Bailouts and Financial Fragility

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The question

- Bailing out financial institutions creates moral hazard
  - distorts ex ante incentives; increases financial fragility

Q: How should policy makers deal with this issue?

- One view: focus should be on limiting/eliminating future bailouts

Phillip Swagel: “A resolution regime that provides certainty against bailouts will reduce the riskiness of markets and thus help avoid a future crisis.”

→ limiting bailouts is an effective way to promote financial stability
• Implementing such a policy may be difficult, of course, but .... many reform efforts clearly reflect this view

  – Dodd-Frank: “An Act to promote financial stability ... [and] to protect the American taxpayer by ending bailouts.”

Q: If feasible, would a strict no-bailouts policy be desirable?

  – would it increase financial stability?

  – would it raise welfare?

• Analyze this question in a version of the Diamond-Dybvig model

  – add fiscal policy and limited commitment
Results

- A no-bailouts policy does change incentives
  - financial intermediaries become more liquid (more “cautious”)

- But ... it is not necessarily desirable
  - may lower welfare (intermediaries become too cautious)
  - and increase financial fragility (investors become more nervous)

- A tax on short-term liabilities - with no restriction on bailouts:
  - generates higher welfare than either of these regimes
  - always reduces financial fragility

⇒ Best outcome requires allowing bailouts and using prudential policy
Growing literature on bailouts and time consistency issues

- Gale and Vives (2002), Chari and Kehoe (2009), Farhi and Tirole (2012), Bianchi (2012), others

One approach: consider a setting in which incentive efficiency requires the ex post allocation of resources to be inefficient

- a “bailout” aims to improve the ex post allocation, but undermines ex ante incentives

- a no-bailout commitment would solve the problem

Here: bailouts are a socially-desirable insurance arrangement

- also affect fragility via the incentive for investors to withdraw early
Outline

• The model environment

• Equilibrium allocations and financial fragility with:

  (1) Bailouts

  (2) A no-bailouts policy

  (3) Taxing short-term liabilities (bailouts with prudential policy)

• Concluding remarks
Preferences

- 3 time periods, \( t = 0, 1, 2 \)

- Continuum of investors, \( i \in [0, 1] \)
  - utility
    \[
    u\left(c_{1i} + \omega_i c_{2i}\right) + v(g) \quad u \text{ is CRRA, with } \gamma > 1
    \]
  - \( \omega_i \) is 
    \[
    \begin{cases}
    0 & \text{if investor is impatient} \\
    1 & \text{if investor is patient}
    \end{cases}
    \]
  - \( c_{ti} \) is private consumption, \( g \) is a public good

- Type is revealed at \( t = 1 \); private information
  - \( \pi \) = probability of being impatient for each investor
Technologies

- Investors have endowments at $t = 0$

- Goods invested at $t = 0$ yield $\left\{ \frac{1}{R > 1} \right\}$ at $t = \left\{ \frac{1}{2} \right\}$
  - usual incentive to pool resources for insurance purposes

- Public good can be created using private goods as inputs at $t = 1$
  - one unit of private good creates one unit of public good (for simplicity)

- Policy maker can tax deposits at $t = 0$
  - invests funds until $t = 1$, then produces public good
    ... or makes transfers
Intermediation

- Investors pool funds at $t = 0$, withdraw in either $t = 1$ or $t = 2$
  - can interpret as a bank, other financial intermediary, etc.
  - withdrawals at $t = 1$ subject to sequential service (Wallace, 1988)
  - investors arrive in the order given by their index $i$

- Intermediaries’ objective is to maximize investors’ expected utility
  - cannot commit to future actions (as in Ennis & Keister, 2009)

- No restrictions on contracts
  - financial arrangements are optimal given the constraints imposed by the environment (as in Green & Lin, 2003, others)
Crises

• A crisis occurs if some patient investors withdraw at $t = 1$
  
  – a “run” on the financial system

• Investors may condition actions on an extrinsic “sunspot” variable
  
  – $s \in \{a, b\}$; represents investor sentiment

• $s$ is observed by intermediaries and policy maker with a lag
  
  – after $\theta$ withdrawals have taken place (with $0 \leq \theta \leq \pi$)
  
  – re-optimize to utilize remaining resources efficiently
    (so $\theta \approx$ how quickly authorities react to a crisis)
Timeline

- $t = 0$: Endowments deposited
- $t = 1$: Investors observe $\omega_i, s$, withdrawals begin, fraction $\theta$ served, $s$ revealed; bailout payments (if any) made
- $t = 1$: Remaining $t = 1$ withdrawals
- $t = 2$: Public good provided, $t = 2$ withdrawals

- Taxes collected
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• Concluding remarks
(1) Equilibrium with bailouts

- Study equilibria of the game in which:
  - each investor chooses a withdrawal strategy
  - intermediaries choose a payment schedule
  - policy maker chooses a tax rate and a bailout policy

- There is always an equilibrium in which investors do not run
  - first-best allocation of resources obtains

Q: Is there also an equilibrium where investors run in some state?
  - if so, the financial system is fragile
• Suppose investors with $i \leq \theta$ choose to run in state $b$
  
  – one can show that investors with $i > \theta$ never run

• The intermediary’s best response entails:

\[
\begin{align*}
\text{first } & \theta \\
\text{others} & \\
\end{align*}
\begin{align*}
(c_1a, c_2a) \\
(c_1b, c_2b) \\
\end{align*}
\]

• This behavior will be an equilibrium if $c_2b \leq c_1$

  \[\Rightarrow\] financial system is fragile when $c_2b$ is small and/or $c_1$ is large
Determining $c_{2b}$

- After $\theta$ withdrawals, an intermediary has (per investor)

$$1 - \tau - \theta c_1 + b_s$$

- allocates this efficiently among remaining investors: $(c_{1s}, c_{2s})$

- In crisis state, bailout payments will be chosen so that

$$u'(c_{1b}^j) = Ru'(c_{2b}^j) = v'(g_b) \quad \text{for all } j$$

- bailout policy equalizes consumption across remaining investors

$\Rightarrow$ an intermediary with fewer resources receives a larger bailout

- consumption levels $(c_{1b}, c_{2b})$ depend on aggregate conditions (not on an intermediary’s own choices)
Determining $c_1$

- Intermediary’s best response: choose $c_1$ to maximize

$$\theta u(c_1) + (1 - q) Va (1 - \tau - \theta c_1) + q V_b$$

- no incentive to provision for the run state

$\Rightarrow$ set $c_1$ higher (or, choose larger short-term liabilities)

- when $q$ is larger, incentives become more distorted

Measuring financial fragility

- Let $\Phi^B = \text{set of economies that are fragile (i.e., have } c_{2b} \leq c_1)$

- compare the size of this set across policy regimes
The set $\Phi^B$
Outline

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- Concluding remarks
(2) Equilibrium with a no-bailouts policy

• Suppose policy maker must set $b = 0$ in all states

• Intermediaries will now choose $c_1$ to maximize

$$\theta u(c_1) + (1 - q) V_a (1 - \tau - \theta c_1) + q V_b (1 - \tau - \theta c_1)$$

Result: intermediaries are more liquid ...

• Define the degree of illiquidity to be

$$\rho \equiv \frac{c_1}{1 - \tau}$$

$$\approx \text{ratio of short-term liabilities to assets}$$

• Proposition: For any $q > 0$, we have $\rho^{NB} < \rho^B$
... but may be more fragile

- Proposition: some economies are in $\Phi^{NB}$, but not $\Phi^B$

**Intuition:** two competing effects are at work

(1) A no-bailout policy makes intermediaries more liquid ($\sim$ lower $c_1$)
   \[ \Rightarrow \text{tends to reduce fragility} \]

(2) But increases the loss from staying invested in a crisis ($\sim$ lower $c_{2b}$)
   - increases the incentive for investors to withdraw early
   \[ \Rightarrow \text{tends to increase fragility} \]
Graphically
Welfare

- Consider an economy in both $\Phi^B$ and $\Phi^{NB}$
  - a no-bailout policy can either raise or lower welfare

- Proposition: If $q$ is small, $e \in \Phi^B$ implies both $e \in \Phi^{NB}$ and $W^B > W^{NB}$
  - no-bailout policy lowers welfare, does not help with fragility

Takeaway: In many cases, a no-bailout policy is undesirable
Outline

• The model environment

• Equilibrium allocations and financial fragility with:
  
  (1) Bailouts
  
  (2) A no-bailouts policy
  
  (3) Taxing short-term liabilities (bailouts with prudential policy)

• Concluding remarks
(4) Taxing short-term liabilities

- Now suppose the policy maker imposes a tax on intermediaries’ short-term liabilities
  - an intermediary pays $\eta c_1$ to govt for each of first $\theta$ withdrawals
  - no restrictions on bailout policy

- Policy maker chooses $\eta$ to maximize investors’ expected utility
  - no commitment: $\eta$ is determined as withdrawals occur

- Intermediaries will then choose $c_1$ to maximize
  $$\theta u(c_1) + (1 - q) V_a (1 - \tau - (\theta + \eta) c_1 + N) + q V_b$$
Results

• Proposition: $\rho^{NB} < \rho^* < \rho^B$
  – policy reduces illiquidity relative to bailouts alone
  – but not as much as the no-bailouts policy

• Proposition: $\Phi^* \subset \Phi^B$ and $\Phi^* \subset \Phi^{NB}$
  – policy reduces fragility relative to either of the other regimes
  – effective macroprudential policy

Intuition:

• Pigouvian tax lowers $c_1$ ($\Rightarrow$ withdrawing early less attractive)

• Allowing bailouts increases $c_{2b}$ ($\Rightarrow$ waiting more attractive)
Graphically:
Welfare

Proposition: $W^* > W^B$ and $W^* > W^{NB}$

Intuition:

- Under a no-bailouts policy, intermediaries become too liquid
  - must completely self-insure against the bad state

- Bailouts provide socially-valuable insurance
  - encourages socially-desirable maturity transformation
  $\rightarrow \rho^* > \rho^{NB}$

- Incentive distortion is corrected by the Pigouvian tax
  $\rightarrow \rho^* < \rho^B$
Concluding remarks

• I have presented an environment where:
  – bailouts are part of a socially-desirable insurance arrangement
  – the anticipation of bailouts distorts incentives, increases fragility
  – investors are more prone to run when potential losses are larger

• Note: all of these features arise naturally in a fairly standard model
  – each captures important features of recent events

• Implication: a policy combining bailouts with prudential policy is strictly better than:
  
  (i) bailouts alone, or
  
  (ii) a no-bailouts policy
... but suppose effective prudential policy is difficult/infeasible

Recall: “A resolution regime that provides certainty against bailouts will reduce the riskiness of markets and thus help avoid a future crisis.”

- The model highlights two important forces. Eliminating bailouts:
  - leads to an underprovision of financial services
  - makes investors more prone to run

⇒ a no-bailouts policy may increase fragility, lower welfare

- Argues for a shift in policy focus
  - less emphasis on committing to be “tough” in times of crisis
  - more on developing (prudential) policy tools to correct distortions
Caveats

- Some important features of reality are missing, of course
  - distributional issues (and public finance issues more generally)
  - rent-seeking behavior, political motivations in bailouts

- Limits on policy makers’ ability to reallocate may well be desirable

- But ... the main message remains
  - restrictions on bailouts do not necessarily promote efficiency or financial stability
  - *efficient* bailouts with prudential regulation promote both
Extra stuff
The first-best allocation

- A standard Diamond-Dybvig environment ...

... combined with a simple public-finance problem
Shocks and amplification

• Suppose $\pi$ is random: $\pi_a < \pi_b$. Then a crisis has two components:

  (i) more impatient investors (real shock)

  (ii) patient investors try to withdraw early (amplification)

• Amplification was clearly important during the financial crisis

• Bernanke (2010; testimony to Financial Crisis Inquiry Commission)

\[P\]rospective subprime losses were clearly not large enough on their own to account for the magnitude of the crisis. . . .

Rather, the [financial] system’s vulnerabilities . . . were the principal explanations of why the crisis was so severe and had such devastating effects on the broader economy.

  – focus here is on one aspect of these vulnerabilities
The role of the public sector

• A bailout policy in this model has two elements
  
  
(i) transfer of funds from public to private sector

(ii) distribution of funds across intermediaries (chosen ex post)

• Consider a model without (i), i.e. suppose $v(g) \equiv 0$ and $\tau = 0$
  
  – “bailout” = intervention to equate $(c_{1b}^j, c_{2b}^j)$ across $j$

  – similar to Chari & Kehoe (2009), Farhi and Tirole (2012)

  ⇒ result: a no-bailout commitment is desirable

• Key idea: a bailout here is part of an efficient insurance arrangement
  (as in Bianchi [2012])

  – but .. it introduces a distortion in ex ante incentives