

Economics 302  
Intermediate Macroeconomic  
Theory and Policy  
(Spring 2010)

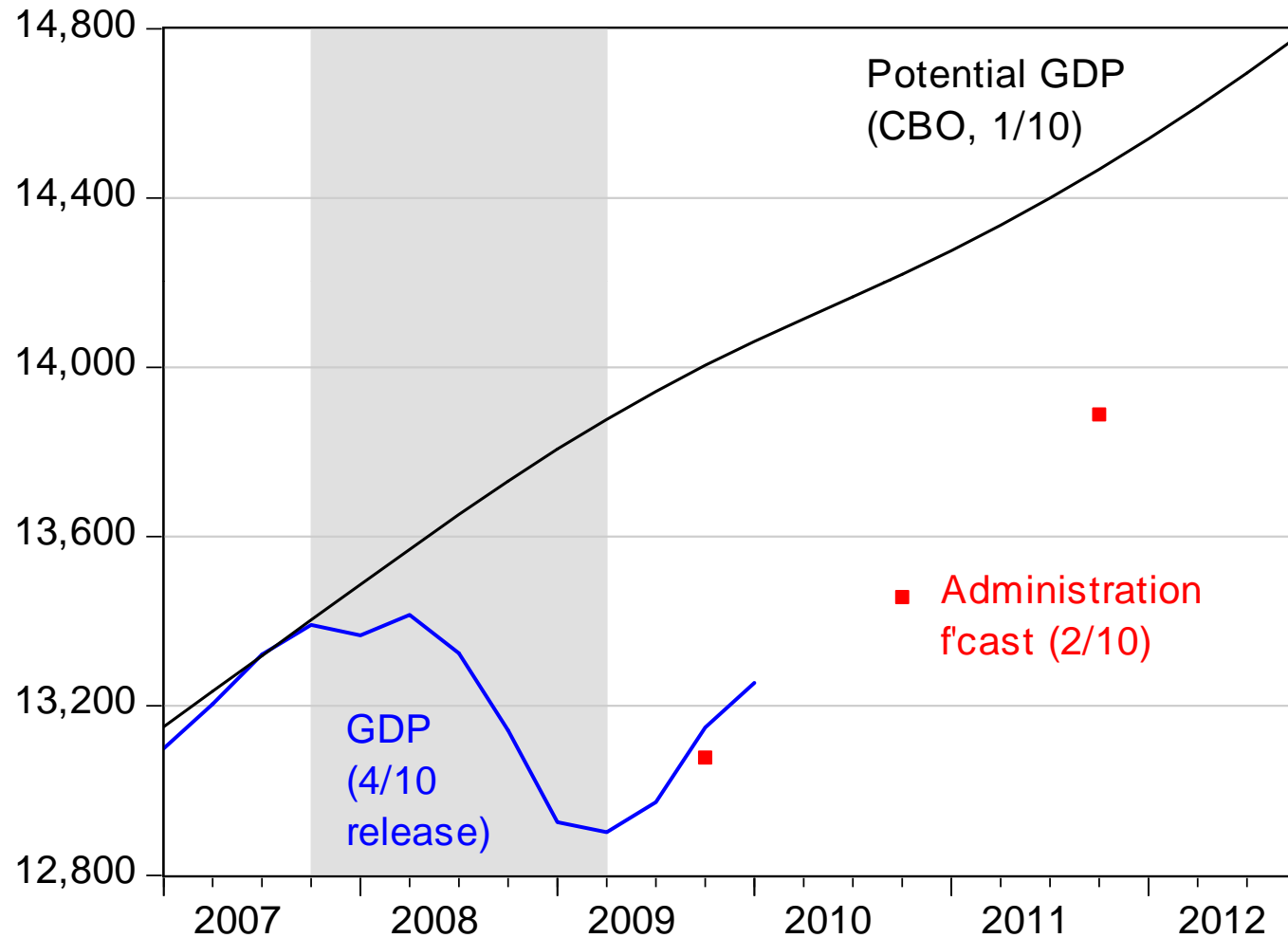
Lecture 28-29

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

# GDP and Long Run GDP



# 4.1 The Determinants of Economic Growth

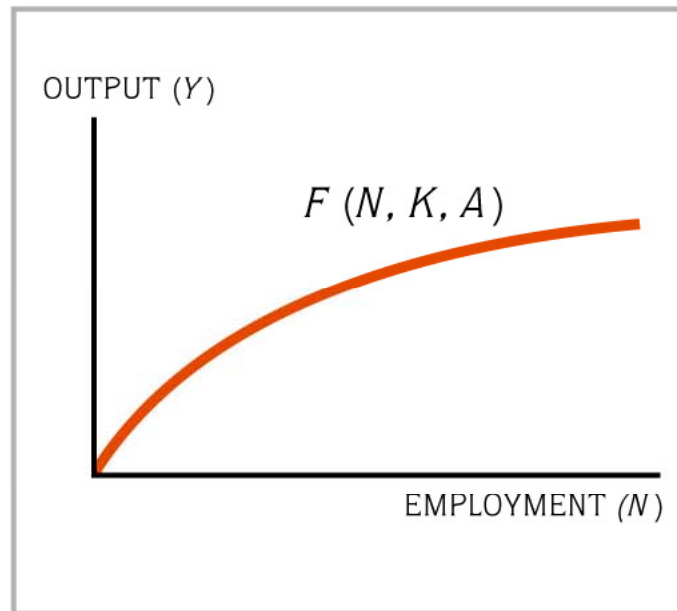
- Labor
- Capital
- Technology

# 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:

**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

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

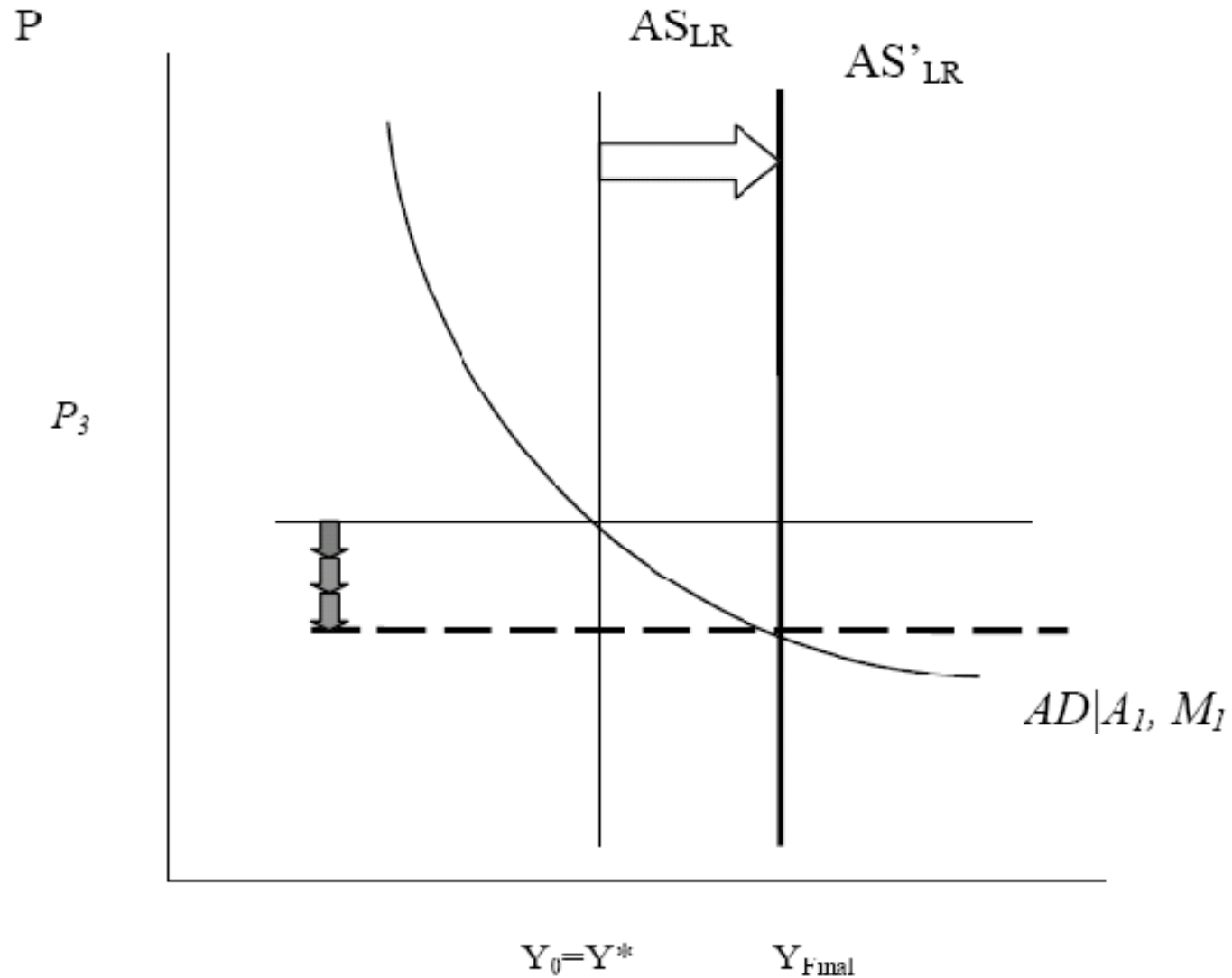
= amount of output produced when the labor market is at full employment

= 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

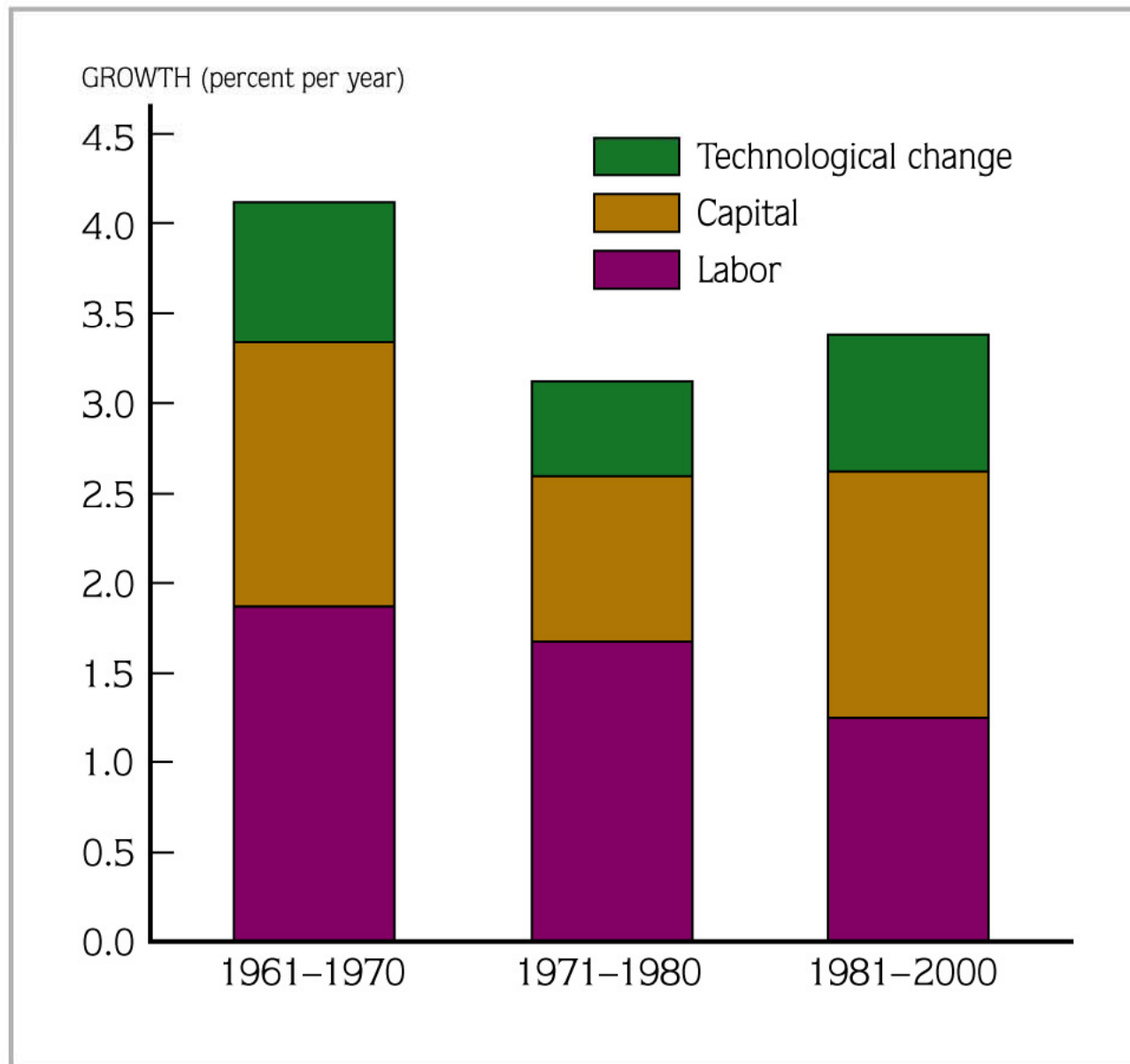
# 5.1. The Growth Accounting Formula

- 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

# 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)

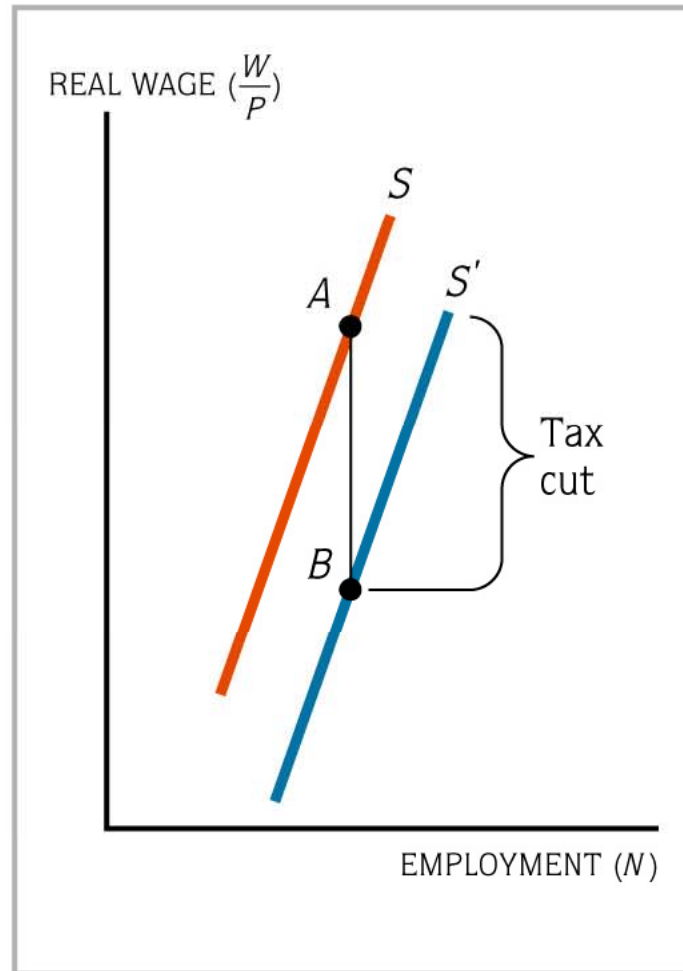


# Policies to Increase Labor Supply

- 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

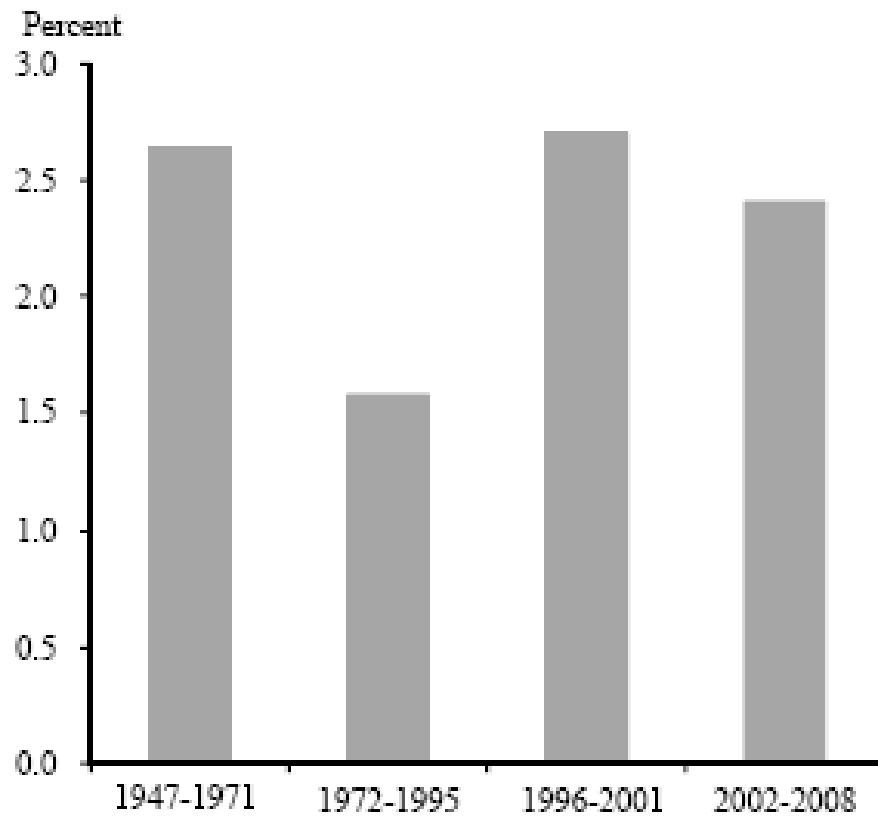
# From GDP Growth to Per Capita Growth

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

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

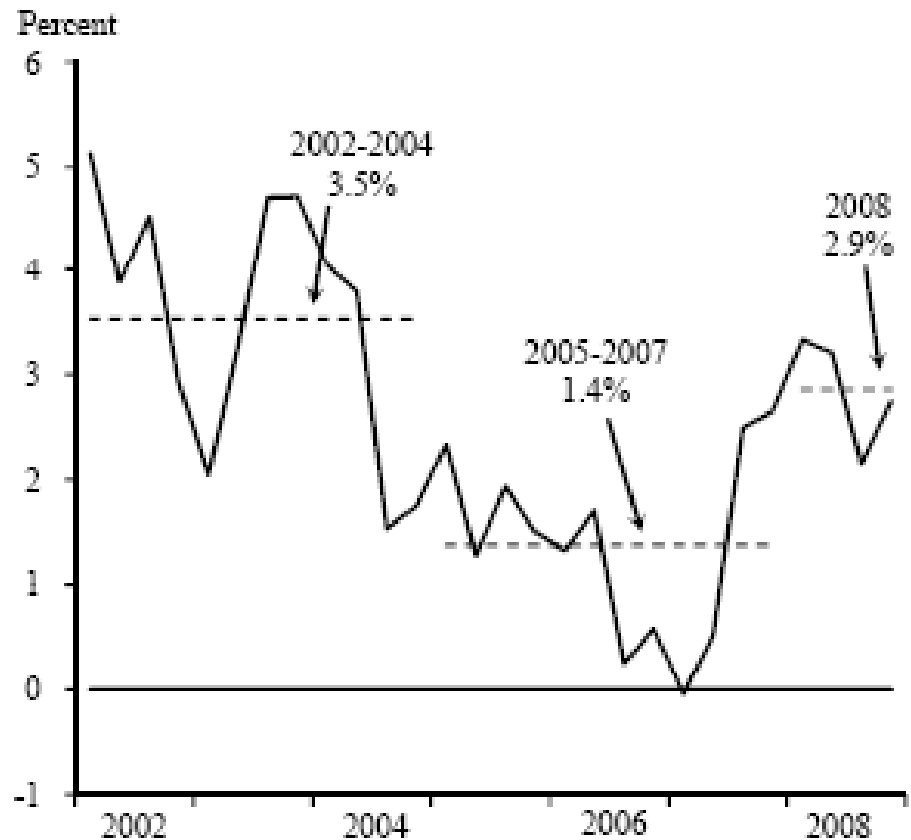
# Will the Acceleration Continue?

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



Source: Bureau of Labor Statistics.

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



Source: Bureau of Labor Statistics.

<http://www.frbsf.org/publications/economics/letter/2009/el2009-11.html>