Innovation and Growth with Frictions

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The basic idea

- Productivity growth depends on innovation, implementation, and diffusion of new ideas
- If innovators and entrepreneurs are different people, then knowledge must flow from former to latter (technology transfer)
- There are all sorts of "frictions" that impede the process knowledge creation and knowledge transfer

Frictions

1. Property rights difficult to enforce because new ideas soon enter public domain

2. Search externalities may exist in market that matches innovators with entrepreneurs

3. Bargaining protocols may lead to *ex ante* inefficient investments (holdup problem)

4. Limited commitment in credit markets may impede technology transfer

Results

- Clean analytics, easy comparative statics
- Solve for set of corrective (Pigouvian) taxes
- Interesting result concerning the effect of how a "bank" (or financial market) can mitigate the hold-up problem associated with investments in liquid assets (bank provides option to reverse these investments)
  - result is general; i.e., has nothing specific to do with the knowledge sector

A suggestion

- Focus more on properties of the environment and questions that relate more directly to the knowledge sector (relative to investment, in general)
  - so, maybe toss out liquidity issues and simplify bargaining somehow

Ideas (current setup)

- z_t is individual-specific idea; Z_t is economy-wide knowledge base

- In each period, a set of agents n learn and implement a new, distinct, and better idea w.p. $\sigma \sim F(\sigma)$

- Because ideas are distinct, number of successful innovators $N = nE[\sigma]$ is equal to number of successful innovations

- Every innovation confers temporary advantage $z_t/Z_t = \eta > 1$

- Knowledge diffuses costlessly, universally, with one period lag, and *every* innovation (generally) contributes to expanding the knowledge base; e.g., $Z_{t+1} = N\eta Z_t$

Ideas (alternate setup)

- Because private benefit to innovation is temporary and social benefit is permanent, there is generally too little innovation in equilibrium

- However, this result also depends on the fact that there is no redundancy in what is discovered (all ideas are distinct)

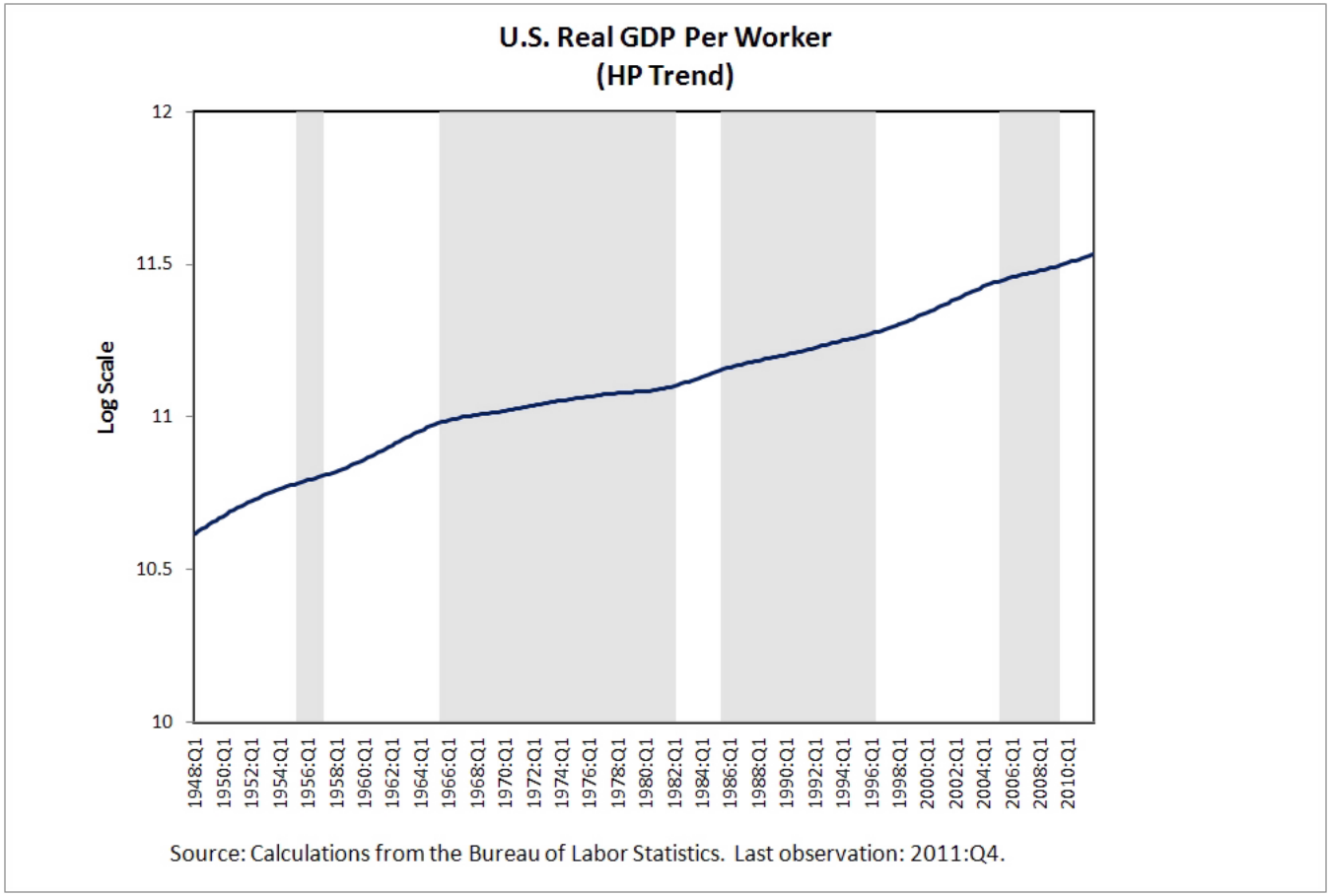
- Imagine instead that people are trying to learn the *same* idea (the next great GPT)

- A small number of innovators become low-cost producers who "infect" others with their knowledge (idea is acquired/stolen by trading partner who subsequently imitates his teacher)

- If probability of contact with good idea is proportional to the extent to which the idea is already spread, the result is a generalized contagion dynamic (generating S-shaped diffusion dynamics)
  - see "Competitive Diffusion" (Jovanovic and MacDonald, JPE 1994)

- Quasilinear structure should make aggregate shocks (innovations) easy to analyze
  - implies stochastic "regimes" of high/low productivity growth

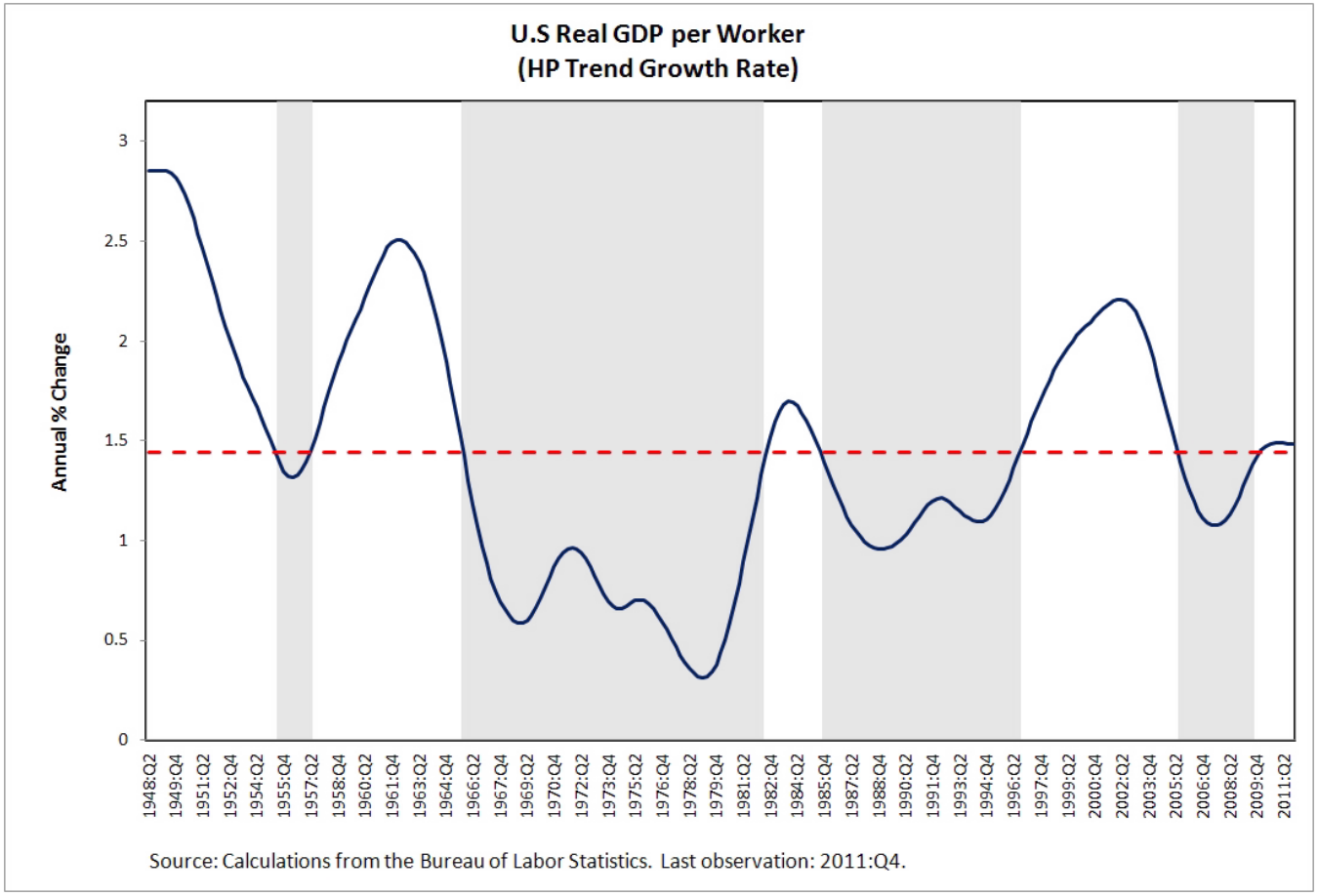
- "Diffusion of Technical Change and the Decomposition of Output into Trend and Cycle" (Lippi and Reichlin, ReStud 1994)



Source: Calculations from the Bureau of Labor Statistics. Last observation: 2011:Q4.

Policy issues (specific to knowledge sector)

- Study the effect/desirability of intellectual property laws
- Might stronger property rights encourage innovation, but slow the diffusion of ideas via imitation?
- Expected duration of productivity slowdowns?



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