Firm-borne Financial Contagion: When Rollover Risk Ripples

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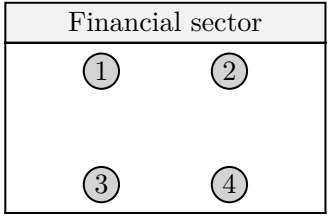
University of Vienna | January 25, 2024

Financial networks



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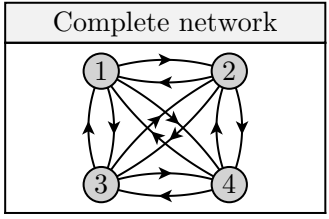

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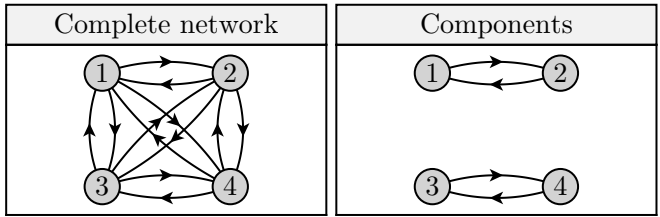
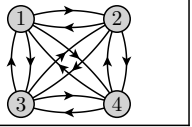
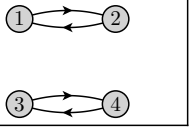


Optimal financial networks

Acemoglu et al. (2015)

Complete network	Network with weakly connected components
	

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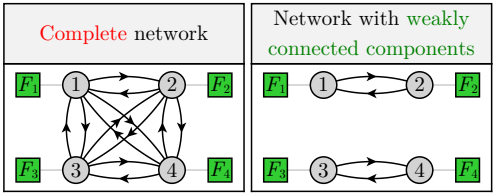

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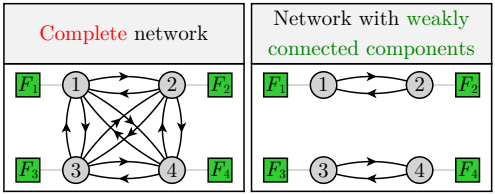

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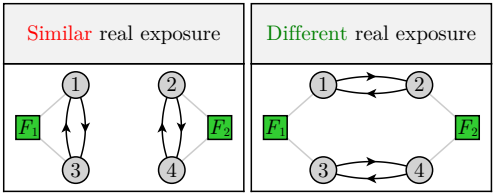

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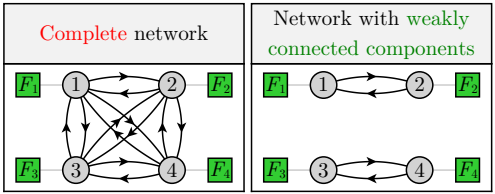

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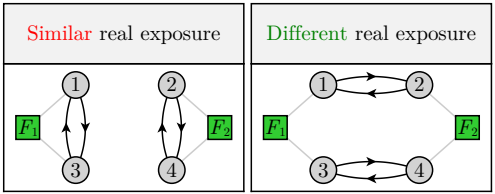
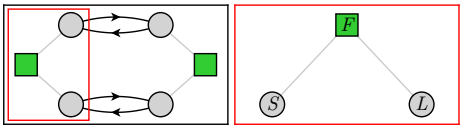


This paper



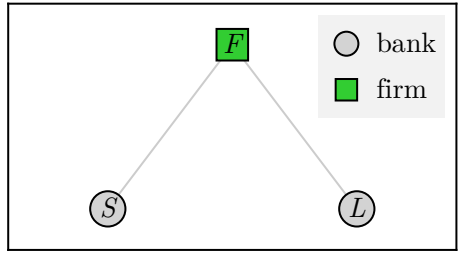
In a nutshell

Research question

Can financial shocks propagate through a common borrower?

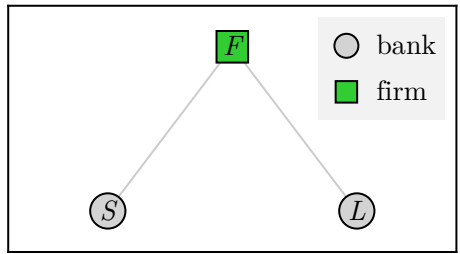
Model (adapted from Acemoglu et al., 2015)

- Firm F needs long-term *and* short-term funding
- provided by multiple banks (Brunnermeier and Oehmke (2013), Kolm et al. (2018))



Mechanism

1. Bank S refuses to rollover short-term debt
2. Firm F suspends long-term debt service (to avoid bankruptcy)
3. Bank L suffers from this suspension



Literature

Relation to the Literature

- Financial contagion & Optimal financial networks e.g. Acemoglu, Ozdaglar, and Tahbaz-Salehi (2015), Elliott, Georg, and Hazell (2021), Donaldson, Piacentino, and Yu (2022)
  - ⇝ new propagation mechanism
- Rollover risk
  e.g. Acharya, Gale, and Yorulmazer (2011), He and Xiong (2012), Eisenbach (2017),
  - ⇝ implications for financial stability
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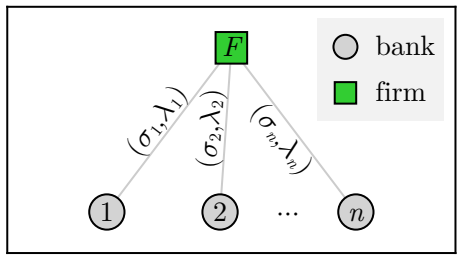
Model

Overview

- n banks, one firm F
- banks provide share of
  - short-term funding σ_i
  - long-term funding λ_i

$\left(\sum_i \sigma_i = \sum_i \lambda_i = 1\right)$



Equilbrium concept

Payment equilibrium (Eisenberg and Noe, 2001; Acemoglu et al., 2015)

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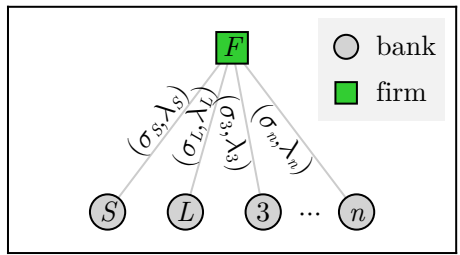


Equilbrium concept

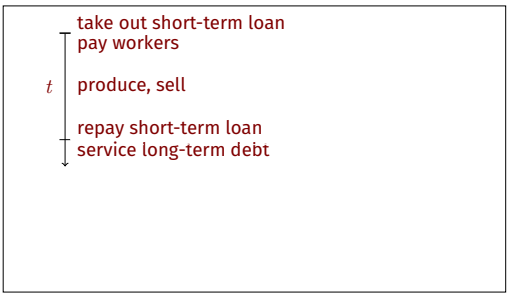
Payment equilibrium (Eisenberg and Noe, 2001; Acemoglu et al., 2015)

Firm I: Assumptions

- Cobb-Douglas production technology $F(K, L) = K^{\alpha} L^{1-\alpha}$ (capital and labor)
- price taker and CRS $\implies$ zero profit $\implies$ no equity
- wages paid before production (short-term loan)
- capital financed using long-term loan

Firm II: Timing

From a dynamic setting ...



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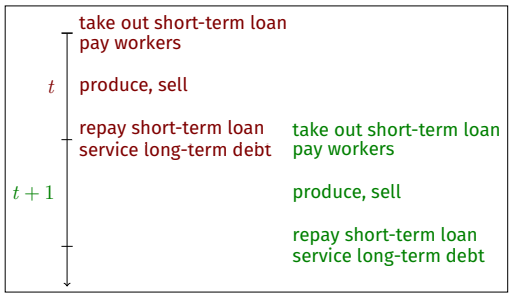

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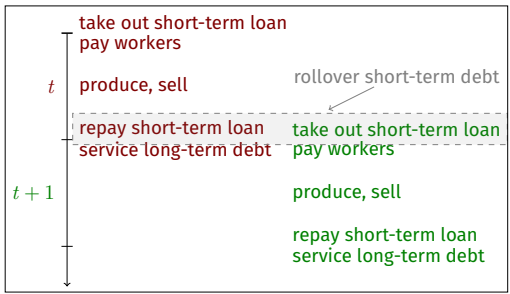

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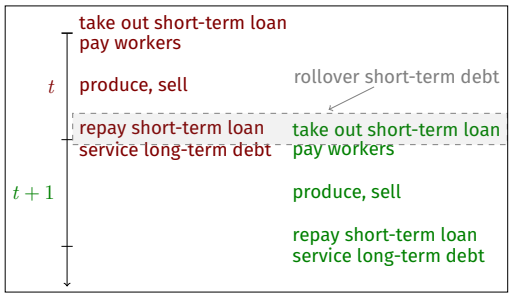

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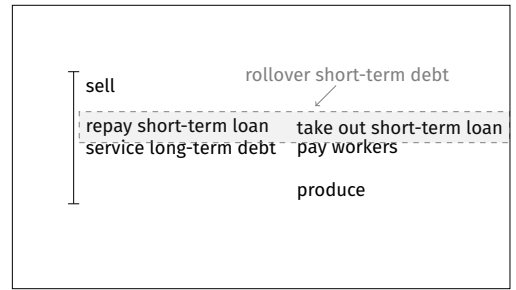
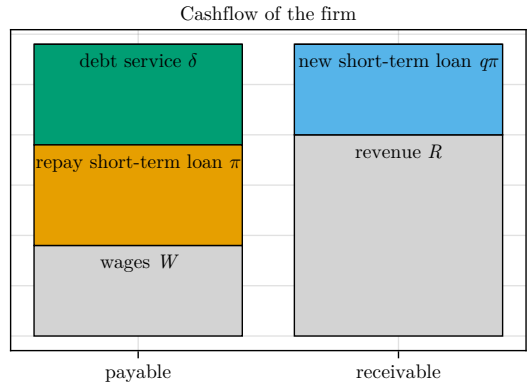


Firm III: Cashflow

- long-term debt service $\delta = \alpha R$
- wages $W = (1 - \alpha)R$
- short-term debt
  - take out $q\pi = W$
  - repay $\pi = \frac{W}{q} = \frac{1-\alpha}{q}R$
- reliance on short-term debt $1 - \alpha$



Banks I

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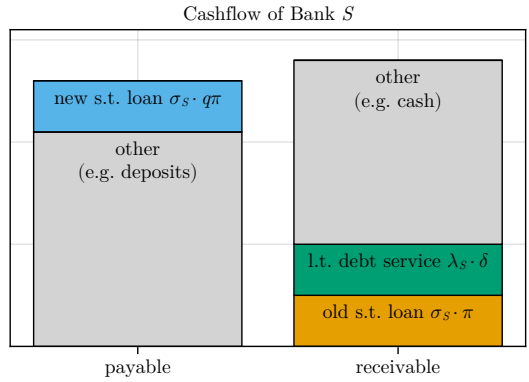
  - new: short-term loans
  - hidden: interbank (part of other)
  - missing: liquidation
- promised cashflows taken as given (previous actions)



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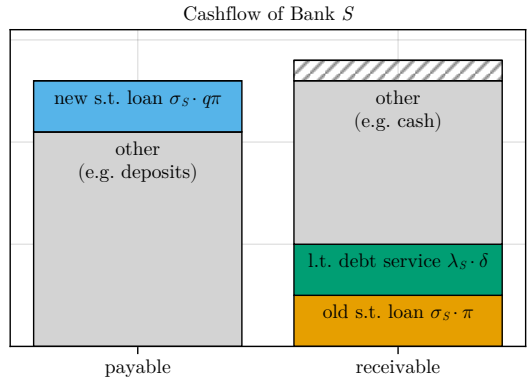

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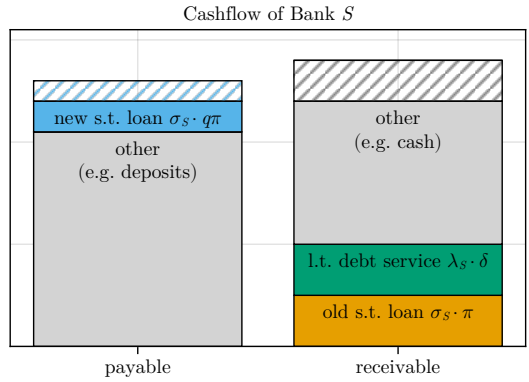

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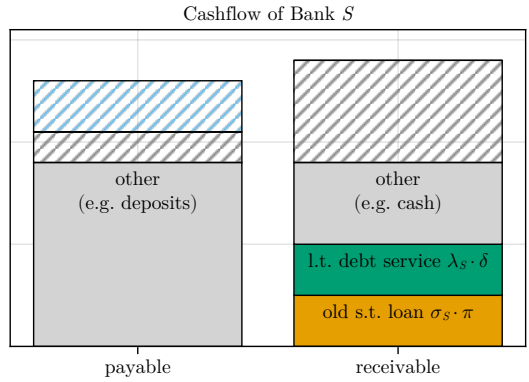
- if shocks happen promises might be broken
  - first: refuse to rollover short-term debt
  - then: default on other promised payments



Mechanism: Rollover Risk Ripples

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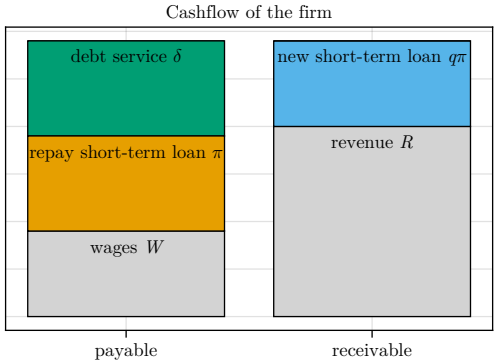

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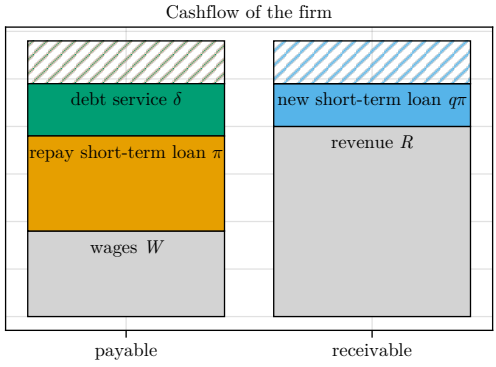

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  $\Longrightarrow$ suspend debt service.

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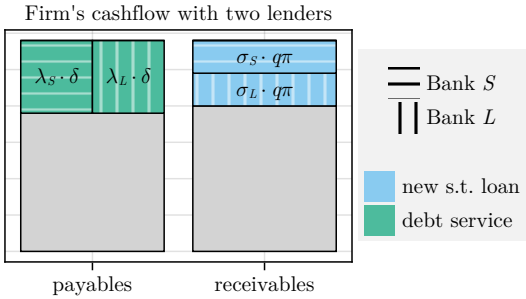

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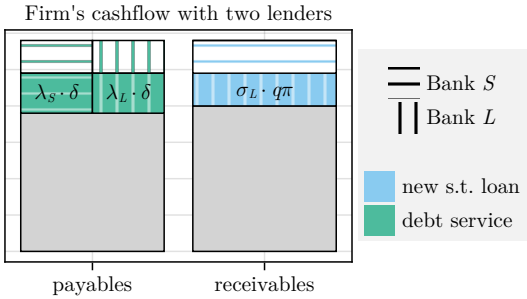

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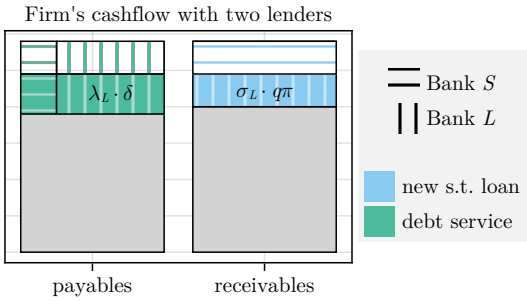

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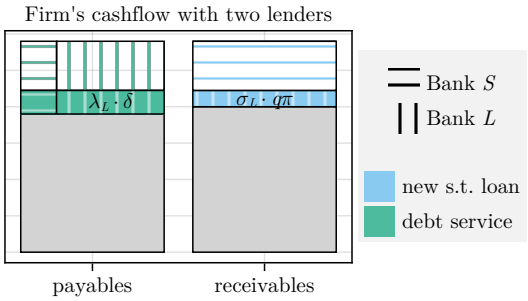

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- S provides more of short-term debt $\implies$ stronger effect

Results

Suspension of debt service payments to Bank L

- assume Bank S withdraws all short-term debt
- Firm loses $\sigma_S \cdot q\pi$

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$$\Delta\delta_L = \lambda_L \Delta\delta$$

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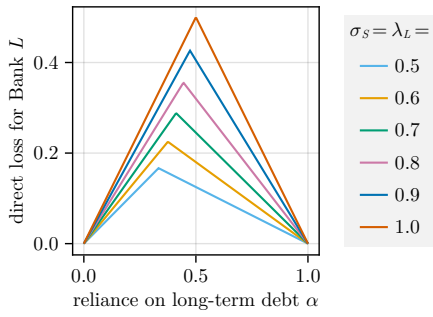

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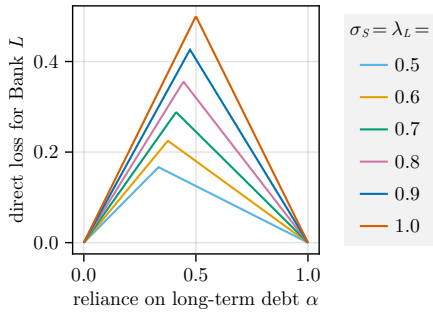

Proposition

The suspension of debt service payments to Bank L is maximal at $\lambda_L = \sigma_S = 1$ and $\alpha = \frac{\sigma_S q}{1+\sigma_S q}$.

Bounding the total effect on Bank L

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- total effect :

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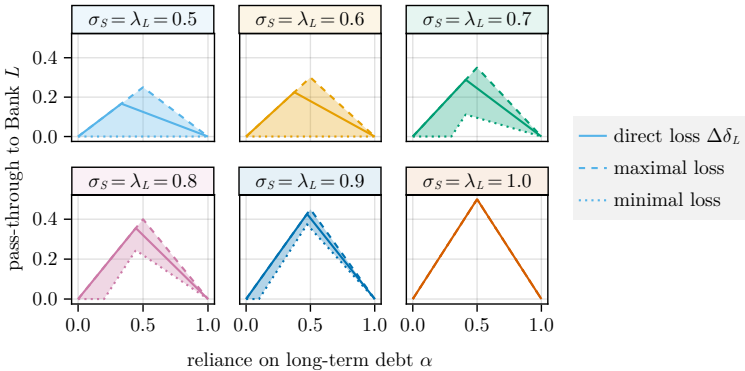


Take-away

Firm-borne financial contagion can be significant if ...

- ... the firm relies on both long-term and short-term debt ($0 \ll \alpha \ll 1$)
- ... there is one major provider of short-term debt (Bank S had high σ_S)
- ... there is one major provider of long-term debt (Bank L has high λ_L)

Outlook

Next steps

- additional channel: liquidation of long-term debt Acemoglu et al. (as in 2015)
- dealing with firm default
- make firm size matter (need multiple borrowers per firm)
- assess relevance of the mechanism in the data
  - maturity structure of firms loans (α)
  - different maturities by different lenders? (σ_S vs λ_L)

Summary

Summary

Can financial shocks propagate through a common borrower?

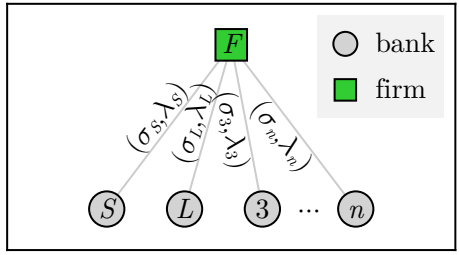
Model (adapted from Acemoglu et al., 2015)

- Firm F needs long-term *and* short-term funding
- provided by multiple banks

Mechanism: Rollover Risk Ripples

Significant transmission if

- S is important short-term lender
- L is important long-term lender



Literature i

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Back-up slides

Back-up 1

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Back-up 2

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