Economics 302 (Sec. 001) Intermediate Macroeconomic Theory and Policy (Spring 2012) 5/7/2012

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U.S. Long Term Growth

- 2001 recession
- 1990-91 recession
- 1982 recession
- WWII
- "Roaring '20s"
- Great Depression
- 1920-21 recession
- "Great Depression"
10.3 A Broader Look at Growth Across Time and Space

Looking at Growth Across Many Countries

Figure 10 - 3

Growth Rate of GDP per Person since 1960 versus GDP per Person in 1960 (2000 dollars) for 70 Countries
11-4 Physical versus Human Capital

Extending the Production Function

• When the level of output per workers depends on both the level of physical capital per worker, $K/N$, and the level of human capital per worker, $H/N$, the production function may be written as:

$$\frac{Y}{N} = f\left(\frac{K}{N}, \frac{H}{N}\right)$$

An increase in capital per worker or the average skill of workers leads to an increase in output per worker.
11-4 Physical versus Human Capital

Extending the Production Function

• A measure of human capital may be constructed as follows:

• Suppose an economy has 100 workers, half of them unskilled and half of them skilled. The relative wage of skilled workers is twice that of unskilled workers.

• Then:

\[ H = [(50 \times 1) + (50 \times 2)] = 150 \Rightarrow \frac{H}{N} = \frac{150}{100} = 1.5 \]
11-4 Physical versus Human Capital

Human Capital, Physical Capital, and Output

• In the United States, spending on education comprises about 6.5% of GDP, compared to 16% investment in physical capital. This comparison:

  – Accounts for the fact that education is partly consumption.

  – Does not account for the opportunity cost of education.

  – Does not account for the opportunity cost of on-the-job-training.

  – Considers gross, not net investment. Depreciation of human capital is slower than that of physical capital.
11-4 Physical versus Human Capital

Endogenous Growth

• A recent study has concluded that output per worker depends roughly equally on the amount of physical capital and the amount of human capital in the economy.

• Models that generate steady growth even without technological progress are called models of endogenous growth, where growth depends on variables such as the saving rate and the rate of spending on education.

  – Output per worker depends on the level of both physical capital per worker and human capital per worker.

  – Is technological progress unrelated to the level of human capital in the economy? Can’t a better-educated labor force lead to a higher rate of technological progress?
12-2 Determinants of Technological Progress

• “Technological progress” in modern economies is the result of firms’ research and development (R&D) activities. The outcome of R&D is fundamentally ideas.

• Spending on R&D depends on:

   The fertility of the research process, or how spending on R&D translates into new ideas and new products,

   and

   the appropriability of research results, or the extent to which firms benefit from the results of their own R&D.
12-2 Determinants of Technological Progress

The Fertility of the Research Process

• The determinants of fertility include:

The interaction between basic research (the search for general principles and results) and applied research (the application of results to specific uses).

The country: some countries are more successful at basic research; others are more successful at applied research and development.

Time: It takes many years, and often many decades, for the full potential of major discoveries to be realized.
12-2 Determinants of Technological Progress

The Appropriability of Research Results

• If firms cannot appropriate the profits from the development of new products, they will not engage in R&D. Factors at work include:

  The nature of the research process. Is there a payoff in being first at developing a new product?

  Legal protection. **Patents** give a firm that has discovered a new product the right to exclude anyone else from the production or use of the new product for a period of time.
FIGURE 5.1 Sources of Growth
Recent Estimates: TFP Growth