Why did collapse of US house prices result in a financial crisis?
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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 ..."
Policy makers push same view in pushing disclosure of stress tests
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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
  - **Intuition:** contagion $\Rightarrow$ informational spillovers $\Rightarrow$ too little disclosure
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- Key findings:
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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 $j \in \{0, ..., n-1\}$ 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
Network WITHOUT Disclosure or Investment
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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 $S = (S_0, \ldots, S_{n-1})$ where $S_j = 1$ if bank is bad, 0 else
- Every one of $\binom{n}{b}$ realizations $S$ has exactly $b$ bad banks (w/ equal prob.)
- Network defined by $\Lambda_{ij}$ of obligations of $i$ to $j$
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 \( p_g \equiv \Pr(e_j = \pi | S_j = 0) \) prob good bank retains assets \( \left( = 1 - \frac{k}{n-1} \right) \)
- \( p_g \to 1 \) implies low contagion, \( p_g \to 0 \) implies high contagion
We now allow banks to raise additional funds they can invest
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- Banks have investment opportunity of size 1 that yields $R$
- Large pool of outside investors with opportunity cost $r < R$
- Only debt contracts allowed between banks and outside investors
- Banks can divert funds to obtain private gains $v$

Assume $R - r < v < R - \max\{r - \pi, 0\}$

- 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 $\bar{r} = \pi + R - v$
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
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.

**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 from bank from $p_0$ to $p_g$.
- If $\bar{r} p_g < r$, no trade possible; no disclosure an eqbm for any $c \geq 0$. 
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- If $\bar{r}p_g < r$, no trade possible; no disclosure an eqbm for any $c \geq 0$
- If $\bar{r}p_g > r$, there is scope for trade
  - Non-disclosure with no investment eqbm if $c \geq p_g R + (1 - p_g)\nu - r$
  - Non-disclosure can only be an eqbm if disclosure is sufficiently costly
• If force all banks to pay $c$ and disclose, full revelation

• Disclosure can unfreeze markets or prevent socially wasteful diversion
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Disclosure can unfreeze markets or prevent socially wasteful diversion

Consider no investment eqbm; Pareto gain if $nc \leq (R - r)(n - b)pg$

Disclosure desirable when $c$ is low, but non-disclosure eqbm for high $c$
If force all banks to pay $c$ and disclose, full revelation

Disclosure can unfreeze markets or prevent socially wasteful diversion

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Disclosure desirable when $c$ is low, but non-disclosure eqbm for high $c$

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 $p_g \to 1$

- 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
Consider increase in $\phi$

Effect on $p_g$ depends on $\lambda$

- 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