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.*"

  $\longrightarrow$ 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

$\Rightarrow$ Best outcome requires allowing bailouts and using prudential policy

Literature

- 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

$$u\left(c_{1i} + \omega_i c_{2i}\right) + v\left(g\right) \qquad u \text{ is CRRA, with } \gamma > 1$$

$$\text{where } \omega_i = \left\{ \begin{array}{c} 0 \\ 1 \end{array} \right\} \text{ if investor is } \left\{ \begin{array}{l} \text{impatient} \\ \text{patient} \end{array} \right\}$$

  - 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 $\left\{ \begin{array}{c} 1 \\ R > 1 \end{array} \right\}$ at $t = \left\{ \begin{array}{c} 1 \\ 2 \end{array} \right\}$
  - 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

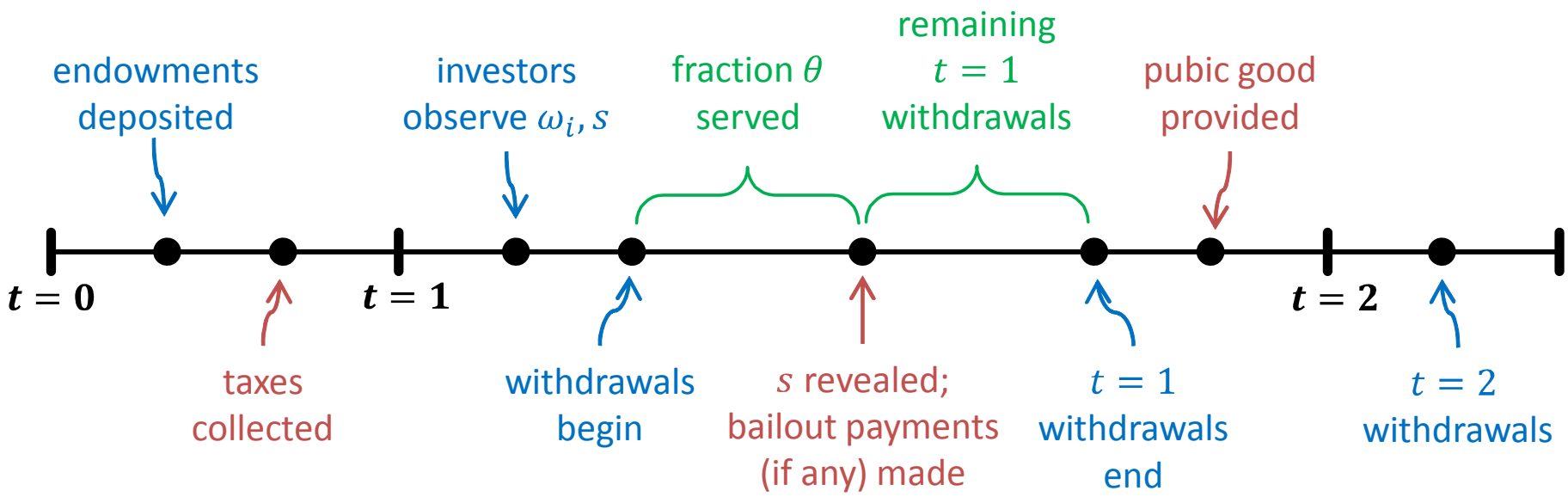
Intermediation

- 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 θ 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


endowments deposited
investors observe ω_i, s
fraction θ served
remaining $t = 1$ withdrawals
pubic good provided
$t = 0$
$t = 1$
$t = 2$
taxes collected
withdrawals begin
s revealed; bailout payments (if any) made
$t = 1$ withdrawals end
$t = 2$ withdrawals

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(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

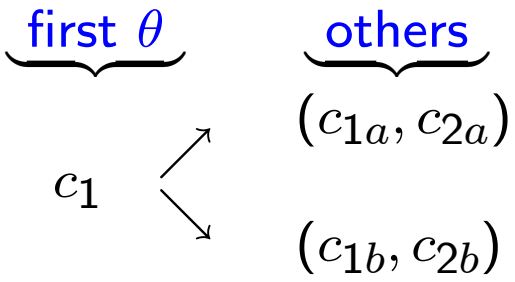
- There is always an equilibrium in which investors do not run
  - first-best allocation of resources obtains

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:



- 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 θ 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

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

  - 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

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

  - no incentive to provision for the run state

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

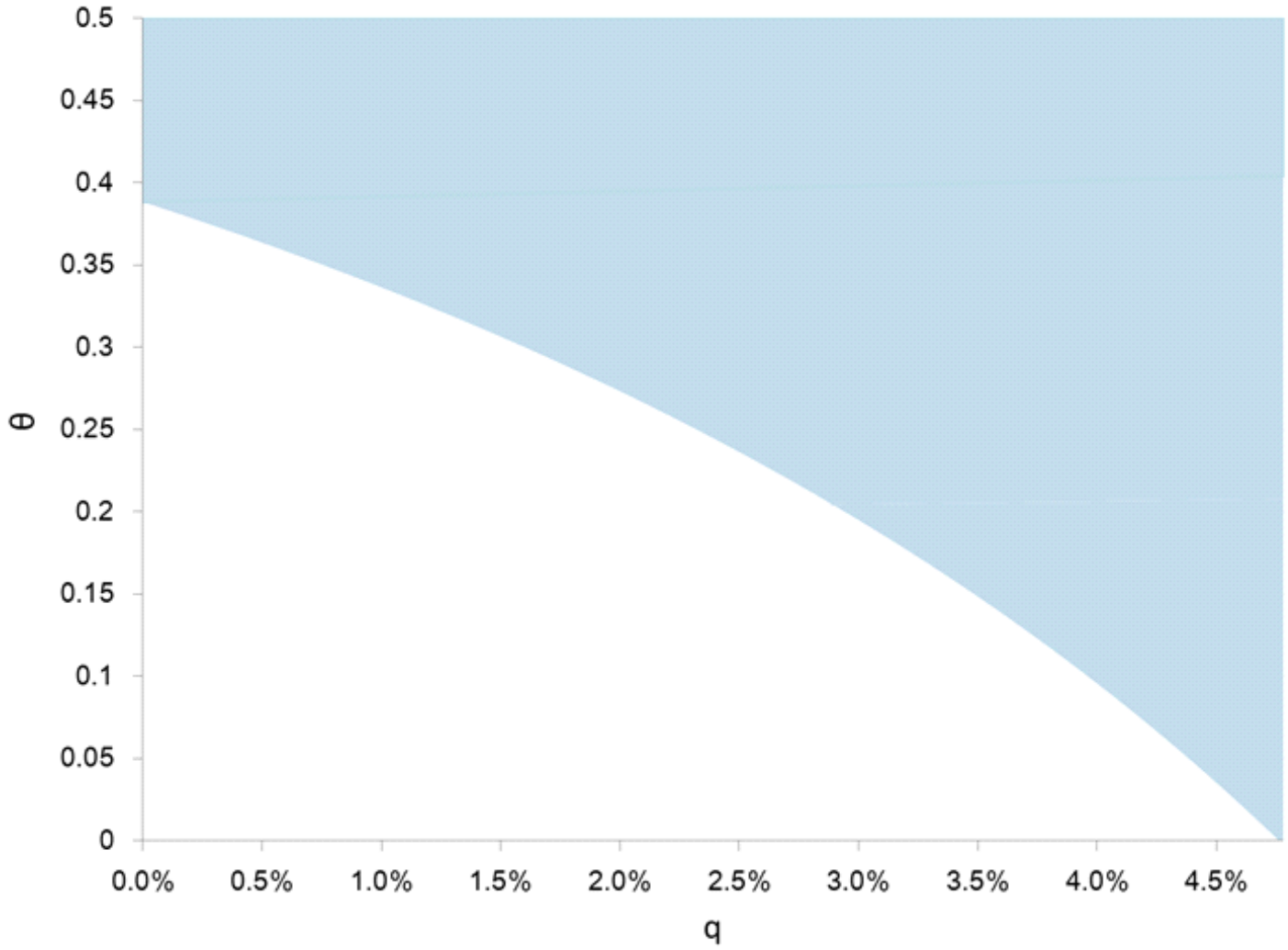
  - when q is larger, incentives become more distorted

Measuring financial fragility

- Let Φ^B = 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 Φ^B



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(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

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

  $\approx$ 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 Φ^{NB}, but not Φ^{B}

Intuition: two competing effects are at work

(1) A no-bailout policy makes intermediaries more liquid ($\sim$ lower c_1)

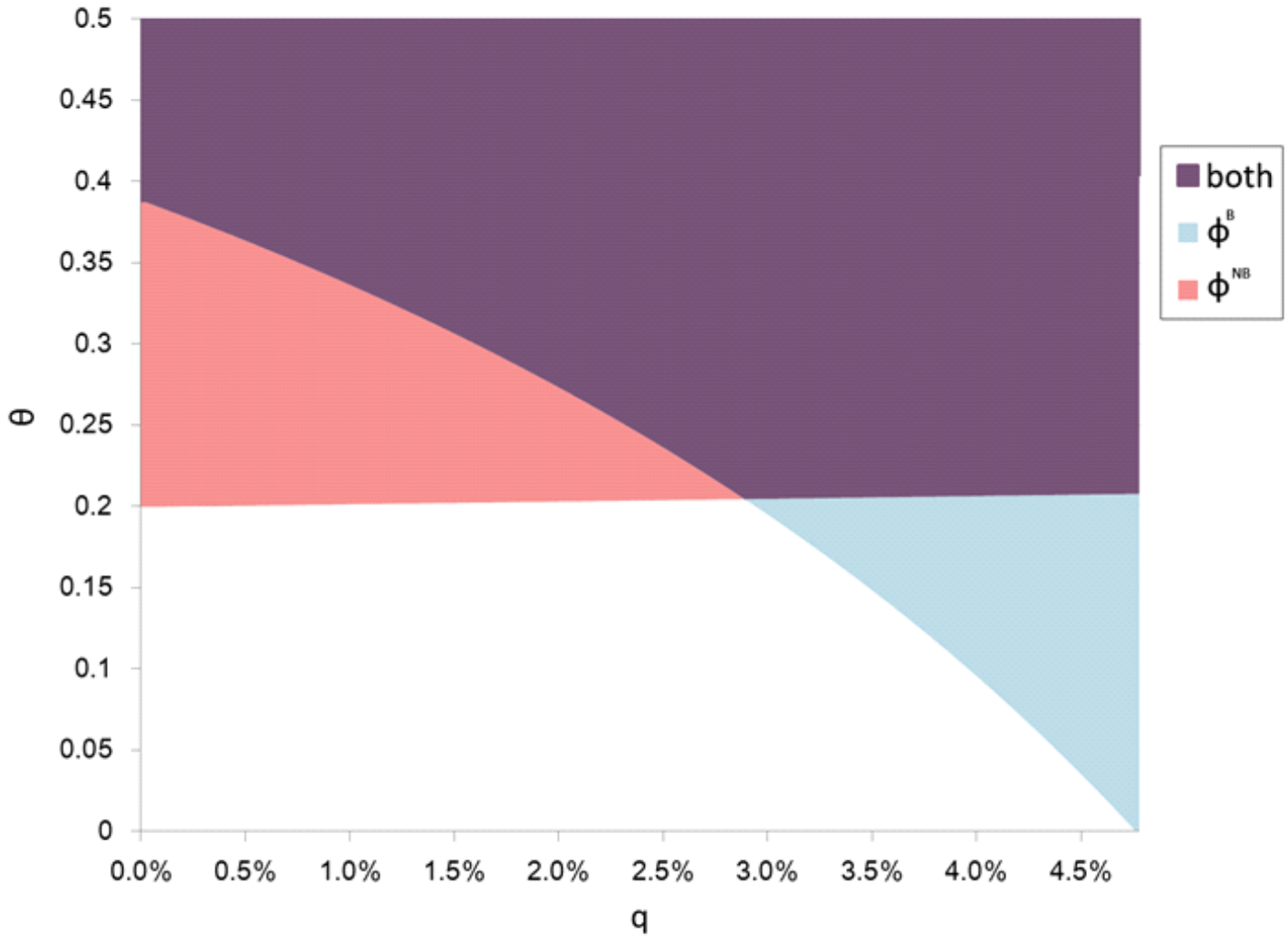
$\Rightarrow$ tends to reduce fragility

(2) But increases the loss from staying invested in a crisis ($\sim$ lower c_{2b})

– increases the incentive for investors to withdraw early

$\Rightarrow$ tends to increase fragility

Graphically



Welfare

- Consider an economy in both Φ^B and Φ^{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

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(4) Taxing short-term liabilities

- Now suppose the policy maker imposes a tax on intermediaries' short-term liabilities
  - an intemediary pays ηc_1 to govt for each of first θ withdrawals
  - no restrictions on bailout policy
- Policy maker chooses η to maximize investors' expected utility
  - no commitment: η is determined as withdrawals occur
- Intermediaries will then choose c_1 to maximize

$$\theta u\left(c_1\right)+\left(1-q\right)V_a\left(1-\tau-\left(\theta+\eta\right)c_1+N\right)\ +qV_b$$

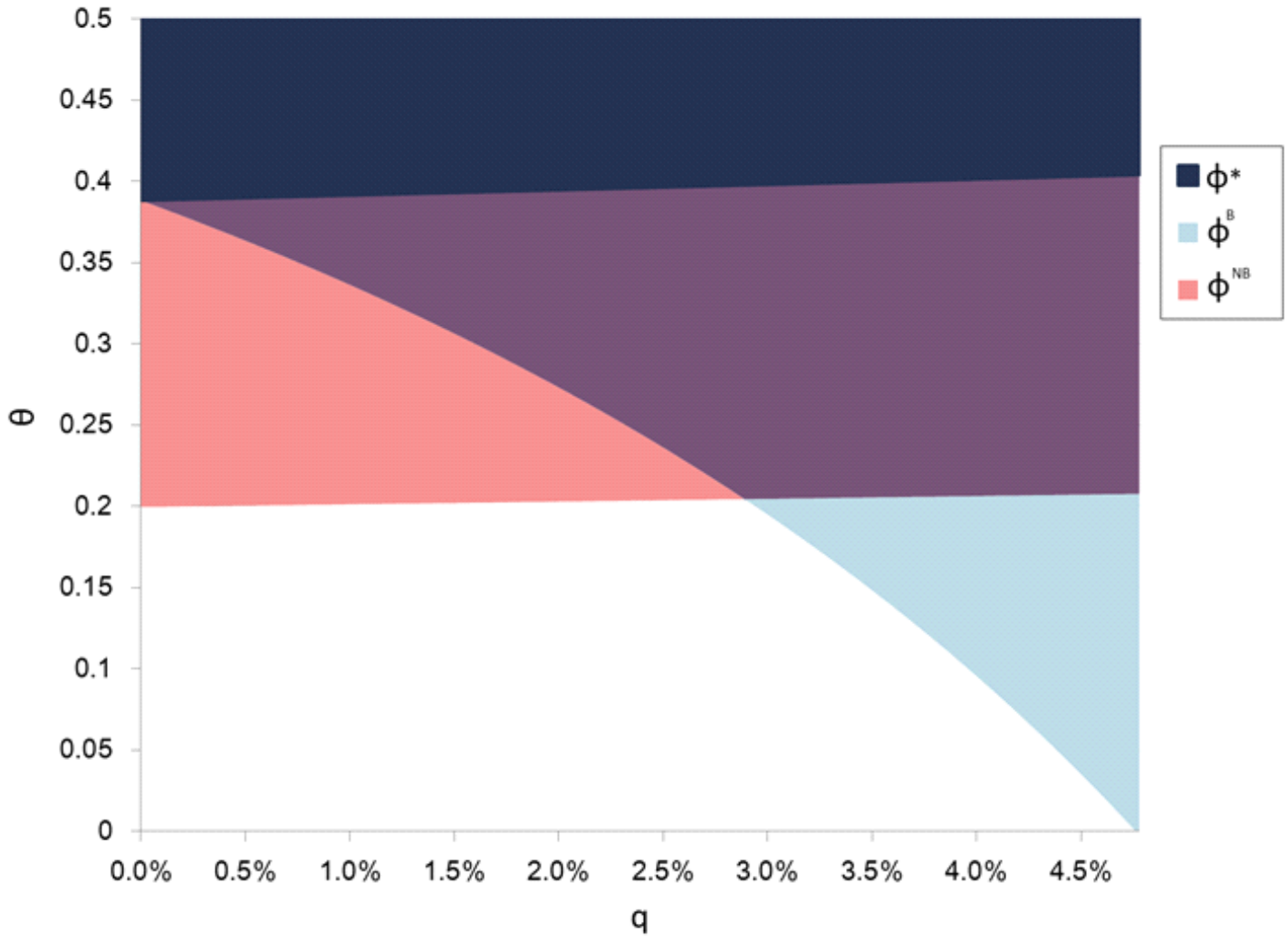
Results

- 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

Intution:

- 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 $W^* > W^{NB}$

Intution:

- 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

$\longrightarrow \rho^* > \rho^{NB}$

- Incentive distortion is corrected by the Pigouvian tax

$\longrightarrow \rho^* < \rho^B$

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

  $\Rightarrow$ 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

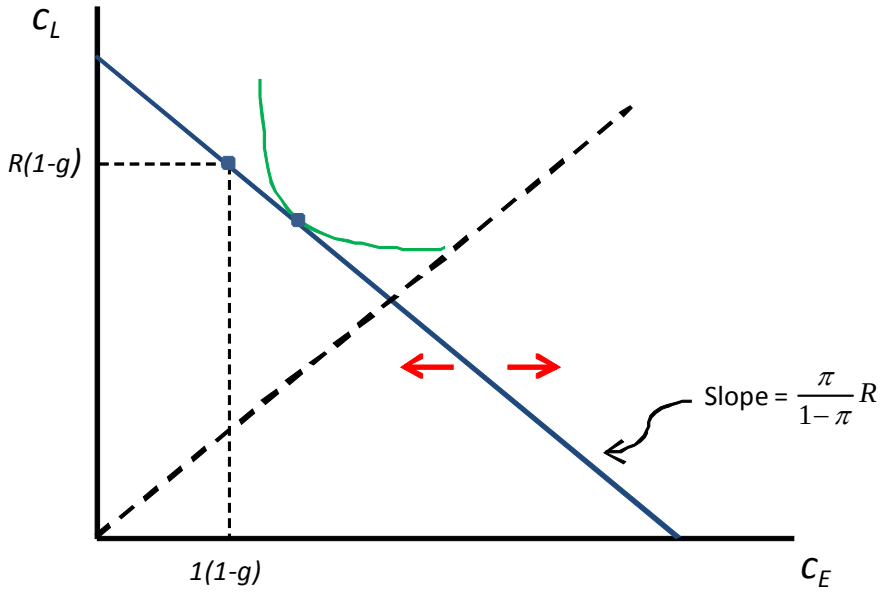
Caveats

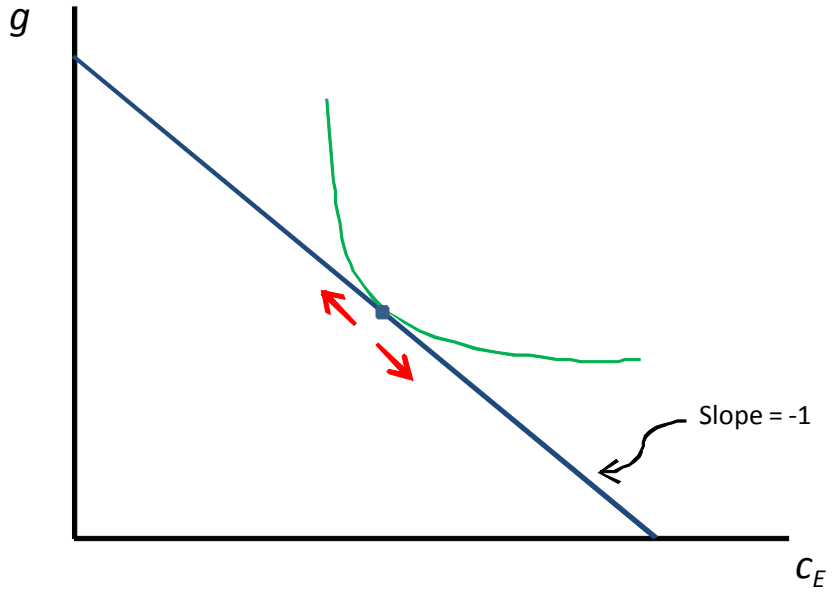
- Some important features of reality are missing, of course
  - distributional issues (and public finance issues more generally)
  - rent-seeking behavior, political motivations in bailouts
- Limits on policy makers' ability to reallocate may well be desirable
- But ... the main message remains
  - restrictions 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 π 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 $\left(c_{1b}^{j}, c_{2b}^{j}\right)$ across j
  - similar to Chari & Kehoe (2009), Farhi and Tirole (2012)

  $\Rightarrow$ 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