Discussion of:

Trading on Sunspots

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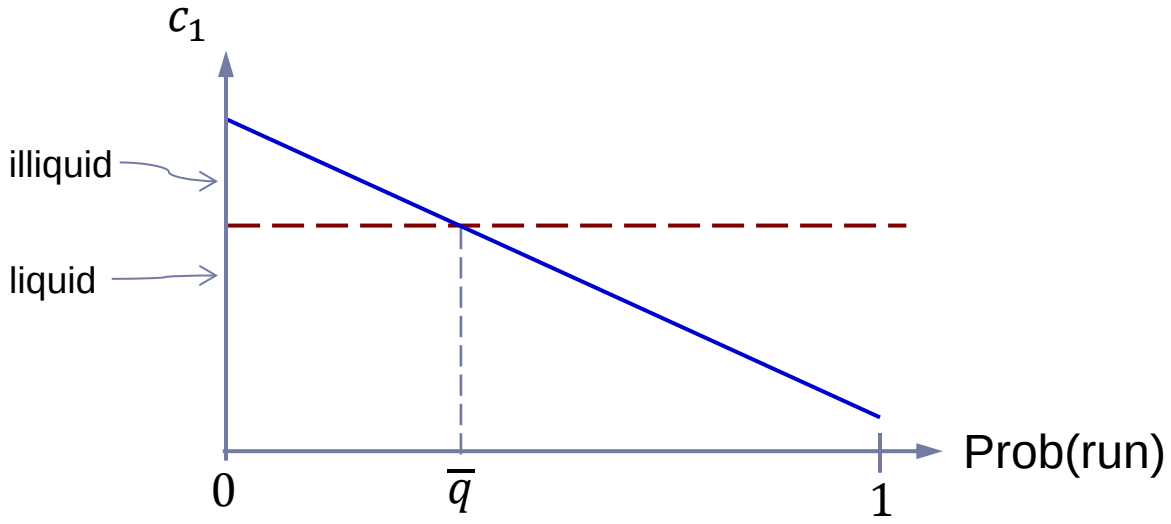
Sunspots and bank runs

- Consider a Diamond-Dybvig model with no uncertainty
  - given the face value of deposits (c_1), depositors play a coordination game
  - if c_1 is large enough, the bank is illiquid and the game has multiple equilibria
- If depositors observe a sunspot variable before choosing their actions:
  - any equilibrium outcome can be assigned to any sunspot state
  - equilibrium probability of a run can be any $q \in [0,1]$
- Now suppose the bank is a player in the game
  - chooses c_1 before the sunspot state is realized
  - aims to maximize depositors' expected utility

- For a higher probability of a run ⇒ the bank becomes more cautious
  - sets c_1 lower to preserve resources (in case things go badly)

  ⇒ becomes less illiquid



- When bank is liquid, depositors have no incentive to run

  ⇒ there cannot be an equilibrium in which Prob (run) $> \overline{q}$

A general point

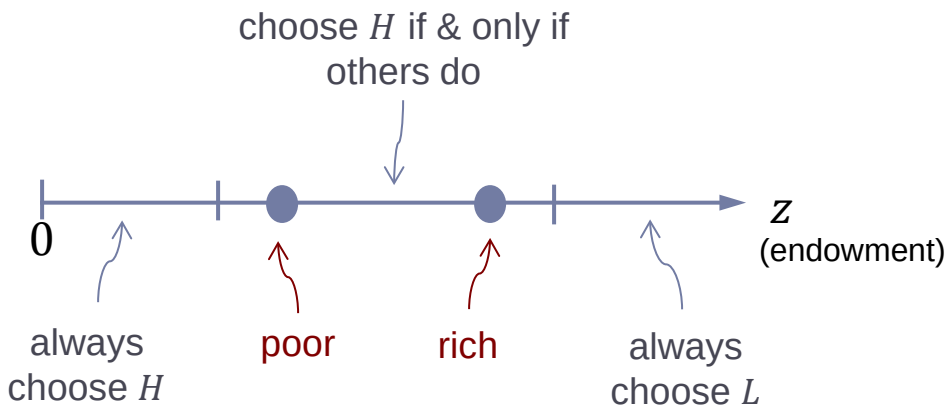
- When actions are taken before the sunspot state is realized:
  - these actions will change the subgame being played in each state
  - a sunspot equilibrium is no longer an arbitrary randomization over the equilibria of the model without sunspots
- These actions will depend on the probability of a crisis
  - likelihood of a crisis ⇒ actions ⇒ states in which a crisis can occur
- Result: model restricts the (sunspot) probability of a crisis in a meaningful way.

References:

- Cooper & Ross (1998), Peck & Shell (2003), Ennis & Keister (2010)

This paper

- A different model, with different issues and a different mechanism
  - but the same general phenomenon appears
- The model without sunspots
  - effort choice game with strategic complementarities
  - binary choice: effort is low or high
  - an individual agent's optimal effort choice is:

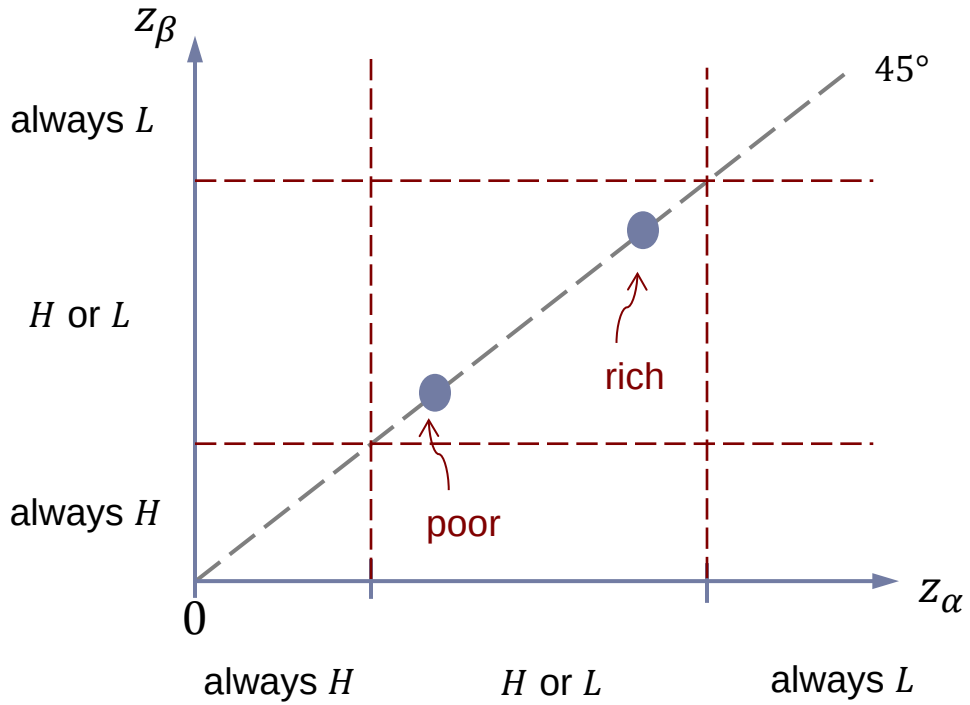


If all endowments are in the middle region …

… then "all H" and "all L" are both equilibria

Adding sunspots

- Introduce two sunspots states: $s \in \{\alpha, \beta\}$
  - but no actions taken before sunspot state is realized
  - look for equilibria in which agents choose High in state α and Low in β
- Optimal effort choice is now:

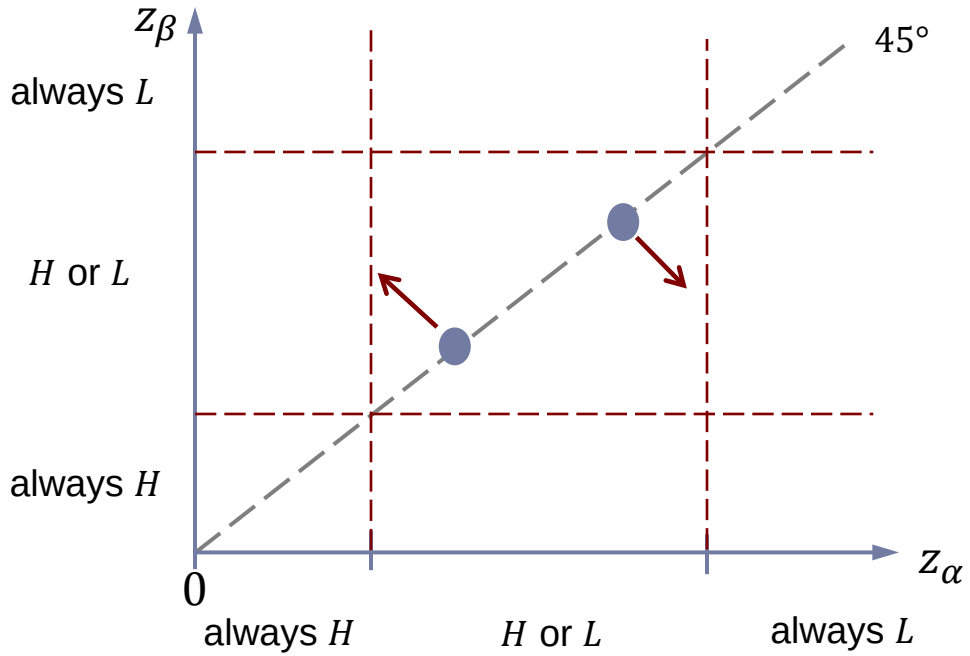


Q: For what values of π_β does this equilibrium exist?

A: Any $\pi_\beta \in [0,1]$

Trading on sunspots

- Now allow trade at $t = 0$ in sunspot-contingent assets
- Paper shows that rich agents will shift wealth from state β to α
  - poor agents do the opposite (obviously)
- Look at the post-trade endowments:



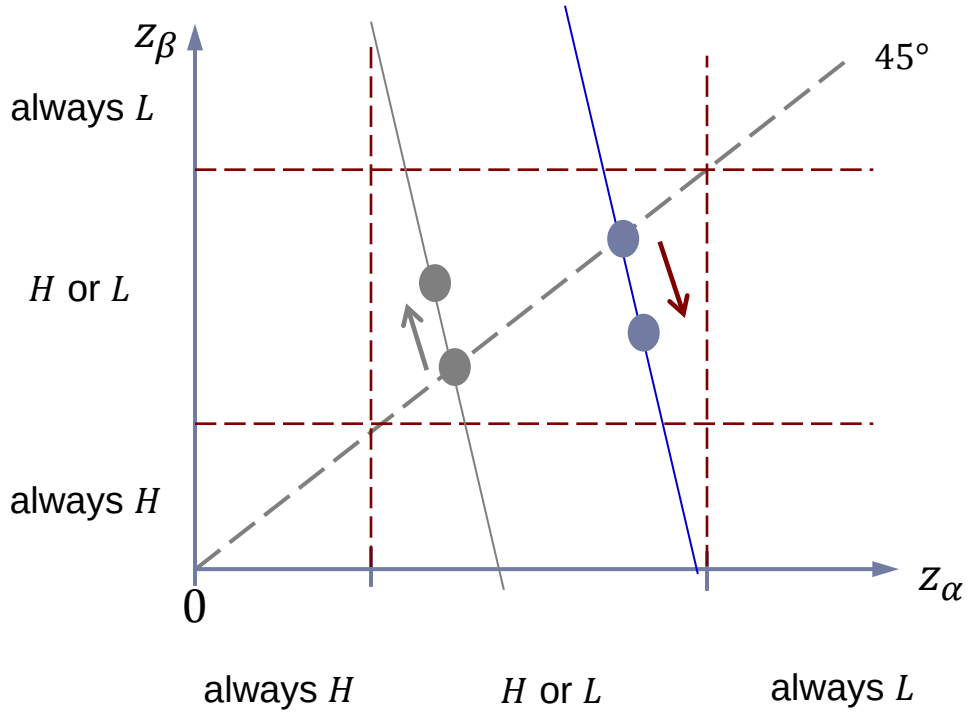
If trades are large enough …

… post-trade endowments will lie outside the middle region…

… changing the equilibria of the coordination game in some state(s)

Why the probabilities matter

- Equilibrium securities prices are related to the probabilities
  - if state s is unlikely, consumption in s is relatively cheap
- Focus on the rich agent:



If β is very unlikely …

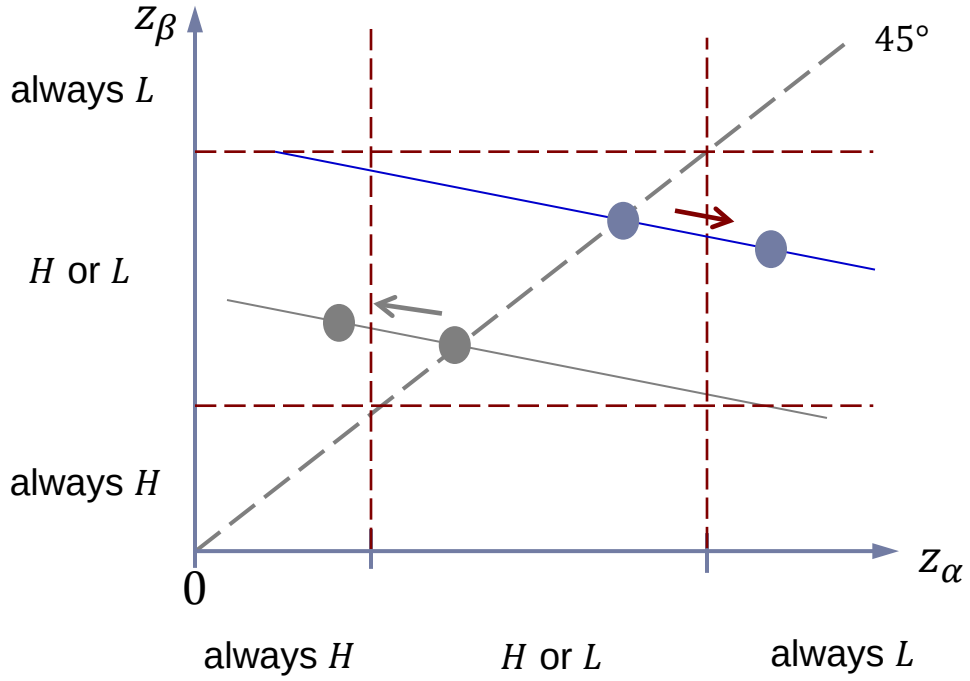
… the budget line is very steep …

… and the post-trade endowment will remain in the middle region …

… and the candidate equilibrium still exists.

- In contrast, if state β is very likely, the budget lines are very flat
  - the rich agent will be very wealthy in state α
  - leading her to choose L instead of H …

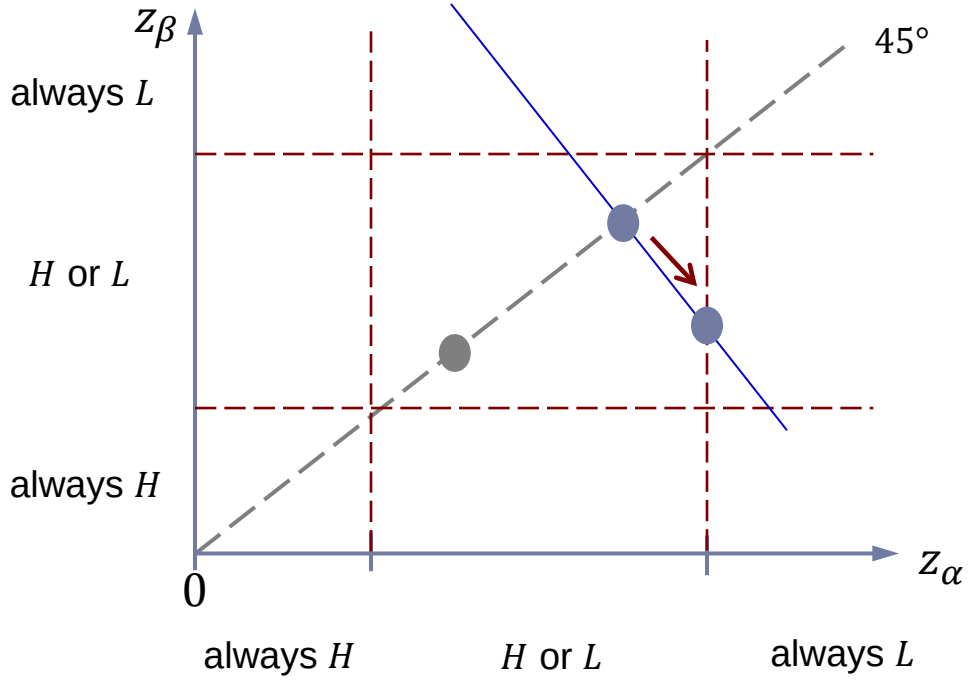
… which is inconsistent with the candidate equilibrium



⇒ There cannot be an equilibrium with this probability distribution over $\{\alpha, \beta\}$

The maximum probability of a crisis

- Result: There is a maximum probability of π_β for which the outcome (H in α, L in β) is an equilibrium
  - post-trade endowment is on the boundary



Interpret as the upper bound on the equilibrium probability of a disaster

Can do comparative statics with this probability

Comment (1): Comparing models

- Mechanisms are very different (asset trade vs. banks), but …
- The maximum probability of a crisis comes from similar logic
  - if the probability were larger, someone would take ex ante actions that undermine the equilibrium incentives
- Interesting difference:
  - DD: if prob(run) is high, bank becomes very safe
    - the **good** action (not run) becomes a dominant choice
  - JT: if prob(bad state) is high, trade makes rich agents even richer in state α
    - the **bad** action (low effort) becomes the optimal choice in α
- What are the implications of this difference?
  - other types of equilibria?

(2) Incomplete markets

- Paper studies a situation with a complete set of Arrow securities
  - for sunspot states
- Cass (1989):

  "The inherent nature of sunspot beliefs … militates against ever having a complete arrow of Arrow-Debreu markets"
- Moreover, incomplete market may be desirable here
  - if underlying model is Walrasian, complete markets are good
  - Cass and Shell (1983) "sunspot-immunity" theorem
  - here: some incomplete-markets structures could conceivably Pareto dominate complete markets

(3) Financial regulation

- Can this framework generate a theory of financial regulation?
  - should we restrict trade in certain types of assets?
  - should we encourage (subsidize?) other assets?
- Tradeoff:
  - want agents to have insurance
  - but also want asset payoffs to move the economy to "good" regions
  - which may make insurance less important

Q: For a given economy, what assets tend to raise $\overline{q}$?

- are there assets that tend to lower it?
- what would a welfare-maximizing asset structure look like?