Sentiments

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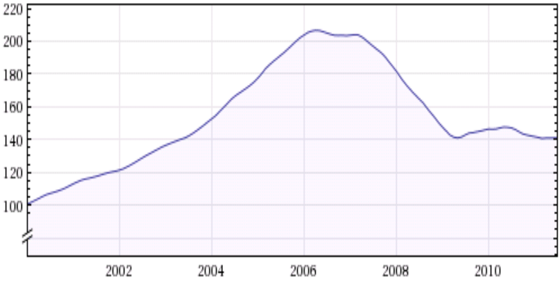
Motivation

- fluctuations hinge on expectations
- but are these driven by preference and technology shocks?



S&P/Case-Shiller house price index, US Jan2000-Oct2011

This paper

1. stay within the core of the neoclassical paradigm
   - competitive, convex, RE, unique equilibrium
2. dispense with aggr shocks in technologies, preferences, etc
3. yet, obtain rich fluctuations in beliefs, allocations, prices

Key insights

1. decentralization $\rightarrow$ imperfect communication

   $\rightarrow$ extrinsic shocks in expectations of "aggregate demand"

2. trade $\rightarrow$ communication $\rightarrow$ propagation

   $\rightarrow$ fads, waves, boom-and-bust cycles

Roadmap

- baseline model: clean theorems, simple examples
- broader insights
- extension 1: waves, boom-and-bust cycles
- extension 2: quantitative potential
- conclusion

The Model

- continuum of islands
  - repres. household and firm on each island
  - produce and trade differentiated goods
- fundamentals fixed and common knowledge
- trading via random matching

The Model: preferences and technologies

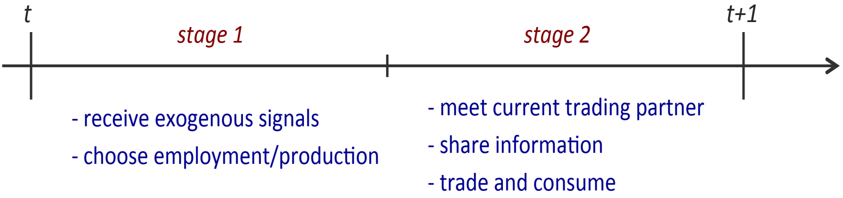
$$y_{it} = A_i F(K, n_{it})$$

$$\mathcal{U}_i = \sum_{t=0}^{\infty} \beta^t \left[U(c_{it}, c_{it}^*) - V(n_{it}) \right]$$

$$F(k,n) = k^{1-\theta} n^{\theta} \qquad U(c,c^*) = c^{1-\eta} c^{*\eta} \qquad V(n) = \frac{1}{\epsilon} n^{\epsilon}$$

The Model: matching, trade, and communication

at each t, each island i is randomly matched to some j



info dynamics: $\omega_i^t = (\omega_i^{t-1}, \omega_j^{t-1}, x_{it})$

Equilibrium

- employment and production:

$$V'(n_{it}) \quad = \quad w_{it} \quad = \quad \mathbb{E}_{it}\left[p_{it}\right]\frac{\partial y_{it}}{\partial n_{it}}$$

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"aggregate demand externality" = p_i increases with y_j

Equilibrium

- equil : fixed point in allocations and beliefs of prices (Lucas)

- equil : also PBE of fictitious game (Morris-Shin)

$$\log y_{it} \;=\; (1-\alpha)\, f_i \;+\; \alpha\, \mathbf{E}_{it}[\log y_{jt}]$$

Walrasian trade $\rightarrow$ as if strategic complementarity

- contraction mapping $y = \mathcal{T}\, y$

Theorem

The equilibrium exists and is unique, for arbitrary info structure.

Communication, beliefs, and fluctuations

- communication $\rightarrow$ coordination of beliefs
- "perfect communication" $\equiv$ prior to trading, i and j share same beliefs about prices (p_{it}) and/or allocations (y_{it}, y_{jt})

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Theorem

Extrinsic fluctuations along unique equilibrium if and only if communication is imperfect.

What drives beliefs?

- in general:

$$y_i = f\,(\,A_i, \mathcal{B}_i\,) \qquad y_j = f\,(\,A_j, \mathcal{B}_j\,)$$

A_i is TFP, $\mathcal{B}_i$ is expected terms of trade

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- perfect communication: $\mathcal{B}_i = \mathcal{B}_j$

$\Rightarrow$ $(y_i, y_j, \mathcal{B}_i, \mathcal{B}_j) = f\left(A_i, A_j\right)$

$\Rightarrow$ beliefs pinned down by fundamentals

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- imperfect communication: $\mathcal{B}_i \neq \mathcal{B}_j$

$$\Rightarrow \qquad (y_i, y_j, \mathcal{B}_i, \mathcal{B}_j) \neq f\,(\,A_i, A_j\,)$$

$\Rightarrow$ beliefs may vary with extrinsic shocks (“sentiments”)

Sentiment shocks: simple example

$$x_{it} = (x_{it}^1, x_{it}^2)$$

$$x_{it}^1 = \log A_{jt} + \varepsilon_{it} \qquad x_{it}^2 = x_{jt}^1 + \xi_t$$

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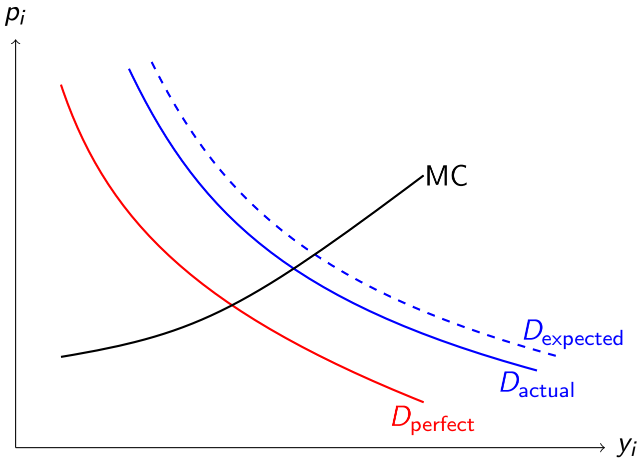
Proposition

ξ_t does not impact either fundamentals or beliefs of fundamentals.

Yet, it causes variation in expected and actual economic activity:

$$Y_t = \Phi \xi_t \qquad \overline{\mathbb{E}_{it} Y_t} = \Psi \xi_t$$

Sentiment shocks = demand shocks



Sentiment shocks: richer example

$$\log A_{it} = \bar{a}_t + a_i$$

$$x_i = (x_i^1, x_i^2, ..., x_i^H)$$

$$x_{it}^1 = \log A_{jt} + \varepsilon_{it}^1 \qquad x_{it}^h = x_{jt}^{h-1} + \varepsilon_{it}^h \qquad \varepsilon_{it}^h = \zeta_t^h + u_{it}^h$$

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Proposition

$\exists\ \bar{\xi}_t = \Xi(\xi_t^1, \ldots, \xi_t^h)$ *and* $v_t \perp (\bar{a}_t, \bar{\xi}_t)$ *such that*

$$\begin{aligned} Y_t &= \Phi \bar{a}_t + \bar{\xi}_t \\ \overline{\mathbb{E}_{it} y_{jt}} &= \Phi \bar{a}_t + \Psi \bar{\xi}_t \\ \overline{\mathbb{E}_{it} Y_t} &= \Phi \bar{a}_t + \Lambda \bar{\xi}_t + v_t \end{aligned}$$

Broader insights (1)

- Arrow-Debreu / standard macro
  - expectations perfectly aligned across agents
  - expectations and outcomes pinned down by fundamentals

- imperfect communication
  - extrinsic variation in expectations
  - "coordination failure" and "animal spirits" along unique equil

Broader insights (2)

- which kind of expectations are we talking about?
- first-order beliefs of endog outcomes (GDP, inflation, etc)
  not higher-order beliefs of exog fundamentals
- only the former matter / can be estimated

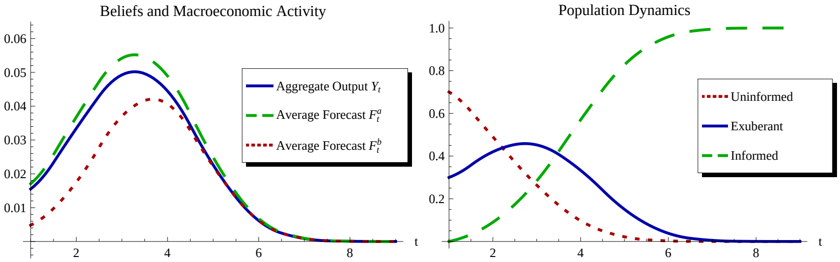
What's next

1. communication $\rightarrow$ waves / boom-and-bust cycles
2. RBC-like extension $\rightarrow$ quantitative potential

Contagion and boom-and-bust cycles

- two regions: "North" and "South"
- TFP differs across regions, info differs both across and within
  - uninformed: know only local TFP
  - partially informed: signals about the other region
  - fully informed: know entire state of nature
- sentiment shock hits only few islands and only at $t = 0$
- communication $\rightarrow$ propagation $\rightarrow$ fads, waves, boom-bust

Contagion and boom-and-bust cycles



Quantitative potential

- extension with investment and utilization
- baseline RBC, but sentiment shocks instead of TFP shocks

	The Model		U.S. Data	
	std. dev.	*corr(X,Y)*	*std. dev.*	*corr(X,Y)*
output Y	1.73	1.00	1.74	1.00
employment N	1.47	1.00	1.34	0.87
consumption C	1.26	0.98	1.19	0.79
investment I	4.30	0.96	4.98	0.76
labor productivity Y/N	0.27	0.99	0.87	0.66
labor wedge LW	5.14	-1.00	4.47	-0.82

Conclusion

- contribution:
  - imperfect communication $\rightarrow$ extrinsic fluctuations
  - within otherwise conventional unique-equil DSGE models
- interpretation:
  - shocks to expectations
  - animal spirits, news shocks, uncertainty shocks
  - demand shocks