Macroeconomics of Financial Markets

ECON 712, Fall 2018

Bubbles

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Beauty Contests

"Professional investment may be likened to those newspaper competitions in which the competitors have to pick out six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view"

J.M. Keynes (1936)

Introduction

- Why a rational representative investor model of asset prices does not generate bubbles?
- Martingale property: LIE (Law of iterated expectations).

Introduction

- Why a rational representative investor model of asset prices does not generate bubbles?
- Martingale property: LIE (Law of iterated expectations).
- This is not the case with heterogeneity, since in general, average expectations fail to satisfy LIE.
- When private information is heterogeneous, agents rely excessively in public signals. Hence
  - Mean price path deviates from consensus liquidation values
  - Prices exhibit inertia.

Fail of LIE with heterogeneous information

- LIE with private information

$$E_{it}\left(E_{i,t+1}(\theta)\right) = E_{it}\left(\theta\right)$$

- LIE with public information

$$E_t^*\left(E_{t+1}^*(\theta)\right) = E_t^*\left(\theta\right)$$

- LIE fails taking averages with asymmetric information

$$\overline{E}_t\left(\overline{E}_{t+1}(\theta)\right) \neq \overline{E}_t\left(\theta\right)$$

Basics

- Information at all dates:
  - $\theta \sim \mathcal{N}(y, \frac{1}{\alpha})$
  - Signals: $x_i = \theta + \epsilon_i$, where $\epsilon_i \sim \mathcal{N}(0, \frac{1}{\beta})$

- Average expectation of average expectations.

$$\overline{E}_t^{T-t}(\theta) \equiv \overline{E}_t\left(\overline{E}_{t+1}\left(...\overline{E}_{T-1}(\theta)\right)\right) = \left(1 - \left(\frac{\beta}{\alpha+\beta}\right)^{T-t}\right) y + \left(\frac{\beta}{\alpha+\beta}\right)^{T-t} \theta$$

- See that

$$\overline{E}_t^{T-t}(\theta) \neq \overline{E}_t(\theta) = \left(1 - \left(\frac{\beta}{\alpha+\beta}\right)\right) y + \left(\frac{\beta}{\alpha+\beta}\right) \theta$$

No learning through prices

- If

$$q_t = \overline{E}_t(p_{t+1})$$

then

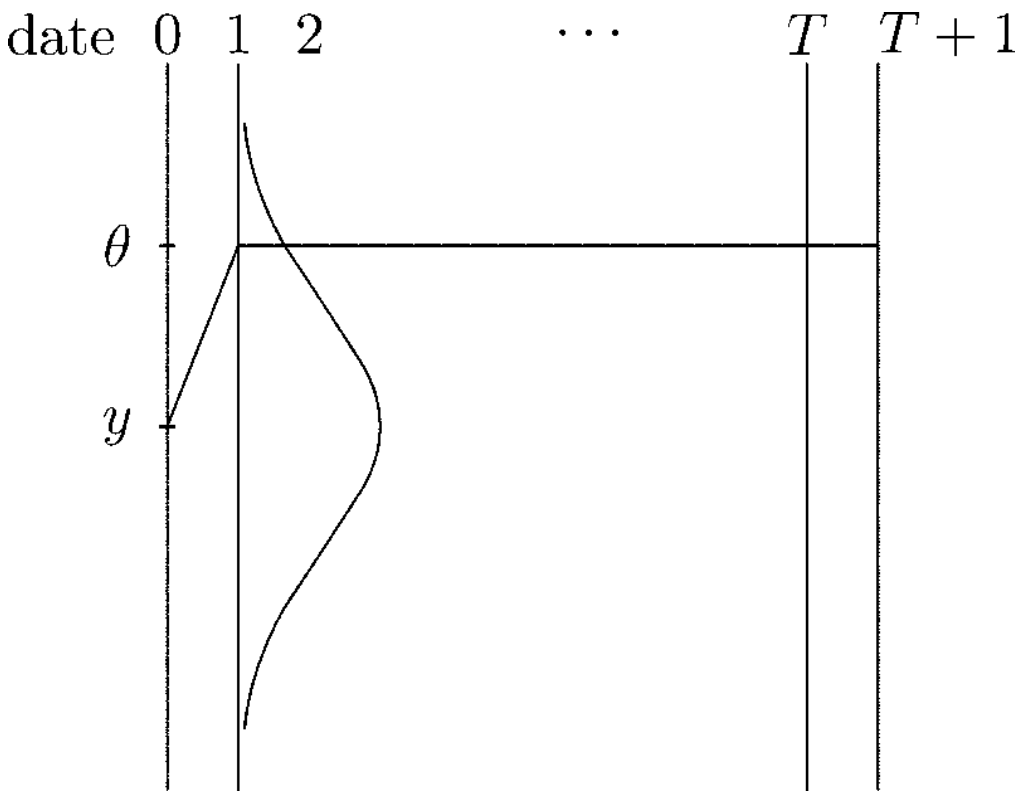
$$q_t = \left(1 - \left(\frac{\beta}{\alpha+\beta}\right)^{T-t}\right) y + \left(\frac{\beta}{\alpha+\beta}\right)^{T-t} \theta$$

- How to obtain the equation for q_t?
- How to deal with learning from past prices?

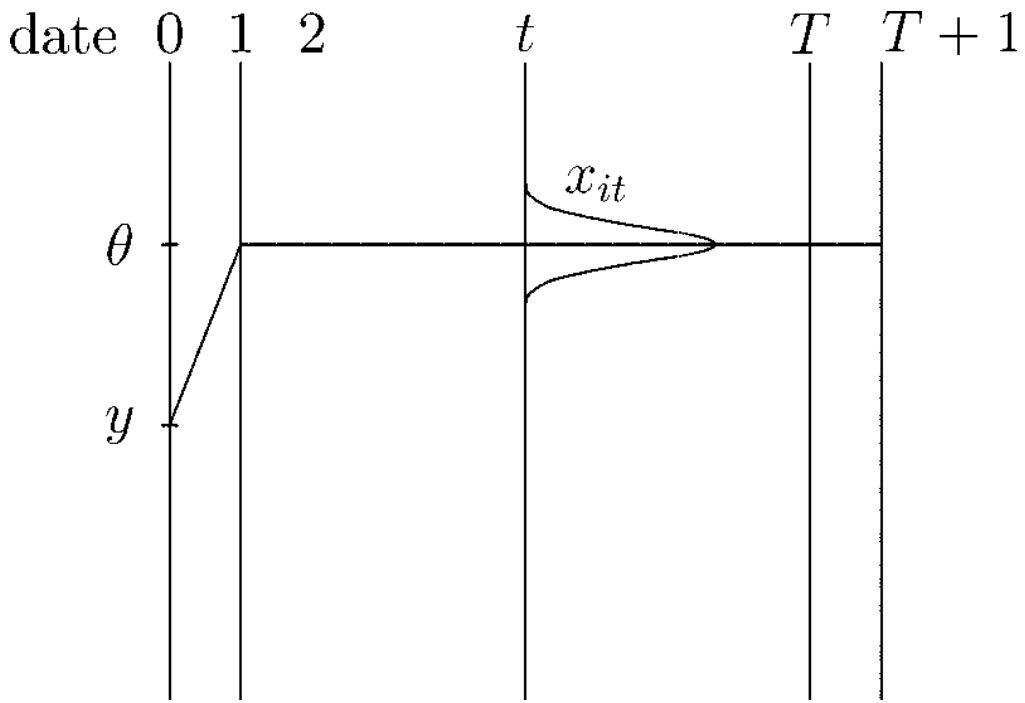
Model

- Single risky asset, liquidated at $T+1$ but traded from 1 to T.
- Liquidation value θ is determined before date 1. $\theta \sim \mathcal{N}(y, \frac{1}{\alpha})$
- Overlapping generation of no wealth constrained traders, each living for two periods and consuming in the second period. $u(c) = -e^{-\frac{c}{\tau}}$
- Information set: $\{y, p_1, p_2, .., p_t, x_{it}\}$ where $x_{it} = \theta + \epsilon_{it}$ and $\epsilon_{it} \sim \mathcal{N}(0, \frac{1}{\beta})$
- Each period exogenous net supply of assets $s_t \sim \mathcal{N}(0, \frac{1}{\gamma})$

Path of fundamental value



Private Information



Price at date T

- Trader i's demand at date T

$$D_{iT} = \frac{\tau}{V_{iT}(\theta)} \left(E_{iT}(\theta) - p_T \right)$$

- Market clearing is given by

$$D_T = \frac{\tau}{V_T(\theta)} \left(\overline{E}_T(\theta) - p_T \right) = s_T$$

- Then, the price at date T is

$$p_T = \overline{E}_T(\theta) - \frac{V_T(\theta)}{\tau} s_T$$

Price at date t

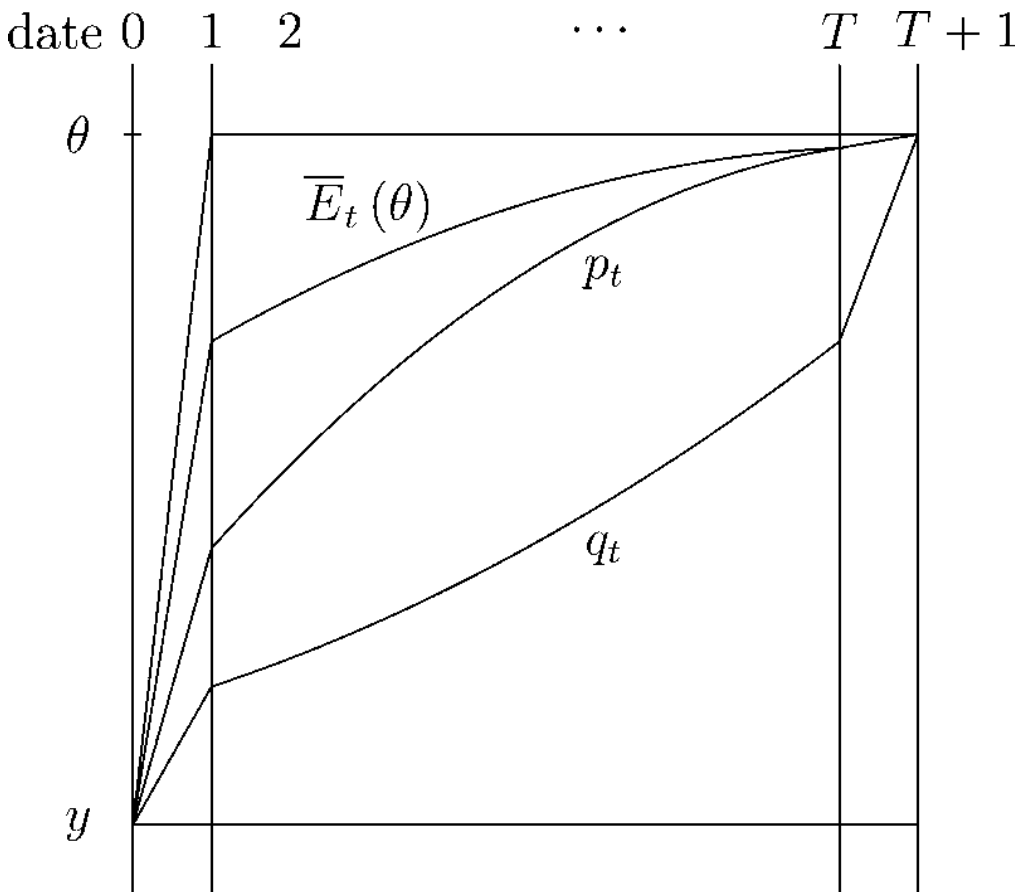
- The asset price at date $T-1$ is

$$p_{T-1} = \overline{E}_{T-1}(p_T) - \frac{V_{T-1}(p_T)}{\tau} s_{T-1} = \overline{E}_{T-1}\overline{E}_T(\theta) - \frac{V_{T-1}(p_T)}{\tau} s_{T-1}$$

- The asset price at a general date t is

$$p_t = \underbrace{\overline{E}_t \overline{E}_{t+1} ... \overline{E}_T(\theta)}_{q_t = \overline{E}_t^{T-t}(\theta)} - \frac{V_t(p_{t+1})}{\tau} s_t$$

Main results



Main results

- Prices deviate systematically from the average expectation of the fundamental value of the asset.
- Inertia of prices.

- Intuition: Excessive weight assigned to the public signal y and previous prices.

Main results

- For risk neutral traders ($\tau \to \infty$) or infinitely precise signals ($\beta \to \infty$), prices are fully revealing of the fundamental value. This is $p_t \to \overline{E}_t(\theta) \neq \theta$.

- As investors become very risk averse ($\tau \to 0$), they are less aggressive and prices are less informative. This is $p_t \to q_t$

Critiques

- This theory captures the systematic deviation of prices from fundamentals but does not capture one of the striking features of bubbles, their collapse.
- Here bubbles suddenly appear and gradually disappear over time and correct itself.

Abreu and Brunnermeier, Ecta 03: Main ideas

- Rational arbitrageurs may know the price of an asset exceeds the fundamental and still decide not to sell.
- The key is they do not know when the bubble will burst, where it is required a critical mass of speculators to do it.
- Main elements for this to work:
  - Dispersion of opinions among arbitrageurs.
  - Need for coordination.

Abreu and Brunnermeier, Ecta 03: Main ideas

- The bubble ultimately burst.
- We can think also in dispersion of information about whether fundamentals have moved towards a new plateau.
- Irrelevant news may have a huge impact through synchronization and coordination effects.
- Critique: Here the bubble is just assumed, and the goal is to show how it is maintained and then suddenly explodes.
- Joseph Zeira (1999) has a similar story. "Information Bubbles".