# Aggregate Implications of Firm Leverage

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# CORPORATE DEBT/GDP: ADVANCED AND EMERGING COUNTRIES



Source: Data from BIS. Figure from Kalemli-Ozcan, Liu, Shim, 2019.

# QUESTIONS

- 1. What causes corporate leverage to increase?
- 2. Can corporate leverage be an important propagator of aggregate boom-bust cycles and affect productivity?
- 3. Does it matter if corporates borrow externally or domestically? in local currency or in foreign currency?

### A key theme: Importance of granular big data for identification

# OUTLINE

- I will start with Europe
- Then discuss the US case
- Finish with EM focusing on the importance of external shocks and foreign currency (FX) debt

<u>Research Agenda:</u> Effects of Corporate Leverage on Boom-Bust Cycles and the Macroeconomy with a Focus on International Linkages

Today's talk is based on:

- 1. Debt Overhang, Rollover Risk, and Corporate Investment: Evidence from the European Crisis (with Luc Laeven, David Moreno)
- 2. Capital Allocation and Productivity in South Europe, *QJE*, 2017 (with Gopinath, Karabarbounis, Villegas-Sanchez)
- 3. Leverage over the Life Cycle, Firm Growth and Aggregate Fluctuations (with Dinlersoz, Hyatt, Penciakova)
- 4. Exchange Rate Fluctuations and Firm Leverage, prepared for *IMF ARC November 2019* (with Liu, Shim)
- 5. U.S. Monetary Policy and International Risk Spillovers, written for Jackson Hole Symposium, August 2019

# Corporate Debt to GDP



# Corporate Investment to GDP



Source: Data from Eurostat and BEA. Figure from Kalemli-Ozcan, Laeven, Moreno (2019).

# UNDERSTANDING INVESTMENT BUST IN EUROPE: APPROACH

- **Big Data:** Match firms to their banks and banks to their sovereigns in 8 European countries that share a common monetary policy (2m+ observations), 2000–2015
- Firm-level datasets that are nationally representative covering SMEs; mimic official size distribution where less than 250 employee firms account for 60 70 percent of economic activity.
- Exploit variation in sovereign risk during the crises that affects banks' balance sheets and hence credit supply to firms who borrowed from these banks during the boom
- Account for existing explanations for low investment in Europe

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- Account for existing explanations for low investment in Europe
  - 1. Low aggregate demand/high future uncertainty (affects all firms)
  - 2. Low bank credit supply (affects all firms)
  - 3. Firm leverage and rollover risk (affects firms differentially as a function of their short-term debt based leverage)

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  - Firms who entered the crisis with high leverage decrease investment more (debt overhang)
  - Firms who borrow from weak banks decrease investment more (lending channel)
    - ...and if these firms have high leverage based on short-term debt they decrease investment even more (roll-over risk)

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**Policy Implication:** Expansionary monetary policy, bank recapitalization and dealing with legacy debt will help but not completely solve the sluggish investment problem until firm de-leveraging process is complete.

## Corporate Leverage and Persistence Sluggish Investment



Why firms accumulated debt and increased leverage during the boom in Europe?

Declining interest rates with the EU integration incentivized firms to finance investment with short-term debt

### Decline in real interest rate in the EU



Source: Data from Eurostat. Figure from Gopinath, Kalemli-Ozcan, Karabarbounis, Villegas-Sanchez (2017).

• lending rate for  $\leq 1$  year loans minus expected inflation

# Firm-level heterogeneity in accessing finance have implications on aggregate productivity when all firms face a lower interest rate

- $\downarrow$  in real interest rate  $\implies \uparrow$  in desired capital (K) for all firms
- firms with high net worth:  $\uparrow K$ , face  $\downarrow$  returns to K
- firms with low net worth: cannot expand K, face  $\uparrow$  returns to K
- dispersion of capital returns  $\uparrow$  within a 4-digit sector and aggregate TFP  $\downarrow$
- importance of size-dependent borrowing constraint

## HETEROGENEITY IN FIRM LEVERAGE

Two types of borrowing constraints for firm i:

$$b_i \leq \theta \times k_i$$

Link to aggregate shocks:

$$b_i <= \theta \times P \times k_i$$

2.

1.

$$b_i <= \theta(k_i) \times k_i$$

b: debt, k: capital, P=1/R: interest rate or P=1/E: exchange rate Which one data supports?

# LEVERAGE AND FIRM SIZE IN EUROPE



Source: Data from ORBIS. Figure from Gopinath, Kalemli-Ozcan, Karabarbounis, Villegas-Sanchez (2017).

Similar picture in the US in terms of the importance of role of firm size in firm leverage..

..but one needs data on small firms to get a meaningful variation in firm size

PROBLEM: LACK OF DATA IN THE US ON SMALL AND YOUNG FIRMS FINANCIAL POSITIONS

- Extensive literature on employment/growth dynamics of U.S. firms
- Far less is known about how these firms finance their growth
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  - 26 percent of domestic employment
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- Non-Compustat firms' financial conditions must have important macroeconomic implications:
  - They account for over half of economic activity
  - Most susceptible to the effects of financial shocks

## WE BUILD: LOCUS Data:

 $\mathbf{L}\mathrm{BD} \ \mathrm{from} \ \mathrm{Census} + \mathbf{O}\mathrm{rbis} \ \mathrm{from} \ \mathrm{Moody's} + \mathbf{C}\mathrm{ompustat} \ \mathrm{from} \ \mathrm{S\&P}, \ \mathbf{US}$ 

# FIRM SIZE DISTRIBUTION IN US: EMPLOYMENT



#### Public firms are 36 times larger employment and 64 times higher revenue than private firms and not represent the aggregate economy

Source: Data from Census, LBD, Compustat and ORBIS. Figure from Dinlersoz, Hyatt, Kalemli-Ozcan, Penciakova (2019).

# FIRM SIZE DISTRIBUTION IN US: OUTPUT



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# LEVERAGE AND FIRM SIZE IN THE US



Short Term Loans/Total Assets (quadratic in log employment)

Source: Data from Census, LBD, Compustat and ORBIS. Figure from Dinlersoz, Hyatt, Kalemli-Ozcan, Penciakova (2019).

# Leverage of US private firms differs drastically from US public firms

SUCH DIFFERENCES HAVE IMPLICATIONS FOR AGGREGATE FLUCTUATIONS

### 1. Leverage

- Strong positive correlation between firm size and leverage for private firms; public firms leverage is independent of size
- Young private firms borrow more and decrease leverage and switch to equity as they get older

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### 3. Firm Growth and Aggregate Boom-Bust Cycles

- Private firms finance growth by borrowing short-term and increasing their leverage
- Private firms entering GR with high leverage grew less (de-leveraging)
- These dynamics can be linked to fluctuations in the aggregate economy: regions and sectors with higher private firm leverage, grow more during the boom and experienced a sharper contraction during the bust.

# IN OPEN ECONOMIES/EMERGING MARKETS...

Corporate Leverage will be driven by:

- Low borrowing costs
- But also by external shocks and capital flows ⇒ affect borrowing costs and exchange rates that affect net worth
- Important role for domestic banks who intermediate capital flows
- Important role for foreign currency debt
- Emerging market corporates borrow:
  - in local and in foreign currency
  - externally and domestically
  - in bonds and loans

CORPORATE DEBT/GDP: DOMESTIC AND EXTERNAL DEBT—Advanced and Emerging Countries



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# CAPITAL FLOWS AND CORPORATE LEVERAGE

### 1. Exchange rate/balance sheet channel:

Capital flows  $\downarrow (\uparrow) \Rightarrow$  exchange rate depreciates (appreciates)  $\Rightarrow$  Firms with FX debt face negative (positive) networth shock, cannot borrow (borrow more)

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- 2. Interest rate/funding cost channel:

Capital flows  $\downarrow (\uparrow) \Rightarrow$  funding/borrowing costs  $\uparrow (\downarrow)$ 

- Does not require balance sheet mismatch
- <u>All banks</u> can cut (increase) lending and <u>all firms</u> can decrease (increase) borrowing

Need to investigate what happens to price of borrowing and quantity of borrowing for a complete picture!

# WHICH SECTOR CAPITAL FLOW INTO? (EM)

60 percent of external liabilities is debt; 70% Loans, 30% Bonds

Both Corporates and Banks Borrow Externally in a Typical EM in Loans; Sovereign borrow in Bonds



Source: Data from BIS, IMF. Figure from Avdjiev, Hardy, Kalemli-Ozcan, Serven (2018).

# Domestic Bank Credit/Corporate Debt

FIRMS MOSTLY BORROW FROM THEIR DOMESTIC BANKS IN EM



Average Share of Credit from Domestic Banks, 2006-2013

## FUNDING COST CHANNEL—EVIDENCE FROM TURKEY, 2000–2012 Lower US interest rates/lower VIX pushes capital flows into EM and lower borrowing costs



# A big data approach: 50m+ loans over a decade, universe of transactions between firms and banks

Source: Data from CBRT. Figure from di Giovanni, Kalemli-Ozcan, Ulu, Baskaya (2019)

## Funding cost channel—Evidence from Turkey, 2000-2012

DURING A BOOM, BOTH LOCAL CURRENCY AND FX CREDIT WILL INCREASE, LEAVING CORPORATES VULNERABLE TO BOTH EXCHANGE RATE SHOCKS AND FUNDING SHOCKS



Source: Data from CBRT. Figure from di Giovanni, Kalemli-Ozcan, Ulu, Baskaya (2019)

# EXCHANGE RATE/BALANCE SHEET CHANNEL

- Large literature that works with **depreciations** focusing on Latin American countries
- This literature shows that, firms with with FX debt and related currency mismatch on balance sheets, suffer in terms of investment and employment during large depreciations
- We use representative firm level data on private and public firms from 10 Asian emerging markets during 2000–2015 and show that **appreciations** over 10% leads to risk-taking by firms:
  - Firms increase leverage if they operate in countries whose corporate sectors have a large share of their total debt in FX, when exchange rate appreciates.
  - However, the effect of similar magnitude depreciations are still larger.

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- 7. To be able to identify these patterns, one needs to use firm-level data that is nationally representative and can deliver firm heterogeneity in financial constraints

## APPENDIX

EUROPE

# COVERAGE RELATIVE TO EUROSTAT (WAGE BILL)

	Spain	Italy	Portugal	Germany	France	Norway
1999	0.69	0.59				
2000 2001	$0.71 \\ 0.73$	$0.63 \\ 0.62$			$0.70 \\ 0.72$	
2002	0.75 0.74	0.69			0.75 0.73	
2003 2004	0.75	0.00 0.71			0.71	0.66
$2005 \\ 2006$	$0.74 \\ 0.74$	$0.72 \\ 0.73$	0.91	0.34	$0.71 \\ 0.72$	$0.67 \\ 0.71$
2007	0.74	0.73	0.94	0.34	0.73 N/A	0.73
2008 2009	0.72 0.72	$0.84 \\ 0.81$	0.96	0.28	0.71	$0.05 \\ 0.85$
$2010 \\ 2011$	$0.73 \\ 0.74$	$0.83 \\ 0.86$	$0.96 \\ 0.97$	$0.30 \\ 0.78$	$0.73 \\ 0.75$	$0.82 \\ 0.82$
2012	0.75	0.86	0.96	0.75	0.74	0.87
$2013 \\ 2014$	$0.74 \\ 0.76$	0.85 0.87	$0.97 \\ 0.97$	$0.76 \\ 0.75$	$0.74 \\ 0.76$	$0.88 \\ 0.88$
2015	0.76	0.88	0.98	0.79	0.77	0.89

# Share of Total Wage Bill by Size Class

	Spain	Italy	Portugal	Germany	France	Norway
ORBIS-AMADEUS						
1-19 employees	0.19	0.11	0.18	0.01	0.08	0.14
20-249 employees	0.47	0.53	0.50	0.33	0.30	0.43
250+ employees	0.34	0.36	0.32	0.67	0.61	0.43
Eurostat (SBS)						
1-19 employees	0.20	0.22	0.21	0.07	0.14	0.15
20-249 employees	0.43	0.44	0.49	0.26	0.31	0.41
250+ employees	0.37	0.34	0.30	0.67	0.55	0.44

 $\mathbf{US}$ 

## LEVERAGE AND FIRM AGE IN THE US



Source: Data from Census, LBD, Compustat and ORBIS. Figure from Dinlersoz, Hyatt, Kalemli-Ozcan, Penciakova (2019).

# Addressing Selection: Age



• Decrease in the observable differences between reporting and non-reporting privately-held firms.

# Addressing Selection: Employment



• Decrease in the observable differences between reporting and non-reporting privately-held firms. additional

# AVAILABLE BUSINESS FINANCE DATA FOR PRIVATE FIRMS

- 1. **Capital IQ**: Mostly public firms. Very few large private firms after late 1990s with assets over 10 million and more than 500 shareholders (around 7000)
- 2. VentureX: 10,000 VC-financed firms. 80% of the firms are younger than 3 with employment less than 20. Panel over time since 1980s.
- 3. Survey of Small Business Finances: Select sample of 3,000-4,000 firms with less than 500 employees for 4 waves of cross section: 1987, 1993, 1998 and 2003
- 4. Kauffmann Firm Survey: 5,000 firms born in 2004, follow until 2011. Mean employment around 5.
- 5. Quarterly Financial Report, QFR: Survey of 5,000 large corporations and 5,000 selected SME manufacturing corporations.
- 6. **Sageworks**: Audited firms; sample is of similar to Orbis (around 200,000 firms). Firms are anonymized.

# TOTAL ASSETS AND LIABILITIES: FLOW OF FUNDS VS. Y-14



# PRIVATE VS PUBLIC FIRMS ASSETS AND LIABILITIES: Y-14



 $\mathbf{E}\mathbf{M}$ 

# FOREIGN CURRENCY DEBT/NON-FINANCIAL SECTOR DEBT

Foreign Currency Debt can be Borrowed both Domestically and Externally



Source: Data from BIS. Figure from Kalemli-Ozcan, Liu, Shim, (2019).

# CAPITAL FLOWS BY SECTOR



FIGURE: Debt, EM

FIGURE: OID, EM

FIGURE: PD, EM