Discussion of: “Monetary policy and herd behavior in new-tech investment”

Olivier Loisel
Aude Pommeret
Franck Portier

Christian Hellwig

Toulouse School of Economics

Environment

- $t = 0,1,\ldots$
- State of nature: $\{H,L\}$, determined at $t=0$, fixed throughout, with $Pr\{H\} = p$.
- World ends each period w.p. $1-\beta$, at which time state is fully revealed.
- Each period, one investor makes investment decision, two options
- Old tech: invest κ, return A when world ends (no uncertainty)
- New tech: invest $\kappa+\Delta(\kappa)$, return $A+\Delta(A)$ in state H, A in state L,
- Each investor receives signal x: $Pr(x=s) = \lambda > ½$.

Assumptions:

- No discounting between periods, all returns realized when world ends.

- In good state, new technology is optimal:

$$\Delta(\kappa) < \Delta(A).$$

- Return always suffices to pay for initial investment:

$$A > \kappa + \Delta(\kappa).$$

Allocation: maps signal histories x^t to current investment action $a(x^t)$.

Social planning problem

- Consider Utilitarian Social Planner:

$$v(p) = \max_{\{a(x^t)\}} \sum_{t=0,x^t}^{\infty} \beta^t \Pr(x^t) a(x^t) (\Pr(H \mid x^t) \Delta(A) - \Delta(\kappa))$$

- Suppose first that signals commonly observable

- Recursive solution:

$$v(p) =$$
$$\max_{\{a(x_H), a(x_L)\}} \Pr(x_H) \{ a(x_H) (\Pr(H \mid x_H) \Delta(A) - \Delta(\kappa)) + \beta v(p'(x_H, p)) \}$$
$$+ \Pr(x_L) \{ (a(x_L) (\Pr(H \mid x_L) \Delta(A) - \Delta(\kappa)) + \beta v(p'(x_L, p))) \}$$

Social planning problem

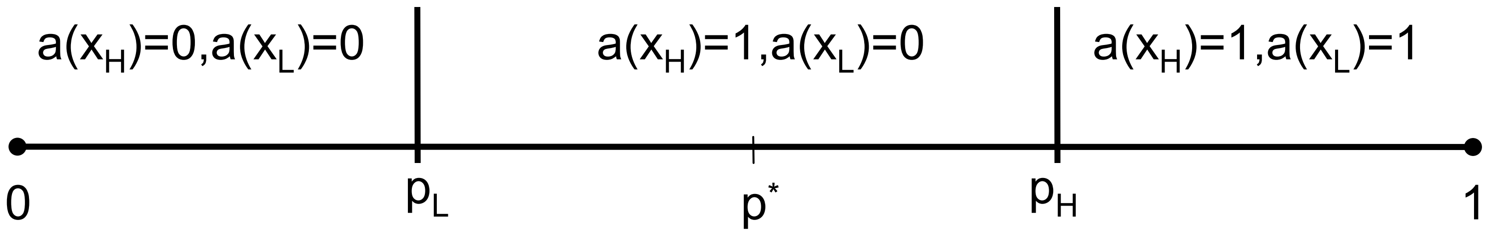
- ***Solution*** to planning problem:
  - exogenous learning through x^t
  - optimal decisions are 'myopic' (i.e. only consider current period payoffs).
  - Invest if and only if $Pr(H|x) > p^*$.
- ***Decentralization:*** contingent payment contracts
  - Uncontingent loan for investment plus
  - Option to bet on aggregate state
- Notice: consistent with incentive compatibility, even if signals are privately observed!
  - Implies contracting restrictions important for herding behavior.

Planning problem with 'herding restriction':

- ***Suppose next that planner can only learn from actions:***
  - $a(x_H) = a(x_L) = 0$ or $a(x_H) = a(x_L) = 1$ implies $p'(x,p) = p$
  - Updating only if $a(x_H) = 1 = 1 - a(x_L)$ or $a(x_H) = 0 = 1-a(x_L)$
- Mimicks updating rule from simple herding models.
- Same planning problem as above, but with additional restriction on updating of beliefs.
- Again, possible to solve recursively, using p as state variable
- Preliminary leg work:
  - Separation: $a(x_H) = 1 = 1 - a(x_L)$ dominates $a(x_H) = 0 = 1-a(x_L)$ (always best to have high signal invest to achieve separation)
  - Pooling: if actions are pooled then choose myopically optimal.

Planning problem with ‘herding restriction’:

- ***Solution:***



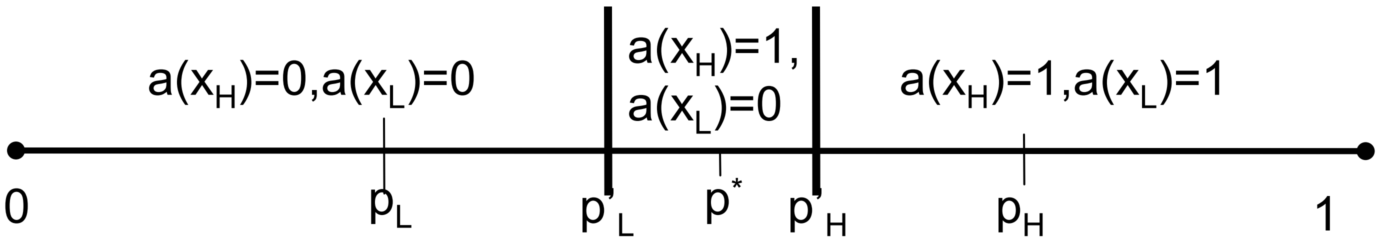
- Separation in middle region, as soon as belief hits p_L or p_H, absorbing state.

- Experimentation:
  - Tradeoff: foregone myopic profits vs gains from additional information

- As β goes to 1, limits p_L and p_H approach 0 and 1.

Pure herding equilibrium

- ***Consider market environment in which investors borrow from deep-pocketed outsiders***



- Same structure, but eq. thresholds much tighter

- Why?
  - Suppose initial belief near p^*, first investor just indifferent before receiving private signal → Signal breaks tie.
  - Second investor: if signal opposes first action, belief back to initial belief Otherwise, signal reinforces first…
  - As soon as two separating investors take identical decisions, they outweigh all further private info, so herd starts.

- Social learning externality: investors don't internalize informational benefits to subsequent investors (think of problem with β=0).

Interest Policy

How policy can correct herding externality

- Interest policy: alter tradeoff between initial investment cost and return.
- Replace κ, $\Delta(\kappa)$ with $\gamma(x^t)\ \kappa$, $\gamma(x^t)\ \Delta(\kappa)$.
- Idea: change tradeoff in such a way that indifference point p^* always lines up with current posterior p.
- Then, signals are pivotal.
- Remark: can use this to implement any investment plan (including optimal one).

Comments:

Back to planning problem:

- Key for social learning externality, herding problem:
  - Uncontingent contracts, limit learning from actions (restriction on contract space)
- Contingent contracts improve separation
  - Glosten-Milgrom: zero-sum best on good outcomes fully reveal information through prices
- Separation of investment/debt decision from information aggregation/secondary markets:
  - Use bets in secondary markets to aggregate info
  - Separate from investment and uncontingent loan.

Comments (ctd):

- Restriction to primary loan contracts
  - One-sided screening possible if $a(x)=1$ (use different upsides to separate signals)
  - Not feasible if $a(x)=0$ is chosen (uncontingent return)
  - One-sided experimentation problem
  - Intervention to foster investment when p is low… (not a story about bubbles, but about busts)

- Similar argument, if investment activity generates additional signals to private sector (learning from outcomes)

Conclusion:

- Interesting herding story for investment
- ‘usual’ critiques of herding models apply (robustness, role of prices etc.)
- Interest rate policy as ‘poor’ substitute for richer contract spaces that avoids herding.
- Key for overall efficiency: separating learning about signals from actual investment decisions
- Is learning externality really a first order concern?