

## Innovation-Based Growth Theory

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**Introduction:** The purpose of this course is to introduce students to what is sometimes called Schumpeterian growth theory. This theory focuses on industrial innovations arising from R&D as the mainspring of economic growth. It integrates the microeconomic theory of R&D into a macroeconomic growth model, making clear who gains and who loses from technological change, and showing how long-run growth is determined by the competitive process of creative destruction. In contrast to the neoclassical theory of Solow and Swan, Schumpeterian theory implies that policy and institutions can have long-lasting effects on economic growth.

**Outline:** The first two lectures will develop the basic ideas of Schumpeterian theory. The first lecture will survey the main issues involved, including the facts to be explained, and will provide a critical review of neoclassical growth theory and of the alternative version of endogenous growth theory known as AK theory. The second lecture will derive a simple aggregate model of growth based on creative destruction, showing how it results in a formal structure that includes the Solow-Swan model as a special case. The techniques demonstrated in this lecture can be used to construct a variety of more elaborate growth models.

Each of the remaining three lectures deals with a specific set of empirical issues that Schumpeterian theory can address. Lecture 3 studies General Purpose Technologies; that is, broad-based major technological innovations like the steam engine, electricity, and the computer which, unlike the incremental technological changes usually studied in growth theory, have significant macroeconomic effects. Among the issues involved are whether the introduction of a new technological paradigm can cause growth to slow down for a prolonged period before ultimately resulting in faster growth, and whether it can cause rising wage inequality of the sort observed in recent decades in the United States, the United Kingdom and other countries.

Lecture 4 will address the question of how long-run growth is affected by the degree of product-market competition. The simplest innovation-based growth models imply that competition is bad for economic growth because it reduces the economic rents that constitute the main incentive for performing R&D. Yet a host of empirical evidence suggests that more competition in fact is good for innovation and growth. We will study some modifications of the basic model that provide channels through which competition can have a positive effect on growth, at least under some circumstances. These modifications provide insights into the question of how growth is affected by competition policy, and also by patent policy.

Lecture 5 deals with the question of how to account for the evolving distribution of world income. Proponents of neoclassical theory have argued that differential rates of technological change, the factor emphasized by Schumpeterian theory, are relatively unimportant in accounting for the income gap between rich nations and poor. Moreover these critics argue that evidence on “conditional converge” among rich nations refutes endogenous growth theory. This lecture will develop an open-economy Schumpeterian model that not only addresses these critiques but also provides a more satisfactory explanation than does neoclassical theory of the facts concerning cross-country income differences.

**Textbook:** The main text for the course is *Endogenous Growth Theory*, by Philippe Aghion and Peter Howitt (MIT Press, Cambridge MA, 1998). In addition, I will be referring to a number of other articles, as indicated in the following schedule:

## Schedule of lectures:

### 1. Introduction to Growth Theory – Monday, June 11, 16:30-17:45

Aghion and Howitt, chapter 1

Rebelo, Sergio, "Long-Run Policy Analysis and Long-Run Growth," *Journal of Political Economy*, 99, 1991, pp. 500-521.

Romer, Paul M., "Increasing Returns and Long-Run Growth," *Journal of Political Economy*, 94, 1986, pp. 1002-1037.

### 2. The Schumpeterian Approach – Tuesday, June 12, 14:00-15:45

Aghion and Howitt, chapters 2 & 3.

### 3. General Purpose Technologies – Wednesday, June 13, 13:30-15:00

Aghion and Howitt, chapter 8

Aghion, Philippe, "Schumpeterian Growth Theory and the Dynamics of Income Inequality," *Econometrica*, forthcoming, 2001

Helpman, Elhanan, and Manuel Trajtenberg. "A Time to Sow and a Time to Reap: Growth Based on General Purpose Technologies." In *General Purpose Technologies and Economic Growth*, edited by Elhanan Helpman. Cambridge, MA: MIT Press, 1998.

Howitt, Peter. "Measurement, Obsolescence, and General Purpose Technologies." In *General Purpose Technologies and Economic Growth*, edited by Elhanan Helpman, 219-51. Cambridge, MA: MIT Press, 1998.

### 4. Growth and Competition – Thursday, June 14, 16:00-17:45

Aghion and Howitt, chapter 7

Aghion, Philippe, Christopher Harris, Peter Howitt and John Vickers, "Competition, Imitation and Growth with Step-by-Step Innovation," *Review of Economic Studies*, forthcoming, 2001.

### 5. Cross-Country Income Differences – Friday, June 15, 13:30-15:00

Aghion and Howitt, chapter 12.

Howitt, Peter, "Endogenous Growth and Cross-Country Income Differences." *American Economic Review* 90 (September 2000): 829-46.

Mankiw, N. Gregory, David Romer, and David N. Weil. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107 (May 1992): 407-37.

Quah, Danny T. "Convergence Empirics Across Economies with (Some) Capital Mobility." *Journal of Economic Growth* 1 (March 1996): 95-124.