

Economics 302  
Intermediate Macroeconomic  
Theory and Policy  
(Spring 2010)

Lecture 22-25  
Apr. 12-Apr. 21, 2010

# **Foreign Trade and the Exchange Rate**

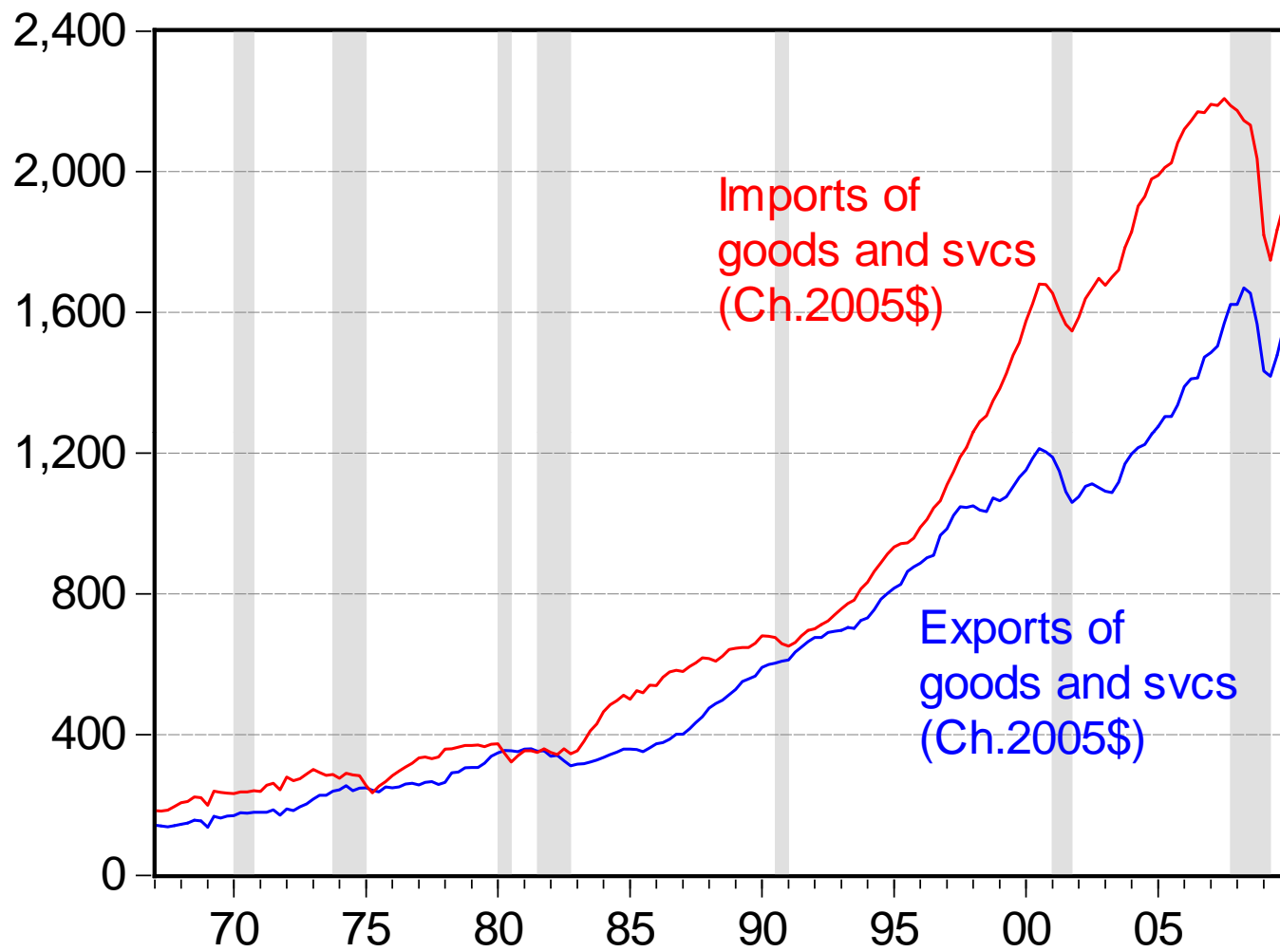
Chapter 12

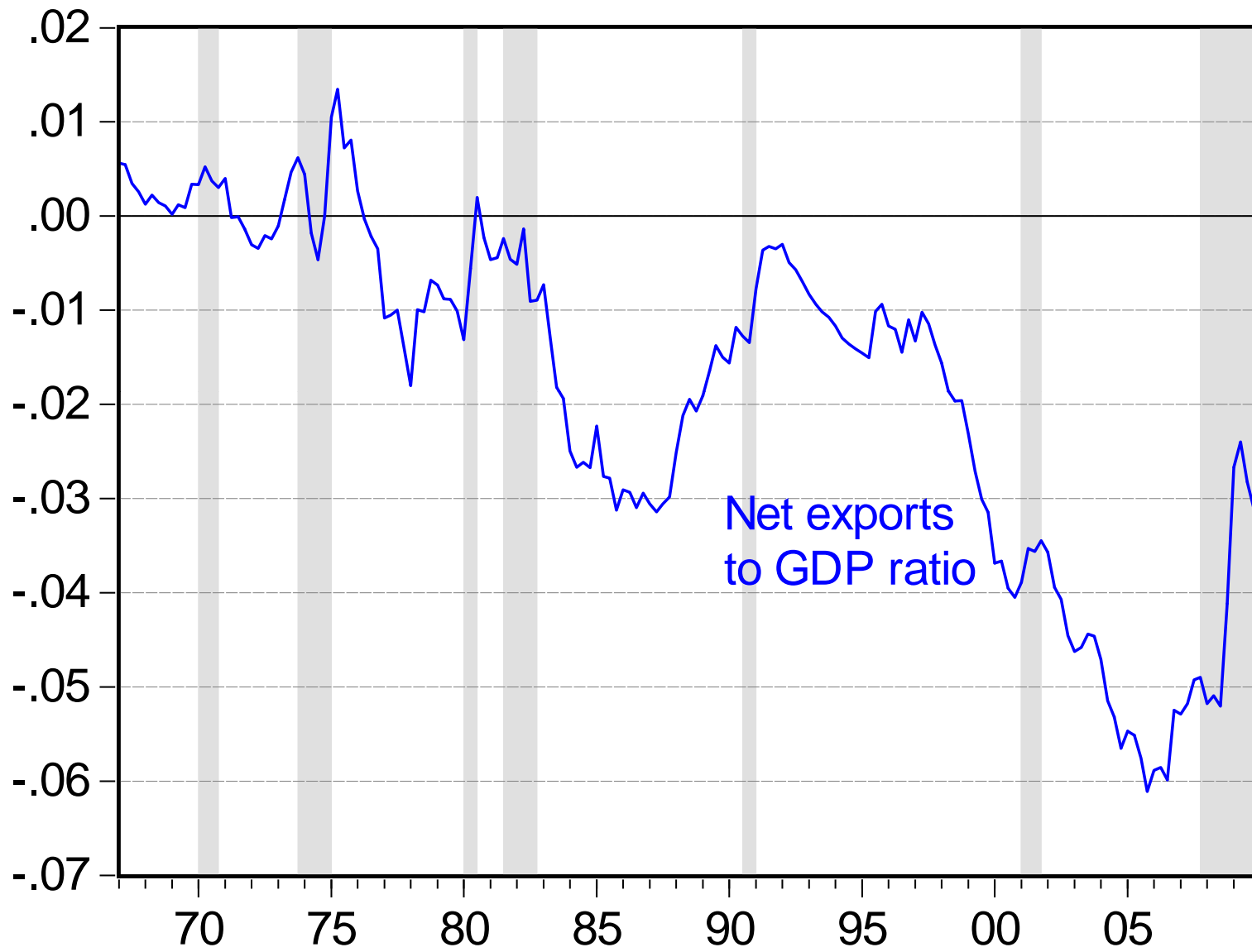
# Outline

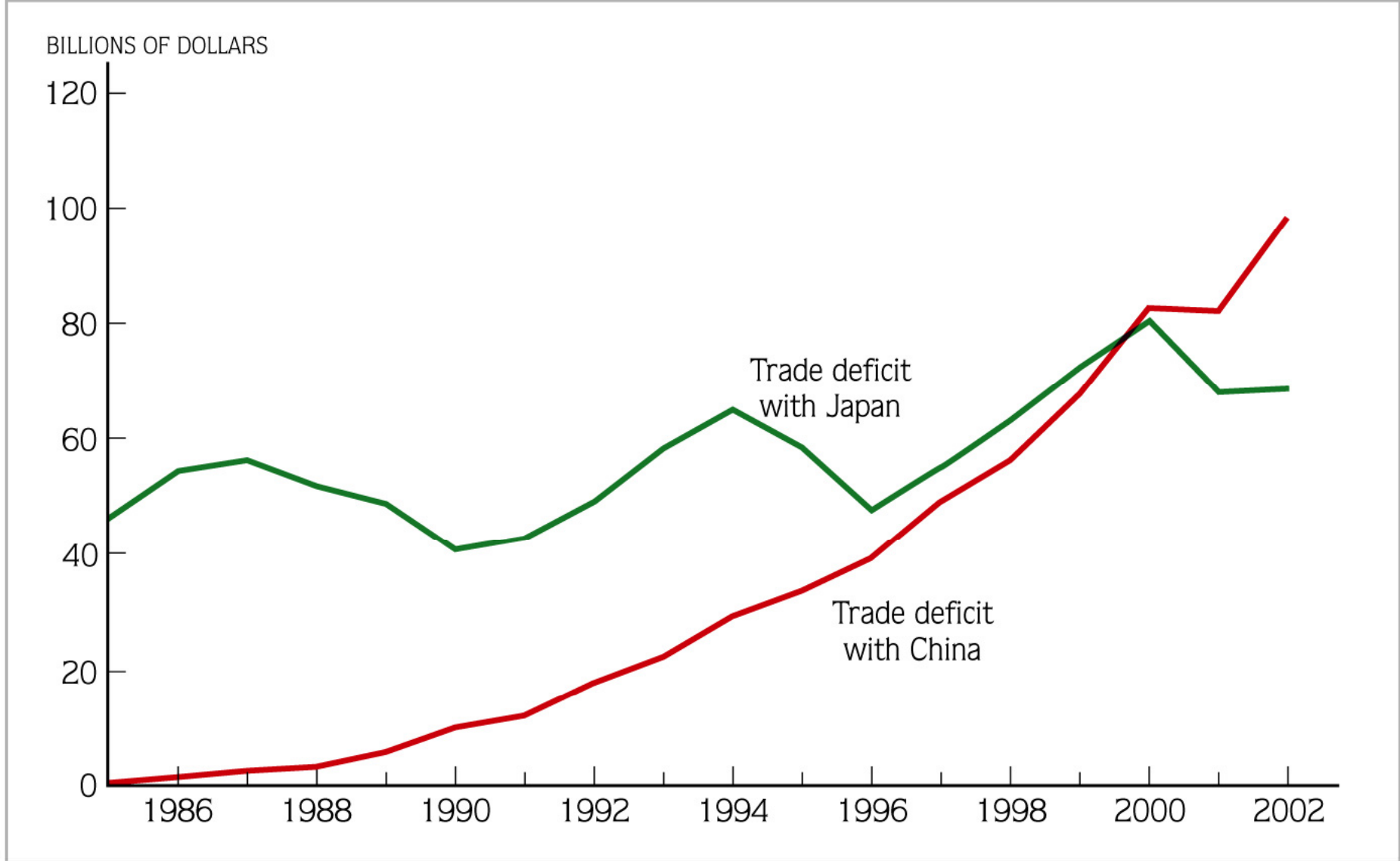
- Foreign trade and aggregate demand
- The exchange rate
- The determinants of net exports
- A model of the real exchange rates
- The IS curve and economic policy in an open economy
- The exchange rate and the price level
- Protectionism versus free trade
- Stabilizing the exchange rate
- Fixed and floating exchange rates in the long run

# 12.1 FOREIGN TRADE AND AGGREGATE DEMAND

- The quantity of goods and services flowing into and out of the United States is not the only important dimension of trade.
  - It matters how much we have to pay for imports and how much we can get for our exports.
- Nominal or dollar flows are important in foreign trade, whereas real flows concern us in considering domestic production.







**FIGURE 12.2** United States Trade Deficit with Japan and China

# 12.1 FOREIGN TRADE AND AGGREGATE DEMAND

- The **terms of trade** is the ratio of the price of exports to the price of imports.
  - When the prices of imports rise, we say there has been an adverse shift in the terms of trade.
- Foreign trade influences U.S. aggregate demand in two ways.
  - Import and export of goods and services

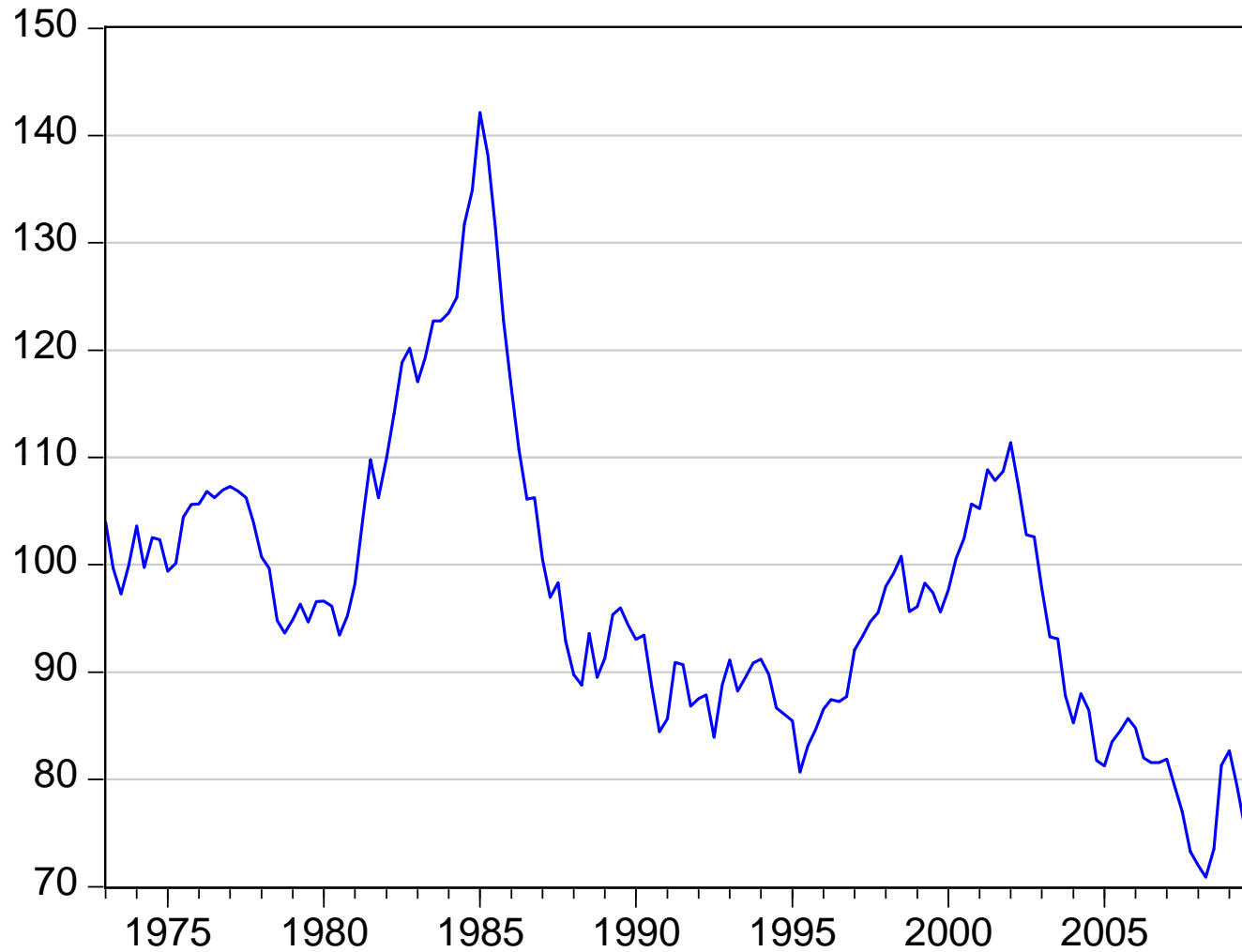


- The **exchange rate** is the amount of foreign currency that can be bought with 1 U.S. dollar.
- The exchange rate is determined in the **foreign exchange market**, where dollars and other currencies are traded freely.
- In today's monetary system the dollar exchange rate is allowed to *float* against the currencies of other large countries.
  - The system is called a *floating* or **flexible exchange-rate system**.

## 12.2 THE EXCHANGE RATE

- A convenient single measure of the dollar exchange rate is the **trade-weighted exchange rate**, which we denote by the symbol  $E$ .
  - This is an average of several different exchange rates, each one weighted according to the amount of trade with the United States.
  - **Depreciation of the dollar** occurs when the exchange rate  $E$  falls. **Appreciation of the dollar** occurs when the exchange rate  $E$  rises.

## NOMDOLLAR\_MAJOR



Source: Federal Reserve Board, (value against major currencies)

<http://www.federalreserve.gov/releases/H10/Summary/>

# The Exchange Rate and Relative Prices

- The **real exchange rate** is a measure of the exchange rate adjusted for differences in price levels between the United States and the Rest of the World (ROW).
- It is a measure of the relative price of goods produced in the United States compared with goods produced in the ROW.

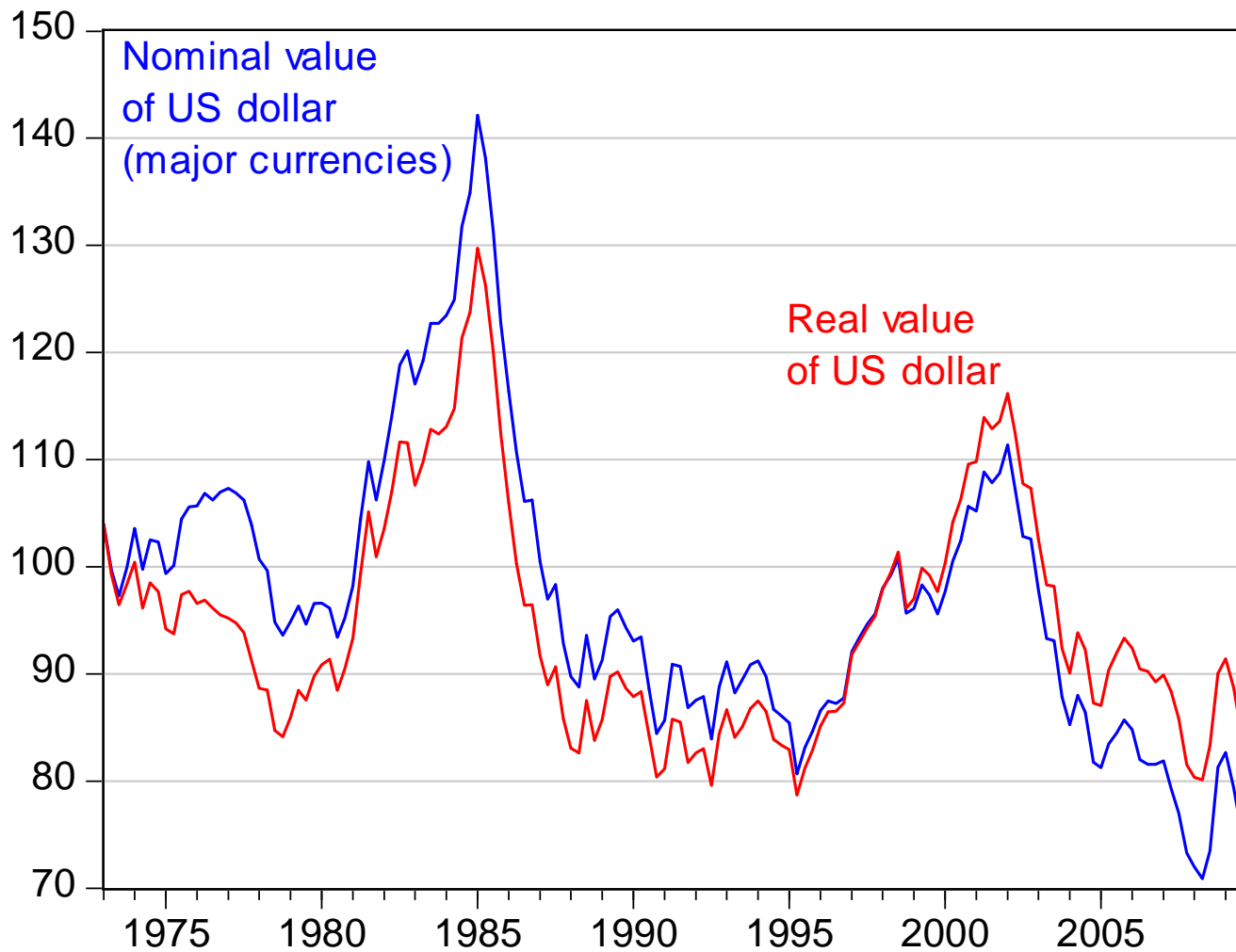
# The Exchange Rate and Relative Prices

Real exchange rate

$$= \frac{\text{Foreign price of US goods}}{\text{Foreign price of ROW goods}} = \frac{ExP}{P_W}$$

# Purchasing Power Parity

- If the United States and the ROW produced all the same products, the exchange rate could not fluctuate in the short run and would change in the longer run only by as much as prices in the ROW rose by more than prices in the United States.
  - This theory of exchange-rate fluctuations is called **purchasing power parity**.



Source: Federal Reserve Board, (value against major currencies)

<http://www.federalreserve.gov/releases/H10/Summary/>

## 12.3 THE DETERMINANTS OF NET EXPORTS

- Fluctuations in the exchange rate change the relative price of U.S. and ROW goods and thereby affect the demand for imports and exports.
  - Imports depend positively on the exchange rate.
  - Exports depend negatively on the exchange rate.



# The Effect of Income

- Generally, imports respond positively to GDP. On the other hand, there is little connection between U.S. exports and U.S. GDP.
  - Hence, net exports depend negatively on GDP.

# The Net Export Function

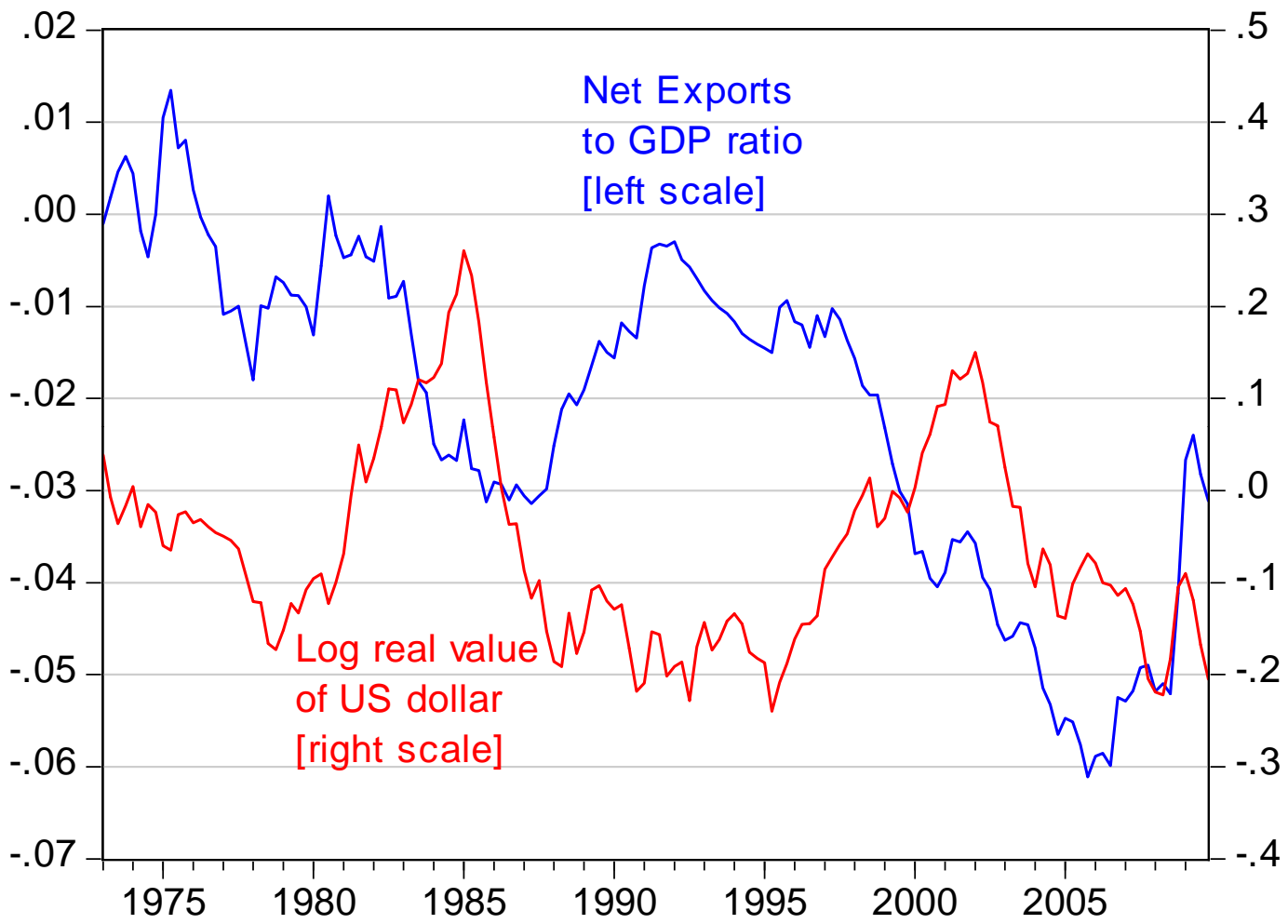
- We can combine imports and exports into a single measure, net exports  $X$ , defined as exports less imports.
  - Net exports depend negatively on the real exchange rate.
  - Net exports depend negatively on real income in the United States.

# The Net Export Function

- We can summarize these ideas in a simple algebraic formula:

$$X = g - mY - n \frac{EP}{P_W} \quad (12.1)$$

- Equation 12.1 is the net export function.
  - It says that net exports equal a constant  $g$  minus a coefficient  $m$  times income  $Y$ , minus a coefficient  $n$  times the real exchange rate.



# Numerical Example

- A numerical example of the net export function can be written:

$$X = 600 - 0.1Y - 100 \frac{EP}{P_W} \quad (12.2)$$

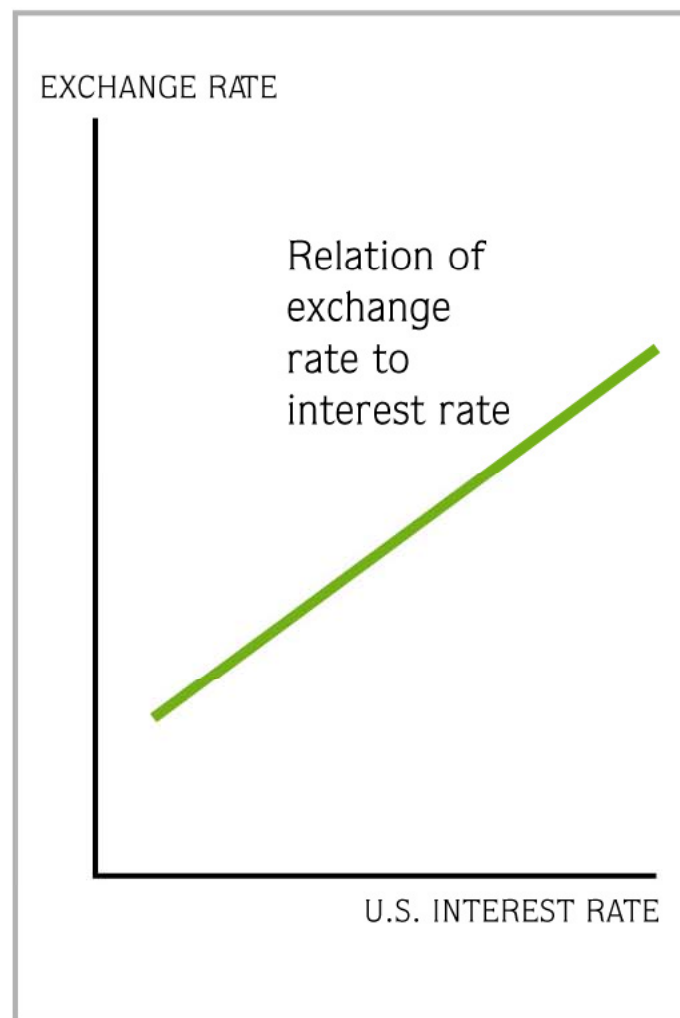
- Suppose that the price level in both the United States and the ROW are predetermined at the value of 1.0
- If output  $Y$  is \$5,000 billion and the exchange rate  $E$  is 1.0, then net exports  $X$  equal zero.

# Numerical Example

- If output  $Y$  rises by \$100 billion, then net exports fall by \$10 billion, because imports rise by this amount.
- If the exchange rate falls from 1.0 to 0.6, about as much as it did from 1985 to 1992, then net exports would rise by \$40 billion.

# 12.4 A MODEL OF THE REAL EXCHANGE RATE

- Fluctuations in the exchange rate are closely related to interest rates in the United States and the ROW.
  - In particular, policies in the United States that raise interest rates tend to cause the dollar to appreciate.



**FIGURE 12.6** Relation between the U.S. Interest Rate and the Exchange Rate



## 12.4 A MODEL OF THE REAL EXCHANGE RATE

- In algebra, we can express the positive relation between the real exchange rate and the U.S. interest rate as

$$(EP/P_w) = q + vR \quad (12.3)$$

where  $R$  is the U.S. interest rate and  $q$  and  $v$  are constants.

## 12.5 THE IS CURVE AND ECONOMIC POLICY IN AN OPEN ECONOMY

- *Without* net exports in the income identity, the IS curve slopes downward, because higher interest rates reduce investment and, through the multiplier, reduce GDP.
- *With* net exports, an increase in the interest rate also raises the exchange rate and thereby reduces net exports.
  - This makes the IS curve flatter than it would be in a closed economy.

## 12.5 THE IS CURVE AND ECONOMIC POLICY IN AN OPEN ECONOMY

- The presence of net exports also reduces the size of the multiplier, making the IS curve steeper.
- Net exports depend negatively on GDP. As GDP rises, part of the increase in spending goes overseas and does not enter domestic aggregate demand.

# Algebraic Derivation of the Open-Economy IS Curve

- $Y = C + I + G + X$
- $Y = a - b(1-t)Y + e - dR + G + g - mY - n(EP/Pw)$
- Putting the interest rate on the left-hand side gives:

$$R = \frac{a + e + g}{d} - \frac{1 - b(1-t) + m}{d} Y - \frac{n}{d} \frac{EP}{Pw} + \frac{1}{d} G \quad (12.6)$$

# Algebraic Derivation of the Open-Economy IS Curve

- To get the IS curve, substitute Equation 12.3 into Equation 12.6 to eliminate the real exchange rate:

$$R = \frac{a + e + g - nq}{d + nv} - \frac{1 - b(1 - t) + m}{d + nv} Y + \frac{1}{d + nv} G \quad (12.7)$$

# Effects of Monetary and Fiscal Policy on Trade in the Short Run

- Suppose the Fed increases the money supply.
  - The decline in interest rates depreciates the exchange rate, net exports rise, and GDP rises.
  - However, the increase in GDP tends to decrease net exports because imports rise.
    - There are thus two offsetting effects of an increase in the money supply on net exports: exports rise, but imports may rise even more.

# Effects of Monetary and Fiscal Policy on Trade in the Short Run

- Suppose that government spending is increased.
  - The rise in interest rates causes the exchange rate to appreciate.
  - The higher exchange rate reduces exports
  - The increase in government spending crowds out exports as well as investment.
  - Imports also rise because of the increase in the dollar and GDP.
    - Thus, an increase in government spending increases the trade deficit or reduces the trade surplus.

# Price Adjustment

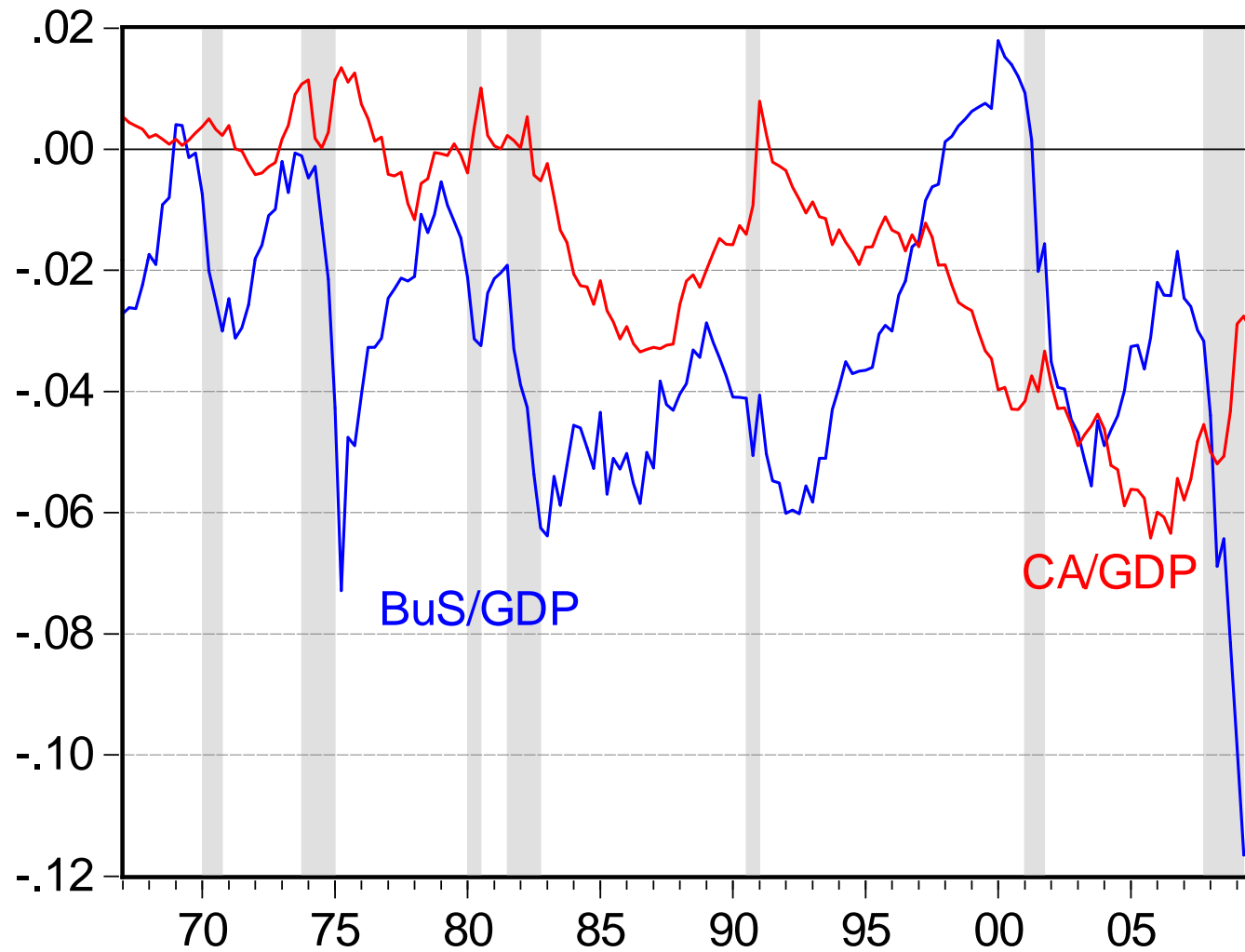
- An increase in the money supply eventually causes prices to rise.
- The price level will increase by the amount of the original increase in the money supply.
- The real exchange rate will return to normal so that the nominal exchange rate  $E$  will depreciate by the amount of the increase in the price level.
- In the long run, money is neutral.



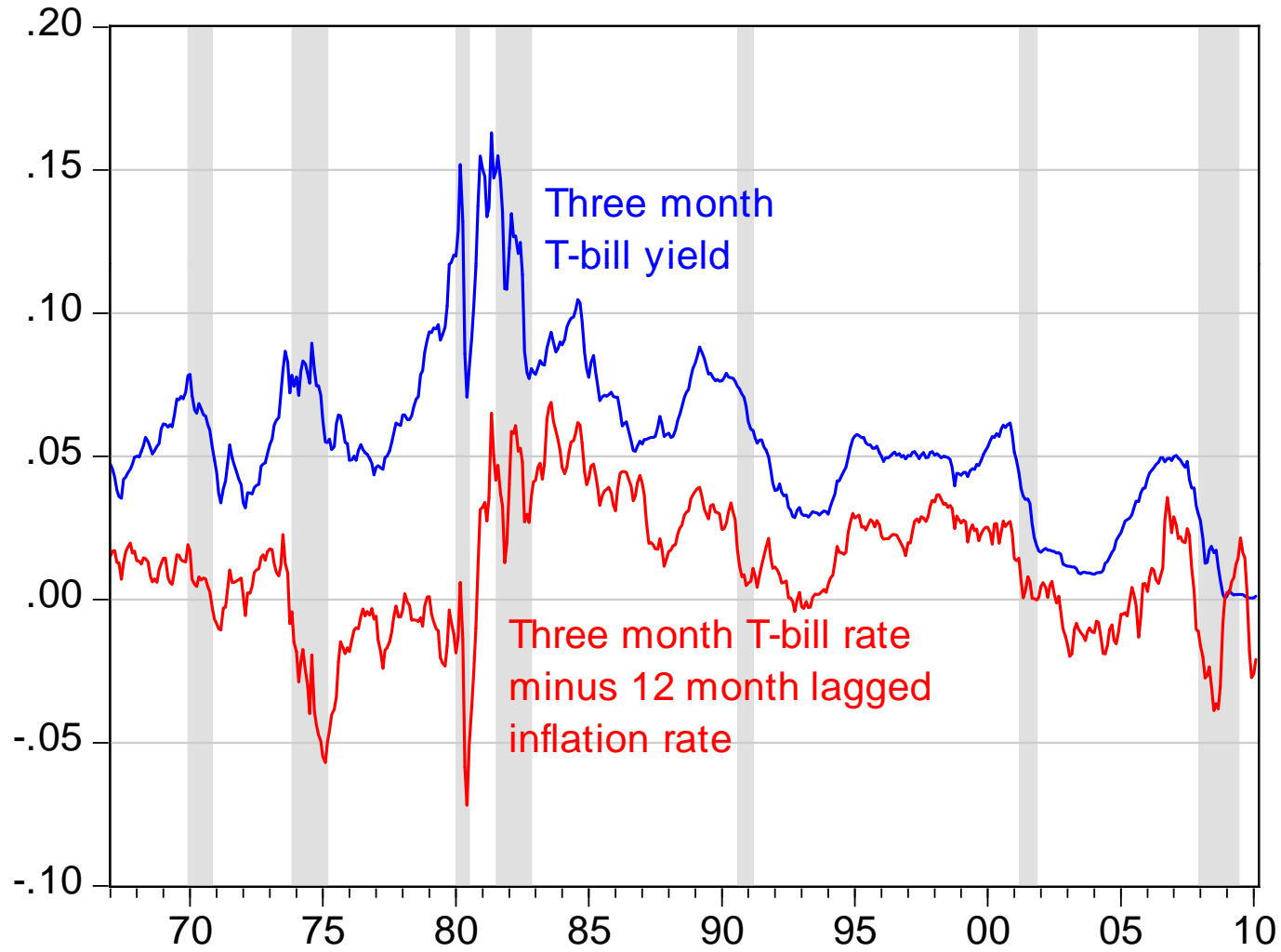
# Price Adjustment

- An increase in government spending eventually causes an upward adjustment in prices
  - The reduction in real balances raises interest rates and further reduces investment and net exports.
  - Output returns to potential output, and the sum of investment and net exports declines by exactly the amount of the increase in government spending.
  - The real exchange rate and the real interest rate are permanently higher after the process is complete.

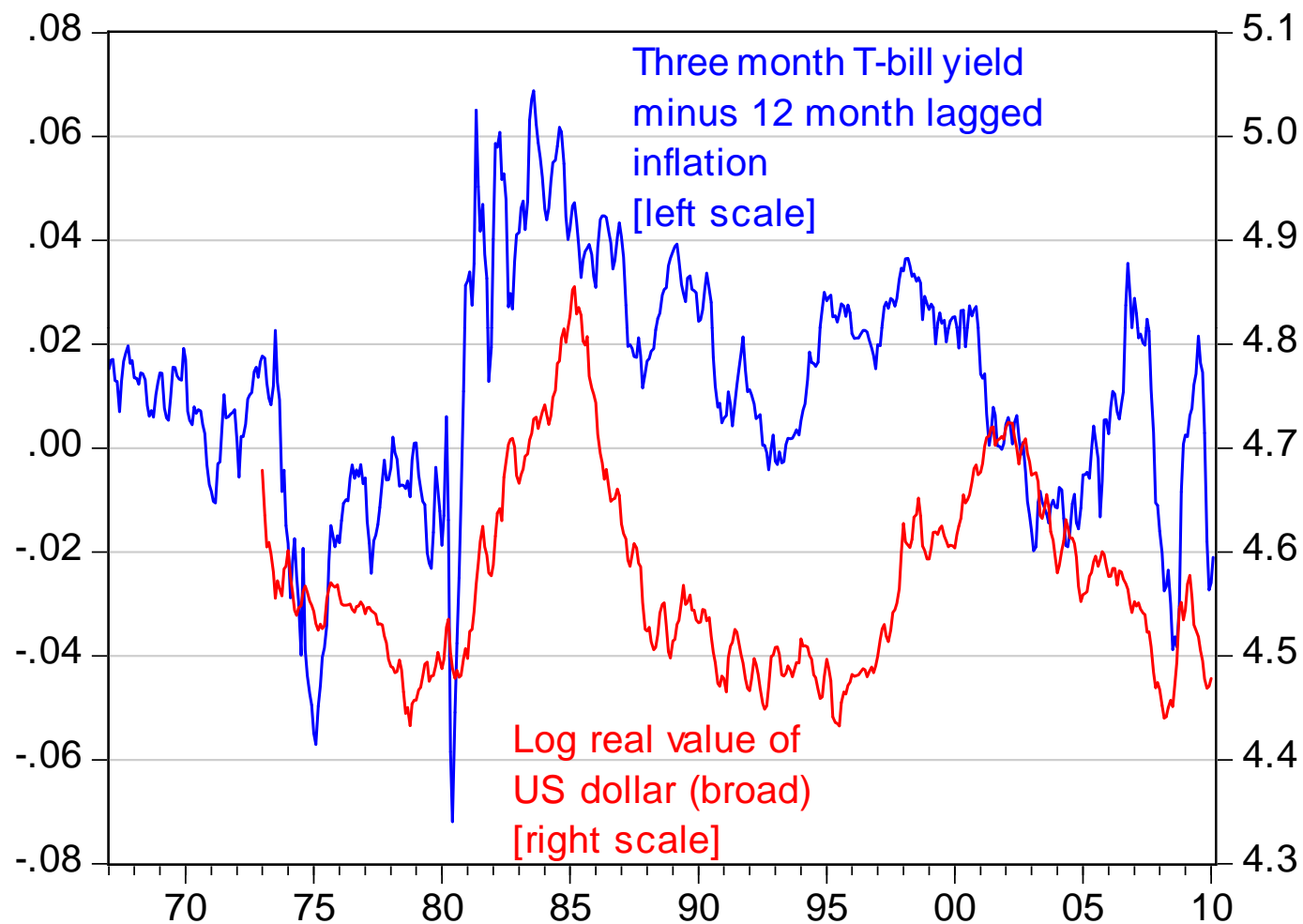
# Budget Balance and CA Balance



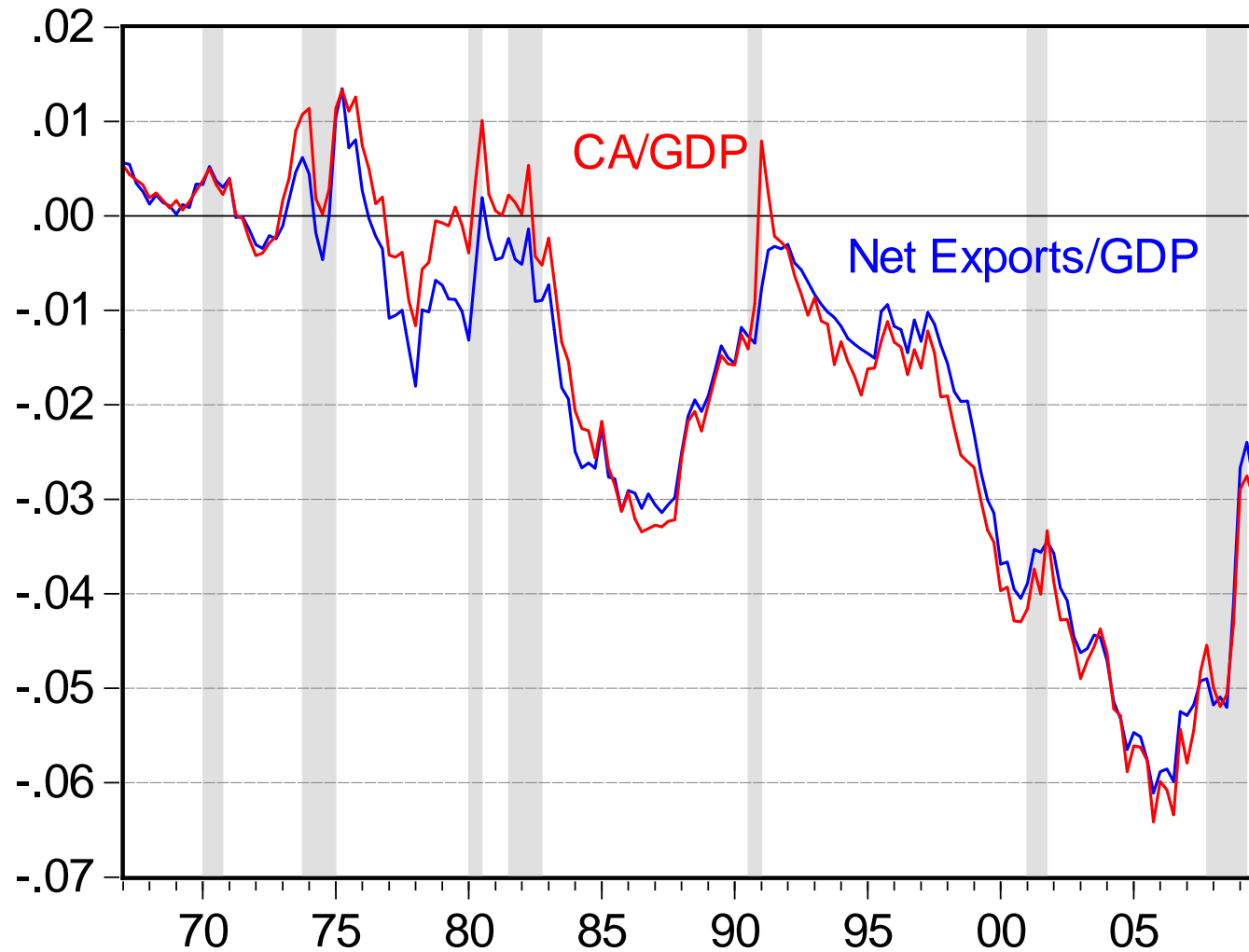
# Monetary Policy



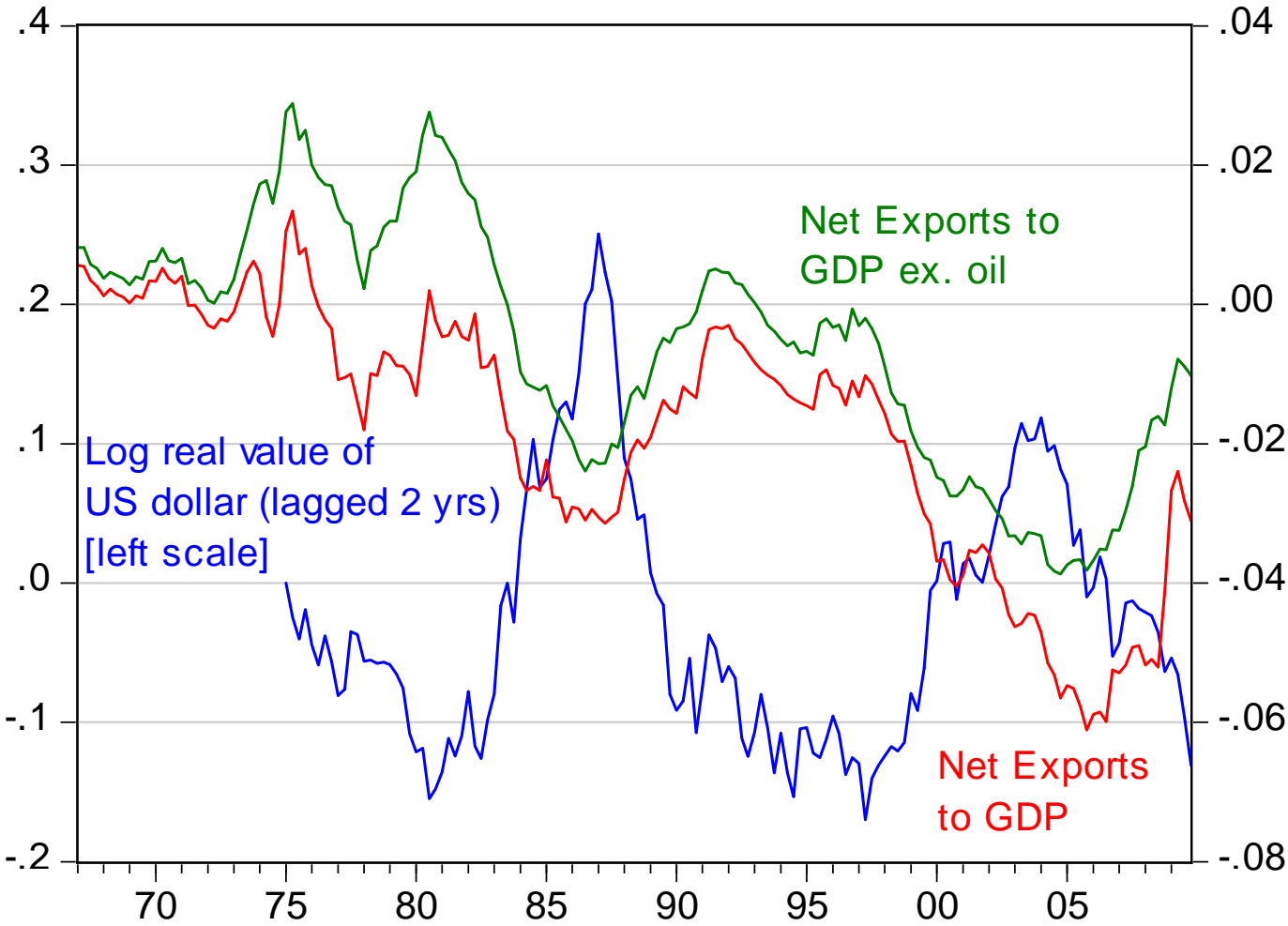
# Real Interest Rate & Real Value of the Dollar



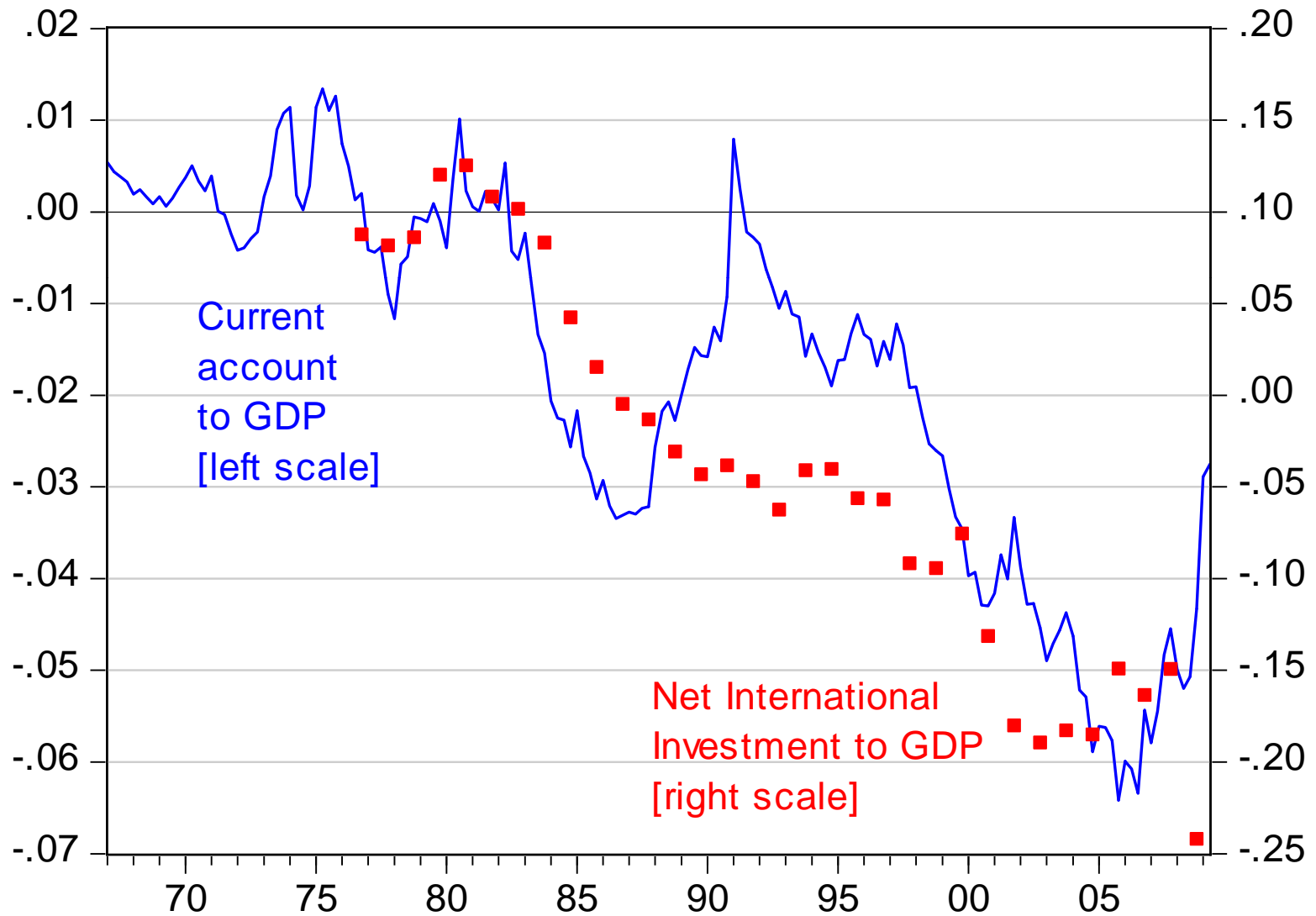
# Current account and net exports



# Real Value of Dollar and Net Exports



# Net foreign Assets



# 12.6 THE EXCHANGE RATE AND THE PRICE LEVEL

- Changes in a small country's exchange rate bring immediate and important changes in that country's price level.
- This is not true for the large U.S. economy.
- Movements in the exchange rate do not create price shocks for the U.S.

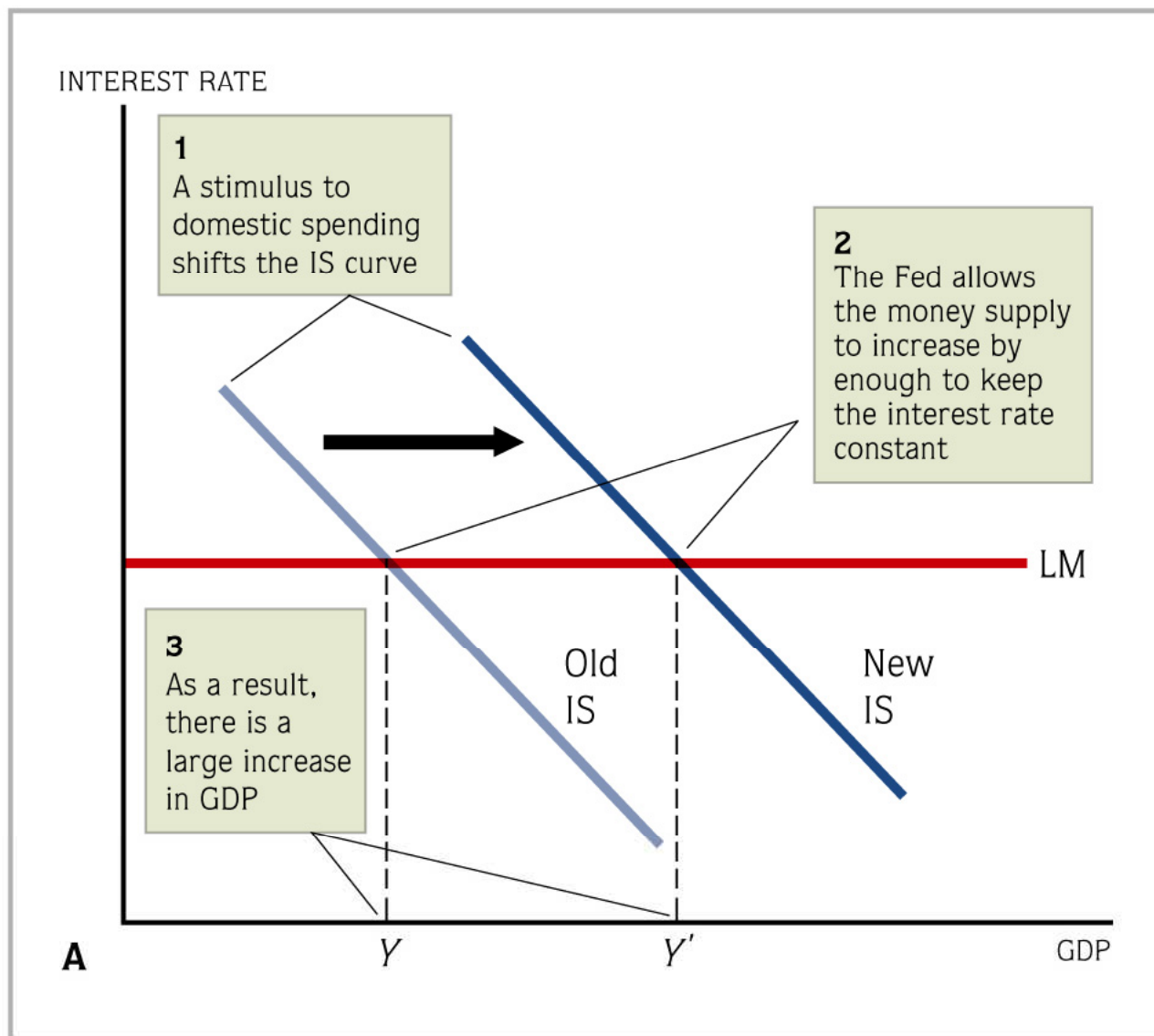


# 12.7 PROTECTIONISM VERSUS FREE TRADE

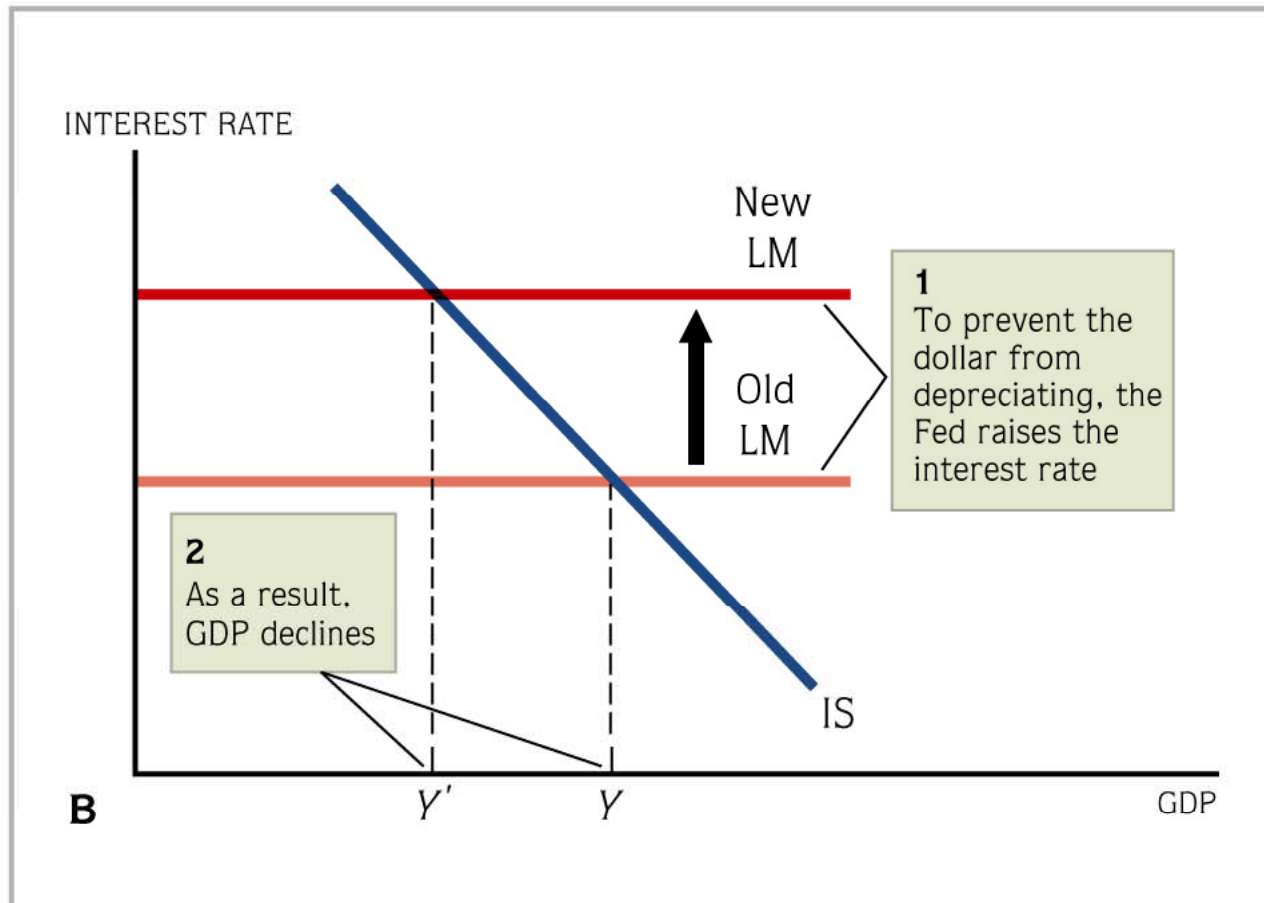
- If foreign competition could be eliminated or discouraged, domestic producers would enjoy increased profits.
  - The losers would be U.S. consumers, who would pay higher prices as a result of lessened competition.
- Industries in the tradables sector push constantly in favor of protectionist measures. These measures include tariffs, quotas, and outright bans of certain imports.

# 12.8 STABILIZING THE EXCHANGE RATE

- How might U.S. policy be changed to stabilize the exchange rate?
- The Fed would have to keep the interest rate constant by setting a horizontal LM curve.
- It would not be able to use monetary policy to achieve other goals such as stability of GDP and prices.



**FIGURE 12.7** Effect of a Spending Shock and a Foreign Shock under Exchange-Rate Stabilization (top)



**FIGURE 12.7** Effect of a Spending Shock and a Foreign Shock under Exchange-Rate Stabilization (bottom)

# 12.9 FIXED AND FLOATING EXCHANGE RATES IN THE LONG RUN

- The exchange rate, price level, and monetary policy for an economy in the long run are related by

$$PE = P_w \quad (12.8)$$

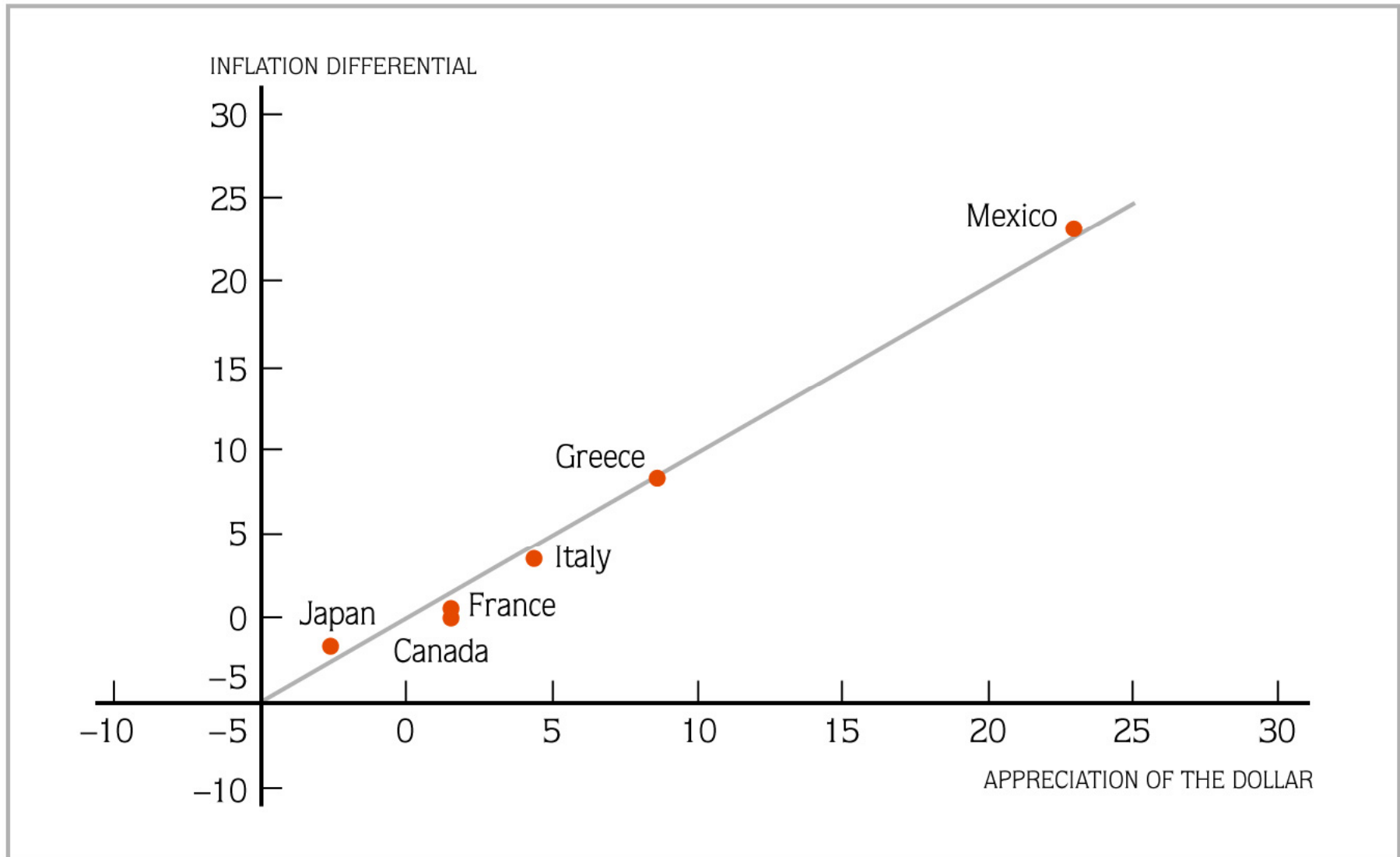
- Equation 12.8 says that *purchasing power parity* holds in the long run.
- Given an exchange-rate target  $E$ , we can solve Equation 12.8 for the price level needed to achieve that exchange rate:

- $P = P_w/E \quad (12.9)$

## 12.9 FIXED AND FLOATING EXCHANGE RATES IN THE LONG RUN

- With a floating exchange rate, Equation 12.8 has a different interpretation.

$$E = P_w/P \quad (12.10)$$



**FIGURE 12.8** Inflation Differentials and Appreciation of the Dollar Relative to Six Countries, 1973–2002