Allocating Losses: Bail-ins, Bailouts and Bank Regulation

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Bail-ins and bailouts

- In a crisis, a financial institution's losses fall on combination of:
  - its own investors and creditors "bail-ins"
  - the public sector "bailouts"
- Recent policy efforts aim to increase bail-ins (& limit bailouts)
  - examples: contingent convertible bonds (CoCos); Orderly Liquidation Authority; Single Resolution Mechanism
- Focus is on tying bail-ins to observable, bank-specific triggers
  - example: if some measure of equity falls below a threshold …
    - certain long-term debt is converted to equity
    - or the bank is placed into a resolution process
  - which imposes losses on some creditors; limiting need for bailout

Timing

- However, think about the period *before* this information is observed
  - regulators may be aware there are problems
  - but lack actionable, bank-specific information
- In this period, banks will likely have private information
  - about how exposed they are to the current situation, for example
- … and some discretion over when to recognize losses, etc.
  - which might then trigger a bail-in

Q: Should regulators wait for observable information to arrive?

- or should they act sooner? If so, how?

Literature

- Growing body of work on bail-ins, contingent bank liabilities and bank resolution
  - Flannery (2009), Goodhart & Avgouleas (2014), Sommer (2014), Bernard et al. (2017), Bolton & Oehmke (2019), Robatto (2017), Dewatripont and Tirole (2018), Walther and White (2019), others
- 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 (2000, 2003), Peck and Shell (2003), Ennis and Keister (2009), Sultanum (2014) and others

- These papers emphasize that investors want bail-in contracts
  - an efficient way of dealing with adverse shocks
  - no need for regulation or supervisory bail-ins in these models
- Role for policy: encourage more state-contingent contracts
- Example: reform to money market mutual funds in the U.S.
  - prior to 2014: must redeem shares on demand at par or close
  - now: funds can impose withdrawal fees and suspend redemptions
    - directed to do so if it is in the best interests of their shareholders
- Will this type of reform will be effective?
  - this older literature suggests the answer is "yes", but …

What we do

- Study an environment where:
  - banks have the *ability* to bail in their investors at any time
  - govt. can provide bailouts and lacks commitment
  - regulator observes relevant information with a lag
- Derive the efficient pattern of bail-ins and bailouts in a crisis
- In equilibrium:

  (i) bailouts undermine investors' desire for bail-in contracts
  - result: equilibrium bail-ins are too small, bailouts are too large

  (ii) this distortion can be a source of financial fragility

  (iii) mandating a system-wide bail-in can improve welfare
  - while also improving banks' incentives, financial stability

Outline

1) The environment

2) Efficiently allocating losses
   - a planner's problem

3) Equilibrium
   - distorted incentives, inefficient outcomes

4) Regulation

5) Conclusion

Investors

- $t = 0,1,2$
- Investors: $i \in [0,1]$ in each of many locations
  - endowed with 1 at $t = 0$, nothing later
- Utility: $u(c_1 + \omega_i c_2) + v(g)$
  - where $\omega_i = \begin{Bmatrix} 0 \\ 1 \end{Bmatrix}$ means investor is $\begin{Bmatrix} \text{impatient} \\ \text{patient} \end{Bmatrix}$
  - and u is of the CRRA form
- Type ω_i is revealed at $t = 1$, private information
  - π = prob. of being impatient for each investor
    = fraction of impatient investors at $t = 1$

Diamond-Dybvig plus public good

Banks

- Investment technology yields return $\begin{Bmatrix} 1 \\ R > 1 \end{Bmatrix}$ at $\begin{Bmatrix} t = 1 \\ t = 2 \end{Bmatrix}$
- Endowments are pooled in a *bank* in each location
  - bank is a coalition of investors → no agency problem w/in bank
  - investors' claim is a hybrid of debt and equity
- Two aggregate states ($t = 0$)
  - normal times: bank's assets continue to be worth 1 (per depositor)
  - crisis: a fraction $1 - \phi$ of bank's assets become worthless
    - ϕ varies across locations; idiosyncratic draw from distribution F
- Bank decides how much to pay withdrawing investors …
  - *after* bank and investors observe its realized ϕ

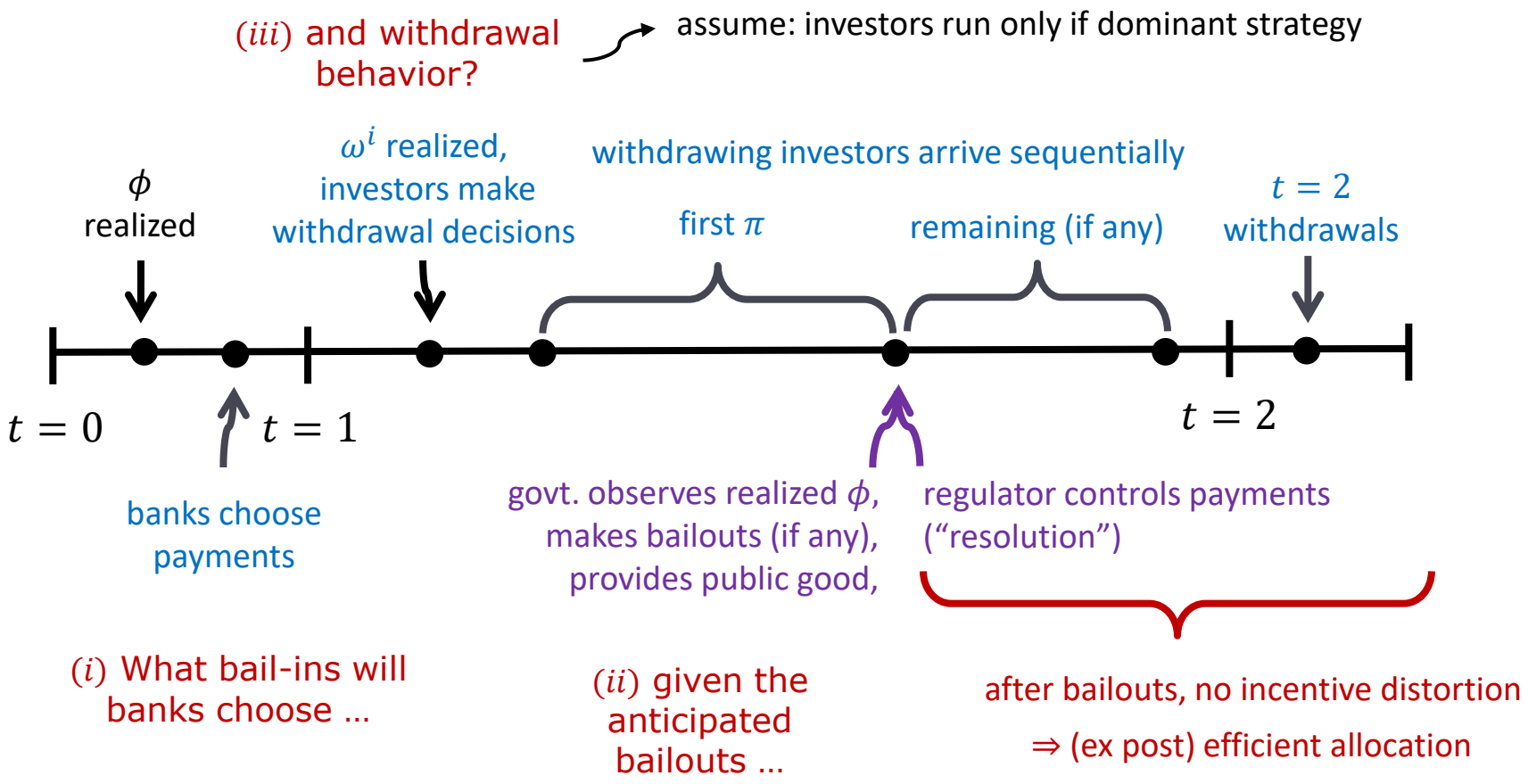
Public sector

- Fiscal authority ("government"):
  - endowed with $\tau > 0$ units of the good at $t = 1$
    - $\tau =$ the *fiscal capacity* of the public sector
  - provides the public good and (possibly) bailouts to weak banks
    - chosen as best response to situation at hand (no commitment)

      $\Rightarrow$ will distort banks' (i.e. investors') incentives

- Regulator:
  - can limit banks' payouts to investors
  - observes value of bank-specific ϕ only after $\pi \geq 0$ withdrawals
    - captures the time needed to do detailed examinations

Timeline



- Note: no decisions are made before ϕ is realized
  - ex ante probabilities of the two states do not matter

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   - two proposals

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Normal times

- In normal times, $\phi = 1$ in all locations
- Banks solve a standard Diamond-Dybvig allocation problem:

$$\max \ \pi u(c_1) + (1-\pi)u(c_2)$$

$$s.t. \qquad \pi c_1 + (1-\pi)\frac{c_2}{R} \leq 1$$

solution: (c_1^*, c_2^*) with $c_1^* < c_2^*$

- Interpretation:
  - (c_1^*, c_2^*) is the "face value" of a bank's liabilities to its investors
  - measure bail-ins relative to this face value

Allocating losses

- Now suppose a crisis occurs and $\phi \sim F\left[\underline{\phi}, 1\right]$
  - total losses in the banking system: $\int_{\underline{\phi}}^{1}(1-\phi)dF(\phi)$ (fixed)

Q: How would a planner *allocate* these losses?

- Feasibility: $\pi c_1(\phi) + (1-\pi)\frac{c_2(\phi)}{R} \leq \phi + b(\phi)$

- Planner will set: $c_1(\phi) = \big(1-h(\phi)\big)c_1^*$, $c_2(\phi) = \big(1-h(\phi)\big)c_2^*$ } for some $h(\phi)$

- Then feasibility is: $h(\phi) + b(\phi) = \underbrace{1-\phi}$

bail-in + *bailout* = *loss* in each location

A planner's problem

- The planner will choose bail-ins h and bailouts b to maximize:

$$\int_{\underline{\phi}}^{1} \{\pi u[(1-h(\phi))c_1^*] + (1-\pi)u[(1-h(\phi))c_2^*]\} dF(\phi)$$

$$+v\left(\tau - \int_{\underline{\phi}}^{1} b(\phi) dF(\phi)\right)$$

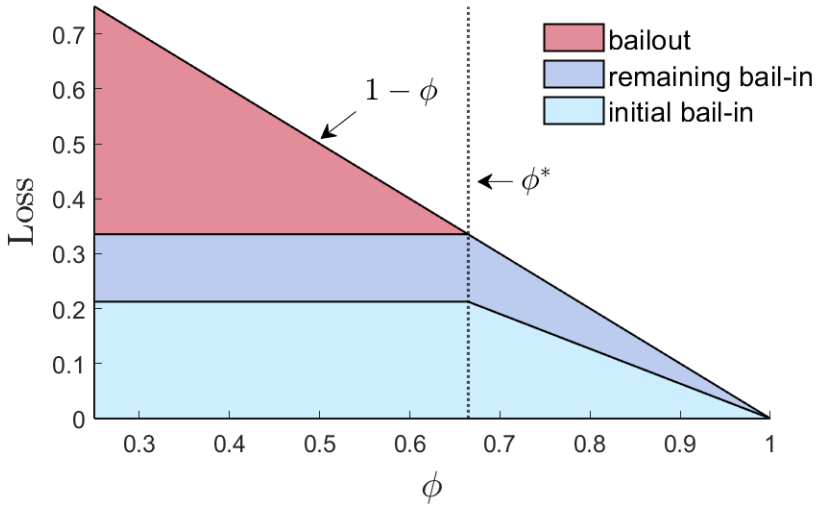
  - subject to:

$$h(\phi) + b(\phi) = 1 - \phi$$

and $\quad 0 \leq h(\phi) \leq 1,\ b(\phi) \geq 0 \quad$ for all ϕ

- What does the solution look like?

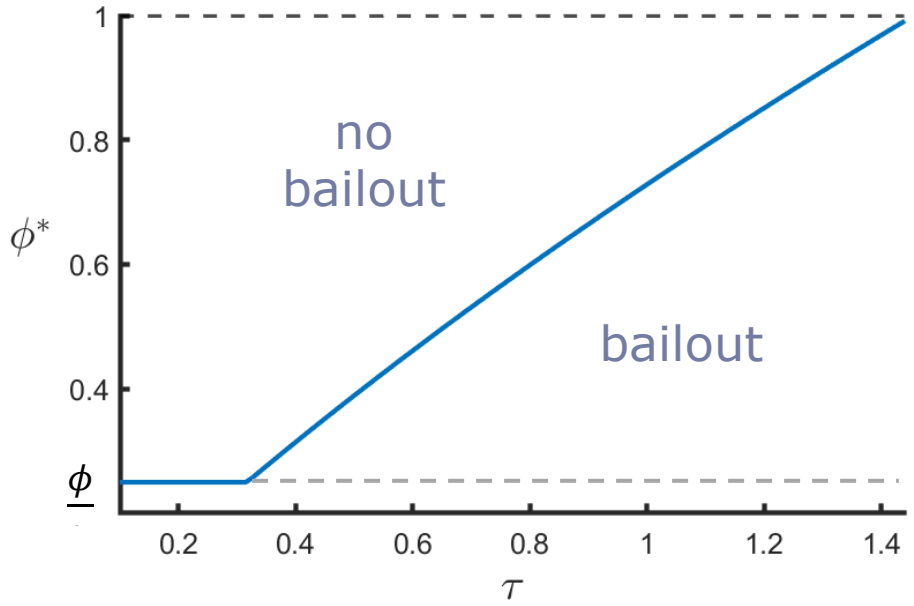
- Solution is characterized by a cutoff ϕ^*
- Banks with $\phi \geq \phi^*$ are not bailed out
  - bail-in covers entire loss $1 - \phi$



- Banks with larger losses are bailed out
  - investors in <u>all</u> of these banks are bailed in at rate $(1 - \phi^*)$
- Interpretation: public sector takes the "tail risk"
  - bails out worst banks, but only after a sufficient bail-in

Q: How much tail risk should the public sector take?

- Cutoff ϕ^* depends on the government's fiscal position τ



- If τ is sufficiently small, there will be no bailouts
  - when fiscal situation is tight, public sector provides no insurance
- As τ increases, it becomes optimal for the public sector to absorb more of the tail risk.

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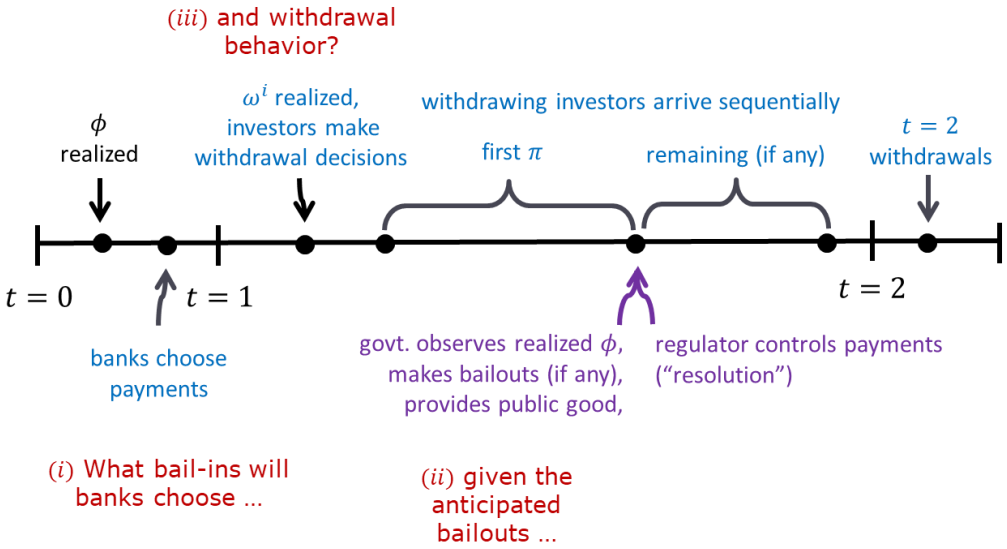
The bail-in game

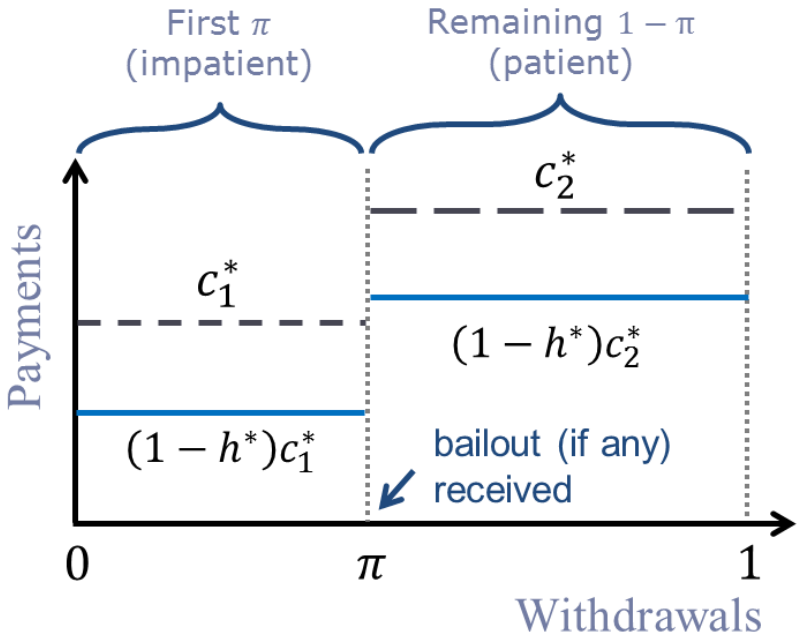
- The fiscal authority will bail out those banks in worst shape
  - note: a bank's condition depends (in part) on its bail-in choice
- At $t = 0$, each bank chooses a bail-in $h(\phi)$
  - based on the bailouts it anticipates the fiscal authority making
  - which depend on the bail-in choices of other banks
- Banks play a "bail-in game"



Bail-in incentives

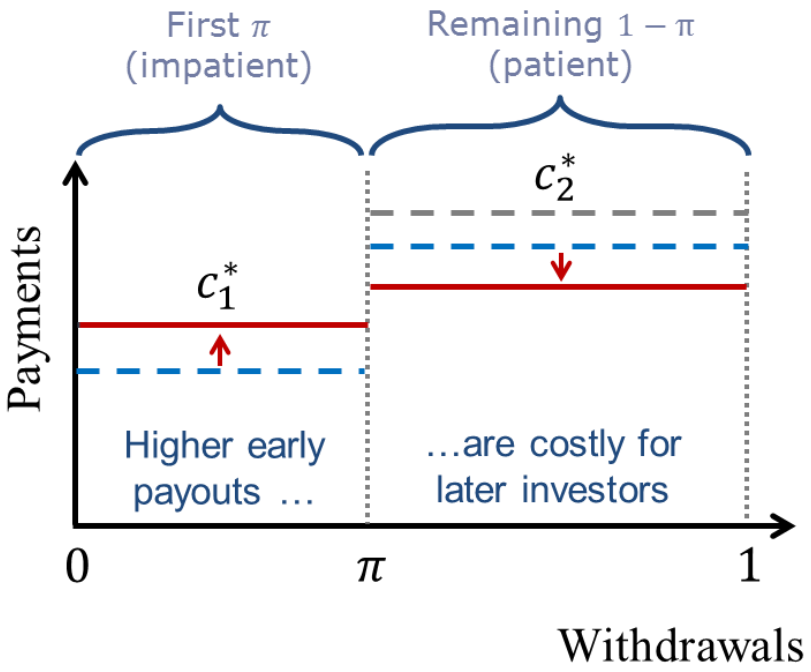
Q: Is the planner's $h^*(\phi)$ an equilibrium of the bail-in game?

- Suppose all other banks follow this plan
  - if an individual bank chooses $h^*(\phi)$ …
  - … its investors will receive the planner's allocation for them



Q: What happens if it deviates?

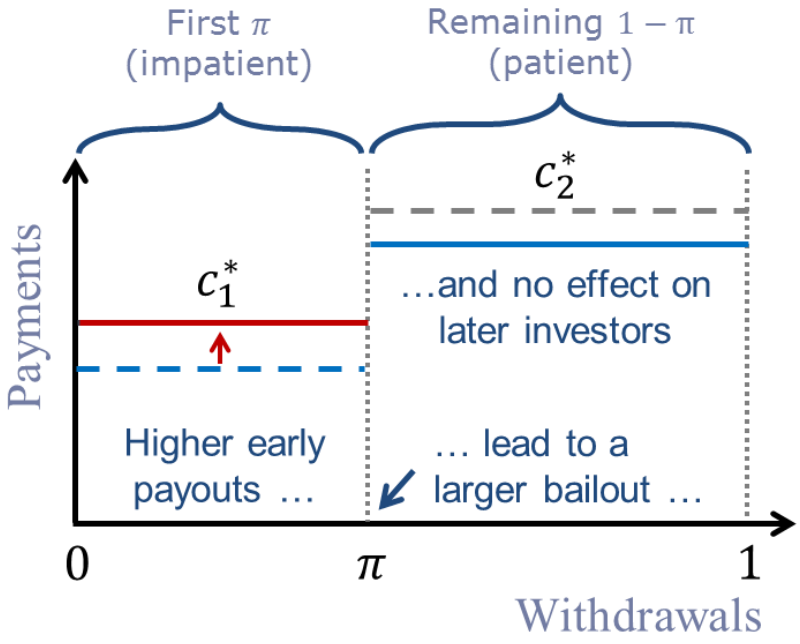
- Suppose the bank does not receive a bailout
- If it sets $h(\phi) = 0$ …
- … its patient investors will consume less
- Deviation makes bank's investors worse off
  - otherwise planner would have chosen it



⇒ Banks not receiving a bailout will follow the planner's bail-in

- in line with the older literature on Diamond-Dybvig models

- Suppose the bank **does** receive a bailout
- If it sets $h(\phi) = 0$ …
  - remaining investors will be in worse shape
  - which leads to a larger bailout (!)
- Deviation is clearly desirable
  - shifts some losses to the public sector



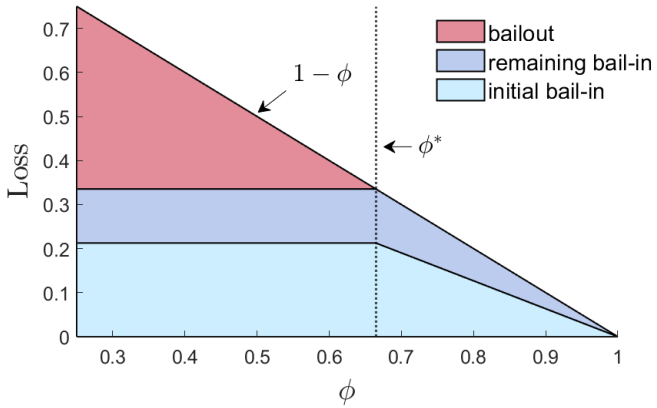
⇒ Banks receiving a bailout will **not** follow the planner's bail-in

- bailouts undermine bail-ins

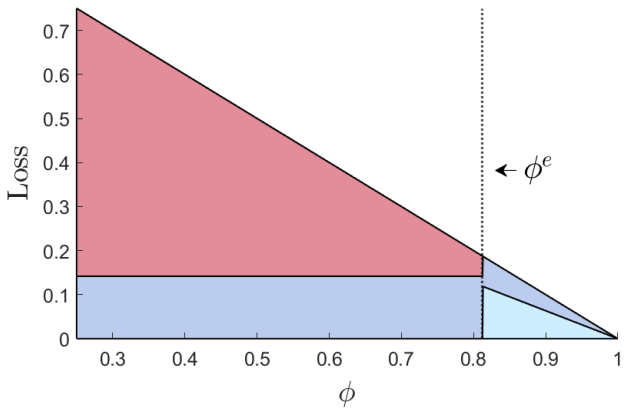
What does an equilibrium look like?

- If all banks that are bailed out set $h(\phi) = 0$

Planner



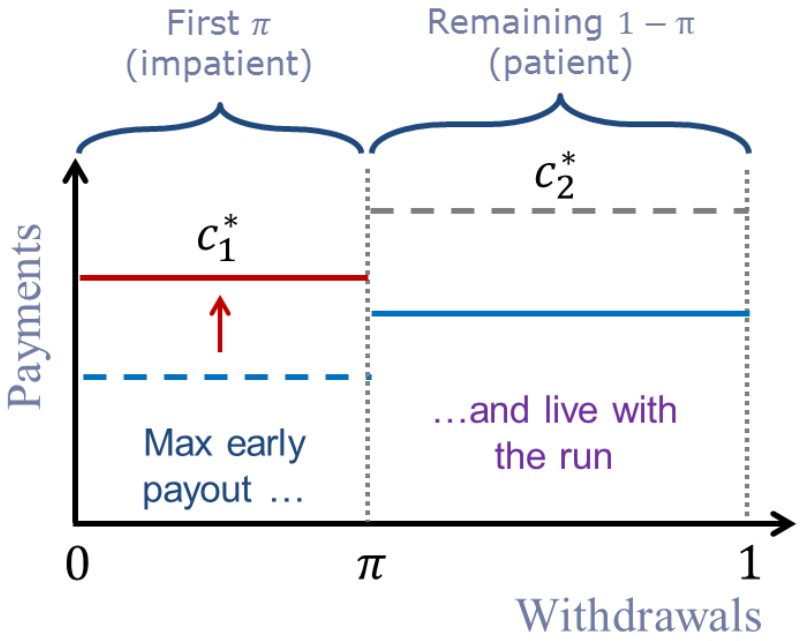
Equilibrium



- Bail-ins are too small overall
  - especially: no bail-in of first π withdrawals
- Bailouts are too large
  - intensive margin: banks bail-in less → are bailed out more — always
  - extensive margin: more banks are bailed out — sometimes

Bank runs

- If the planner's bail-in is very large and bank sets $h(\phi) = 0$ …
- … withdrawing early may become a dominant strategy
  - bank will suffer a run
- What will a bank in this situation do?
- Could bail-in just enough to remove incentive to run
- Or could allow the run to happen
  - recall: this is a fundamentals-driven run by *insiders* ("looting")



⇒ Incentive distortion here is a *source* of financial fragility

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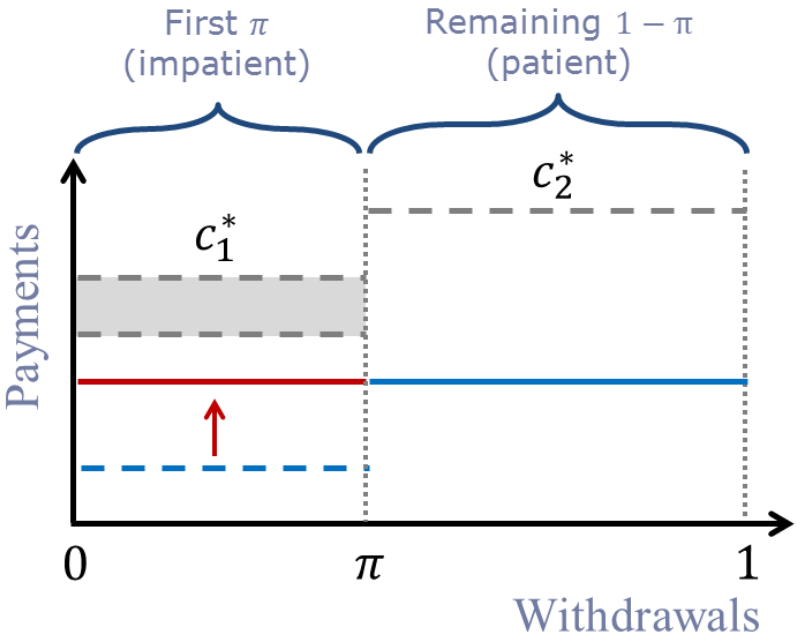
What can a regulator do?

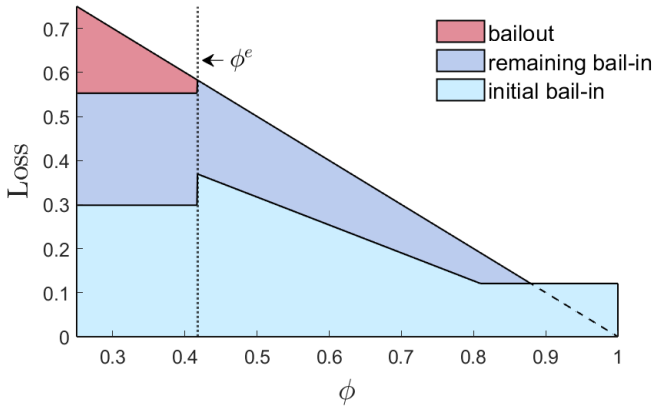
- Suppose we impose a *system-wide bail-in*
  - require all banks to set $h(\phi) \geq \eta$ (notice the weak inequality)
- Interpretations:
  - writing down debt (including short-term)
  - imposing withdrawal fees
  - restricting dividend payments

  ⇒ anything than prevents resources from flowing out of the bank
- Easy to see how this can help
  - gain from bail-in at banks with large losses is first-order
  - distortion in banks with zero or small losses is second order
- Less obvious: the policy also *improves incentives*

Incentive effects

- We saw: a bank may be willing to live with a run
  - if there is a large benefit for the early withdrawers
- Required bail-in limits the benefit of "cheating"
- If chosen appropriately …
  - … bailed-out banks will set bail-in **greater** than the minimum
  - result: no runs occur
  - regulator uses the *threat* of a run to disciple banks





Optional bail-ins

- A mandatory minimum bail-in is costly for sound banks
- In some cases, the following policy is better:
  - banks can either set $h(\phi) = 0$ or set $h(\phi) \geq \eta$
  - call this an *optional minimum bail-in*
- Idea:
  - effective if bailed-out banks would experience a run at $h(\phi) = 0$
  - but not at $h(\phi) = \eta$

  $\rightarrow$ another way the threat of a run can discipline bank behavior
    - in the spirit of Calomiris and Kahn (1991), Diamond and Rajan (2001)
    - but applied to regulatory policy

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Conclusion

- Our model captures situations where:
  - regulators know there is a problem, but not *where* the losses are
  - some bank investors/creditors have private information
  - some banks anticipate being bailed out

Q: In such a situation:

- should regulators wait for observable information to arrive?
- or should they act sooner? If so, how?

- We provide conditions under which they should be *proactive*
  - that is, impose a system-wide bail-in at the onset of a crisis
  - adjust policy once bank-specific information becomes available

Key results:

- Systemwide bail-ins can improve the allocation of resources
  - the benefit of improving the actions of weak banks …
  - … outweighs the cost of distorting the actions at sound banks
- And also improve financial stability
  - by limiting the incentive to "loot" a weak bank
- A one-size-fits-all bail-in may create substantial distortions
- But these distortions can be mitigated by:
  - setting a minimum, rather than fixed, bail-in
  - in some cases, making the bail-in optional