# Mechanisms for Contagion in the Financial System

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# Financial Contagion

what is financial contagion?

- spillover between financial sector and real economy
  - cross-country channel
    - cross-country contagion
  - time-series channel
  - emergence of fintech
- contagion in the interbank market

# Outline

# Ingredient I. Firms: Real Economy

- borrow on the financial market and invest
- two-dimensional type
  - **creditworthiness:** good or bad collateral $\rightarrow$ pay back or not
  - **opacity:** which investors can recognize them?
- production technology
  - linear technology
  - collateralize investment to borrow on the financial market

# Ingredient II. Investors: Financial Market

- integrated (global) financial market with incomplete information
- two characteristics
  - **expertise**: which opaque firms can they recognize?
  - **prudence:** bold or cautious
    - bold: don't miss out on any creditworthy firm
    - cautious: make sure never to lend to a non-creditworthy firm

| **Bold** | good | bad |
|---|---|---|
| transparent | ✔ | ✗ |
| opaque | ✔ | ✔ |

| **Cautious** | good | bad |
|---|---|---|
| transparent | ✔ | ✗ |
| opaque | ✗ | ✗ |

- have to at least break even

# Credit Market

**bold investors**

- pooling equilibrium
- a single, low interest rate
- many firms, including some bad, opaque ones raise financing

**cautious investors**

- separating equilibrium
- good firms face different interest rates: positive credit spread
- no bad firms raise financing
- some good firms, in most opaque countries, might be rationed

# Modeling Differences

| | **cross-country** | **time-series** |
|---|---|---|
| **use of financing** | hedge liquidity shock | increase scale |
| **firm opaqueness** | continuous | 2 points |
| **investor expertise** | continuous | 2 points |
| **investor prudence** | exogenous | endogenous |

# Outline

Framework

Financial & Real Sector: Cross-Country Channel

Financial & Real Sector: Time-Series Channel

Emergence of Fintech

Contagion in the Interbank Network

# Heterogeneous Exposure to Credit Cycles

- before 2008: boom-bust cycles in emerging economies
  - structural weaknesses
- since 2008: Eurozone Crisis 2010-2012
  - certain advanced economies are also exposed
  - others experience inflows in bad times
- why are countries differentially exposed to credit cycles? When does the exposure change?
- core vs periphery, advanced vs emerging economies
- *frictions in supply of global capital*

# Main Mechanism

- global financial market for firms across different countries
- global **financial** recession when lenders turn from bold to cautious
- firms' optimal **real investment** response differ across countries
  - in opaque countries firms choose risky strategies
  
  $\rightarrow$ high exposure to the financial cycle

**countries partition to low and high exposure group:**

**continuum of core and periphery countries**

# Timing

- $t = 0$: *initial investment*
  - firm with a unit endowment, invests $I(\tau, \omega)$
  - saves the rest
- $t = 1$: *shocks and external financing*
  - aggregate shock: *investor prudence*
  - idiosyncratic liquidity shock: a fraction of firms
    - to maintain $i \leq I$, have to inject $i$, used as collateral to borrow
- $t = 2$: *production*
  - $\rho$ output per unit of maintained investment

# TIMING

- $t = 0$: *initial investment*
  - firm with a unit endowment, invests $I(\tau, \omega)$
  - saves the rest

$$I(\tau,\omega) + \mathbb{E}_\theta \Big[ \underbrace{\text{down-payment}}_{\text{increasing in interest rate and obtained credit}} \Big] = 1$$

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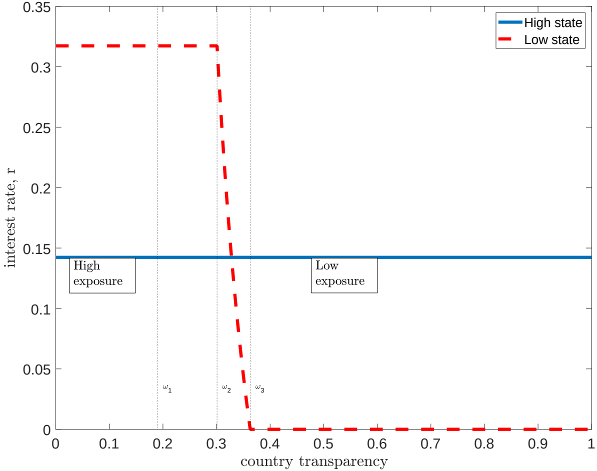
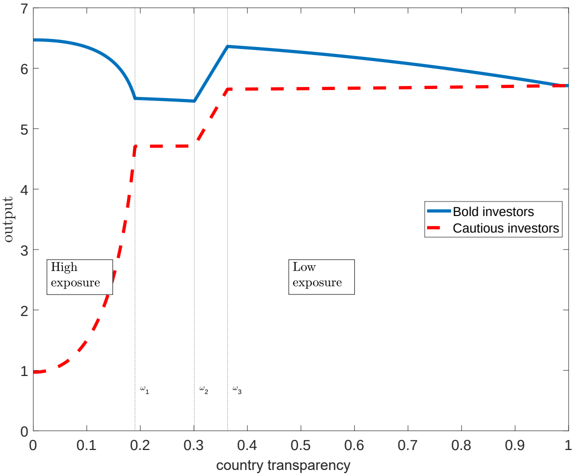
# Cross-Country Equilibrium: Credit Market



# Cross-Country Equilibrium: Output



# Financial $\leftrightarrow$ Real Spillover: Common Global Lenders

**boom-bust spillover**

- interest rate schedules affect common ex-ante investment
- high investment
  1. **safe:** low rates for liquidity (good firms) $\Rightarrow$ attenuated cycle, core
  2. **risky:** rationed, no liq. (bad firms) $\Rightarrow$ amplified cycle, periphery

**cross-country spillover**

- lenders dramatically change their target countries across booms and busts
  1. inflow to periphery in the boom
  2. outflow from the periphery into the core, in the bust
- credit rationing and dampening of the output in periphery

# Cross-Country Contagion I.
# Credit Demand $\uparrow$: More Distressed Firms

higher global aggregate liquidity demand:

- each firm: smaller scale, more precautionary saving
- suppressed boom and more pronounced bust in virtually all countries
- **credit crunch disproportionately severe in most peripheral countries**
- **some countries pushed out of the core**

## Cross-Country Contagion II.
## Excess Savings: Global Saving Glut

increase in the supply of capital by low-skilled global investors:

- supply of capital $\uparrow \Rightarrow$ boom (common) interest rate $\downarrow$
- investment $\uparrow$ across all countries $\Rightarrow$ larger global boom
  - bad firm access to credit $\uparrow$ in periphery:
    more pronounced boom fueled by bad investment
- *boom-bust spillover:*
  larger collapse, volume of non-performing debt $\uparrow$ in periphery
- *cross-country contagion:*
  **the core shrinks and the periphery expands**

# Outline

# Economic Cycles

- economies are subject to cycles!
  - *good times:*

    abundant credit to all firms, small spread, high output growth

    *overheated market, deterioration of loan quality*
  - *bad times:*

    bad firms squeezed, expensive credit, low/negative growth

    *credit crunch, loan quality improvement*

# Main Mechanism

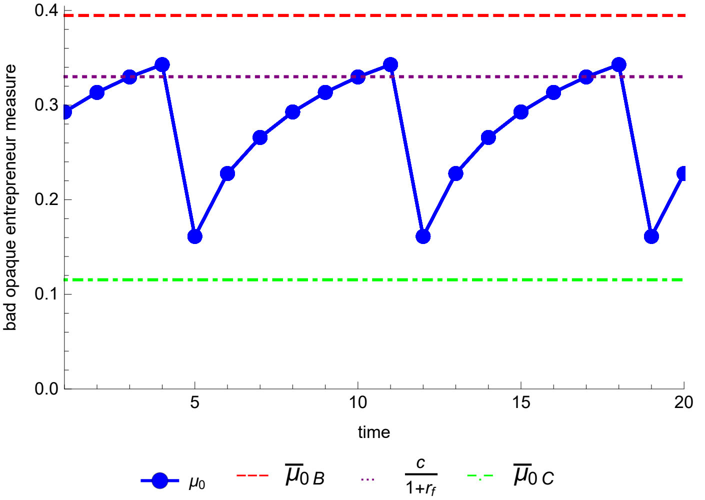
- rational prudence $\sim$ choice of lending standards
- two-way interaction between prudence and real outcomes

$$
\begin{tikzcd}
\text{lax standards} \arrow[r] & \text{credit market and real boom} \arrow[d] \\
\text{improving fundamentals} \arrow[u] & \text{deteriorating fundamentals} \arrow[d] \\
\text{credit and real downturn} \arrow[u] & \text{tight standards} \arrow[l]
\end{tikzcd}
$$

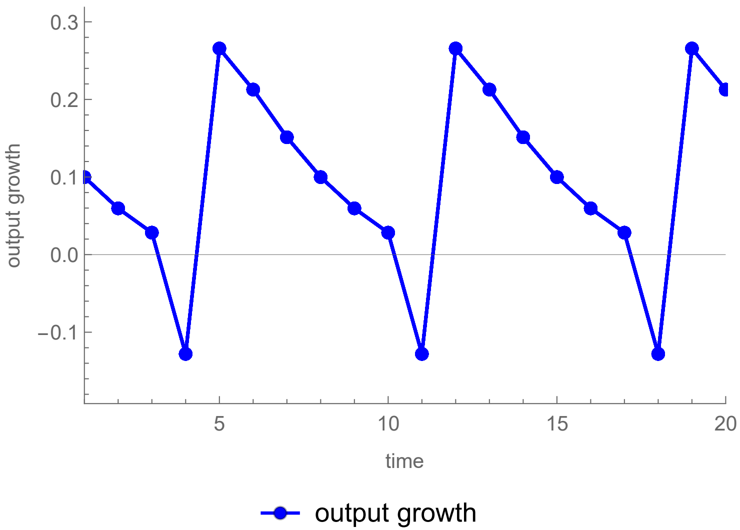
$\Rightarrow$ **endogenous cycles**

# Cycling Type Distribution.

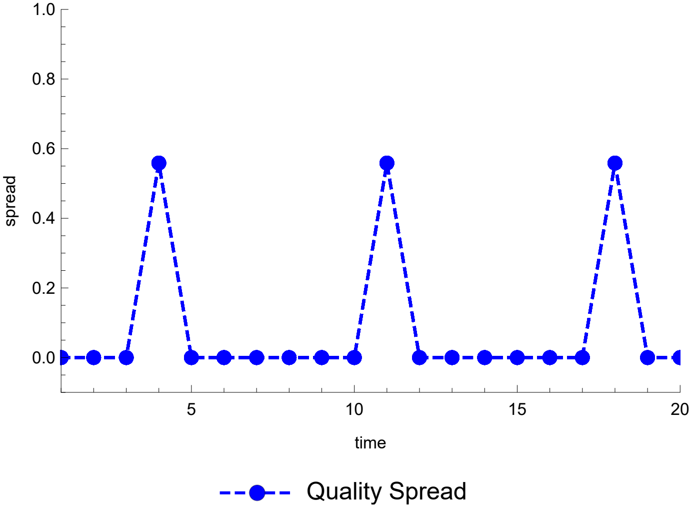
## Measure of bad opaque entrepreneurs



# Cycling Output Growth



# Cycling Credit Spread



# Financial $\leftrightarrow$ Real Spillover

- each investor does not internalize her effect on evolution of state
- static externality: tight standards leads to credit crunch and recession today
- **dynamic externality:** tight standards cleanse the economy from bad firms leading to healthier booms in the future
- constraint optimal outcome: often **cyclical**
- equilibrium **not** constraint efficient

# Outline

- Framework
- Financial & Real Sector: Cross-Country Channel
- Financial & Real Sector: Time-Series Channel
- Emergence of Fintech
- Contagion in the Interbank Network

# FINTECH

- **mortgage lenders** (Fuster, Plosser, Schnabl & Vickery, RFS 2019)
  - market share of U.S. mortgage $\uparrow$: 2010-2016: 2% $\rightarrow$ 8%
  - adjust supply more elastically in response to exogenous mortgage demand shocks
  - **positive spillover?**
- **P2P lenders vs banks** (Tang, RFS 2019)
  - substitute in terms of serving infra-marginal bank borrowers
  - complements with respect to small loans
  - credit expansion resulting from P2P lending likely **only** among borrowers who already have access to bank credit
  - **no spillover?**

# Fintech

- **marketplace lending** (Vallee & Zeng, RFS 2019)
  - screening and information production by investors
  - sophisticated investors systematically outperform
  - outperformance shrinks when the platform reduces information provision to investors
  - **more unequal/cyclical outcomes?**
- **financial inclusion** (Philippon, 2019)
  - robo-advising improves access to financial services (fixed cost $\downarrow$)
  - big data reduces unwarranted human biases against minorities
  - but also decreases the effectiveness of existing regulations
  - welfare benefits across the board if policies adjusted
  - **less unequal/cyclical outcome?**

# Outline

# Interbank Network

1. **sources** of contagion
   - *downside extenality:* each bank $i$ does not internalize the failure cost of $i$'s counterparties if $i$ fails
   - *upside externality:* rent-seeking behavior and positive intermediation spreads
2. different **types** of contagion
   - *lender to borrower:* lender unable to provide liquidity
   - *borrower to lender:* borrower does not pay back
3. **structure of the network** and systemic risk/contagion
4. role of **CCPs**