Corporate Debt, Boom-Bust Cycles, and Financial Crises

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Does corporate debt play a role in business cycles?

Since 2007-08 crisis, household debt seen as important from a macroeconomic perspective

- Micro evidence on household debt-fueled boom-bust cycles (e.g., Mian & Sufi, 2009, 2010)
- Complementary cross-country macro evidence (e.g., Mian, Sufi & Verner, 2015; Jordà et al., 2016)

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For corporate debt, much cross-sectional micro evidence on leverage and credit supply shocks

- Investment (e.g., Whited, 1992; Ivashina & Scharfstein, 2010; Ottonello & Winberry, 2018)
- Employment (e.g., Chodorow-Reich, 2014; Kalemli-Özcan, Laeven & Moreno, 2022)
- Capital (mis)allocation (e.g., Gopinath et al., 2017)

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Less well understood: macroeconomic role of corporate debt

- Empirical evidence is mixed (e.g., Giroud & Mueller, 2021; Jordà et al., 2022)
- Pressing policy issue (e.g., IMF, 2021; Boone et al. 2022; CGFS, 2022; ESRB, 2023)

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Some quotes from the literature

Mian, Sufi & Verner (QJE, 2017)

“[A] rise in non-financial firm debt has only weak predictive power on subsequent GDP growth.”

Jordà, Kornejew, Schularick & Taylor (RFS, 2022)

“[T]here is no evidence that corporate debt booms result in deeper declines in investment or output.”

Büyükkarabacak & Valev (2010):

“[Firm] credit expansions are associated with banking crises but their effect is weaker and less robust."

Greenwood, Hanson, Shleifer & Sorensen (JF, 2022)

“[B]oth nonfinancial business and household credit growth forecast the onset of a future crisis.”

Giroud & Mueller (JFE, 2021)

“An increase in listed firms’ leverage predicts lower future employment on the firm and regional level.”

This paper

We study the link between firm debt, financial crises, and recessions using cross-country data

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Backbone: Dataset on sectoral credit exposures from the Global Credit Project

- Extends data used in Müller & Verner (2023), new data on non-performing loans by sector
- Unprecedented coverage of credit to households and firms
- 115 countries, 1940-2014, overlaps with 90 banking crisis episodes

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Equipped with these data, we ask the following questions:

- Does firm debt matter for the likelihood of banking crises? Does it matter for the ensuing recession?
- Once a crisis hits, are defaults among firms or households more damaging to bank balance sheets?
- What is the relation between firm and household debt expansions with future GDP growth?

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Takeaway: Firm debt plays key role in boom-bust cycles because of its link with GDP crash risk

Roadmap

1 Data

2 Corporate Debt and Financial Stability

3 The Role of Heterogeneous Financing Constraints

4 Credit Allocation and Crisis Recovery

5 Credit Growth and GDP Crash Risk

6 Conclusion

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Backbone: A new database on sectoral credit

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- 115 countries, 1940-2014, > 600 sources
- Measures outstanding domestic credit by sector
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New here: an extended version of these data

- Novel time series on credit to non-bank financial institutions
- Extensive use of disaggregated credit to non-financial corporations by industry
- Hand-collected data on non-performing loans by sector around 21 banking crises

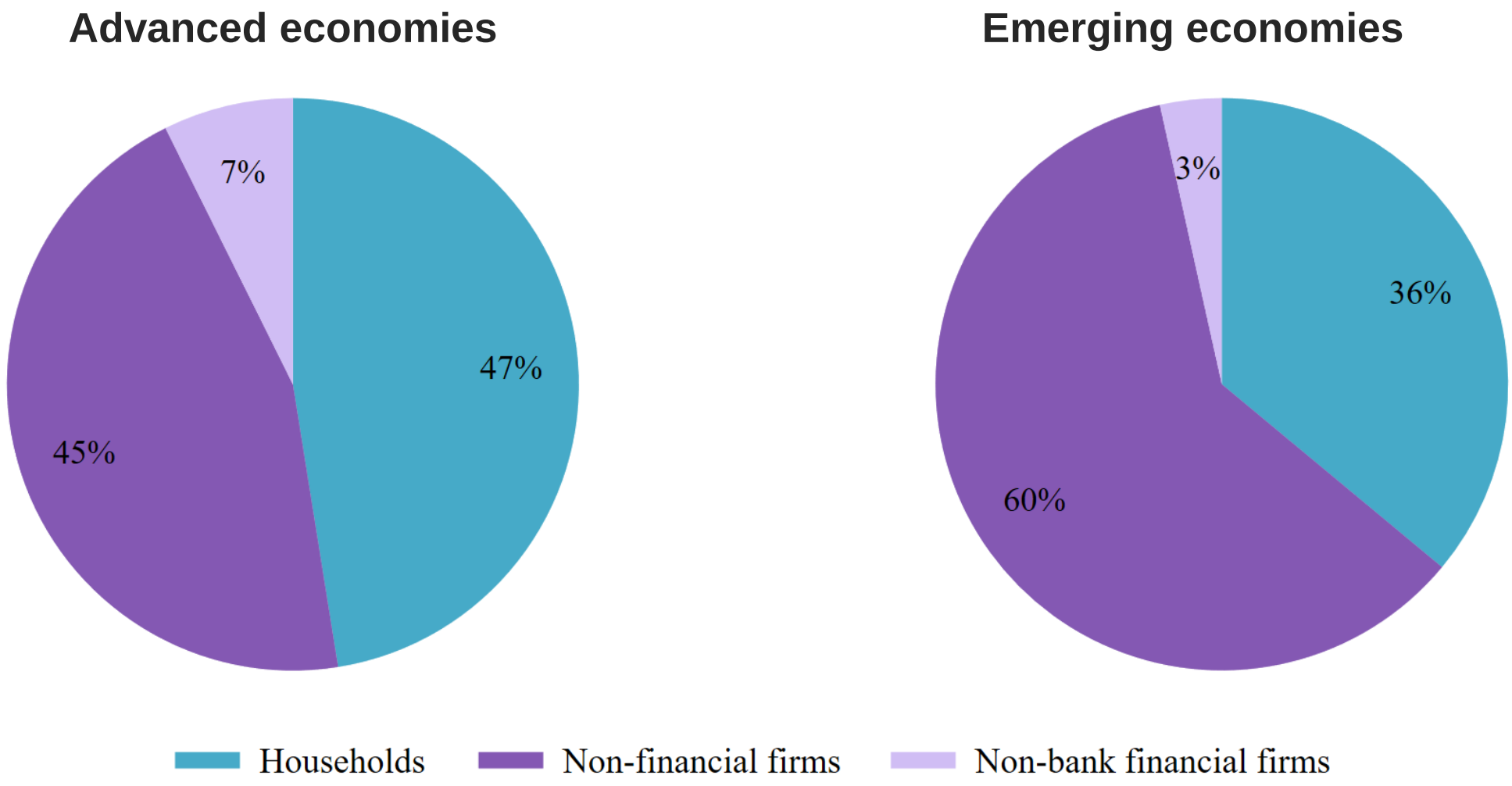
Example of the data sources: Canada Year Book

17.—Loans of Chartered Banks, according to Class, Outstanding at Sept. 30, 1950-52

NOTE.—The classification of chartered bank loans was revised in 1950; the figures in this table are, therefore, not comparable with those for 1947-49 in the 1951 Year Book, pp. 1043-1044.

Class of Loan	1950	1951	1952
	$'000	$'000	$'000
Government and Other Public Services—			
Provincial governments	23,600	24,859	6,349
Municipal governments and school districts	91,505	114,531	102,399
Religious, educational, health and welfare institutions	33,143	45,912	43,284
Totals, Government and Other Public Services	148,248	185,302	152,032
Financial—			
Investment dealers and brokers to the extent payable on call or within thirty days	101,177	107,091	135,173
Trust, loan, mortgage, investment and insurance companies and other financial institutions	85,983	91,720	107,519
Totals, Financial	187,160	198,811	242,692
Personal—			
Individuals, for other than business purposes, on the security of marketable stocks and bonds	243,370	255,605	274,324
Individuals, for other than business purposes, *n.e.s.*	218,201	211,303	227,992
Totals, Personal	461,571	466,908	502,316
Agricultural, Industrial and Commercial—			
Farmers	255,783	298,936	334,202
Industry—			
Chemical and rubber products	29,175	54,257	30,322
Electrical apparatus and supplies	14,310	41,388	22,886
Food, beverages and tobacco	122,514	171,968	168,366
Forest products	76,057	115,685	136,500
Furniture	16,188	19,776	14,363
Iron and steel products	53,389	97,509	95,641
Mining and mine products	26,015	33,381	47,991
Petroleum and products	22,914	31,055	32,813
Textiles, leather and clothing	138,862	213,377	157,963
Transportation equipment	30,102	46,437	52,810
Other products	55,180	63,118	53,156
Public utilities, transportation and communication companies	53,912	87,937	67,526
Construction contractors	122,736	151,774	158,643
Grain dealers and exporters	93,124	98,558	186,518
Instalment finance companies	96,476	100,830	149,397
Merchandisers	436,144	542,869	483,967
Other business	135,492	133,837	139,047
Totals, Agricultural, Industrial and Commercial	1,778,373	2,302,692	2,332,111
Grand Totals	**2,575,352**	**3,153,713**	**3,229,151**

Composition of credit to the private sector



Notes: Data from the Global Credit Project (Müller & Verner, 2023). Numbers are unweighted averages.

Data on financial crises

Baron, Verner & Xiong (2021)

- 46 countries, 1870-2016
- 224 crises
- Dates based on narrative evidence + 30% cumulative bank equity decline

Laeven & Valencia (2020)

- 165 countries, 1970-2017
- 151 crises
- Dates based on narrative evidence

We use Baron, Verner & Xiong (2021) where available, otherwise Laeven & Valencia (2020)

- Focus on systemic banking crises
- Overlap when requiring credit data on household and firm debt: 90 crises

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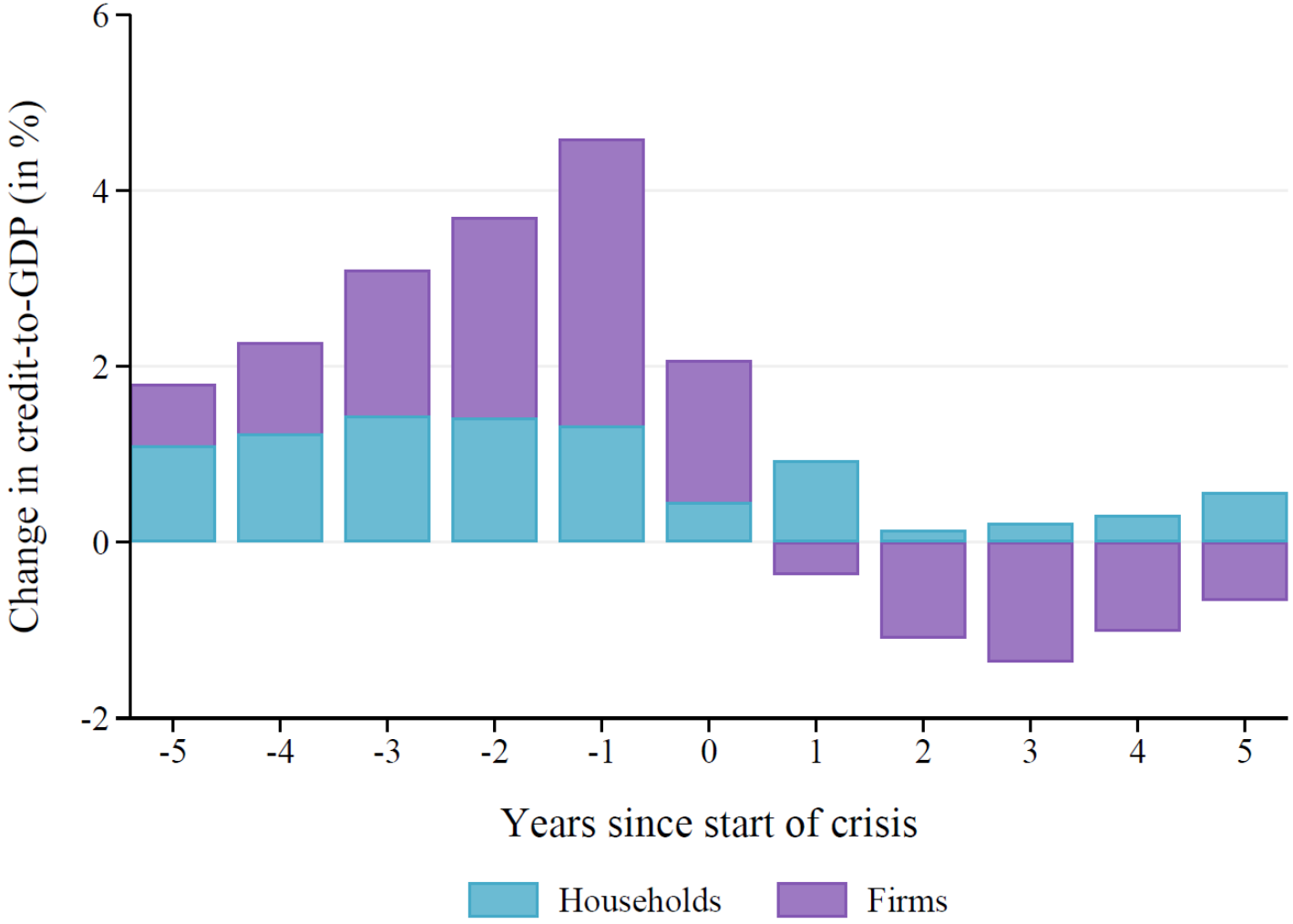
Firm debt accounts for 2/3 of credit growth before crises

Decomposition of credit growth in a sample of 90 crises



Predictive panel regressions

Methodology: Linear probability model in the spirit of Jordà (2005)

$$P(Crisis)_{i,t+h} = \alpha_i + \sum_{k \in K} \beta^k \, \Delta_3 \mathrm{Credit}^{\mathrm{k}}/\mathrm{GDP}_{\mathrm{i,t}} + \varepsilon_{i,t}$$

$P(Crisis)_{i,t+h}$ Financial crisis starts within $t + h$ (BVX, 2021 or Laeven-Valencia, 2020)

$\Delta_3 \mathrm{Credit}/\mathrm{GDP}_{\mathrm{i,t}}$ Change in credit/GDP between t-3 and t **(standardized)**

Forecast horizon h 1, …, 5

Driscoll-Kraay standard errors with lag length $\mathrm{ceil}(1.5h)$

Note: We omit additional h subscripts for α_i, β, and $\varepsilon_{i,t}$ for clarity of exposition

Firm debt predicts crises similarly to household debt

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	Dependent variable: Crisis within...				
	1 year	2 years	3 years	4 years	5 years
Households	0.012	0.024+	0.038*	0.049*	0.058**
	(0.007)	(0.013)	(0.017)	(0.019)	(0.018)
Firms	0.017**	0.028**	0.030**	0.028**	0.021+
	(0.005)	(0.007)	(0.007)	(0.010)	(0.011)
Observations	3,027	3,027	3,027	3,027	3,027
# Crises	84	84	84	84	84

Firm credit growth predicts crises **similarly** to household debt, stronger at 1-2 year horizon

1 SD higher firm credit growth → probability of a crisis within 3 years goes up by 3pp

Are corporate defaults a root cause of banking crises?

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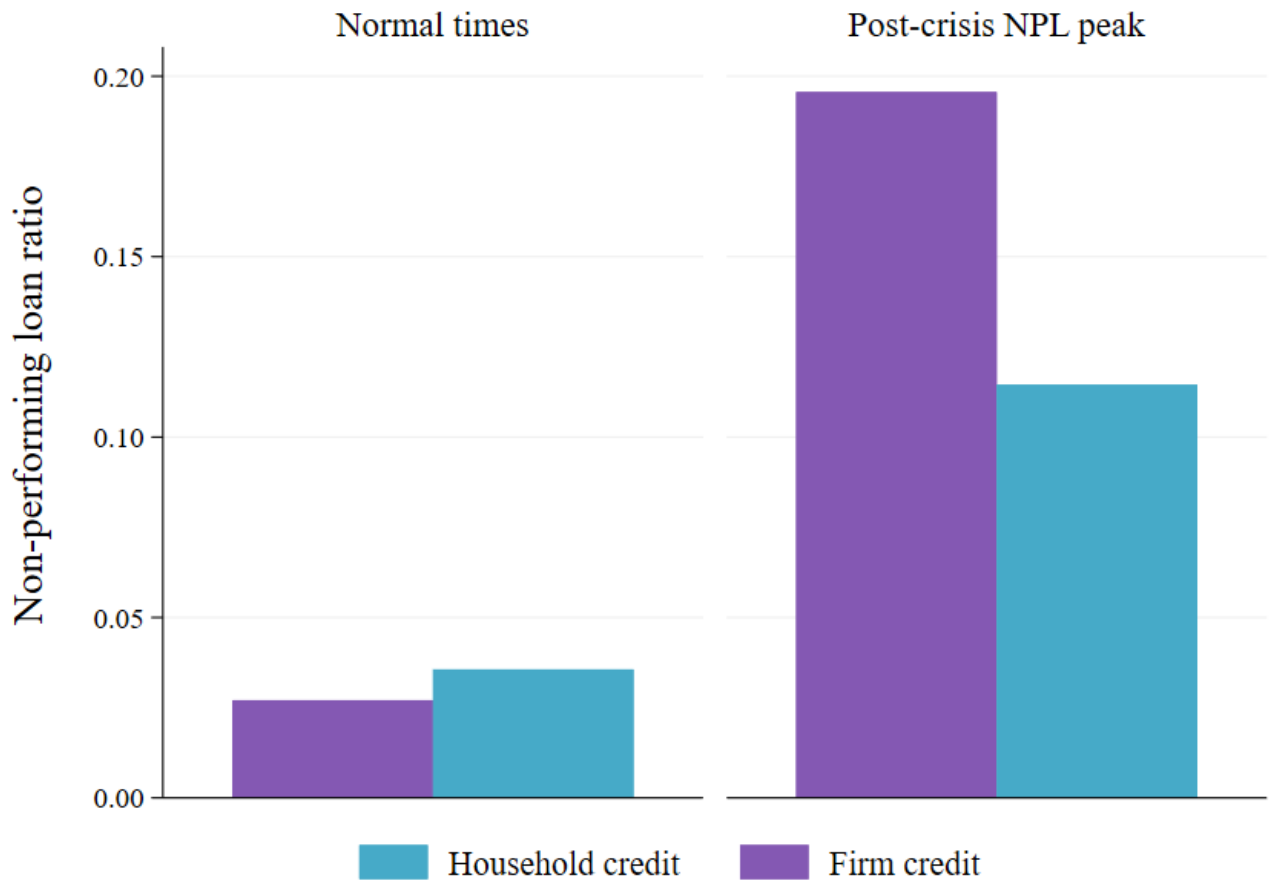
We use newly collected data on NPLs by sector to shed light on this

- 21 countries
- 22 banking crises
- Source: National central banks

Firm NPLs are double those of households during crises

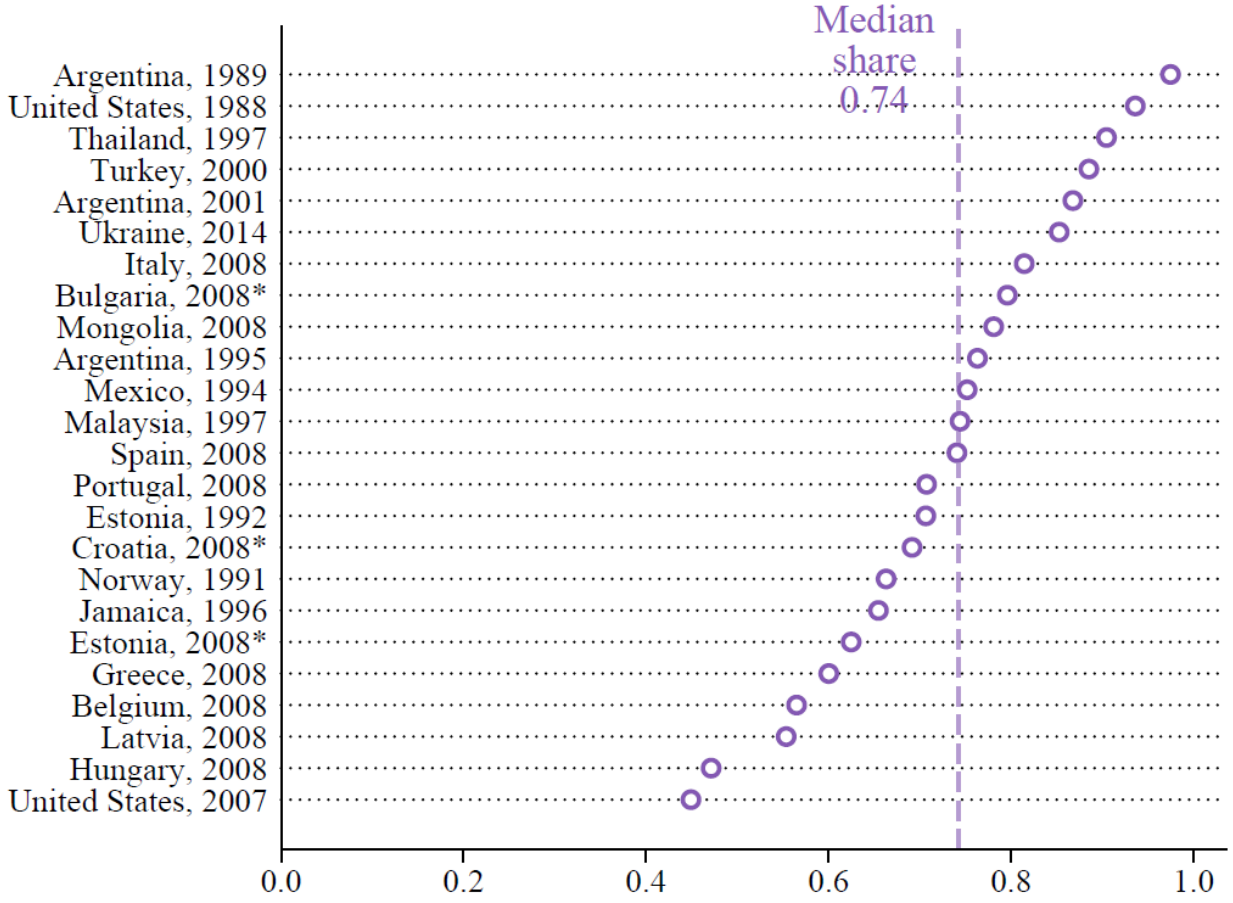
Ratio of non-performing loans (NPLs) by sector



Notes: Sample of 21 countries and 22 crises. NPL ratio = Non-performing loans / Outstanding loans. “Post-crisis NPL peak” is when total NPL ratio is at its within 10 years post-crisis. Normal times are years not within 10 years after a crisis.

Firms account for vast majority of NPLs after crises

Share of firms in total non-performing loans (NPLs)



Notes: Share of firms = NPLs of firms / Total NPLs, measured when total NPL ratio is at its peak within 10 years after a crisis.

Roadmap

Exploring heterogeneity in financing constraints

Firms differ in their reliance on external financing, leverage, and the collateral they pledge

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In a new revised draft, to be posted soon, we add evidence based on:

3. Dispersion in debt growth across firms (also excluding construction and real estate)
4. Issuance of cash flow-backed credit

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$$\text{Dispersion}_{i,t} = \text{SD}(\Delta_3 \text{Credit/GDP}_{i,k,t}) \qquad \text{for} \qquad k \in \{A, B+C, F+L, G+I, H+J, K\}$$

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Sectoral credit growth in…

A	Agriculture
$B + C$	Mining and manufacturing
$F + L$	Construction and real estate
$G + I$	Retail and wholesale trade
$H + J$	Transportation and communication
K	(Non-bank) finance

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	Dependent variable: Crisis within...					
	1 year		3 years		5 years	
	(1)	(2)	(3)	(4)	(5)	(6)
SD of credit growth	2.836+	1.874+	4.002**	2.217*	3.867**	2.367+
	(1.624)	(1.097)	(1.456)	(0.999)	(1.336)	(1.377)
Total credit growth		0.295**		0.547**		0.459**
		(0.110)		(0.114)		(0.085)
Observations	1,429	1,429	1,429	1,429	1,429	1,429
# Crises	42	42	42	42	42	42
AUC	0.66	0.73	0.62	0.69	0.60	0.65

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Crises follow periods in which firm credit in some industries grows "out of whack"

The role of firm debt backed by real estate collateral

Clear theoretical link between procyclical collateral values and business cycle fluctuations

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Firm-level evidence: real estate values affect firm borrowing, investment, and employment

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We measure firm credit growth for sectors "high" and "low" in reliance on real estate collateral

- Collateral data: 5 countries (incl. Federal Reserve's Y-14 data for the US)
- "High": construction/real estate, agriculture, wholesale/retail trade
- "Low": manufacturing/mining, transport/communication, other services

Crises follow booms in firm credit secured by real estate

$$P(Crisis)_{i,t+h} = \alpha_i + \sum_{k \in K} \beta^k \, \Delta_3 \text{Credit}^{\text{k}}/\text{GDP}_{\text{i,t}} + \varepsilon_{i,t}$$

	Dependent variable: Crisis within...				
	1 year	2 years	3 years	4 years	5 years
Δ_3HH/GDP	0.025+	0.041*	0.052*	0.067**	0.073**
	(0.013)	(0.018)	(0.021)	(0.022)	(0.020)
Δ_3NFC, real estate-backed/GDP	0.020**	0.031**	0.037**	0.026	0.015
	(0.006)	(0.010)	(0.012)	(0.017)	(0.022)
Δ_3NFC, other/GDP	-0.003	-0.006	-0.013	-0.014	-0.017
	(0.004)	(0.007)	(0.010)	(0.013)	(0.012)
Δ_3FIN/GDP	0.019*	0.029**	0.026*	0.018	0.013
	(0.009)	(0.010)	(0.011)	(0.015)	(0.020)
Observations	1,246	1,246	1,246	1,246	1,246
# Crises	38	38	38	38	38
AUC	0.77	0.74	0.72	0.70	0.68

Roadmap

Credit allocation and the recovery from recessions

Financial crises linked to deep recessions (e.g., Cerra & Saxena, 2008; Reinhart & Rogoff, 2009)

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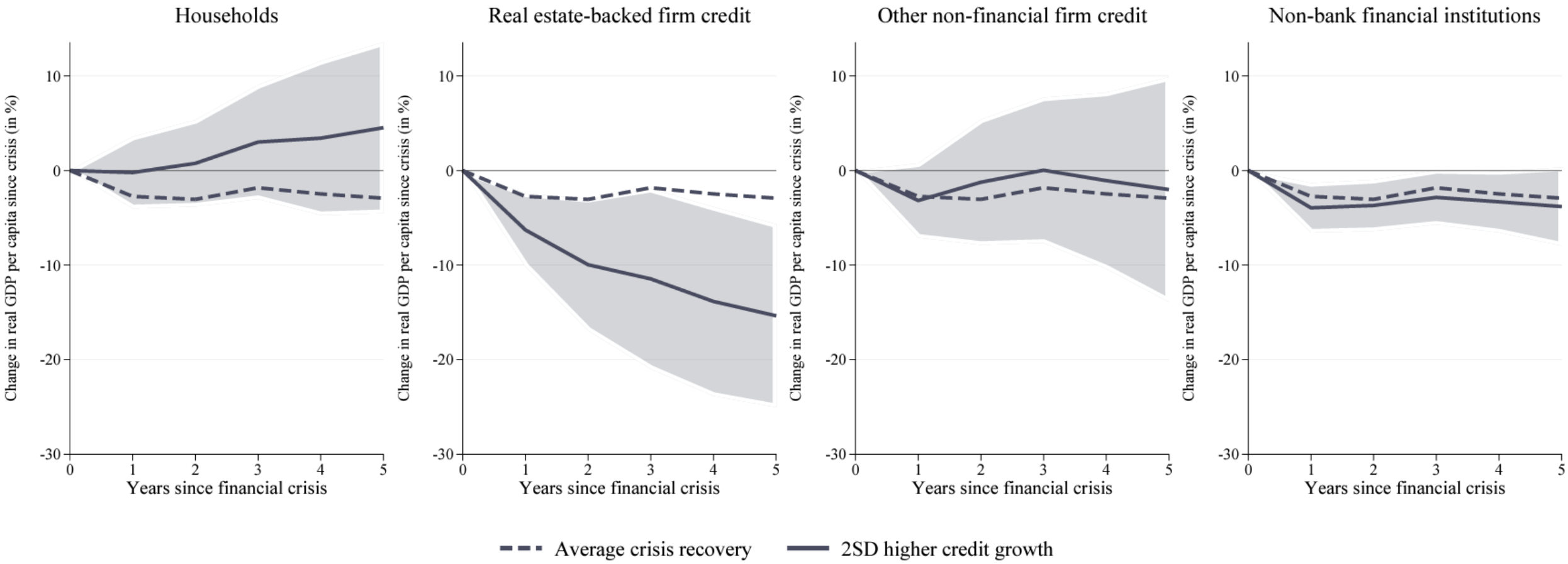
Methodology: Local projections

$$\Delta_h \log(y)_{i,t} = \alpha_i + \beta_1 Crisis_{i,t} + \sum_{k \in K} \beta_2^k \, \Delta_3 \mathrm{Credit^k/GDP_{i,t}} + \sum_{k \in K} \beta_3^k \, Crisis_{i,t} \times \Delta_3 \, \mathrm{Credit^k/GDP_{i,t}} + \varepsilon_{i,t}$$

Firm debt backed by real estate predicts slow recoveries

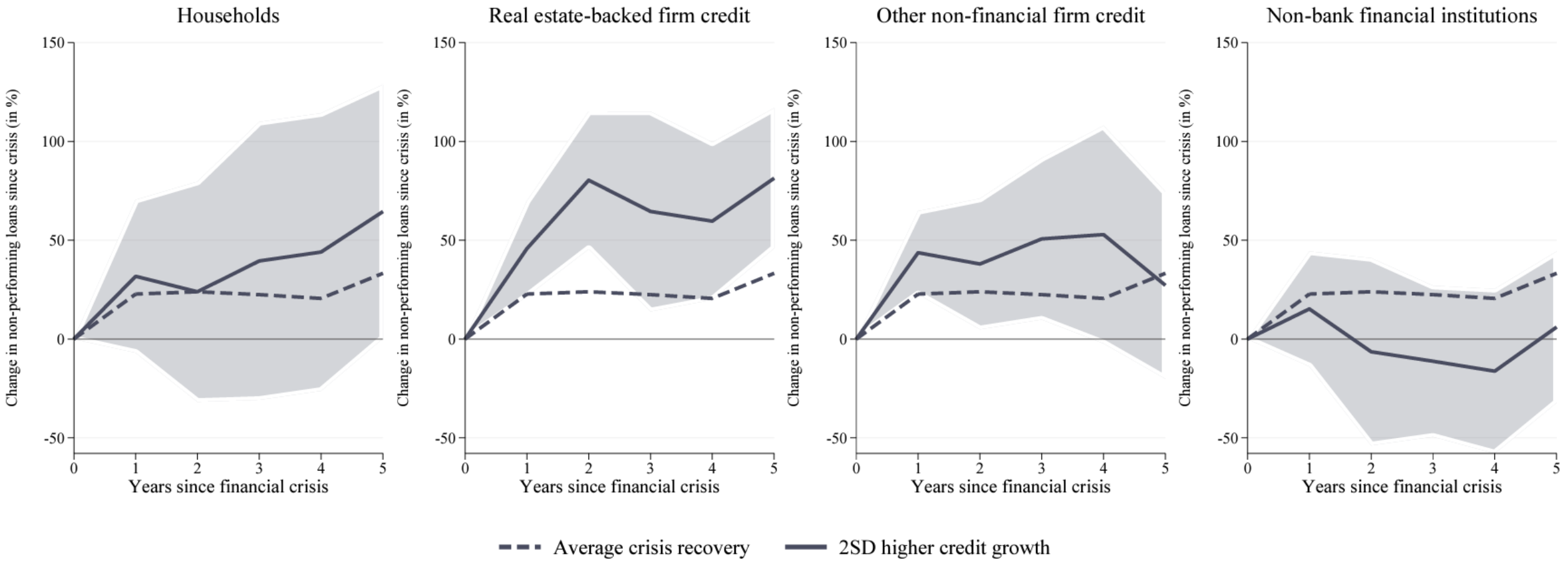
$$\Delta_h \log(real\ GDP\ p.c.)_{i,t} = \alpha_i + \beta_1 Crisis_{i,t} + \sum_{k \in K} \beta_2^k\, \Delta_3 \mathrm{Credit^k/GDP_{i,t}} + \sum_{k \in K} \beta_3^k\, Crisis_{i,t} \times \Delta_3 \mathrm{Credit^k/GDP_{i,t}} + \varepsilon_{i,t}$$



Notes: The dashed black line are the estimates of β_1 for different horizons. The solid black line is the sum of the coefficients $\beta_1 + \beta_3$ for a two-standard deviation higher value of $\Delta_3 Credit^k/GDP_{i,t}$. The grey area are 95% confidence intervals based on standard errors double-clustered by country and year.

NPLs spike after booms in real estate-backed firm credit

$$\Delta_h \log(NPL\ ratio)_{i,t} = \alpha_i + \beta_1 Crisis_{i,t} + \sum_{k \in K} \beta_2^k\, \Delta_3 \mathrm{Credit^k/GDP_{i,t}} + \sum_{k \in K} \beta_3^k\, Crisis_{i,t} \times \Delta_3 \mathrm{Credit^k/GDP_{i,t}} + \varepsilon_{i,t}$$



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Taking stock

Firm debt is important for understanding financial crises because it…

- is highly predictive of the future likelihood of a crisis
- accounts for majority of pre-crisis credit growth and losses during the crisis
- helps predict slow recoveries (especially when secured by real estate collateral).

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- accounts for majority of pre-crisis credit growth and losses during the crisis
- helps predict slow recoveries (especially when secured by real estate collateral).

However, the existing literature has found a weak link between firm debt growth and future GDP

- Mian, Sufi, and Verner (2017) show this result in a cross-country panel

Taking stock

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- Mian, Sufi, and Verner (2017) show this result in a cross-country panel

We turn to panel quantile regressions to reconcile these findings

- We use the methods introduced in Machado and Santos Silva (2019)
- **Key finding:** household debt matters more for average growth, corporate debt for crash risk

Corporate debt, household debt, and GDP crash risk

	Dependent variable: $\Delta_3 y_{i+k}, k = -1, ..., 5$					
	$\Delta_3 y_{it-1}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
Panel A: OLS regression with FE						
Δ_3HH/GDP	-0.003	-0.207*	-0.336**	-0.416**	-0.421**	-0.381**
	(0.079)	(0.081)	(0.083)	(0.090)	(0.099)	(0.102)
Δ_3FIRM/GDP	0.113*	-0.080	-0.077+	-0.048	0.002	0.033
	(0.055)	(0.055)	(0.044)	(0.040)	(0.046)	(0.051)
Observations	3821	3703	3581	3455	3329	3203

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Panel B: Quantile regression (10th percentile)						
Δ_3HH/GDP	0.120	-0.042	-0.128	-0.222**	-0.274**	-0.273**
	(0.094)	(0.078)	(0.078)	(0.082)	(0.083)	(0.086)
Δ_3FIRM/GDP	0.071	-0.191**	-0.171**	-0.117*	-0.034	-0.007
	(0.053)	(0.045)	(0.046)	(0.048)	(0.048)	(0.049)
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Panel C: Quantile regression (5th percentile)						
Δ_3HH/GDP	0.159	0.009	-0.063	-0.156	-0.232*	-0.243*
	(0.115)	(0.096)	(0.096)	(0.102)	(0.101)	(0.104)
Δ_3FIRM/GDP	0.058	-0.226**	-0.200**	-0.140*	-0.045	-0.018
	(0.065)	(0.055)	(0.056)	(0.059)	(0.058)	(0.059)
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Corporate debt, household debt, and GDP crash risk

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Household debt is a drag on growth, but firm debt is important for growth-at-risk

Roadmap

1 Data

2 Corporate Debt and Financial Stability

3 The Role of Heterogeneous Financing Constraints

4 Credit Allocation and Crisis Recovery

5 Imbalances in Credit Growth

6 Conclusion

Conclusion

Firm debt plays a key role in boom-bust cycles

- Explains most of credit growth before financial crises
- Predicts path of post-crisis recovery and defaults
- Inconsistent with view of firm debt as relatively benign for the macroeconomy

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- Dispersion of firm credit predicts crises, suggesting heterogeneous financing constraints
- Firms' reliance on real estate collateral plays a role, distinct from residential mortgages

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Takeaway: Household and firm debt are linked to the real economy through different channels

- Household debt is a drag on growth, consistent with "indebted demand" (Mian, Straub & Sufi, 2021)
- Firm debt matters for GDP crash risk due to its role in default waves and financial crises

Corporate Debt, Boom-Bust Cycles, and Financial Crises

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20 May 2025

Important sectoral heterogeneity in crisis predictability

	Dependent variable: Crisis within...				
	1 year	2 years	3 years	4 years	5 years
Households	0.022+	0.035*	0.047**	0.061**	0.066**
	(0.011)	(0.016)	(0.017)	(0.018)	(0.017)
Agriculture	-0.001	-0.001	-0.005	-0.015	-0.025**
	(0.004)	(0.006)	(0.011)	(0.010)	(0.008)
Manufacturing, Mining	-0.010	-0.018+	-0.014	-0.008	-0.001
	(0.007)	(0.010)	(0.011)	(0.014)	(0.015)
Construction, Real estate	0.015+	0.022*	0.019*	0.013	0.013
	(0.008)	(0.010)	(0.008)	(0.012)	(0.019)
Retail, wholesale trade	0.015**	0.026*	0.034*	0.029+	0.025+
	(0.004)	(0.010)	(0.015)	(0.017)	(0.015)
Transport, communication	-0.001	-0.008*	-0.021**	-0.032**	-0.045**
	(0.004)	(0.004)	(0.007)	(0.012)	(0.013)
Other firm credit	0.001	0.003	-0.002	-0.002	-0.007
	(0.004)	(0.006)	(0.008)	(0.011)	(0.012)
Finance (excl. interbank)	0.021+	0.035**	0.038**	0.036**	0.034*
	(0.011)	(0.012)	(0.011)	(0.011)	(0.013)
Observations	1,217	1,217	1,217	1,217	1,217
# Crises	37	37	37	37	37
AUC	0.78	0.76	0.73	0.72	0.71

Dispersion in firm credit growth

In the data, the dispersion of credit growth increases during credit expansions

$\text{Dispersion}_{\text{i,t}} = \text{SD}(\Delta_3 \text{Credit/GDP}_{\text{i,k,t}})$ for $k \in \{A, B+C, F+L, G+I, H+J, K\}$

$$Dispersion_{i,t+h} = \alpha_i + \beta \Delta_3 Total\ credit/GDP_{i,t} + \varepsilon_{i,t+h}$$

	Dep. var.: Dispersion of credit growth in...				
	1 year	2 years	3 years	4 years	5 years
Total credit growth	0.020**	0.021**	0.022**	0.021**	0.018**
	(0.006)	(0.004)	(0.002)	(0.002)	(0.002)
Observations	1,604	1,599	1,593	1,585	1,574
Within-R^2	0.07	0.07	0.08	0.07	0.05