Bail-ins, Bailouts and Optimal Bank Regulation

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Bail-ins

- Much recent discussion of “bailing in” bank creditors
  - that is, imposing losses on debt holders in a crisis

- Idea can be implemented in different ways
  - examples: contingent convertible bonds (CoCos); Orderly Liquidation Authority; Single Resolution Mechanism

- Focus is on observable, bank-specific triggers

- However, banks will have some (relevant) private info
  - and some discretion over when to recognize losses, etc.

Q: Should regulators wait for observable information to arrive? Or should bail-in policy be more proactive?
Growing body of work on bail-ins, contingent bank liabilities and bank resolution


Focus is typically on how a regulator should react to the information it receives

Older literature on bail-ins begins with ... Wallace (1988; 1990)

- “the best arrangement in a [model] with aggregate risk displays something resembling partial suspension” a “bail in”
- or: bail-ins are necessary to implement efficient allocations
- see also Green and Lin (2003), Peck and Shell (2003), Ennis and Keister (2009), many others
These papers emphasize that investors want bail-ins contracts
- an efficient way of dealing with negative shocks
- no need for regulation or supervisory bail-ins in these models
  - question of what regulator can observe is irrelevant

Role for policy: encourage more state-contingent contracts

Example: reform to money market mutual funds in the U.S.
- prior to reform: must redeem shares on demand at par or close
- now: funds can impose withdrawal fees and suspend redemptions

Literature suggests this type of reform will be effective
- and sufficient; no need for regulator to take additional action
What we do

- Study an environment where:
  - a bank has the *ability* to bail in investors very quickly
  - regulator observes relevant information with a lag
  - govt. can provide bailouts and lacks commitment

- Show:
  - (i) bailouts undermine banks’ incentive to voluntarily bail in
  - (ii) optimal policy requires imposing bail-ins that are:
    - *prompt* and *system-wide*
    - either *uniform* across banks or *selective* (that is, separating)
  - (iii) policy can implement the constrained-efficient allocation, but ...
  - (iv) additional bail-ins may be needed to prevent bank runs
Outline

1) The environment

2) The efficient allocation
   - a combination of bail-ins and bailout
   - but can only be implemented if regulator has full information

3) Optimal bank regulation
   - uniform bail-ins, bank runs, and selective bail-ins

4) Fragility and robust regulation

5) Conclusion
(1) The environment
Investors

- $t = 0, 1, 2$

- Investors: $i \in [0,1]$ in each of many locations $k$
  - endowed with 1 at $t = 0$, nothing later

- Utility: $u(c_1 + \omega_{i,k} c_2) + v(g)$
  - where $\omega_{i,k} = \begin{cases} 0 \\ 1 \end{cases}$ means investor is impatient or patient

- Type $\omega_{i,k}$ is revealed at $t = 1$, private information
  - $\pi = \text{prob. of being impatient for each investor}$
  - $= \text{fraction of impatient investors at } t = 1$

Diamond-Dybvig plus public good
Banks

- Representative bank in each location
  - offers a contract to investors at $t = 0$
  - allows investors to choose whether to withdraw at $t = 1$ or $t = 2$
    - withdrawing investors arrive sequentially at $t = 1$
  - payments at $t = 1, 2$ can depend on everything observable to bank

- Investment yields return $\{ \frac{1}{R > 1} \}$ at $\{ t = 1, t = 2 \}$ if sound, but ...

- Some assets turn out to be worthless at $t = 1$
  - fraction $n$ of banks $\rightarrow$ lose fraction $\sigma$ of their assets
  - two aggregate states: $n = 0$ (good) and $n > 0$ (bad)
Information

- At beginning of $t = 1$, investors observe:
  - own preference type $(\omega_{i,k})$
  - aggregate state $(n)$ and own-bank shock $(\sigma_k)$

- Announce withdrawal decision to their bank
  - bank sees withdrawal demand *before* allowing any withdrawals
  - withdrawing investors then arrive one-at-a-time
  - $\rho_k = \text{fraction who choose to withdraw early}$

- Bank $k$’s state: $s_k = \{n, \sigma_k, \rho_k\}$

- Banking contract specifies payments to each investor
  - as a function of $s_k$
Public sector

- Fiscal authority ("government"): 
  - $t = 0$: taxes endowments 
  - $t = 1$: provides public good and (possibly) bailouts to weak banks 
    - chosen as best response to situation at hand (no commitment) 
    - $\Rightarrow$ will distort banks’ incentives (as in Keister, 2016)

- Regulator: 
  - can restrict payments made by a bank to set $X(s_k) \subseteq \mathbb{R}_+$ 
    - measurable with respect to regulator’s information set 
  - observes bank-specific states $s_k$ after $\theta \geq 0$ withdrawals 
    - $\theta > 0$: bank’s state is initially private information 
    - captures the time needed to do detailed examinations
Timeline

- **t = 0**: Banking contracts set
- **t = 1**: Regulator observes aggregate state $n$
- **t = 1**: Fraction $\theta$ of investors served
- **t = 1**: Remaining $t = 1$ withdrawals
- **t = 2**: Investors observe $n, \sigma_k$ and own type; announce withdrawal decision
- **t = 2**: Regulator observes $s_k$
- **t = 2**: Bailouts made (if any) public good provided
- **t = 2**: $t = 2$ withdrawals

Taxes collected
(2) The efficient allocation
A planner’s problem

- Suppose a planner could operate all banks plus the govt.
  - and can observe investors’ types and dictate withdrawal decisions

- Note: planner will have patient investors withdraw at $t = 2$

- Sound banks:
  - choose consumption for each impatient investor ($c_{1S}$) ...
  - ...and for each patient investor ($c_{2S}$) to solve

\[
\begin{align*}
\text{max } & \pi u(c_{1S}) + (1 - \pi) u(c_{2S}) \\
\text{s.t. } & \pi c_{1S} + (1 - \pi) \frac{c_{2S}}{R} \leq 1 - \tau
\end{align*}
\]

solution: $(c_{1S}^*, c_{2S}^*)$ with $c_{1S}^* < c_{2S}^*$
Weak banks:

\[
\max \pi u(c_{1W}) + (1 - \pi)u(c_{2W})
\]

\[
s.t. \quad \pi c_{1W} + (1 - \pi)\frac{c_{2W}}{R} \leq (1 - \tau)(1 - \sigma) + b
\]

Bailouts efficiently distribute resources between \( g \) and \( c \):

\[
v'(\tau - nb) = u'(c_{1W}^*) = Ru'(c_{2W}^*)
\]

Result: The constrained efficient allocation has:

- **bailouts**: \( b^* > 0 \) for all weak banks
- combined with **bail-ins**: \((c_{1W}^*, c_{2W}^*) < (c_{1S}^*, c_{2S}^*)\)
Can the efficient allocation be decentralized?
Implementation when $\theta = 0$

- If $\theta = 0$, regulator completely controls bank thru choice of $X(s_k)$
  - but does not observe preference types

- Timing:
  - fiscal authority chooses $\tau$, regulator chooses $X$ ("policy")
  - investors choose withdrawal strategies ("post-deposit game")
  - fiscal authority makes bailouts (without commitment)

Result: There exists $(\tau, X)$ such that the efficient allocation is the unique BNE.

- Why can’t a bank run occur?
  - because regulator would see it right away, decrease early payments
  $\Rightarrow$ we have removed a key ingredient generating the “usual” bank runs
Implementation when $\theta > 0$

- Now suppose $\theta > 0$
  - that is, bank’s state (both $\sigma_k$ and $\rho_k$) is initially private information

- After $\theta$ investors have withdrawn, regulator controls payments
  - government makes bailout payments to weak banks
  - from that point forward, the outcome is unique, efficient

- But during first $\theta$ withdrawals, $\sigma_k$ is private info of the bank

Q: Is the efficient allocation an equilibrium?

- need weak banks to voluntarily bail in (think of MMF rules)
- suppose all other banks follow: $\begin{cases} c_{1S}^* & \text{if } \{\sigma_k = 0\} \\ c_{1W}^* & \text{if } \{\sigma_k = \sigma\} \end{cases}$
- what is the best response of an individual weak bank $i$?
If bank $i$ chooses to bail in:

First $\theta$ impatient

Remaining $\pi - \theta$ impatient

Patient

Withdrawals

0  $\theta$  $\pi$  1

Payments

$c^*_1W$

$c^*_2W$

bailout received
If bank $i$ chooses to imitate a sound bank:

- Deviation to $c_{1S}^*$ is profitable $\Rightarrow$ bailouts undermine bail-ins

$\triangleright$ First $\theta$ impatient

$\triangleright$ Remaining $\pi - \theta$ impatient

$\triangleright$ Patient

Withdrawals

Payments

$(i)$ Delayed action ...

$\ldots(ii)$ leads to larger bailout

$\ldots(iii)$ so that consumption is equalized across weak banks.
(3) Optimal bank regulation
Weak banks have an incentive to set $c_1$ very high
- effectively “looting” the bank before the bailout

What should the regulator do in this situation?

One option: set $X = [0, c_1^* S]$ 
- cap on early payments to prevent “extreme looting”

Better option: set cap below $c_1^*$
- force all banks to bail in their investors (“uniform” bail in)
- example: require CoCo bonds with a systemic trigger

Q: Is this policy optimal? Or can the regulator do better?
- before answering this question ...
Bank runs

- Note: this is a “fundamentals” bank run
  - withdrawing early is a dominant strategy for patient investors
This run is different from the usual Diamond-Dybvig story

- the bank has the tools to prevent the run (could lower $c_1$)
- but chooses not to do so (because bailout would be smaller)
- even though the run is costly for the bank’s investors

The regulator can use this fact to its advantage

Suppose $X = \{c_{1W}, c_{1S}\}$ where values are chosen so that:

- a weak bank will experience a run if it chooses $c_{1S}$
- but not if it chooses $c_{1W}$
- and the payoffs satisfy: $U_W(c_{1W}, \text{no run}) \geq U_W(c_{1S}, \text{run})$
- “disciplining” role of runs, in the spirit of Calomiris & Kahn (1991); Diamond & Rajan (2001)
Note: bail-in at weak banks is *staggered*

- Initially small, then becomes larger once regulator observes $s_k$
The optimal bail-in policy can be either uniform or selective:
- tends to be selective when the shock is large

When selective, policy may set $c_{1s} > c_{1s}^*$
- banks must “prove” they are sound by distorting allocation

There exists a policy $(τ, X)$ that implements the constrained efficient allocation as an equilibrium

But ... is it the only equilibrium?
(4) Fragility and robust regulation
Suppose patient investors in other banks choose to run

(i) larger need for bailouts puts strain on government budget ...

(ii) results in lower consumption for this bank’s remaining investors ...

(iii) which can cause a run (!)
In other words

- Equilibrium within a given bank is still unique
  - if a run occurs, looks like it is due to “fundamentals”

- But there is a strategic complementarity across banks
  - if investors are running on other weak banks
  - bailout received by my bank will be smaller
  - increases the incentive to run on my bank

- Result: weak banks may be susceptible to a run under the “optimal” policy
  - problem arises when the shock is large

related to literature on “diaboli loops”
Robust regulation

- What should the regulator do in this situation?

- One option: choose a policy that delivers a unique equilibrium
  - larger bail-in that lowers welfare, but preserves resources

- Could look at sunspot-drive runs (following Peck-Shell, etc.)

- Another option: commit to no bailouts
  - may be difficult to do
  - restores banks’ incentive to prevent runs
  - but an imperfect solution: lose risk-sharing benefit
(5) Conclusions
Summary

- Want prompt bail-in of bank creditors in a crisis
  - leads to more efficient allocations, smaller bailouts, etc.
  - “prompt”: depends on information not yet available to regulator

- How is this outcome best achieved?

- In the absence of bailouts, only need to make voluntary bail-ins **feasible**
  - but ... bailouts undermine incentive to voluntarily bail-in

- Regulator can implement constrained efficient allocation imposing prompt, system-wide bail-ins
  - either uniformly or with an option to self-select

- But may need larger bail-ins to preserve financial stability