Discussion of:

*Trading on Sunspots*

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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 $\text{Prob (run)} > \bar{q}$
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 $\Rightarrow$ actions $\Rightarrow$ states in which a crisis can occur

- Result: model restricts the (sunspot) probability of a crisis in a meaningful way.

References:

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:

    \[
    z \text{ is chosen if and only if others do choose } \begin{cases} 
    H & \text{poor} \\
    L & \text{rich} 
    \end{cases} 
    \]

If all endowments are in the middle region …

… then “all H” and “all L” are both equilibria
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 \( \alpha \) and Low in \( \beta \)

Optimal effort choice is now:

- \( z_\alpha \) poor rich
- \( z_\beta \) always

**Q:** For what values of \( \pi_\beta \) 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 $\beta$ to $\alpha$
  - 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 $\beta$ 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 $\beta$ is very likely, the budget lines are very flat

- the rich agent will be very wealthy in state $\alpha$
- leading her to choose $L$ instead of $H$ …

... which is inconsistent with the candidate equilibrium

$\Rightarrow$ 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 $\pi_\beta$ for which the outcome $(H$ in $\alpha$, $L$ in $\beta$) is an equilibrium

- post-trade endowment is on the boundary
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 $\alpha$
    - the bad action (low effort) becomes the optimal choice in $\alpha$

- 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 $\bar{q}$?
  - are there assets that tend to lower it?
  - what would a welfare-maximizing asset structure look like?