Risk seekers: trade, noise, and the rationalizing effect of market impact on convex preferences by Efstathios Avdis

Harjoat S. Bhamra

Imperial College Business School

2020

Paper's Contributions

Show that

- information-based trade **is** possible without exogenous noise
- if public information becomes more precise, risk sharing decreases but welfare increases
- show that presence of risk averse agents is **not** isomorphic to noise traders and random endowments
    - if private information becomes cheaper, liquidity always increases – not so for economies with noise traders or random endowments.

Why do we care?

- No Trade Theorem (statements taken from Back (2010) Chapter 19)
  - Strictly risk averse investors do not bet on events that are unrelated to endowments and payoffs of positive net-supply assets, even if they have different information about the likelihood of such events occurring.
  - Suppose we are at a Pareto optimal equilibrium. Investors will not trade based on new information.
- Grossman-Stiglitz Paradox
  - If the market is (strong-form) efficient and all information (including insider information) is reflected in the price, then no one has an incentive to expend resources to gather information and trade on it. How, then can all information be reflected in the price?
  - Markets cannot be strong-form informationally efficient, because agents who collect costly information have to be compensated with trading profits.
- Huge empirical literature exploring whether or not markets are efficient
  - E.g. EMH implies that discounted stock price process is a martingale. Any return predictability must be linked to a risk premium.

Cannot understand financial markets without understanding role of information.

Ways for Information to Generate Trade

- noise traders (Kyle (1985)), random endowments
- production and uncertainty about market betas (Bond & Eraslan (2010))
- risk seeking behaviour – this paper

Two Key Ideas

- adding noise increases expected utility of risk seeker
- price impact reduces demand for a strategic investor

Risk Attitudes and Noise

- No Trade – hinges on idea that adding noise to a payoff decreases expected utility. Easy to reverse with risk seeking agents.
- Consider a random variable $w = y + \epsilon$ ($E[\epsilon] = 0$) and apply Jensen's Inequality to a convex function $u(\cdot)$

$$E[u(w)|y] \geq u(E[w|y]) = u(y) \tag{1}$$

- Taking expectations

$$E[u(y + \epsilon)] \geq E[u(y)] \tag{2}$$

- Adding noise increases the expected value of a convex function
- Adding noise increases expected utility of risk seeker – can overcome no trade theorem

Risk Attitudes and Price Impact

Price impact reduces demand, ensuring that a risk seeker's demand is finite and positive when price is lower than expected dividend.

- $t \in \{0, 1\}$
- exogenous dividend D paid at $t = 1$, date-0 endogenous price of asset paying dividend is P
- 3 or more agents
- Gain to agent n from purchasing X_n units of asset is $\pi_n = X_n(D - P)$
- mean-variance preferences

$$E[\pi_n|\mathcal{F}_n] - \frac{1}{2}\delta Var[\pi_n|\mathcal{F}_n] = X_n E[D - P|\mathcal{F}_n] - \frac{1}{2}\delta X_n^2 Var[D - P|\mathcal{F}_n] \quad (3)$$

FOC

$$0 = \frac{\partial}{\partial X_n}\left(X_n E[D-P|\mathcal{F}_n] - \frac{1}{2}\delta X_n^2 Var[D-P|\mathcal{F}_n]\right) \tag{4}$$

$$0 = E[D-P|\mathcal{F}_n] - \delta X_n Var[D-P|\mathcal{F}_n] \tag{5}$$

$$- X_n \underbrace{\frac{\partial}{\partial X_n} E[P|\mathcal{F}_n]}_{\text{independent of } X} - \frac{1}{2} X_n^2 \underbrace{\frac{\partial}{\partial X_n} Var[D-P|\mathcal{F}_n]}_{=0} \tag{6}$$

Agents account for impact of demand on price – strategic behaviour.
There is a cost to investing in the risky asset even when agent is risk seeking.

$$0 = E[D - P|\mathcal{F}_n] - X_n \left(\delta Var[D - P|\mathcal{F}_n] + \frac{\partial}{\partial X_n} E[P|\mathcal{F}_n] \right) \tag{7}$$

$$\tag{8}$$

$$X_n = \frac{E[D - P|\mathcal{F}_n]}{\delta Var[D - P|\mathcal{F}_n] + \underbrace{\frac{\partial}{\partial X_n} E[P|\mathcal{F}_n]}_{\text{price impact}}} \tag{9}$$

- low price relative to future dividend – greater demand
- greater variance – lower demand for risk averse agent, greater demand for risk seeking
- greater price impact, i.e. larger $\frac{\partial}{\partial X_n} E[P|\mathcal{F}_n]$ – lower demand

SOC

$$\overbrace{\delta Var[D-P|\mathcal{F}_n]}^{\text{can be negative}}+\overbrace{\frac{\partial}{\partial X_n}E[P|\mathcal{F}_n]}^{+ve}>0 \tag{10}$$

$$\delta > -\frac{1}{Var[D-P|\mathcal{F}_n]}\frac{\partial}{\partial X_n}E[P|\mathcal{F}_n] \tag{11}$$

Because of positive price impact of agent n's demand, she can be risk seeking while preserving optimality of finite positive demand

Questions

- What is the minimum mass of risk seekers needed to generate sizable trade? The online appendix shows that equilibrium survives with a sole risk seeker. Extend this to answer the above question.
- Is there empirical evidence supporting a sufficiently high of mass of risk seekers for your theoretical findings to be quantitatively relevant? Literature on lottery stocks may be useful.

Summary

- Clear, well explained theory.
- Paper is polished.
- Any additional improvements are really a matter of taste.