Endogenous Growth Theory

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What determines technological progress at the frontier?

Three Questions Neoclassical Theory Cannot Answer

1. **What drives sustained growth at the frontier?**
   - **Neoclassical:** Exogenous technological progress g
   - But technology is created by profit-seeking firms... how?
2. **Why do policies affect long-run growth?**
   - **Neoclassical:** Policies shift levels, not growth rates
   - But, competition policy, R&D subsidies, investments in education affect growth.
3. **Why do countries diverge?**
   - **Neoclassical:** Conditional convergence assumes some countries "have faster g"
   - Why does g differ across countries?

The Challenge: How do we pay for Technology Improvements?

The Fundamental Accounting Problem:

- With constant returns: $Y = F_K K + F_L L$
- If factors paid marginal products: $Y = rK + wL$
- Nothing left over to pay for technology improvements!

We need increasing returns somewhere in the economy

- But increasing returns $\Rightarrow$ can't have perfect competition
- Endogenous growth models solve this problem in in different ways

A Brief Intellectual History

Wave 1: Learning-by-Doing / AK (Arrow, 1962; Romer, 1986)

- Knowledge spillovers from broad capital accumulation sustain high MPK
- Perfect competition preserved via external returns
- **AK paradigm:** A benchmark for savings- and capital-focused policies.

Wave 2: Product Variety (Romer, 1990)

- R&D expands differentiated intermediates that raise TFP (horizontal innovation)
- Monopolistic competition generates rents to finance innovation

Wave 3: Schumpeterian (Aghion-Howitt, 1992)

- Step-by-step quality improvements displace incumbents (vertical innovation)
- Creative destruction links growth to frontier proximity and policy

The Central Question

Can economic policy permanently raise growth rates?

- **Neoclassical answer**: No (only levels)
- **AK answer**: Yes (any policy affecting saving/investment)
- **Product variety answer**: Yes (policies affecting R&D incentives)
- **Schumpeterian answer**: Yes (policies affecting competition, patents, creative destruction)

Different answers $\Rightarrow$ Different policy prescriptions

How to Think About Models

Not: "Which model is true?"

- Schumpeterian models likely best fit to aggregate data
- But that doesn't make other models redundant

Instead: "Which model is sufficient for the question?"

- Simpler models often sufficient for specific questions
- More complex models needed for others
- Trade-off between realism and tractability

The Need for Models

"All models are wrong, but some are useful." – George Box

- Without a model all we have is hand waving.

Key Skill: Learn to draw on the appropriate model for your question

- Ability to apply mental models to a situation is one of our comparative advantages as economists.
- Start with the simplest model that could possibly work.