Market Feedback: Who Learns What?

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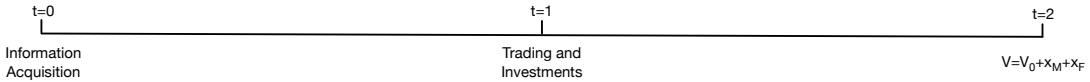
Setup

- Why I liked this paper:
  - Nice laboratory to explore information substitutability vs complementarity
  - Tractable, with closed form solutions.
  - Intuitive assumptions and setup.
  - Very interesting results
- Where I struggled:
  - An explosion of conditional cases
  - Intuition for main mechanisms

Setup



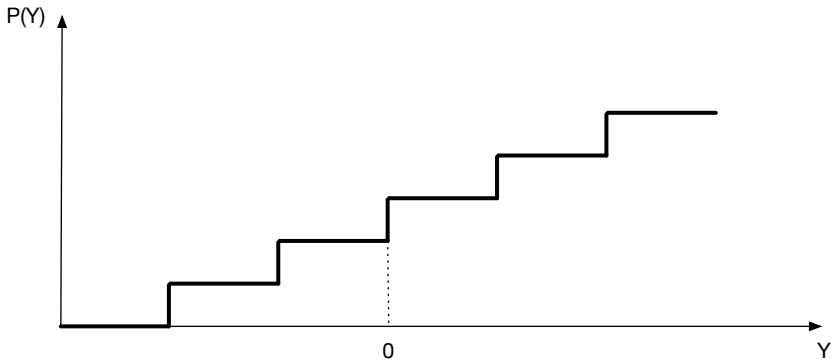
- Firm:
  - Free signal about F with probability ω
  - Can then see F perfectly OR get a shot at M with probability $\delta\omega$
- Each trader can see F or M perfectly. Trades 1, 0, or -1.
- Noise traders demand $z \sim U[-1, 1]$.
- Market maker sets price such that $P = E[V|Y]$

Equilibrium Behavior

- Price is an increasing step-function in demand
- Traders buy on H and sell on L
- If $\kappa > 0$ firm invests on any H OR if P high enough.
- If $\kappa < 0$ firm invests if both signals are $\emptyset$ or H, and P high enough.

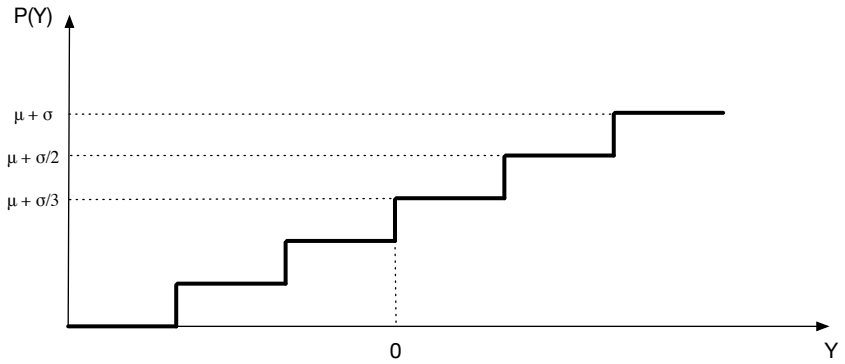
Price

$\kappa > 0$



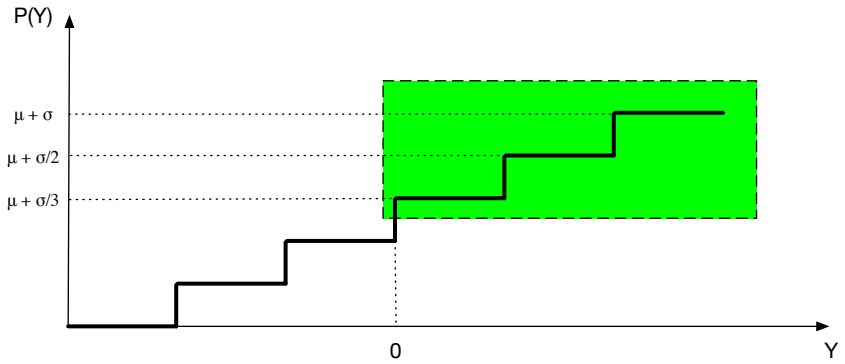
Price

$\kappa > 0$



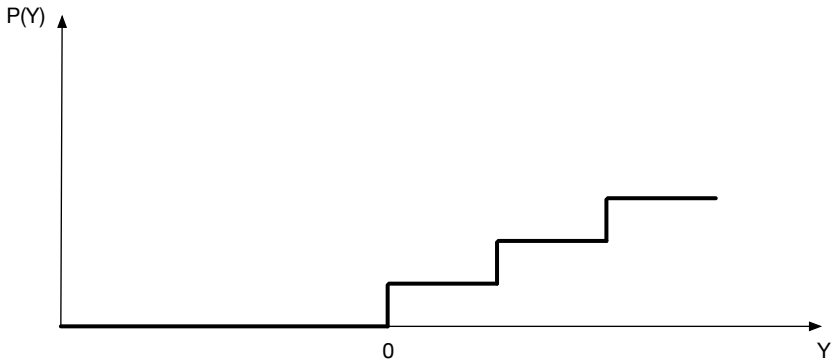
Price

$\kappa > 0$



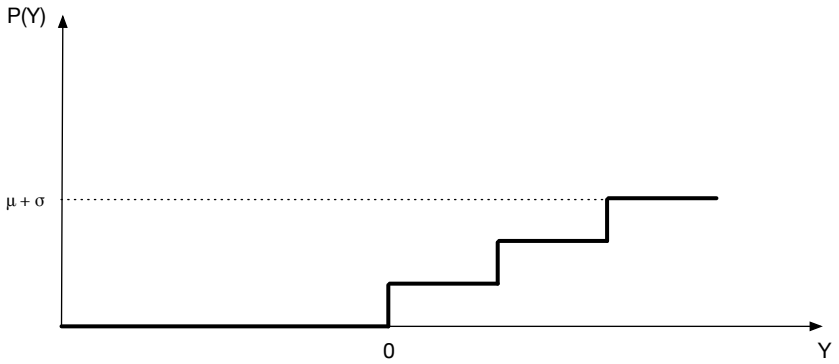
Price

$\kappa < 0$



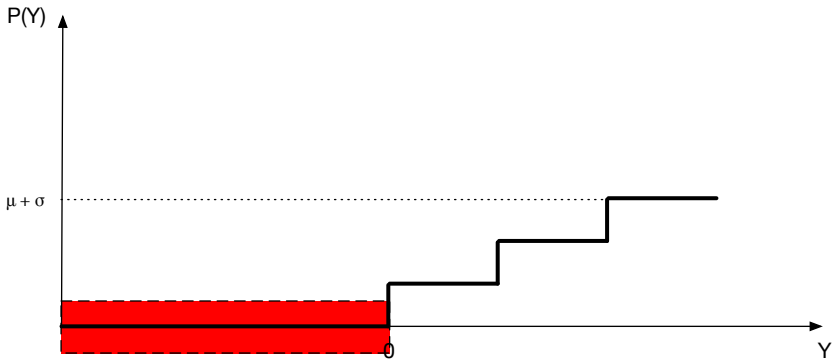
Price

$\kappa < 0$



Price

$\kappa < 0$



Information Equilibrium

- Firm wants to learn about a different factor than traders.
  - If $\kappa > 0$, H is sufficient. If L, wants second opinion.
  - If $\kappa < 0$, L is sufficient. If H, wants second opinion.
- Traders' best responses depends on κ:
  - If $\kappa > 0$ firms increasing probability of seeing F is matched by traders.
  - If $\kappa < 0$ firms increasing probability of seeing F causes traders to shift to M.

One Problem: Difficult Model

- Discrete variables: s_1, s_2, a, θ_M, θ_F, P, etc.
- Proof of Equilibrium is 19 pages long!
- The word 'if' is used over 200 times in one proof.

Intuition for Traders' Learning (1)

- Suppose that $\omega \to 1$ AND $\delta \to 0$.
- Firm has no information strategy. Always sees F perfectly. Never sees M.
- Traders' best responses *do not qualitatively change*.
- Still want to align with firm when $\kappa > 0$ and differ when $\kappa < 0$.

Intuition for Traders' Learning (2)

$\omega \to 1$, $\delta \to 0$, $\kappa > 0$

- Prior is that firm *should* invest.
- Aligning lets traders match firm action (go long when investing and vice-versa).
- Main downside of aligning is if firm sees L, and M is high.
- Therefore, traders will split, but on the margin, will favor aligning.

Intuition for Traders' Learning (3)

$\omega \to 1$, $\delta \to 0$, $\kappa < 0$

- Prior is that firm *should not* invest.
- Differing gives traders best chance to change firm's mind.
- Main downside of differing is if firm sees L, and M is high.
- Traders again will split, but on the margin will favor differing.

Intuition for Traders' Learning (4)

What if $\omega < 1$, $\delta \to 0$?

- Firm still never sees M, and sometimes doesn't see F (depending on q)
- If firms get no information, traders split between the signals.
- Therefore, increasing the odds of the firm getting $\emptyset$ tilts best response towards $\frac{1}{2}$.

Intuition for Traders' Learning (5)

What if $\omega < 1$, $\delta > 0$?

- Firm can see either M or F (worse at seeing M)
- As δ increases, and q decreases:
  - Firms information between the two factors is close to even as δ close to 1.
  - Traders more likely to split between the two factors.
  - Therefore: Increasing δ similar effect on traders to reducing ω!

What have we learned?

- Turns out prior beliefs matter a lot!
  - When prior is to invest, traders want to be on same page as firm.
  - When prior is not to invest, traders want to change firm's mind.
- Including firm information choice changes shape but not sign of best response.