CC boom	0.059* (0.032)		0.038 (0.033)	0.106*** (0.020)		0.103*** (0.020)
HC boom		0.170*** (0.044)	0.163*** (0.045)		0.039** (0.019)	0.014 (0.019)
MaPP $\times$ CC boom	-0.008 (0.018)		0.008 (0.019)	-0.040*** (0.010)		-0.037*** (0.010)
MaPP $\times$ HC boom		-0.208*** (0.059)	-0.205*** (0.058)		-0.075*** (0.029)	-0.040 (0.025)
Observations	20675	20675	20675	20490	20490	20490
Number of countries	37	37	37	37	37	37
Number of financial firms	792	792	792	790	790	790
Adjusted R-squared	0.624	0.625	0.625	0.751	0.750	0.751

- The interaction term between MaPP and the household credit (HC) boom is negative and significant for leverage (columns 2 & 3).

Conclusions

- Credit booms in the household sector contribute to systemic risk build-up.
- Macroprudential policies attenuate systemic risk during household credit booms.
- During corporate credit booms, macroprudential tools seem to be less effective in reducing systemic risk.
- Leverage is identified as a key transmission channel.
- Limits on sectoral exposures are most effective in reducing systemic risk.