Discussion of “Coordinating Business Cycles”

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Conference on Multiple Equilibria and Financial Crises

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Multiple equilibria in a model of investment for productivity increase

- Fixed aggregate labor (only input)
- Each firm: if investment at cost c, then constant marginal lowered from 1 to $\alpha < 1$.
- Profit fixed fraction of sales, $\Rightarrow$ profit increase proportional to sales px: $\pi_{i,j}$.
- $\pi_{i,j}$, $i, j \in \{0, 1\}$ with $i = 1$ when firm invests, $j = 1$ when other firms invest.

$$\pi_{1,0} = (\frac{1}{\alpha})^{\sigma-1}\pi_{0,0}, \quad \pi_{1,1} = (\frac{1}{\alpha})^{\sigma-1}\pi_{0,1}, \quad \pi_{0,1} = (\frac{1}{\alpha})\alpha^{\sigma-1}\pi_{0,0}.$$

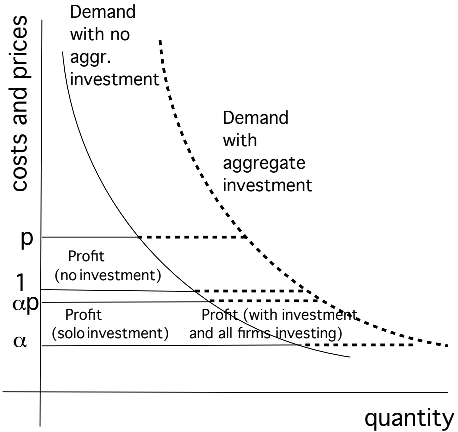
$$\pi_{0,1} > \pi_{0,0} \quad \text{iff} \quad \sigma < 2.$$

- Multiple equilibria if

$$(\alpha^{1-\sigma} - 1)\pi_{0,0} < c(1+\rho) < (\alpha^{1-\sigma} - 1)\pi_{0,1}.$$

- With more substitution (endogenous labor and capital), the upper-bound on σ increases above 2.

Multiple equilibria in a model of investment for productivity increase (2)



Remarks

- Extension to growth (many equilibria).
- In the STD model, the individual decision is not investment but a "capacity utilization". Because of the equivalence of price and production in the imperfect competition model, this is equivalent to a lower cost of production.
- Endogenous labor (and capital) in the STD model, condition $\sigma < S$ with $S > 2$.

STD assumption on the fundamental

- Aggregate productivity parameter $\theta_t = \rho\theta_{t-1} + \epsilon_t$.
- At the end of each period t, agents learn θ_t perfectly (from the production).
- Global game because of the possibility of arbitrarily large jumps of ϵ_t.

A simplified model for comparisons

Mass 1 of agents, action 0 (low) or 1 (high). x_t is the mass of "high" in period t.

Payoff of low is 0, payoff of high is $E[\theta(x+1) - c$. (c cost of high).

Perfect information: multiple equilibria if $c/2 < \theta_t < c$.

Imperfect information: $\theta_t - b = a(\theta_{t-1} - b) + \eta_t$, $\eta_t \sim \mathcal{N}(0, 1/q_\eta)$

agent information $s_{it} = \theta_t + \epsilon_t$, $\epsilon_t \sim \mathcal{N}(0, 1/q_\epsilon)$

Critical value s^*. Mass of investment $x_t(\theta_t - s_t^*) = F(\sqrt{p_\eta}(\theta_t - s_t^*))$.

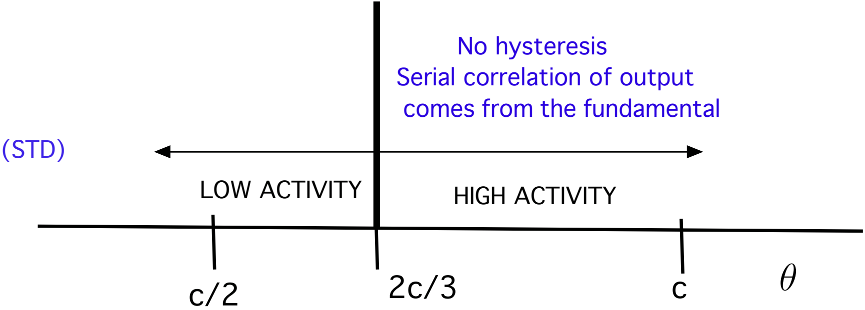
Marginal s^*: $E[\theta_t(x_t + 1)|s_t^*] = c$.

$E[\theta_t|s_t^*] + \int \theta F(\sqrt{p_\eta}(\theta_t - s_t^*))dF_{s_t^*}(\theta) = c$.

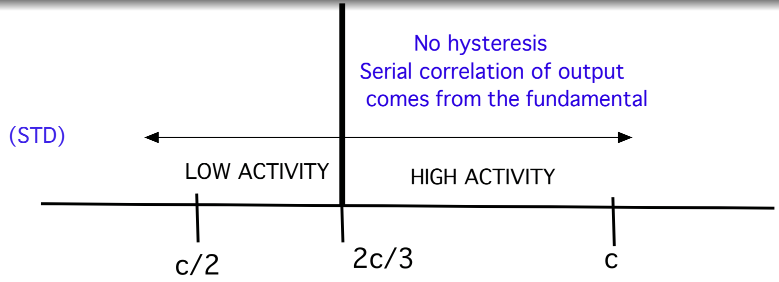
Assume that the precision q_ϵ is arbitrarily large: $s^* \approx 2c/3$

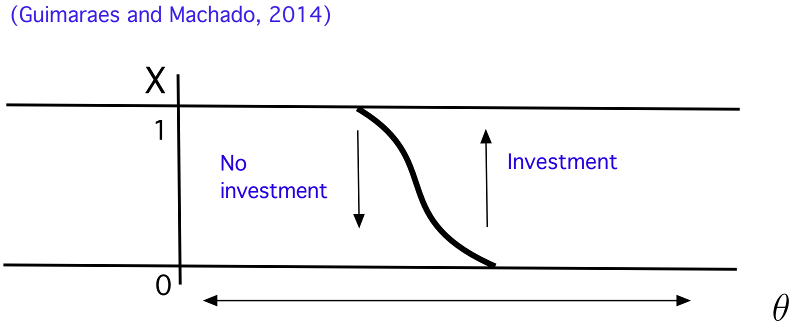
Because the distribution is highly concentrated, most agents invest if $\theta_t > 2c/3$.

Evolution of output



Comparison with Guimaraes and Machado, 2014





Comparison with Chamley, "Coordinating Regime Switches," QJE 1999