Economics 302
Intermediate Macroeconomic Theory and Policy
(Fall 2009)

Lecture 29

Dec. 15, 2009

Outline

- 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

$$\mathbf{Y = F(N,K,A)}$$

- It depends on labor for a given capital stock and a given level of technology

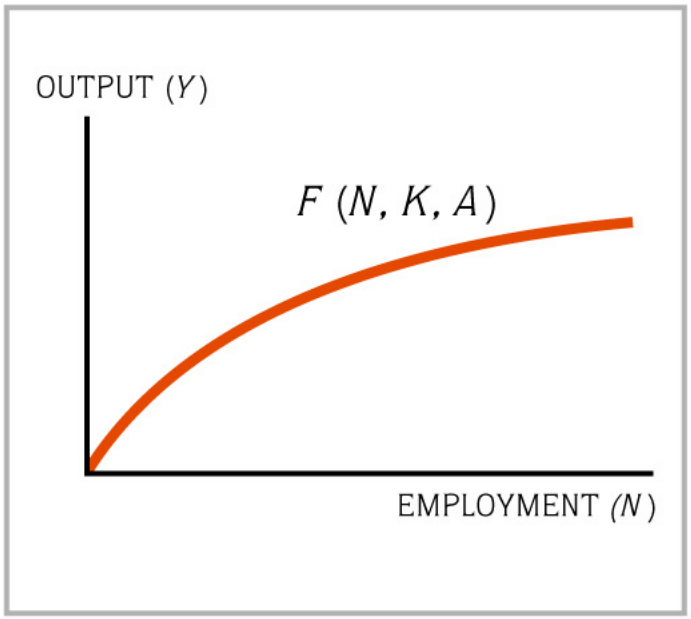


FIGURE 4.1 The Production Function in Terms of Labor Input

4.2 Full Employment and Potential GDP

- The growth model assumes that the economy is at full employment:

Demand for Labor = 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

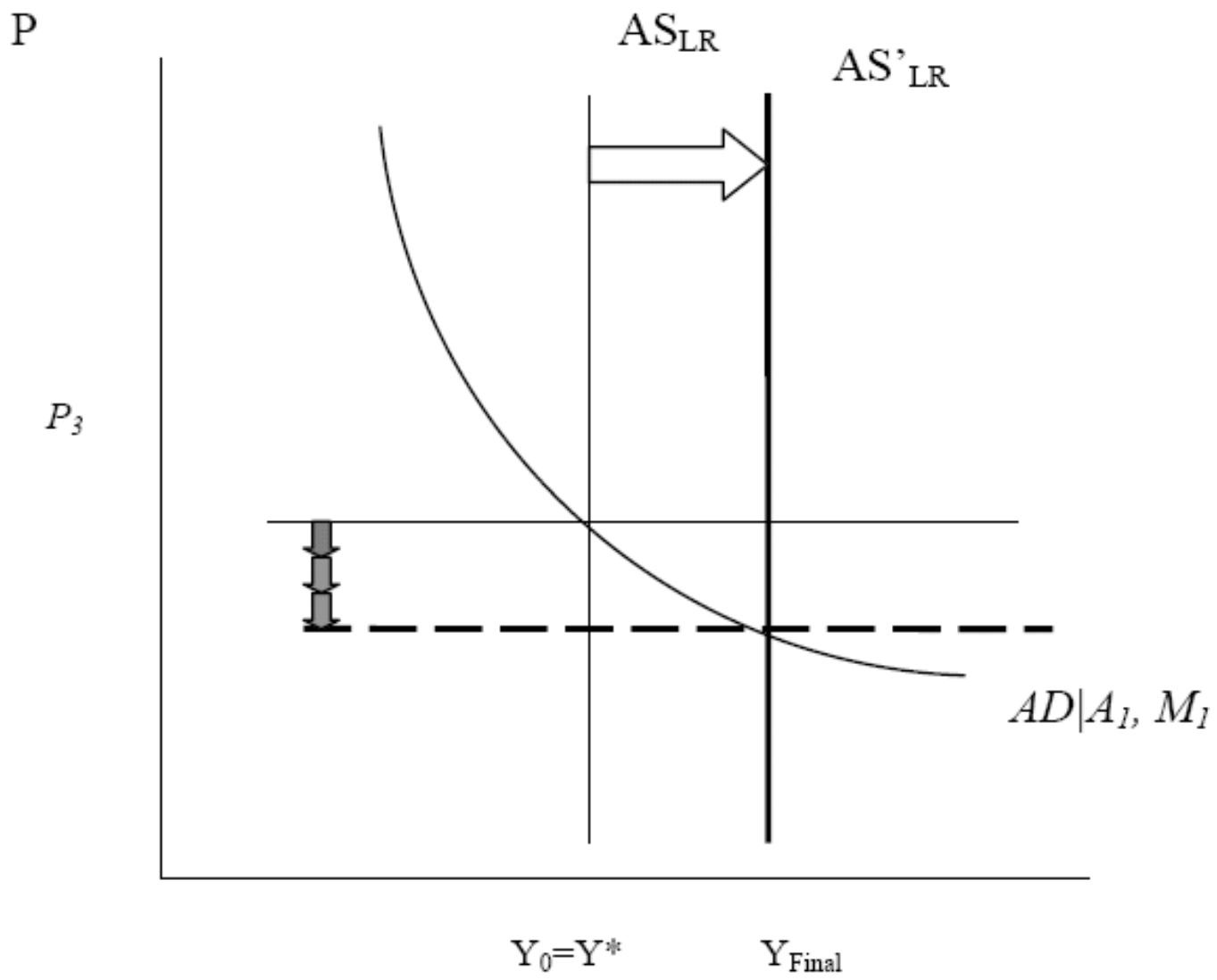
$Y^* = F(N^*,K,A)$

= 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



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 **(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.

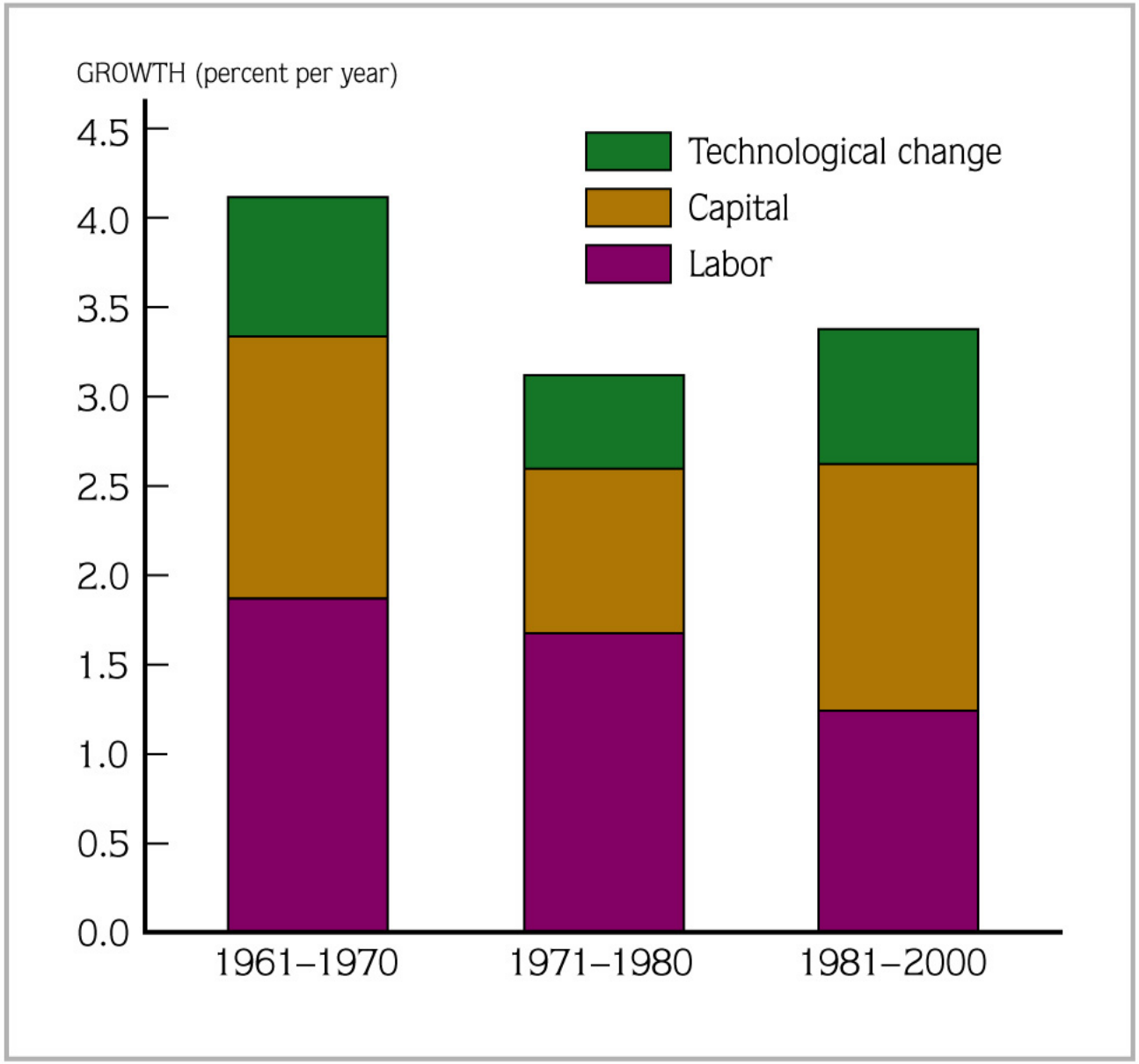


FIGURE 5.1 Sources of Growth

Macroeconomics, 6th Edition

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

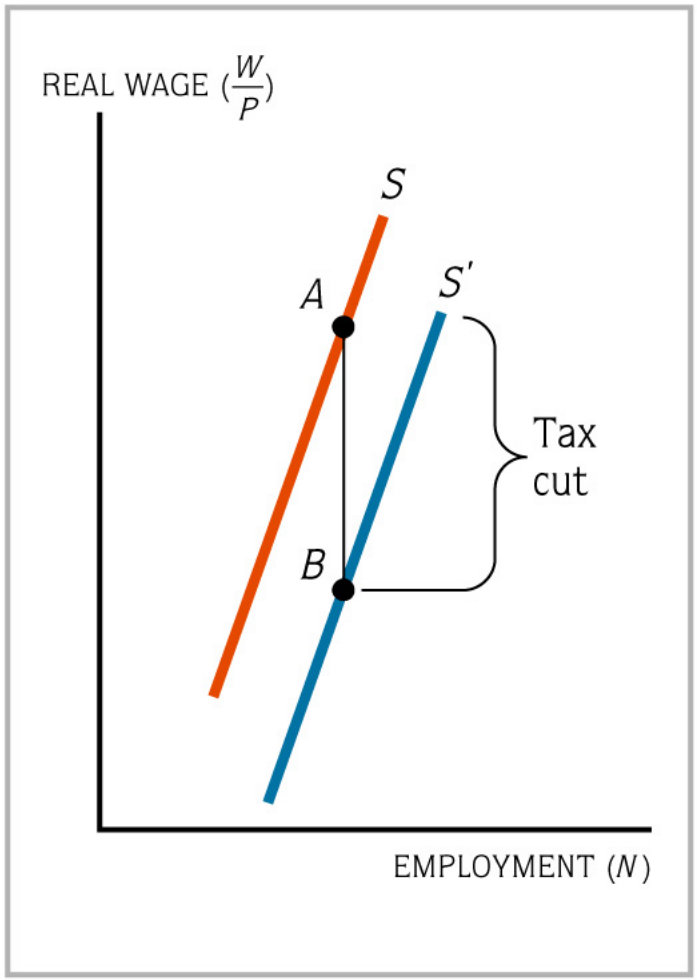


FIGURE 5.5 Shift in Labor Supply from a Tax Cut

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

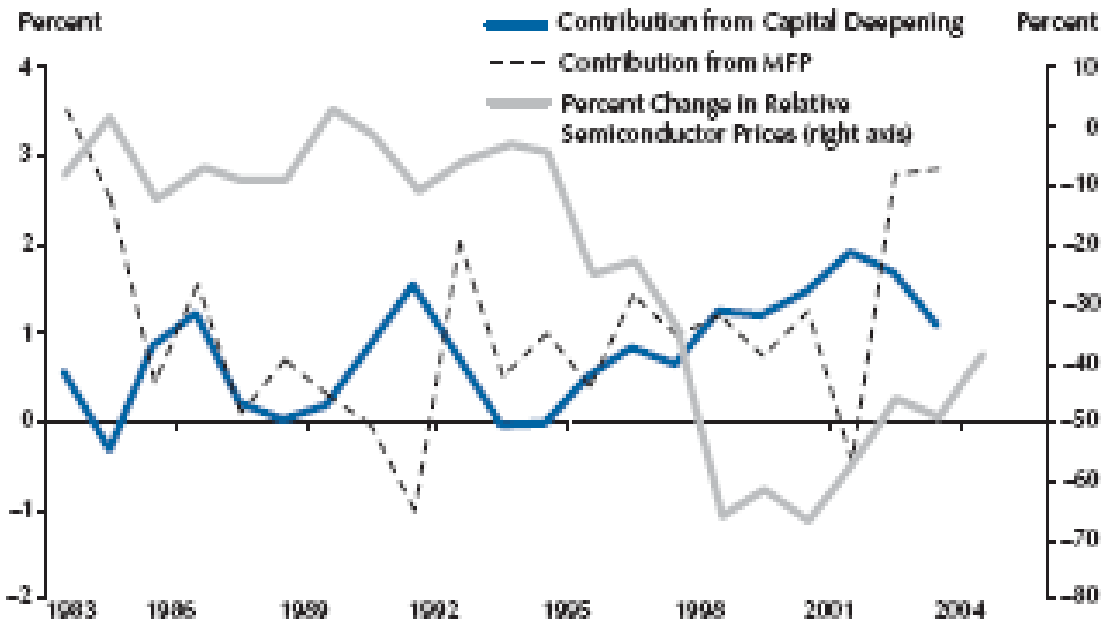
$$\Delta Y / Y = \Delta A / A + 0.7\left[\frac{\Delta N}{N}\right] + 0.3\left[\frac{\Delta K}{K}\right] \qquad (5.12)$$

$$(\Delta Y / Y) - (\Delta N / N) = \Delta A / A + 0.3 \times \left[\frac{\Delta K}{K} - \frac{\Delta N}{N}\right]$$

Detail of the Acceleration

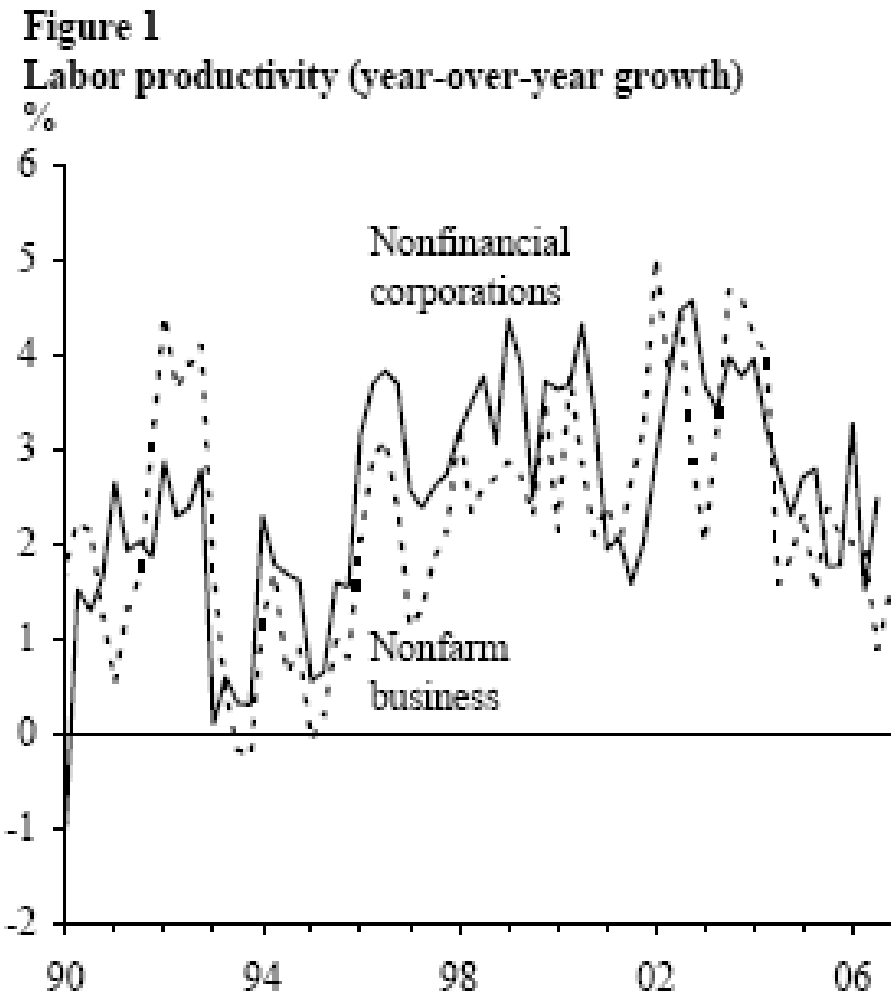
Figure 2

Contributions to Labor Productivity Growth and Relative Changes in Semiconductor Prices



SOURCE: Productivity data, Dan Sichel (via e-mail); semiconductor prices, BLS.

Will the Acceleration Continue?



http://www.frbsf.org/publications/economics/letter/2007/el2007-09.html