

# Mandatory Disclosure and Financial Contagion

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# Big Picture Intro: Market Freezes and Bad Apples

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- Gorton (2008) argued key part was uncertainty about who bore losses:

*“...It was not possible to know where the risk resided and **without this information market participants rationally worried about** the solvency of their trading **counter parties**.*”

*This led to a **general freeze** of intra-bank markets ...”*

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- Bernanke (2013) on stress tests:

*“In retrospect, the **SCAP [stress test] stands out** for me as one of the critical turning points in the financial crisis.*

*It **provided** anxious investors with something they craved: **credible information about prospective losses at banks.***

*Supervisors’ **public disclosure of the stress test results helped restore confidence** in the banking system and enabled its successful recapitalization. ”*

# Key Questions

- Can uncertainty about who bears losses lead to market freezes and require intervention?
  - Why don't banks privately hire auditors to run stress tests?
- Our analysis focuses on the role of financial *contagion*
  - Contagion  $\equiv$  shock to some banks lead to losses at others not hit by shock
- Key findings:
  - Mandatory disclosure can be welfare improving for large contagion
  - Mandatory disclosure cannot raise welfare for small contagion

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  - **Intuition:** contagion  $\Rightarrow$  informational spillovers  $\Rightarrow$  too little disclosure
  - Some features (e.g. leverage) imply contagion and need for intervention

# Overview of Full Model

- $n$  banks, indexed  $j \in \{0, \dots, n - 1\}$  arranged in a network
- Bank  $i$  has obligations  $\Lambda_{ij} \geq 0$  to banks  $j \neq i$
- $b < n$  banks are “bad”, i.e. they each suffer a loss  $\phi > 0$
- “Good” banks that don’t directly suffer losses  $\phi$  may still be defaulted on



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- All banks, including bad banks, can profitably invest new funds ...
  - ... BUT agency problem implies only banks w/enough equity will invest
- Banks know only if they are bad, not which other banks are bad
- Banks can disclose at cost  $c \geq 0$  if they have suffered loss  $\phi$  or not

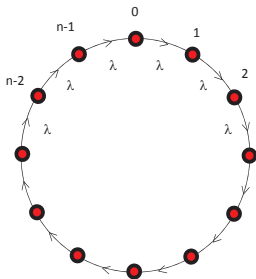
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- All banks endowed with  $\pi$  worth of assets (before raising new funds)
- Bad banks hit with loss  $\phi$  where  $\pi < \phi < \frac{n}{b}\pi$  (more senior obligation)
- State of network  $\mathbf{S} = (S_0, \dots, S_{n-1})$  where  $S_j = 1$  if bank is bad, 0 else
- Every one of  $\binom{n}{b}$  realizations  $\mathbf{S}$  has exactly  $b$  bad banks (w/ equal prob.)
- Network defined by  $\Lambda_{ij}$  of obligations of  $i$  to  $j$

# Special Case: Circular Network and One Bad Bank

Suppose (i)  $b = 1$ ; (ii)  $\frac{\lambda}{\pi}$  and  $\frac{\phi}{\pi}$  integers; ; (iii)  $\Lambda_{ij} = \lambda$  if  $j = i + 1$  and  $0$  else:



- Given bad bank fails, next  $k = \min\{\frac{\lambda}{\pi}, \frac{\phi - \pi}{\pi}\}$  banks have zero equity
- Let  $p_g \equiv \Pr(e_j = \pi \mid S_j = 0)$  prob good bank retains assets  $(= 1 - \frac{k}{n-1})$
- $p_g \rightarrow 1$  implies low contagion,  $p_g \rightarrow 0$  implies high contagion

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- Banks have investment opportunity of size 1 that yields  $R$
- Large pool of outside investors with opportunity cost  $\underline{r} < R$
- Only debt contracts allowed between banks and outside investors
- Banks can divert funds to obtain private gains  $v$
- Assume  $R - \underline{r} < v < R - \max\{\underline{r} - \pi, 0\}$ 
  - Temptation large enough that a bank with zero equity diverts
  - Temptation small enough that a bank with equity  $\pi > 0$  invests
- Maximum rate outsiders can charge is  $\bar{r} = \pi + R - v$

# Full Model: Adding Disclosure & Full Timeline

- After banks learn own  $S_j$ , *simultaneously* choose whether to disclose it
- Cost of disclosure  $c \geq 0$  (trade secrets, stress test costly)
- After disclosures by *all* banks, outside investors offer debt contracts  $\{r_j^*\}$
- Banks learn  $S$ , investment/diversion undertaken, payoffs realized



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- Banks learn  $S$ , investment/diversion undertaken, payoffs realized
- **Main questions:**
  - 1 Is no disclosure an equilibrium? Will it involve investment?
  - 2 Can mandatory disclosure improve welfare if no disclosure?

# Existence of Non-Disclosure Equilibrium

Suppose we expect no bank to disclose  $S_j$ . Should a good bank disclose?

- If no investment in eqbm, only reason to disclose is to attract investment
- Disclosure raises outsiders beliefs about bank from  $p_0$  to  $p_g$
- If  $\bar{r} p_g < \underline{r}$ , no trade possible; no disclosure an eqbm for any  $c \geq 0$

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- If  $\bar{r} p_g > \underline{r}$ , there is scope for trade
  - Non-disclosure with no investment eqbm if  $c \geq p_g R + (1 - p_g)v - \underline{r}$   
 Non-disclosure can only be an eqbm if disclosure is sufficiently costly

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- **Non-disclosure eqbm exist but dominated by mandatory disclosure**
  - Always possible for  $p_g$  close to zero if  $c$  small
  - Never possible for  $p_g$  close to one.

# Intuition for Results

- When  $p_g$  close to 1, no informational spillovers
  - Agents fully internalize benefits of disclosure
  - If disclosure optimal, agents will undertake it
  - True regardless of whether there is investment at  $p_g \rightarrow 1$
  
- When  $p_g$  close to 0, no disclosure  $\Rightarrow$  no investment
  - Disclosure raises beliefs from  $Pr(e_j = \pi)$  to  $Pr(e_j = \pi | S_j = 1) = p_g$
  - Unilateral disclosure not enough to induce investment
  - Coordination failure - no reason to reveal when other banks don't

▶ Intermediate cases

# Relating the Model to the 2007-8 Crisis

- Consider increase in  $\phi$
- Effect on  $p_g$  depends on  $\lambda$  [▶ figure](#)
  - If  $\lambda$  small (low leverage), no effect on  $p_g$
  - If  $\lambda$  large (high leverage),  $p_g$  falls
- Economy can move from eqbm w/investment to one w/no investment
- Mandatory disclosure may be welfare improving in this case
- Model highlights role of leverage within network to create contagion
- Disclosure may become desirable before markets freeze