# Bailouts and Financial Fragility
# Todd Keister (Restud 2015)

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- During a crisis, a fiscal transfer that covers banks' losses distorts *ex ante* incentives (moral hazard)
- But prohibiting bail out can make the economy more susceptible to runs
- **Research question**: Is restricting policy makers' ability to bail out banks an effective way of promoting financial stability? What is an optimal regulatory policy ?

- Model of financial intermediation based on Diamond and Dybvig (1983) with limited commitment and a public good

- Results: no-bailout may increase liquidity but can be welfare deteriorating, or increase financial fragility
- Tax on short-term liabilities but no bailout restrictions correct incentives and generates financial stability
- Comparison with the literature
  - Chari and Kehoe (2015): threat of costly bankruptcy encourage managers to exert efforts, bailout undermines the ex ante effort.
  - Farhi and Tirole (2012): bailouts generate strategic complementarity in banks' maturity transforming decisions, existence of multiple equilibria
- **Here**: 1) insurance is between private and public sector, 2) bailouts create incentive to become more illiquid but also weakens the patient agents' incentives to withdraw early

# Environment: investors

- 3 time periods t=0,1,2
- Continuum of investors, i $\in [0, 1]$
- Agents utility

$$U(c_1, c_2, g, \omega_i) = u(c_1 + \omega_i c_2) + v(g)$$

  $\omega_i$ binomial random, private information (realized in t=1)
- $\omega_i = 1$ patient, $\omega_i = 0$ impatient
- $\pi$: probability (fraction) of impatient
- Each agent endowed with one unit of private good at t=0

# Environment: technologies

- 1 single constant return to scale technology
- returns 1 if withdrawal at t=1 or $R > 1$ if withdrawal at t=2
- Public good can be created using private goods as input at t=1
- Policy maker: taxes $\tau$ to produce public good (at t=1) or to bailout financial intermediaries (unable to commit)

# Environment: intermediaries

- Perfect competition, they maximize the expected utility of investors
- No trade between investors in period 1 and 2
- Investors go to the central location (intermediaries)
- Can choose to withdraw at period 1: sequential-service (arrive at the central location given index i) or wait until t=2
- Intermediaries can't commit to future actions

# Model II

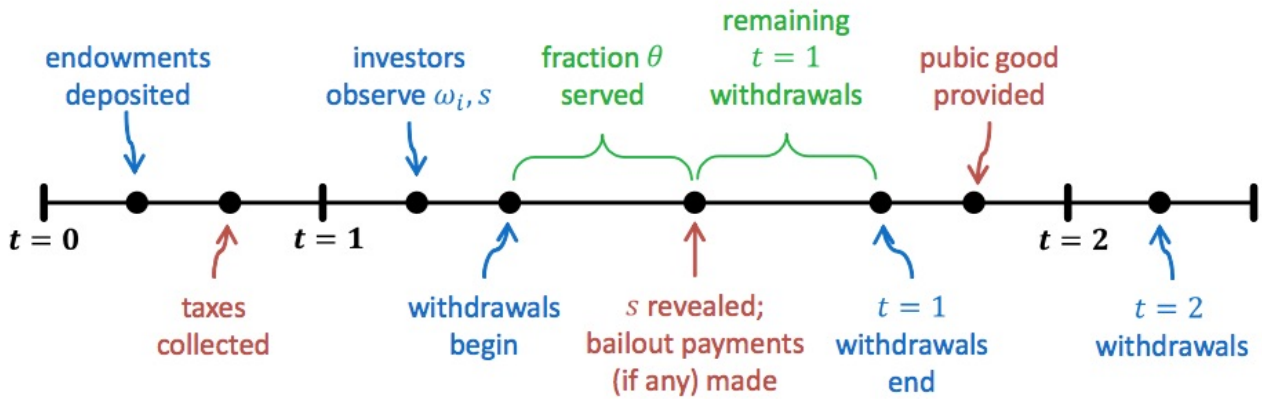
- Welfare measure:

$$W = \int_0^1 E(U(c_1(i), c_2(i), g; \omega_i)di$$

- Crisis: some patient investors withdraw early
- Possible states $S = \{\alpha, \beta\}$ with probability (1-q,q).
- Agents can condition their action on an "extrinsic sunspot" $y_i(\omega_i, s)$
- Observed with a lag by banks and policy maker

# Model II

- Timing




- **Financial fragility**: if there exists an equilibrium profile such that $y_i(1, \beta) = 0$ for a positive measure of investors

# Bailouts

- Partial run strategy profile

$$y_i(\omega_i, \alpha) = \omega_i \forall i$$

$$y_i(\omega_i, \beta) = \begin{cases} 0 & i \leq \theta \\ \omega_i & i > \theta \end{cases}$$

1. allocation of remaining resources of financial intermediaries

| first $\theta$ | others |
|---|---|
| $c_1 \rightarrow$ | $c_{1a}, c_{2a}$ |
| $c_1 \rightarrow$ | $c_{1b}, c_{2b}$ |

maximizing

$$V(\Psi_s) = (1-\theta)(\hat{\pi}_s u(c_{1s})^j + (1-\hat{\pi}_s)u(c_{2s}^j))$$

subject to $\Psi_s^j = (1-\theta)(\hat{\pi}_s c_{1s}^j + (1-\hat{\pi}_s)\frac{c_{2s}^j}{R})$

$c_{2b}$ is determined s.t: $u'(c_{1s}^j) = Ru'(c_{2s}^j)$

2. Policy maker chooses bailout to maximize

$$\int V(\Psi_b^j)d\sigma(j) + v(\tau - b)$$

- So $u'(c_{1s}^j) = Ru'(c_{2s}^j) = v'(g_b)$
- Marginal value of resources equalized across all intermediaries
- Intermediaries with **fewer resources** receive **higher bailout**

3. Determining $c_1$

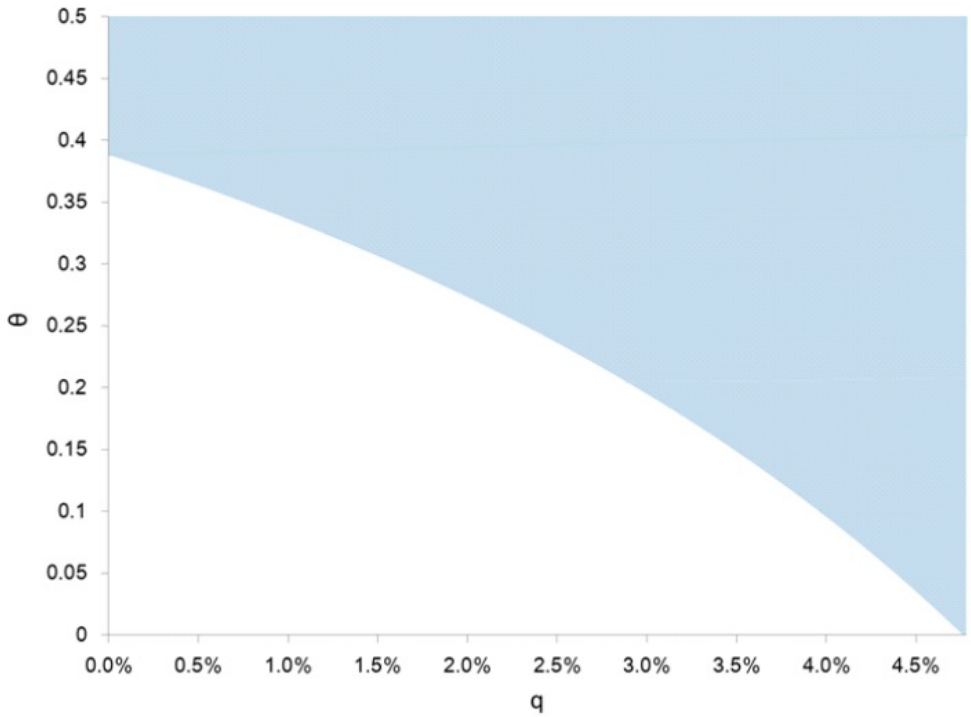
$$\theta u(c_1^j) + (1-q)V(1-\tau-\theta c_1^j, \hat{\pi}_a) + qV(1-\tau-\theta\overline{c_1}+b, \hat{\pi}_b)$$

   - Incentive distorsion: set $c_1$ to equate $u'(c_1^j) = (1-q)\mu_a^j$:
   - $c_1$ higher (more short term liabilities)

4. Choose the tax rate $\tau$

# Fragile equilibrium

- In which $c_1 \geq c_{2b}$




- For low q the delay parameter $\theta$ must be quite large to have fragile system
- $\theta$ *decreases* with q (higher incentives to give higher return to first fraction $\theta$ of investors)

# Restriction on bailouts

- (1) is unchanged, (2) is trivial: $b^j = 0$
- Incentives corrected: intermediaries choose $c_1^j$

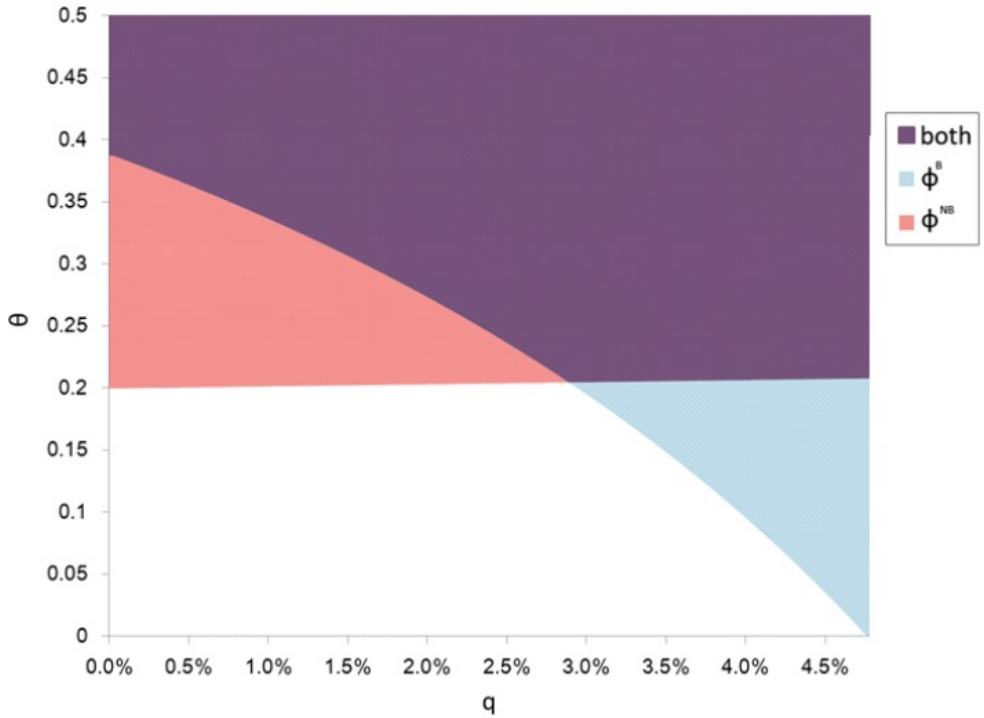
$$\theta u(c_1^j) + (1-q)V(1-\tau-\theta c_1^j, \hat{\pi}_a) + qV(1-\tau-\theta c_1^j, \hat{\pi}_b)$$

- Result: more liquid intermediaries
- $u'(c_1^j) = (1-q)\mu_a + q\mu_b$

# Competing effects on financial fragility

- Define degree of illiquidity $\rho = \frac{\theta c_1}{1-\tau}$ : $\rho^N < \rho^B$
- but may be more fragile: increase in loss of "late" investors who withdraw (no public funds to mitigate losses)
- Main intuition: it raises incentives to withdraw early

- Comparing the two sets




- q small: threshold for fragility lower under no bailout ($\theta$)
- as probability of crisis increases, intermediaries under no bailout are more cautions: higher threshold for fragility
- There is a $q < \overline{q}$ and $e \in \Phi^B$ implies $e \in \Phi^{NB}$ and $W^{NB} < W^N$

# Welfare

- Easy to compare when financial system is fragile under one system and not the other
- Choose a regime both in $\Phi^{NB}$ and $\Phi^{N}$

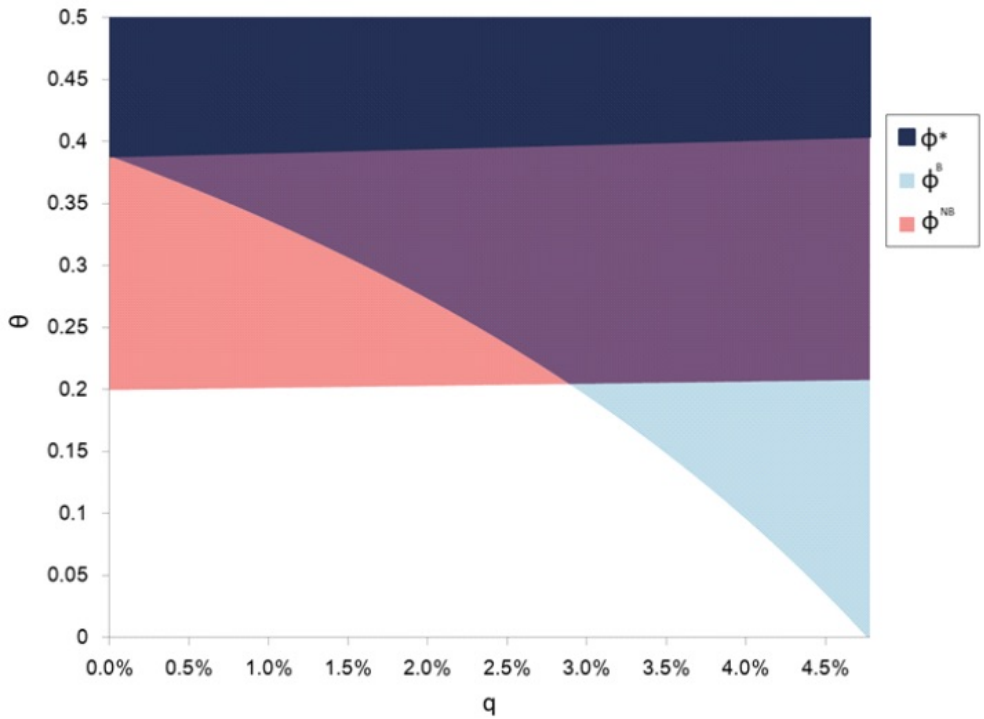
# Taxing short-term liabilities

- Pigouvian tax on short-term liabilities to correct *ex ante* distorted incentives created by bailouts
  - Intermediary pays $\eta c_1$ for each of first $\theta$ withdrawals
  - No restrictions on bailout policies
- (1) and (2) are unchanged
  - Government chooses $\eta$ to max investors utility
  - No commitment
- Intermediaries choose $c_1$ to maximize

$$\theta u(c_1^j)+(1-q)V(1-\tau-\theta(1+\eta)c_1^j+T,\hat{\pi_a})+qV(1-\tau-\theta\overline{c_1}+b,\hat{\pi_b})$$

# Results

- $\rho^N < \rho^* < \rho^{NB}$ and $\Phi^*$ is contained in $\Phi^{NB}$ and $\Phi^B$
- Pigouvian tax decreases $c_1$ (withdrawing early is less attractive)
- Allowing bailout increases $c_{2b}$




- as q increass, bailouts and Pigouvian tax generates higher threshold for fragility than NB regime
- $W^* > W^{NB}$ and $W^* > W^B$

# conclusion

- 3 keys ingredient for financial fragility:
  - no commitment from intermediaries
  - no commitment from policy maker
  - Aggregate uncertainty (sunspot variable)
- Bailouts are part of a **socially desirable insurance** arrangement
- Bailouts distort incentives, but combined with prudential policies, it is strictly better than
  1. No bailout
  2. Bailout alone