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
  - Flannery (2009), Goodhart & Avgouleas (2014), Sommer (2014), Bolton & Oehmke (2016), Bernard, Capponi, & Stiglitz (2017), Robatto (2017), Walther and White (2017), many 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 (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 $\omega_{i,k} = \begin{Bmatrix} 0 \\ 1 \end{Bmatrix}$ means investor is $\begin{Bmatrix} \text{impatient} \\ \text{patient} \end{Bmatrix}$
- Type $\omega_{i,k}$ 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

- 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 $\begin{Bmatrix} 1 \\ R > 1 \end{Bmatrix}$ at $\begin{Bmatrix} t = 1 \\ t = 2 \end{Bmatrix}$ if sound, but …

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

Information

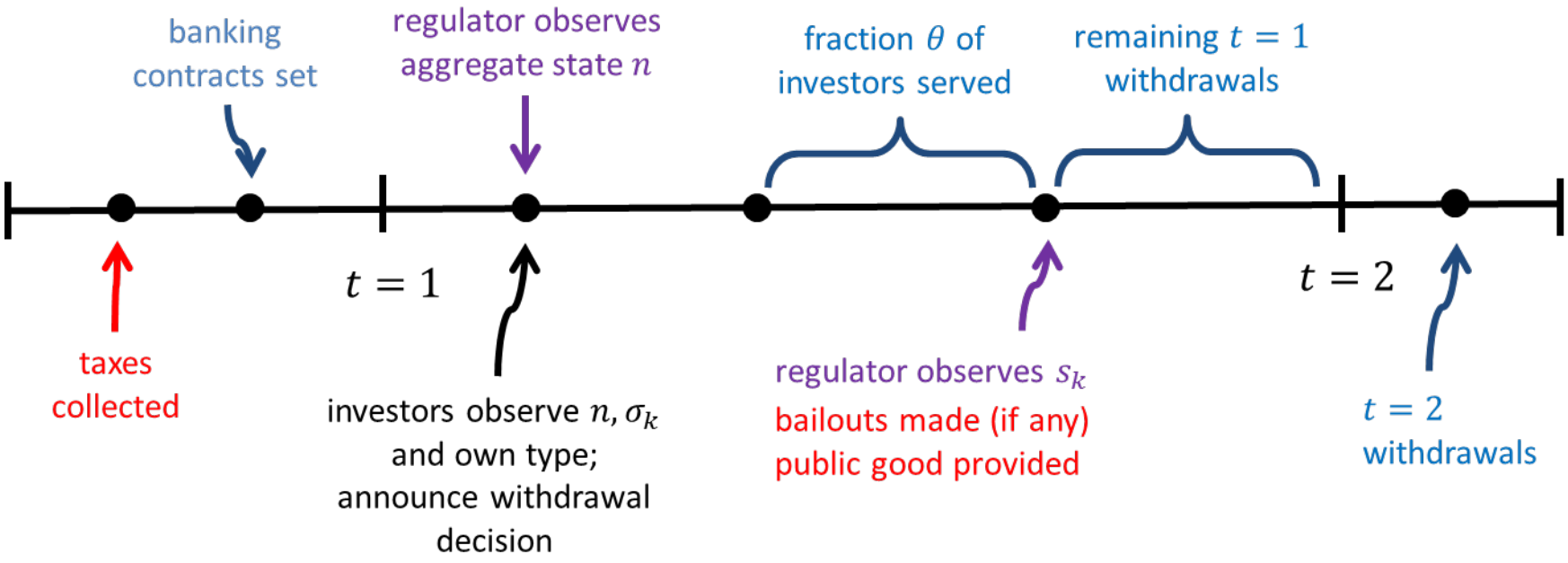
- At beginning of $t = 1$, investors observe:
  - own preference type $(\omega_{i,k})$
  - aggregate state (n) and own-bank shock (σ_k)
- Announce withdrawal decision to their bank
  - bank sees withdrawal demand *before* allowing any withdrawals
  - withdrawing investors then arrive one-at-a-time
  - $\rho_k =$ 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)

    ⇒ will distort banks' incentives (as in Keister, 2016)
- Regulator:
  - can restrict payments made by a bank to set $X(s_k) \subseteq \mathbb{R}_+$
    - measureable 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


banking contracts set
regulator observes aggregate state n
fraction θ of investors served
remaining $t = 1$ withdrawals
taxes collected
$t = 1$
investors observe n, σ_k and own type; announce withdrawal decision
regulator observes s_k
bailouts made (if any)
public good provided
$t = 2$
$t = 2$ withdrawals

(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

$$\max \ \pi u(c_{1S}) + (1-\pi)u(c_{2S})$$

$$s.t. \qquad \pi c_{1S} + (1-\pi)\frac{c_{2S}}{R} \leq 1 - \tau$$

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

- Weak banks:

solution: (c_{1W}^*, c_{2W}^*) with $c_{1W}^* < c_{2W}^*$

$$\max \pi\, u(c_{1W}) + (1-\pi)u(c_{2W})$$

$$s.t. \qquad \pi c_{1W} + (1-\pi)\frac{c_{2W}}{R} \leq (1-\tau)\underbrace{(1-\sigma)}_{\text{losses}} + b$$

bailout

- 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: $(c_{1W}^*, c_{2W}^*) \ll (c_{1S}^*, c_{2S}^*)$

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 τ, regulator chooses X ("policy")
  - investors choose withdrawal strategies ("post-deposit game")
  - fiscal authority makes bailouts (without commitment)

Result: There exists (τ, 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

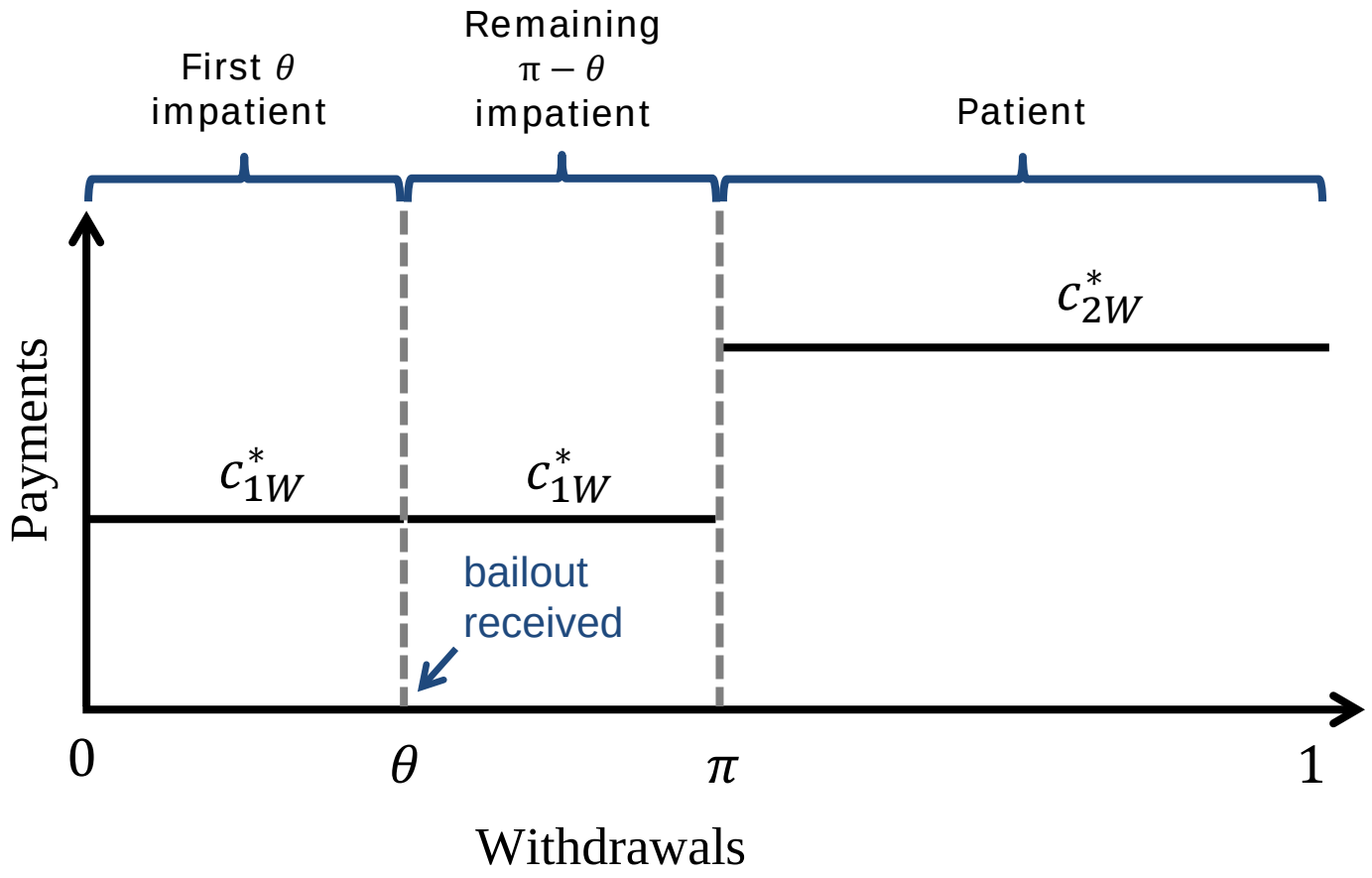
Implementation when $\theta > 0$

- Now suppose $\theta > 0$
  - that is, bank's state (both σ_k and ρ_k) is initially private information
- After θ 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 θ withdrawals, σ_k is private info of the bank

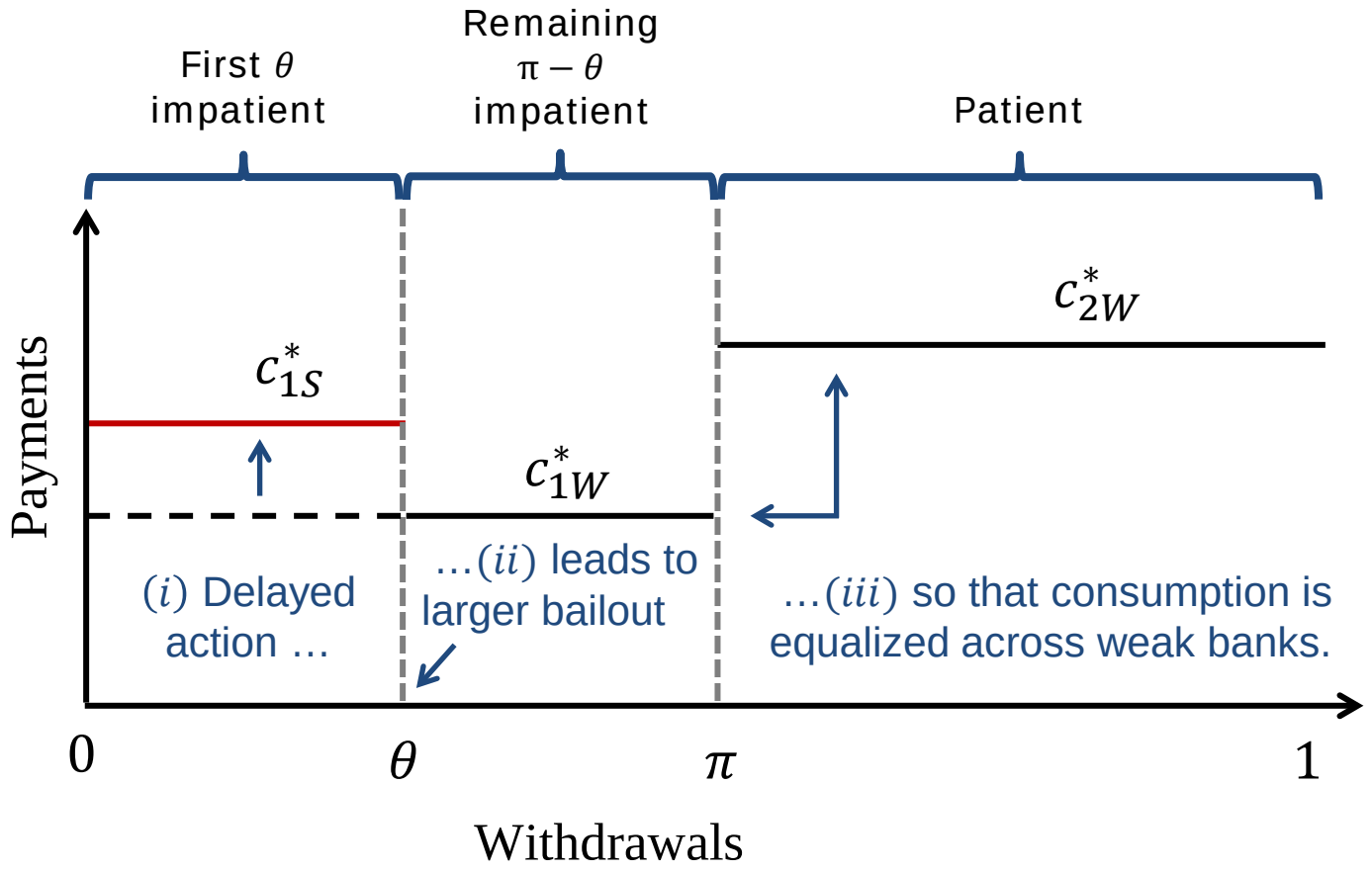
Q: Is the efficient allocation an equilibrium?

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

- If bank i chooses to bail in:



- If bank i chooses to imitate a sound bank:



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

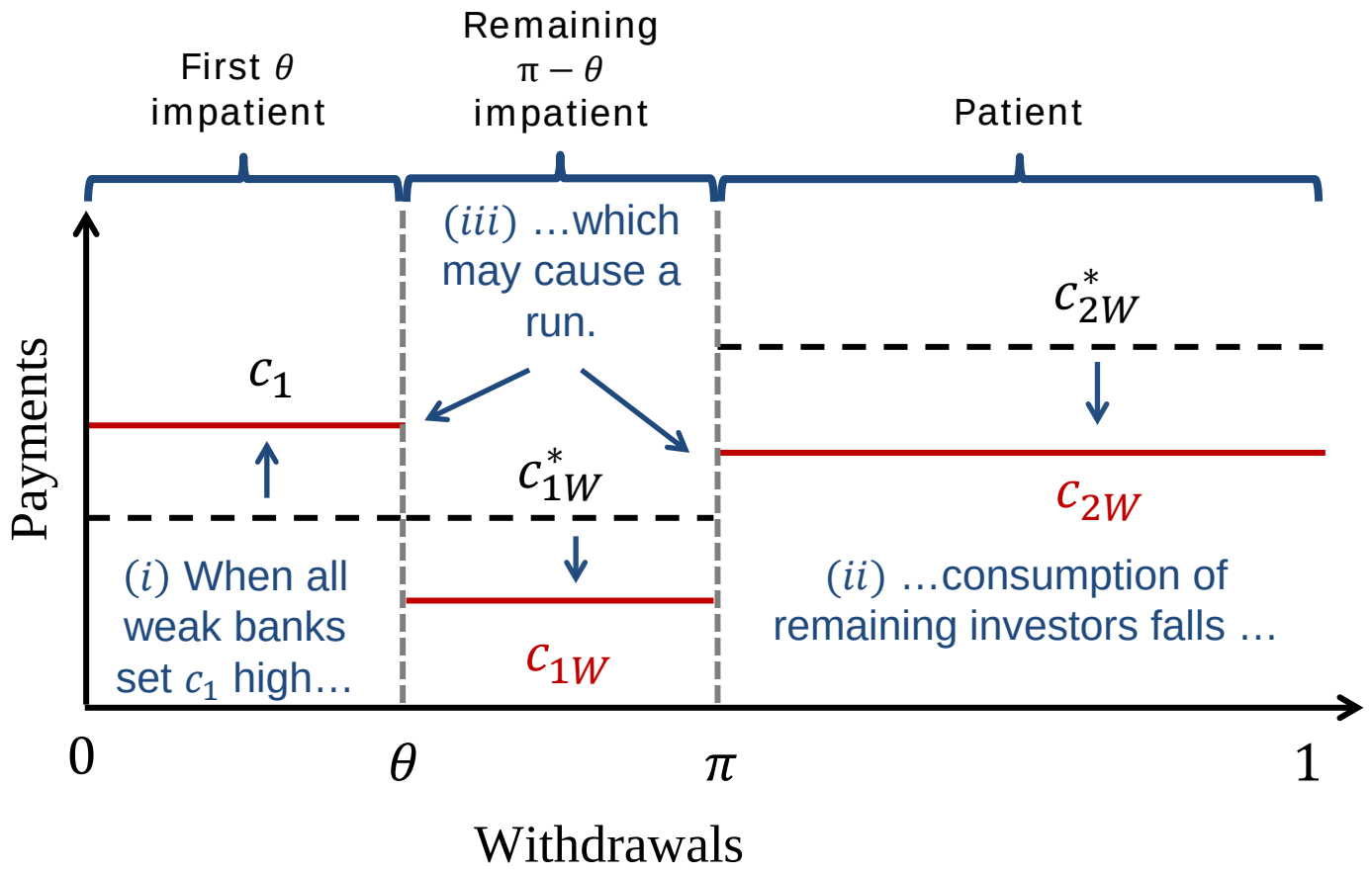
(3) Optimal bank regulation

- 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 $X = [0, c_{1S}^*]$
  - cap on early payments to prevent "extreme looting"
- Better option: set cap *below* c_{1S}^*
  - 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?

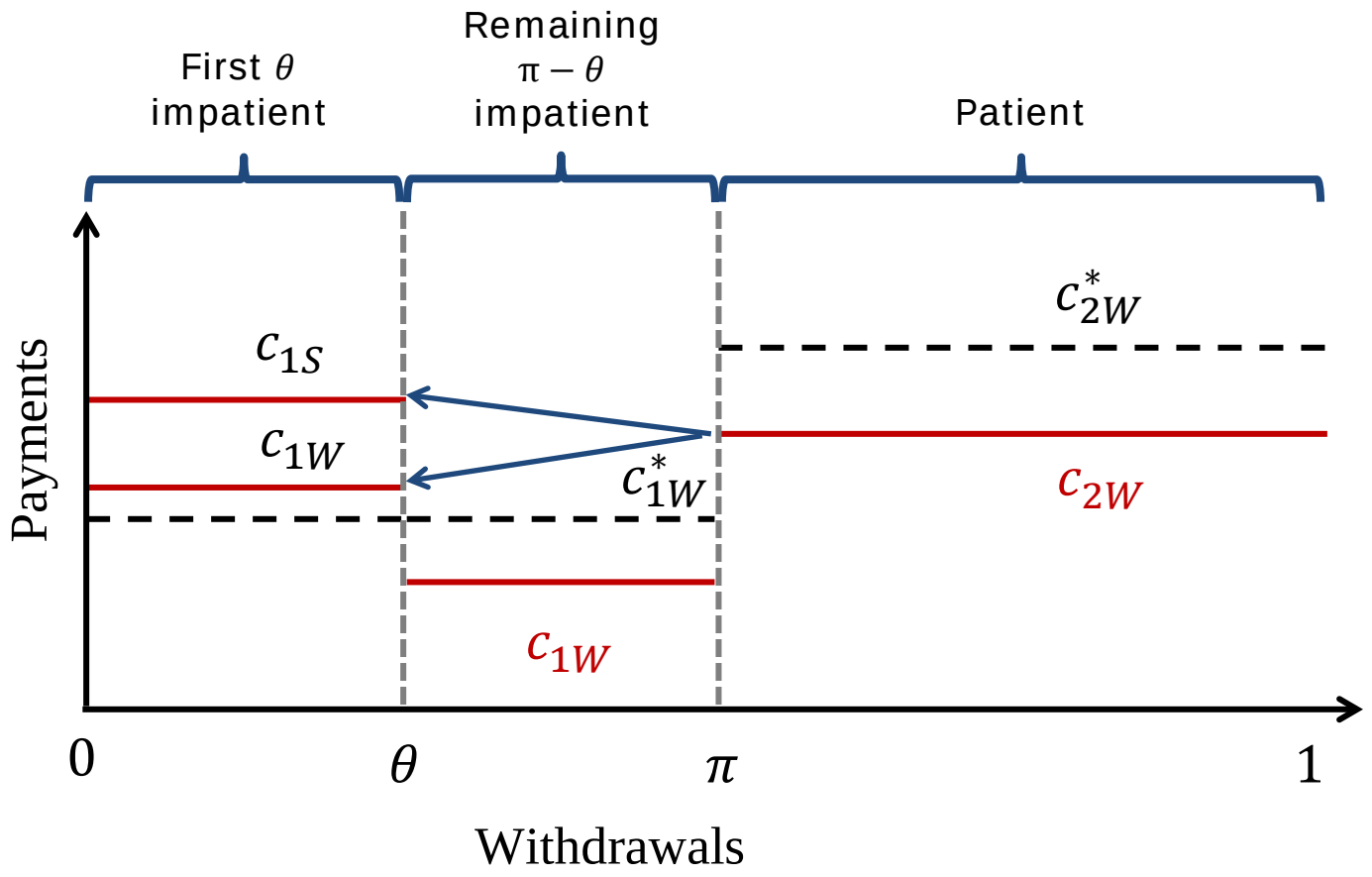
- before answering this question …

Bank runs



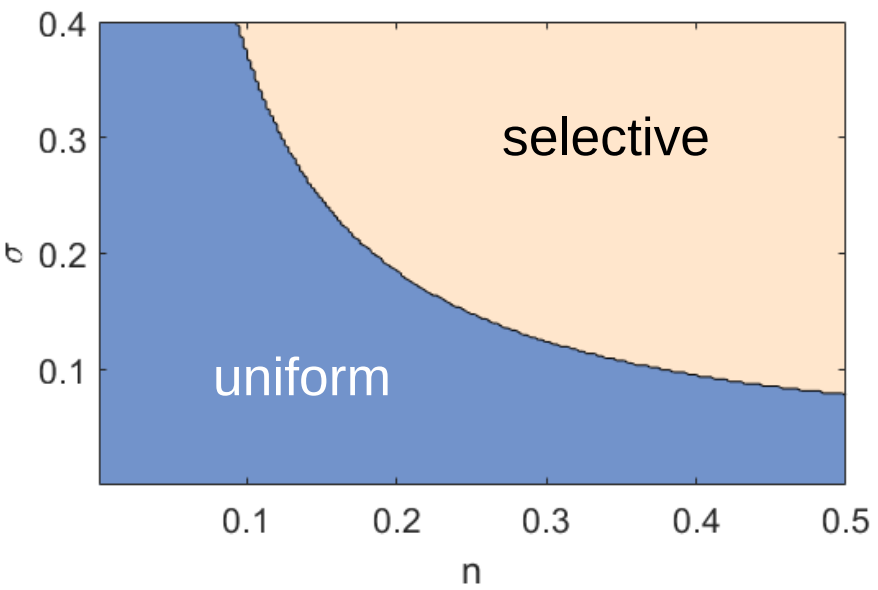
- Note: this is a "fundamentals" bank run
  - withdrawing early is a dominant strategy for patient investors

- 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 <u>not</u> if it chooses c_{1W} — a "selective" bail in
  - 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

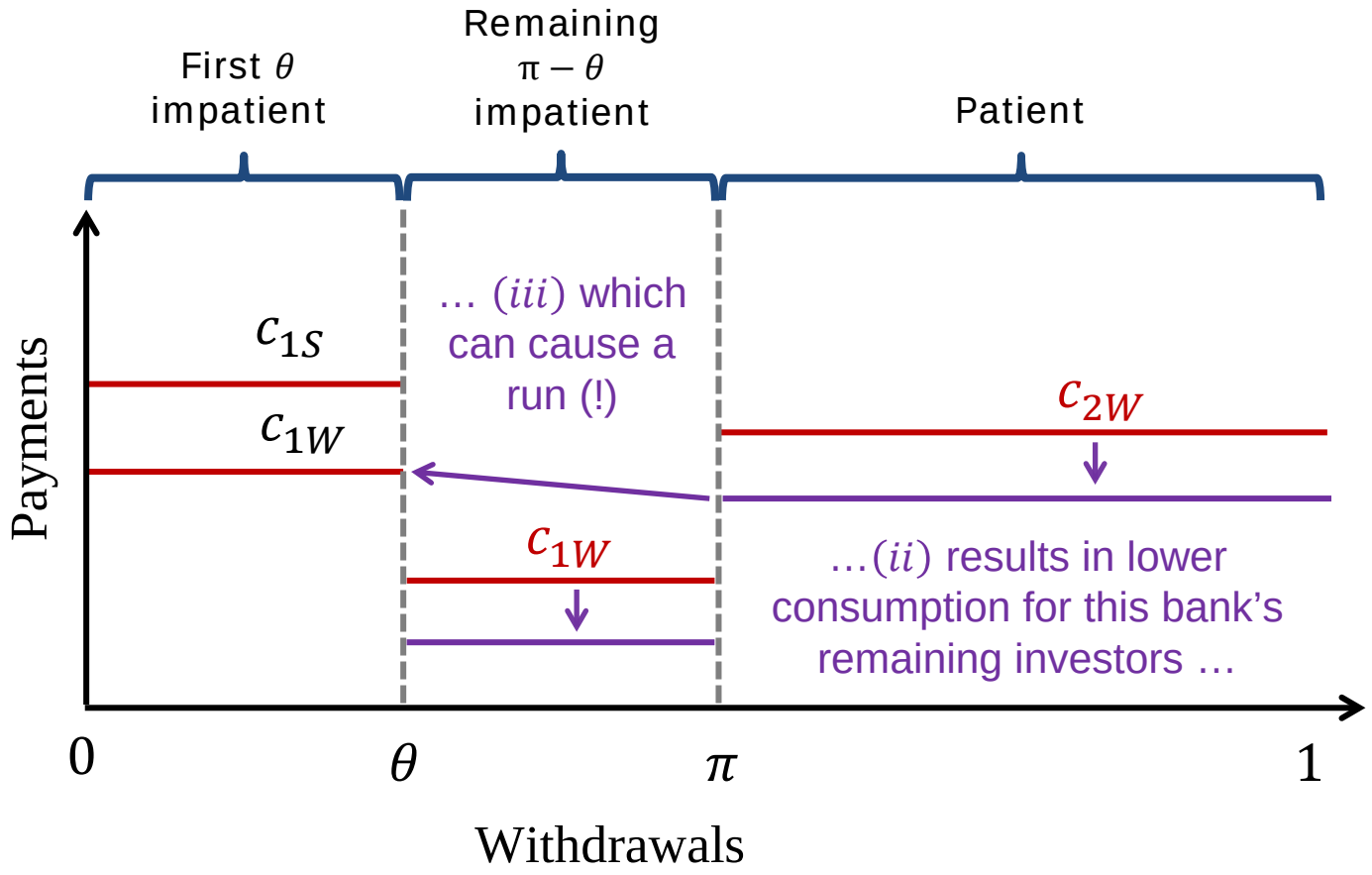
- There exists a policy (τ, X) that implements the constrained efficient allocation as an equilibrium

- But … is it the only equilibrium?

(4) Fragility and robust regulation

Fragility

- Suppose patient investors in <u>other</u> banks choose to run
  - (i) larger need for bailouts puts strain on government budget …



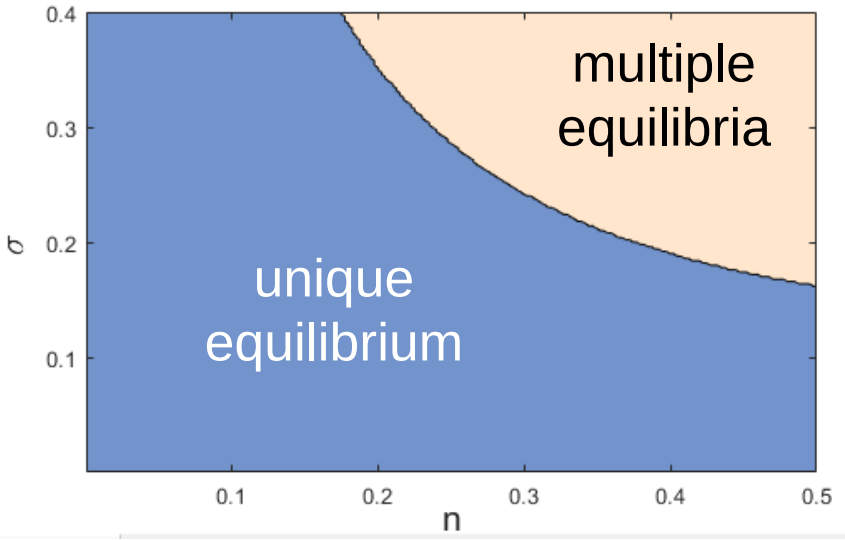
In other words

- 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

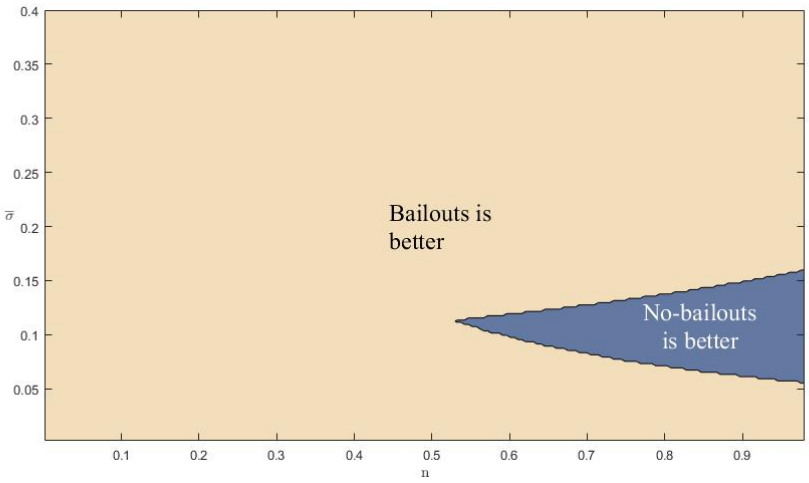
related to literature on "diabolic loops"

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



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