2 “Non-fundamental” movements in asset prices and investment

- Late 90’s “bubble”

- High investment, high asset prices

- What shocks driving it? Expectations, rational/exuberance

- What channels?

- What welfare/policy implications?
2.1 A model of non-fundamental prices

- Harrison and Kreps, Sheinkman and Xiong

- Trading dates 0 and 1

- Payoff realized at date 2 $R^H = 1, R^L = 0$

- Signal $s \in \{h, l\}$ observed date 1
• Agents with different “view of the world”

• Agent O does not think signal is informative, he assigns probability $\pi^o$ to high realization

• Agent T thinks signal is informative, assign conditional probabilities

\[ \pi^h > \pi^o > \pi^l \]

• Both think signal $h$ has ex ante probability $\alpha$
• No short selling

• Price of the asset is \( \pi^o \) or \( \pi^h \) at date 1

• Price of asset at date 0 is

\[
P_0 = (1 - \alpha) \pi^o + \alpha \pi^h > \pi^o
\]
• Cost of investment at date 0
  \[-\frac{1}{2}k^2\]

• Optimal choice of $k$:
  
  \[k = P_0 = \pi^o + \alpha (\pi^h - \pi^o)\]

• both "fundamental" and "non fundamental"
2.1.1 Welfare

- Agent $T$ zero surplus

- Agent $O$ surplus

$$\left[ \pi^o + \alpha \left( \pi^h - \pi^o \right) \right] k - \frac{1}{2} k^2$$

- First welfare theorem holds: $k$ efficient
• Panageas: under mispricing driven by difference of opinions and short-sale constraints

1. q theory holds

2. investment is efficient
2.2 Monopolistic supply of bubbly investment

- Gilchrist, Himmelberg, Huberman

- Suppose large mass of Agents T, risk averse CARA

- they enter the economy at date 1 only consume at date 2

- Now at date 1

\[
\max \mathbb{E}^T \left[ U \left( (R - P) x + W \right) \right] \\
\mathbb{E}^T \left[ (R - P) U' \left( (R - P) x + W \right) \right] = 0
\]
• Rewrite focs using CARA

\[ \pi (1 - P) e^{-\rho x} + (1 - \pi) (0 - P) e^{-\rho 0} = 0 \]

• Demand for stocks at date 1

\[ x = \frac{1}{\rho} \left[ \log \frac{\pi}{1 - \pi} - \log \frac{P}{1 - P} \right] \]

• Inverse demand function

\[ P = \mathcal{P} (x, \pi) \]
Problem of Agent O at date 1:

\[ V(k, \pi) = \max_{x} xP(x, \pi) + \pi^{o}[k - x] \]

s.t. \[ 0 \leq x \leq k \]

- still no short selling

- now prices depend on amount sold, monopolist
• If $\pi = \pi^l$ optimal $x = 0$

$$\mathcal{P}(x, \pi^l) - \pi^o + \frac{\partial \mathcal{P}}{\partial x} x < 0 \text{ at } x = 0$$

proof:

• $\mathcal{P}(0, \pi^l) = \pi^l < \pi^o$
• If $\pi = \pi^h$ two possibilities

$$\mathcal{P}(x, \pi^h) - \pi^o + \frac{\partial \mathcal{P}}{\partial x} x = 0 \text{ with } x \in (0, k]$$

$$\mathcal{P}(x, \pi^h) - \pi^o + \frac{\partial \mathcal{P}}{\partial x} x > 0 \text{ with } x = k$$

• In the first case

$$\frac{\partial V(k, \pi^h)}{\partial k} = \pi^o$$

• In the second case

$$\frac{\partial V(k, \pi^h)}{\partial k} = \mathcal{P}(k, \pi^h) + \frac{\partial \mathcal{P}(k, \pi^h)}{\partial x} > \pi^o$$
• Investment at date 0

• Case 1:

\[ k = (1 - \alpha) \pi^o + \alpha \pi^o = \pi^o \]

Asset prices

\[ P_0 = \pi^o \]
• Case 2:

\[ k = (1 - \alpha)\pi^o + \alpha \left[ \mathcal{P}(k, \pi^h) + \frac{\partial \mathcal{P}(k, \pi^h)}{\partial x} \right] \]

Asset prices

\[ P_0 = (1 - \alpha)\pi^o + \alpha \mathcal{P}(k, \pi^h) \]
• Dispersion of opinion

\[ \pi^h = \pi^o + \sigma \]
\[ \pi^l = \pi^o - (\alpha / (1 - \alpha)) \sigma \]

• when \( \sigma \) is high then Case 2 applies

• when \( \sigma \) is low then Case 1 applies

• q theory does not hold

• investment responds less than 1:1 to the non-fundamental shock
Model predictions

1. Increase in $\sigma \Rightarrow$ increase in asset price $P_0$ over and above predicted increase in $MPK \ (\pi^o R^H + (1 - \pi^o) R^L = \pi^o)$

2. Increase in $\sigma \Rightarrow$ increase in investment

3. The investment response is relatively weaker after a "non-fundamental" shock

\[
\frac{\Delta k / \Delta \sigma}{\Delta P_0 / \Delta \sigma} < \frac{\Delta k / \Delta R^H}{\Delta P_0 / \Delta R^H}.
\]
2.2.1 Welfare

- Two elements of efficiency:

1. Efficient allocation of the bubbly asset ex post

2. Efficient investment ex ante
Ex post efficiency (constrained efficiency)

\[
\max_{x,\tau} \phi \mathbb{E}^T [U (Rx + W - \tau)] + \mathbb{E}^O [R (k - x) + \tau]
\]

s.t. \(0 \leq x \leq k\)

1. Efficiency achieved by competitive trading of the bubble: find a \(P\) s.t.

\[
\mathbb{E}^T [(R - P) U' ((R - P)x)] = 0
\]

\[
\mathbb{E}^O [R - P] = 0
\]

if \(x \in (0, k)\) and inequalities if \(x = 0\) or \(x = k\).
**Claim:** In case 2 we have ex post efficiency, since

\[ \mathcal{P}(x, \pi^h) - \pi^o + \frac{\partial \mathcal{P}}{\partial x} x > 0 \]

implies

\[ \mathcal{P}(x, \pi^h) - \pi^o > 0 \]

so corner solution is efficient.

In case 1 we have \( x < x^* \), too little bubble is sold to the public (usual monopoly result).
Ex ante efficiency

- Two notions: conditional efficiency and second best efficiency

- depending on whether you can fix or not monopoly distortion at date 1
• In case 1 we may have second best efficiency but we always have conditional inefficiency

• if the bubble was efficiently allocated ex post and $x^* < k$, then $\pi^o$ would be the social value of the bubbly asset

$$k = \pi^o$$

• conditional on monopoly ex post, $P^h > \pi^o$,

$$k < \alpha P^h + (1 - \alpha) \pi^o$$
• In case 2 ex post allocation is efficient

• we have inefficient investment ex ante

\[ k = \alpha \left( \mathcal{P}(k, \pi^h) + \frac{\partial \mathcal{P}}{\partial x} \right) + (1 - \alpha) \pi^o < \alpha \mathcal{P}(k, \pi^h) + (1 - \alpha) \pi^o \]

• The bubbly asset is collateral for betting and agents enjoy betting

• A monopolist produces too little betting collateral
2.3 Bubble in Japan

- Chirinko and Shaller (2001) more structural approach to finding a bubble and its effects
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• Remember foc from Hayashi model

\[ G_1 (k', k) = \beta E \left[ V_1 (k', s') \right] \]

• envelope

\[ V_1 (k, s) = (A (s) F_1 (k, l) - G_2 (k', k)) \]
Functional form

\[ G(k', k) = p_I (k' - (1 - \delta) k) + C ((k' - (1 - \delta) k), k) \]

where \( C \) is adjustment cost (sensu stricto).

- Euler equation

\[ p_{I,t} + C_{I,t} = \beta \mathbb{E}_t \left[ A_{t+1} F_{K,t+1} - C_{K,t+1} + (1 - \delta) (p_{I,t+1} + C_{I,t+1}) \right] \]

(interpretation)
• Scenario 1: no bubble/inactive financing mechanism

\[ Q_t = p_{I,t} + C_{I,t} \]
\[ p_{I,t} + C_{I,t} = \beta E_t \left[ A_{t+1} F_{K,t+1} - C_{K,t+1} + (1 - \delta) \left( p_{I,t+1} + C_{I,t+1} \right) \right] \]

• Scenario 2: bubble/inactive financing mechanism

\[ Q_t = p_{I,t} + C_{I,t} + B_t \]
\[ p_{I,t} + C_{I,t} = \beta E_t \left[ A_{t+1} F_{K,t+1} - C_{K,t+1} + (1 - \delta) \left( p_{I,t+1} + C_{I,t+1} \right) \right] \]

• Scenario 3: bubble/active financing mechanism

\[ Q_t = p_{I,t} + C_{I,t} + B_t \]
\[ p_{I,t} + C_{I,t} > \beta E_t \left[ A_{t+1} F_{K,t+1} - C_{K,t+1} + (1 - \delta) \left( p_{I,t+1} + C_{I,t+1} \right) \right] \]
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• Can we distinguish this from good signal not in the econometrician observable set?

• A: No.
• Simple two periods example

\[ k = \pi \]

• Suppose the econometrician does not observe good signal, replaces \( \pi \) with \( \bar{\pi} \), then asset price

\[ q = \pi \]

• both equations violated:

\[ \pi > \bar{\pi} \]

\[ k > \bar{\pi} \]