Economics 302
Intermediate Macroeconomic Theory and Policy
(Spring 2010)

Lecture 28-29

May 3-5, 2010
Outline

• Why is the long run important?
• The determinants of economic growth
• Full employment and potential GDP
• The Solow growth model
4.1 The Determinants of Economic Growth

- Labor
- Capital
- Technology
The Production Function

• How much output can be produced from given amounts of labor, capital and technology

\[ Y = F(N,K,A) \]

• It depends on labor for a given capital stock and a given level of technology
FIGURE 4.1 The Production Function in Terms of Labor Input
4.2 Full Employment and Potential GDP

- The growth model assumes that the economy is at full employment:
  \[ \text{Demand for Labor} = \text{Supply of Labor} \]

- **Potential GDP** = amount of production when labor is fully employed

- To determine potential GDP
  - Calculate \( N \) corresponding to full employment
  - Consider \( A \) and \( K \) given – find \( N \)
Potential GDP

\[ Y^* = F(N^*, K, A) \]

= amount of output produced when the labor market is at full employment
= full employment level of output

- Link to chapter 1: we found that potential GDP grows steadily, while actual GDP fluctuates around a growth trend
- Link to chapter 3: the natural rate of unemployment \((U^*)\) is the amount of unemployment in the economy when employment is at full employment \((N^*)\) and GDP is equal to potential GDP \((Y^*)\).
Positive Supply Side Shock

\[ P \]

\[ P_3 \]

\[ \text{AS}_{LR} \]

\[ \text{AS}'_{LR} \]

\[ \text{AD}|A_l, M_l \]

\[ Y_0 = Y^* \]

\[ Y_{\text{final}} \]
Outline

• The Growth Accounting Formula
• Endogenous Growth Theory
• Policies to Stimulate Growth
• The Neoclassical Growth Revival
• Real wages and Labor Productivity
• Productivity and the New Economy
5.1. The Growth Accounting Formula

- Framework that can be used to determine the contribution of labor, capital and technological change to economic growth:

- Rate of growth of output = technology growth + weighted rates of growth of labor and capital \((\text{growth accounting formula})\)

\[
\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \frac{0.7 \Delta N}{N} + \frac{0.3 \Delta K}{K}
\]
Historical Growth Accounting

• The formula can be used to determine the contributions of each factor in the long-term growth in the US in the last 35 years.
FIGURE 5.1 Sources of Growth
Policies to Stimulate Capital Formation

• Government policy has historically concentrated on capital formation

• A rising capital stock adds to economic growth (see the growth formula)

• An extra 1% of capital growth adds 0.3% point to growth in output. To get an added 1% of growth in output, the capital stock would have to grow 3.3% per year.
Policies to Stimulate Capital Formation

• 1% more growth would restore growth rate from 1960s, increase living standards, and bring additional technical innovations – leading to more growth.

• Increased growth in capital stock requires increased investment spending; this occurs only if we reduce consumption, government purchases, or net exports.
Policies to Stimulate Capital Formation

Ex: 1962 President Kennedy sponsored a new investment tax credit – investment increased 30%

Feasible but not sustainable – investment declined to normal levels: growth in capital stock of 7% in 1966, then 5% in 1974, then between 1 and 4% from 1975-1982 (same investment tax credit)
Policies to Increase Labor Supply

• An extra 1% of employment growth adds 0.7% to output growth. Or, to get an added 1% of output growth, it takes 1.4% of added employment growth.
Policies to Increase Labor Supply

• Increased employment growth through:

  a. reduction in income tax rates
     - increases the incentives to work by increasing the wage
     - makes people better off – which depresses labor supply
     - net effect is small
FIGURE 5.5 Shift in Labor Supply from a Tax Cut
Policies to Increase Labor Supply

• Increased employment growth through:

b. Tax reform

- change the marginal rates and average tax rates without changing average income

Ex: change the amount of deductions = change the average rate

- not an incentive for leisure
From GDP Growth to Per Capita Growth

\[
\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + 0.7 \left[ \frac{\Delta N}{N} \right] + 0.3 \left[ \frac{\Delta K}{K} \right] \tag{5.12}
\]

\[
\left( \frac{\Delta Y}{Y} \right) - \left( \frac{\Delta N}{N} \right) = \frac{\Delta A}{A} + 0.3 \times \left[ \frac{\Delta K}{K} - \frac{\Delta N}{N} \right]
\]
Will the Acceleration Continue?

Figure 1: Average long-term labor productivity growth
Nonfarm business sector


Figure 2: Labor productivity
Nonfarm business sector, year-over-year percent change
