

# **Lecture 1: Intermediate macroeconomics, autumn 2008**

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### **Fundamental questions**

- 1. The relationship between savings, investment and real interest rates in the world economy**
- 2. The relationship between fiscal deficits and the real interest rate?**
- 3. The relationship between savings, investment and the current account in an open economy**
- 4. The relationship between the fiscal balance and the current account in an open economy**
- 5. The explanation of US current account deficits and Chinese current account surpluses**
- 6. The dollar exchange rate and global macroeconomic imbalances**

## A simple model of a closed economy

$Y = F(K, L)$	Production function
$K = \bar{K}$	Given capital stock
$L = \bar{L}$	Given labour force
$Y = C + I + G$	Goods market equilibrium
$C = C(Y - T)$	Consumption function
$I = I(r)$	Investment function
$G = \bar{G}$	Given government expenditure
$T = \bar{T}$	Given lump sum tax

### Goods market equilibrium

$$\bar{Y} = C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$$

$$\bar{G} \uparrow \Rightarrow r \uparrow \Rightarrow I \downarrow$$

### Equilibrium in the market for credit (“loanable funds”)

$$\bar{S} = \bar{Y} - C(\bar{Y} - \bar{T}) - \bar{G} = I(r)$$

Saving = Investment

$$\bar{S} = [\bar{Y} - \bar{T} - C(\bar{Y} - \bar{T})] + [\bar{T} - \bar{G}] = I(r)$$

Private saving + Government saving = Investment

$$\bar{G} \uparrow \Rightarrow r \uparrow \Rightarrow I \downarrow$$

**Figure 3-6: The consumption function**

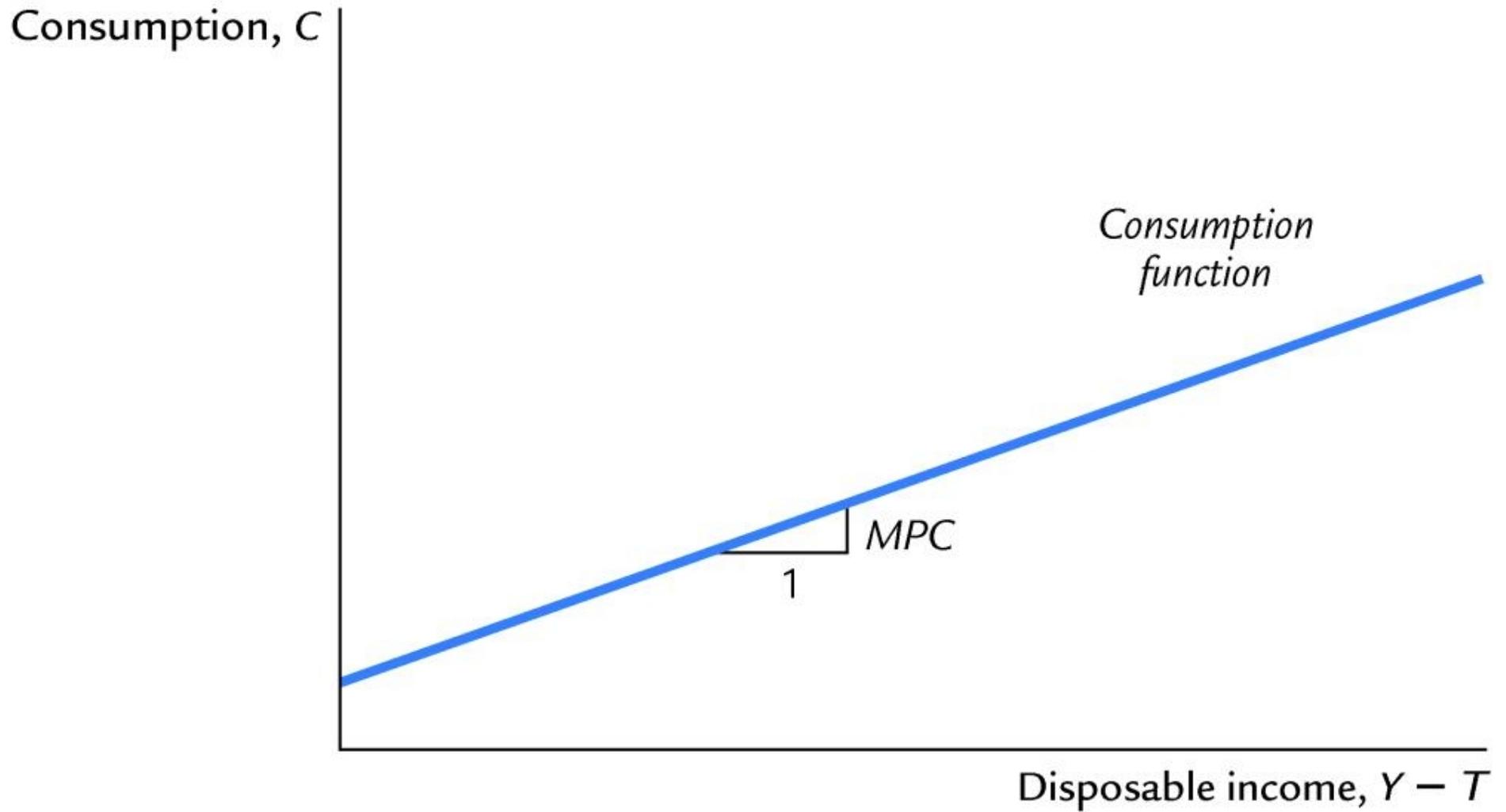


Figure 3-7: The investment function

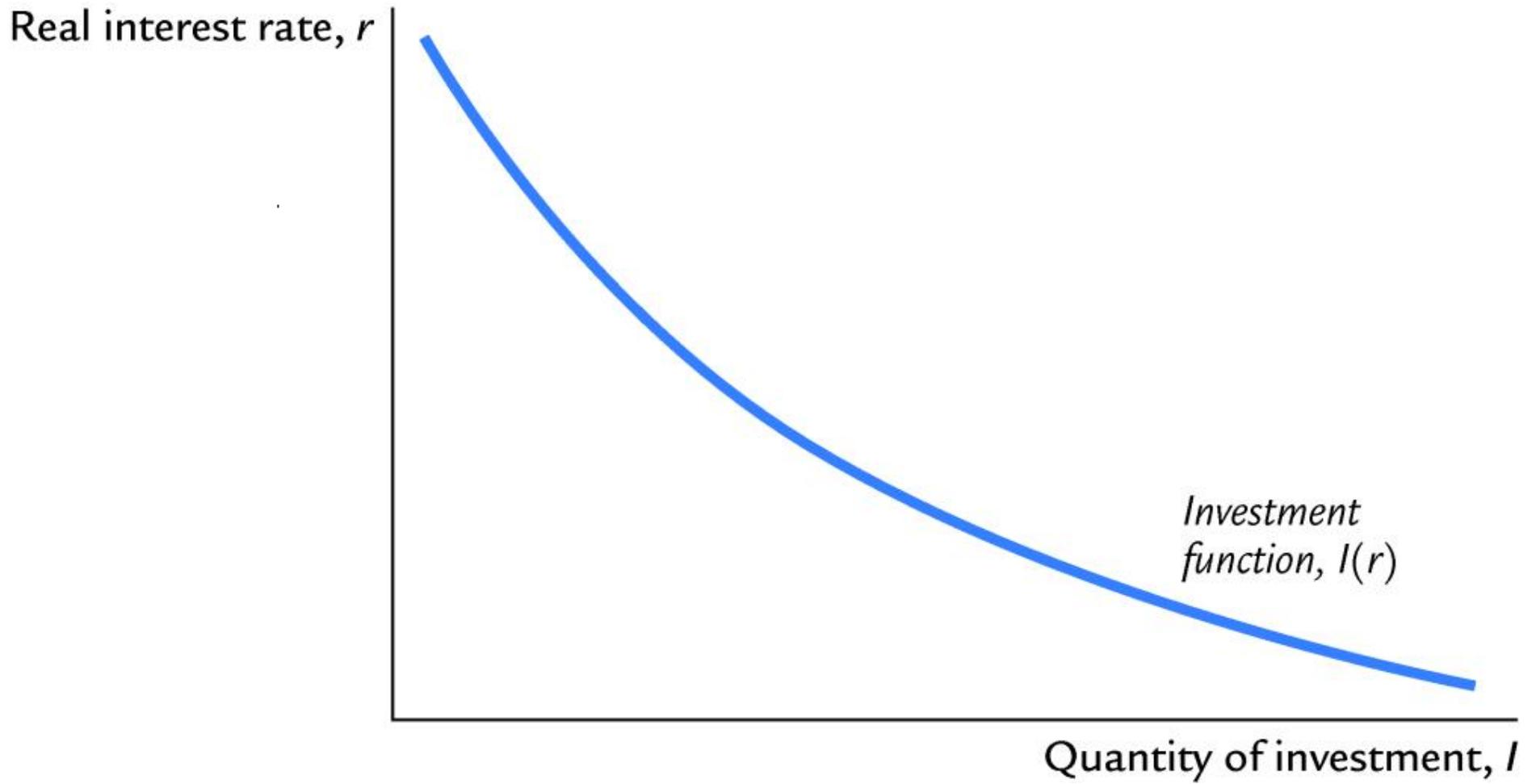


TABLE B-2

**Consumption, Investment and Government Purchases  
as a Percentage of GDP: Some European Comparisons**

	Private Consumption	Investment Expenditure	Government Purchases
EU-15	58.3	19.7	20.9
Belgium	53.2	19.9	23.1
Denmark	48.5	20.6	25.9
Germany	59.3	17.1	18.6
Spain	57.7	29.4	17.8
France	57.1	19.7	23.7
Ireland	44.4	27	15.9
Italy	58.9	20.6	20.3
Netherlands	48.6	19.5	24
Austria	55.5	20.8	17.7
Finland	52.4	19.2	22.5
Sweden	48	17	27.2
United Kingdom	65.3	16.6	21.8
Norway	41.8	18.7	20.4
Switzerland	60.9	21.3	11.9
United States	70	19.9	15.7
Japan	57.4	23.2	18

*Sources:* Eurostat, US Bureau of Economic Analysis, Swiss Secrétariat de l'Etat à l'Economie, Japanese Economic and Social Research Institute.  
Figures are for 2005.

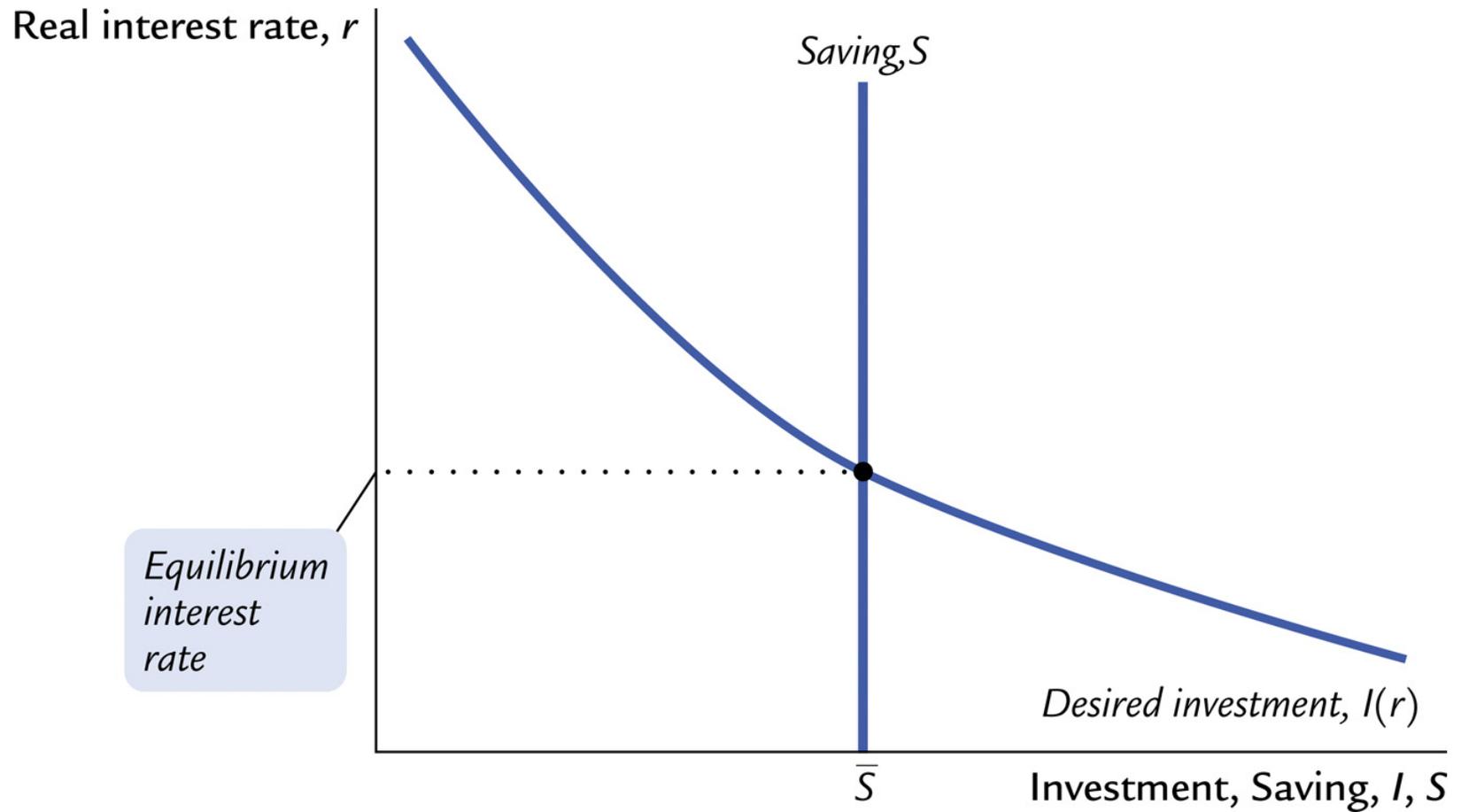
**Similar analysis of tax cuts**

Government saving:  $-\Delta T$

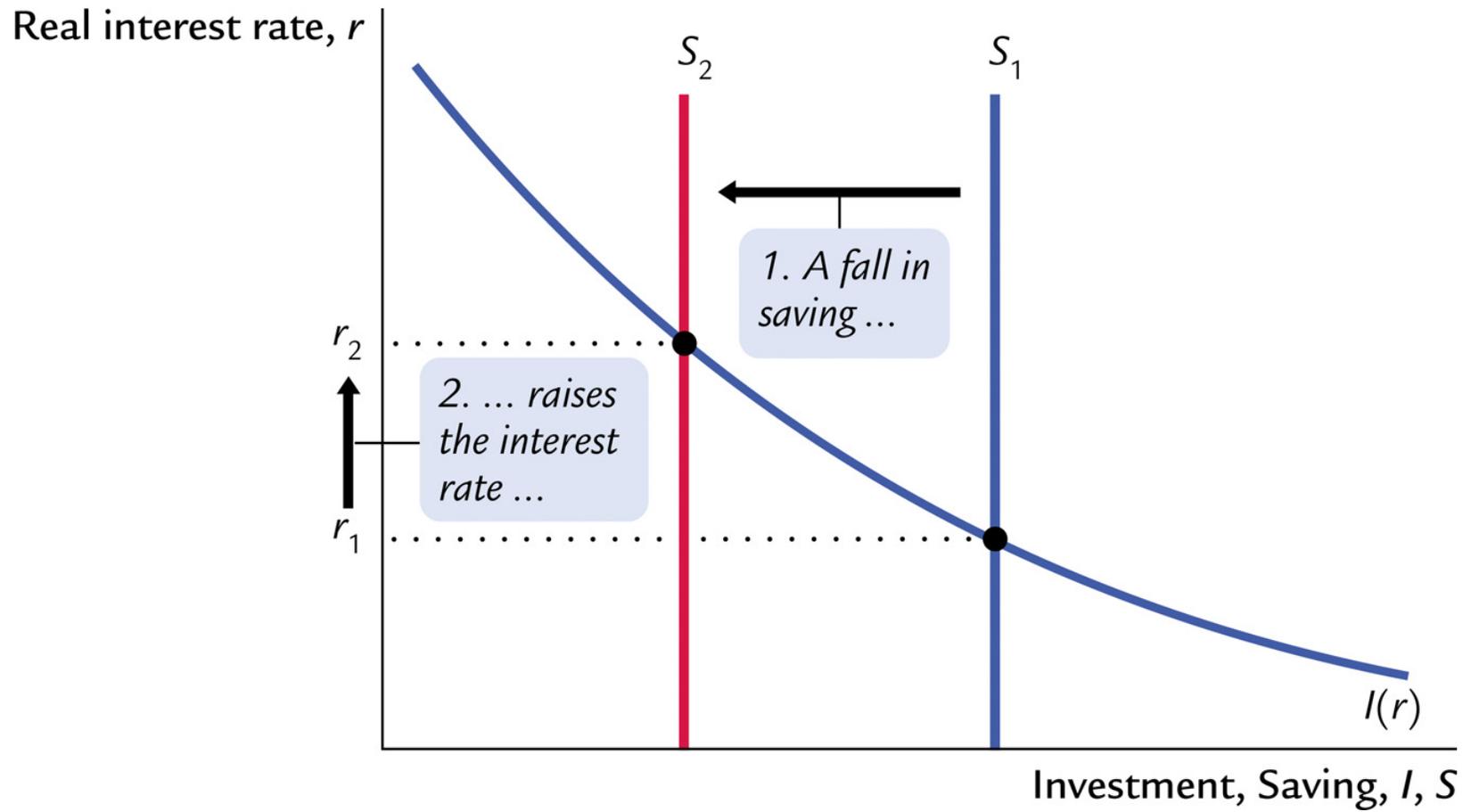
Private saving:  $(1 - MPC)\Delta T$

Total saving:  $-MPC * \Delta T$

**Figure 3-8: Saving, investment and the interest rate**



**Figure 3-9: A Reduction in Saving**



**Figure 3-10: Military spending and the interest rate in the United Kingdom**

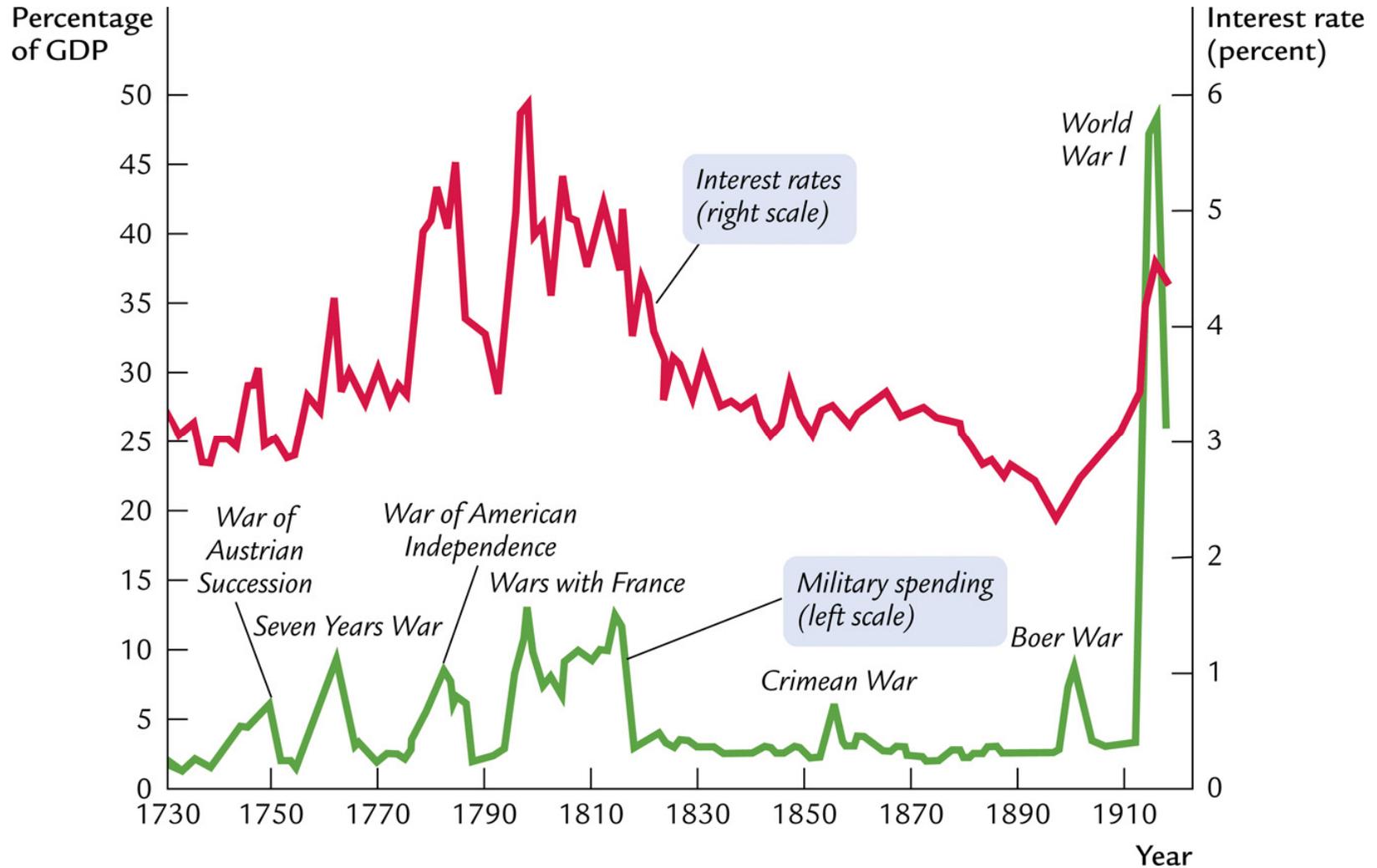
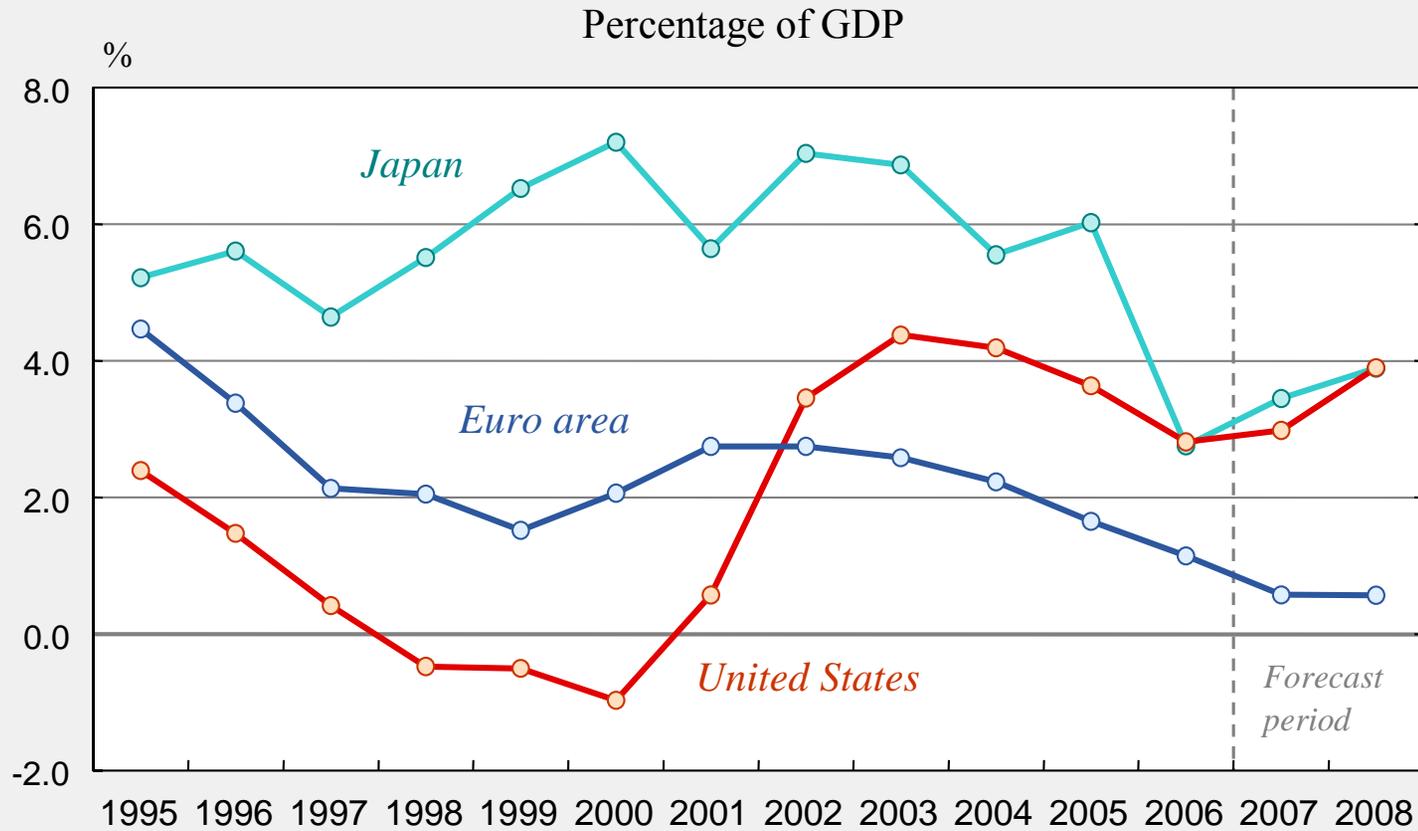


Fig. 1.13

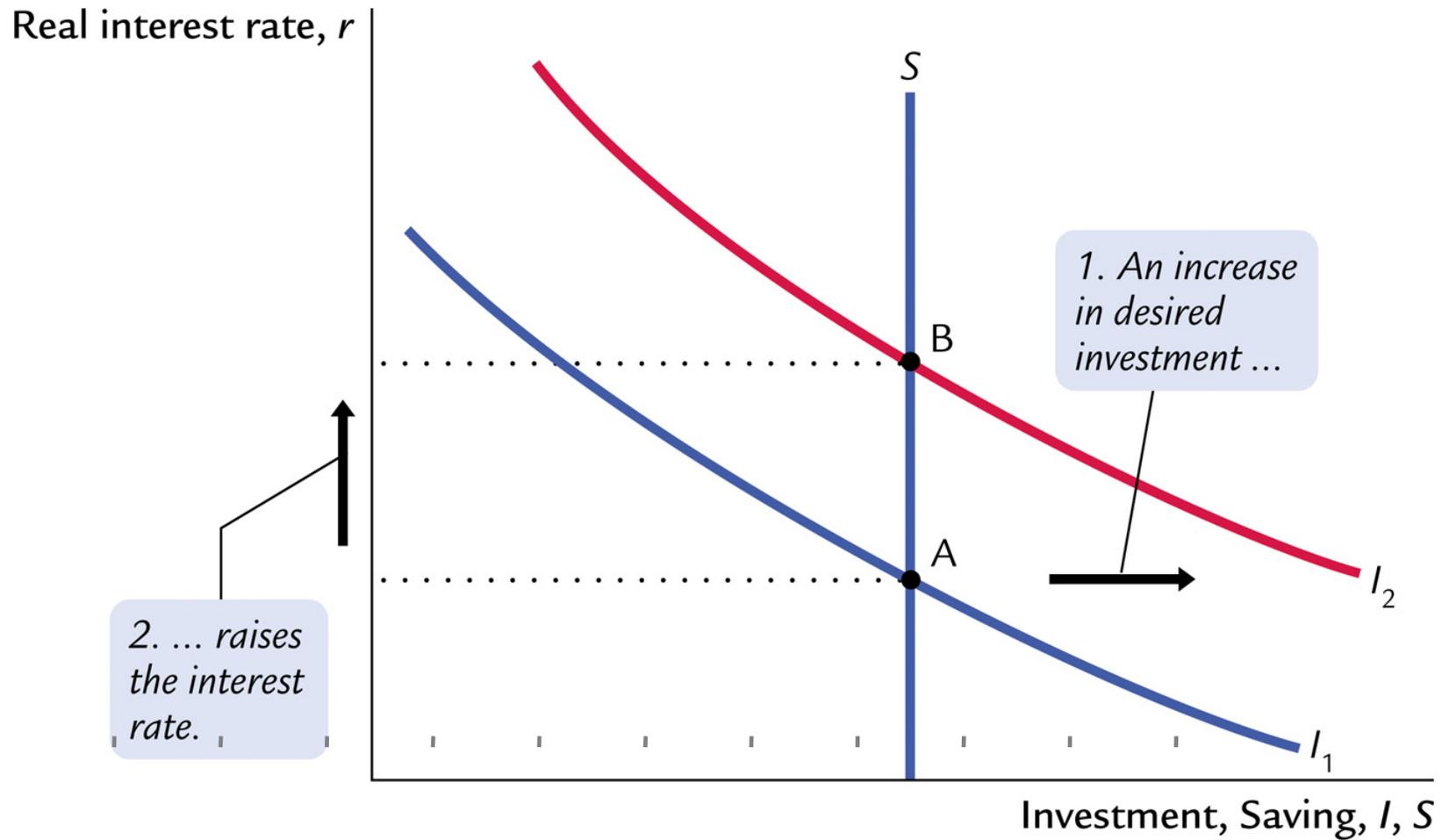
## Government structural budget deficit in the euro area, Japan and the United States



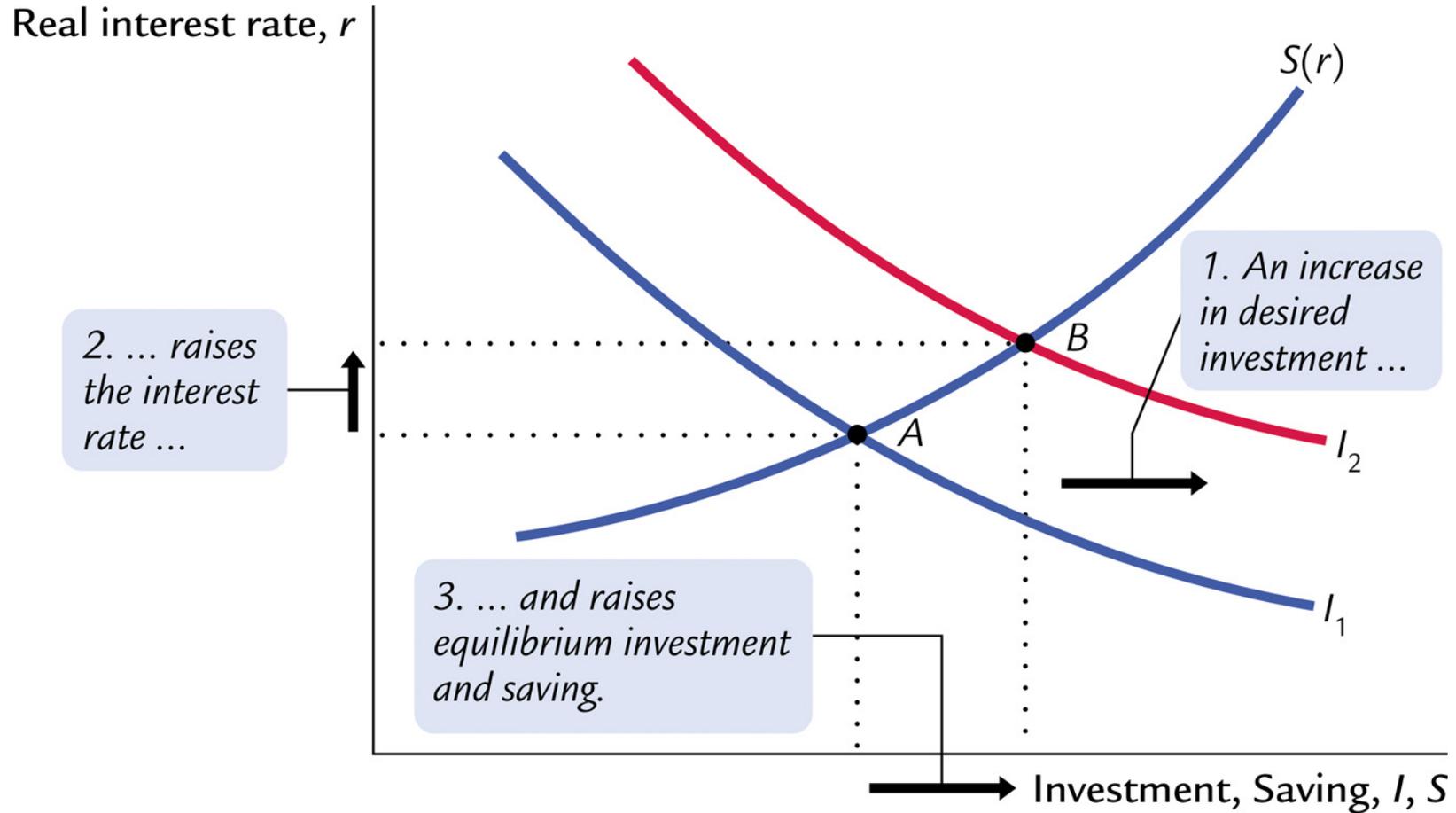
Source: OECD, Economic Outlook 82, December 2007, Table 28; United States: 2008 ifo forecast.

**EEAG Report 2008**

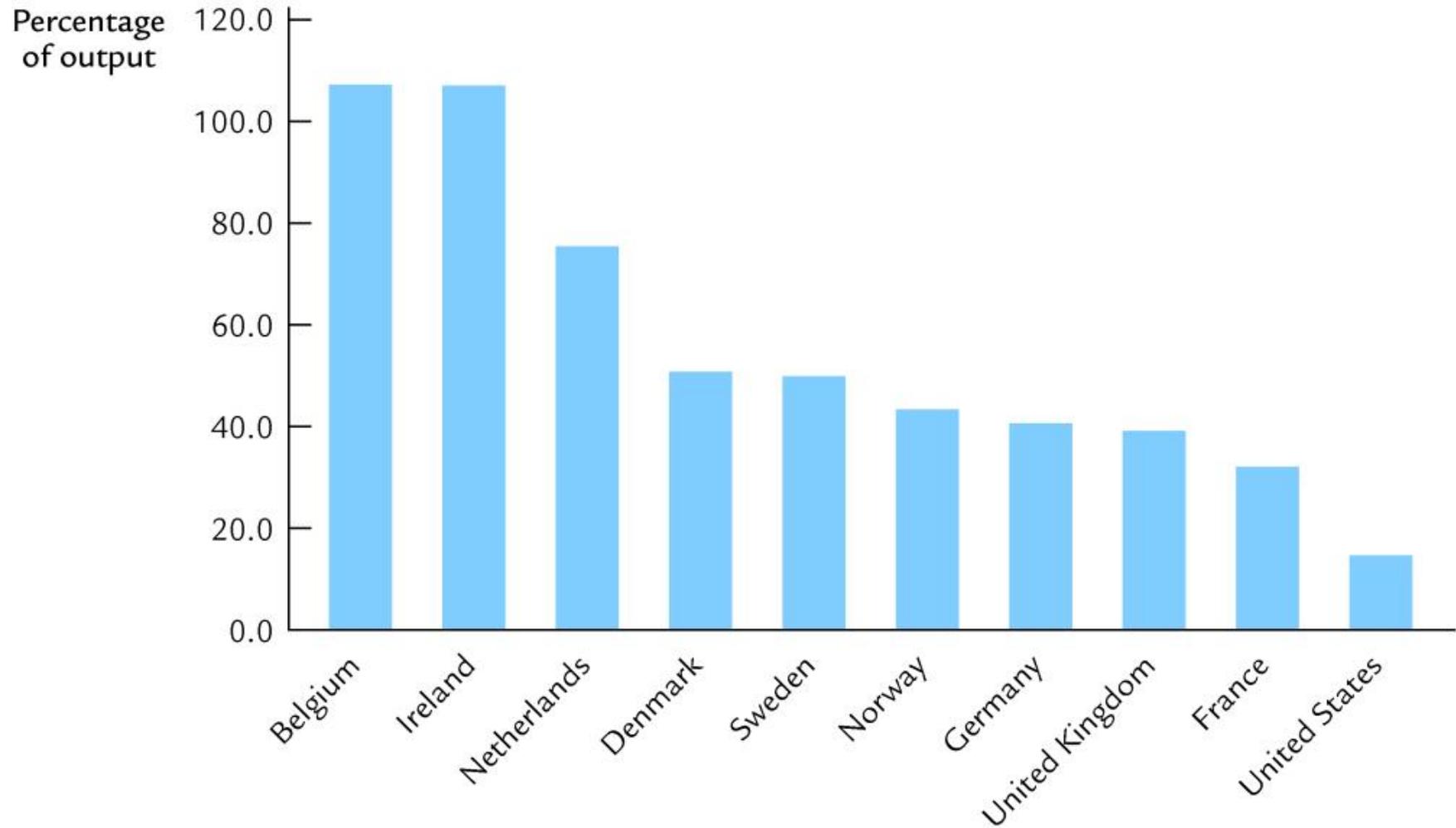
**Figure 3-11: An Increase in the demand for investment**



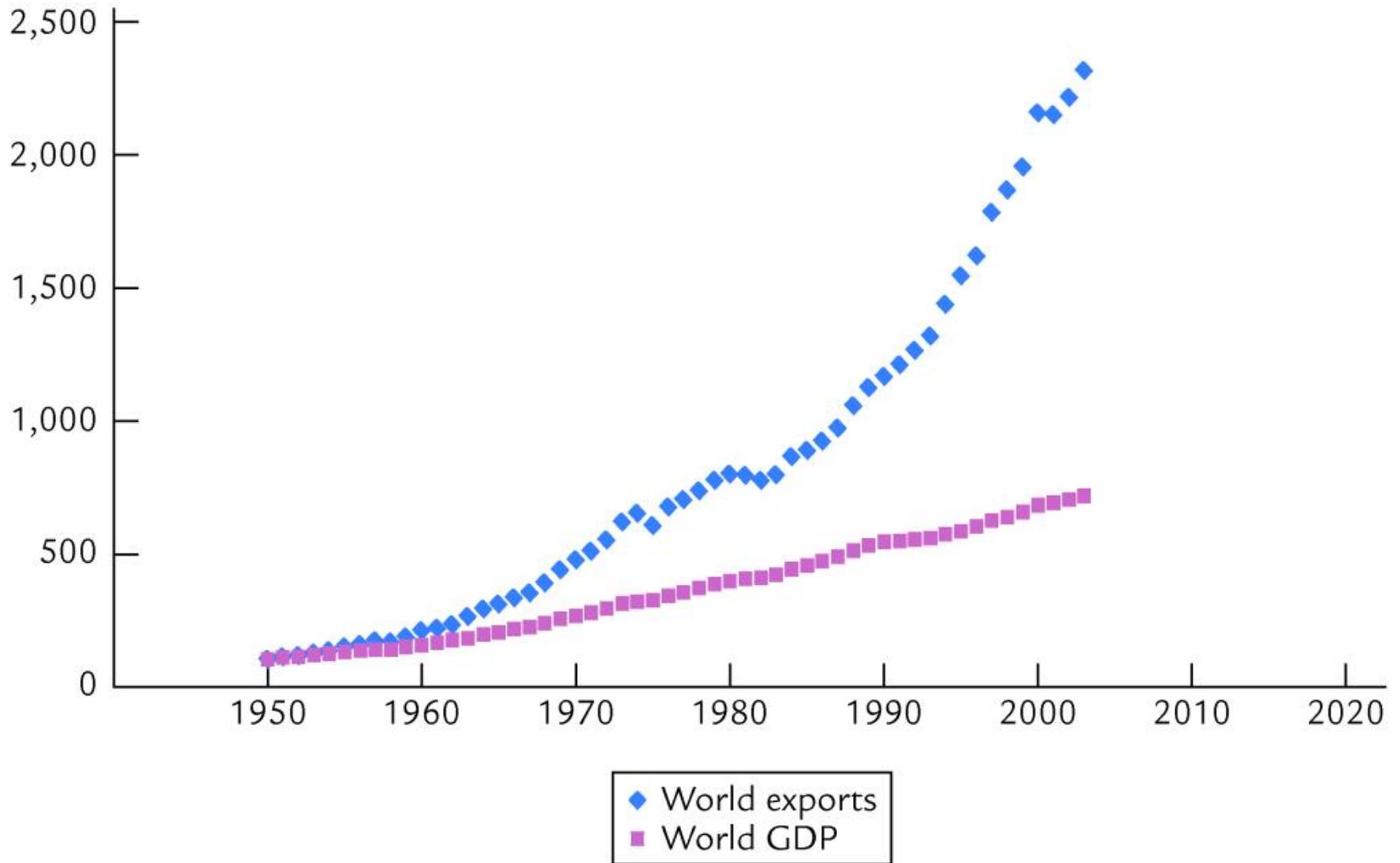
**Figure 3-12: An increase in investment demand when saving depends on the interest rate**



**Figure 5-1: The average of imports and exports as a percentage of output in 2003**



**Figure 5-2: World exports and world GDP 1950-2003**



**Equilibrium in the open economy**

$$Y = C^d + I^d + G^d + EX$$

$$C = C^d + C^f \Rightarrow C^d = C - C^f$$

$$I = I^d + I^f \Rightarrow I^d = I - I^f$$

$$G = G^d + G^f \Rightarrow G^d = G - G^f$$

$$Y = (C - C^f) + (I - I^f) + (G - G^f) + EX$$

$$Y = C + I + G + EX - \underbrace{(C^f + I^f + G^f)}_{IM}$$

$$Y = C + I + G + \frac{EX - IM}{NX}$$

$$Y = C + I + G + NX$$

$$NX = Y - \underbrace{(C + I + G)}_A \quad A = \text{Absorption (domestic spending)}$$

$$NX = Y - A$$

**Saving-investment balance in an open economy**

$$S = Y - C - G = I + NX$$

**Saving can be of two forms: physical accumulation of real capital (I) or accumulation of financial claims on the rest of the world resulting from net exports (NX).**

$$S - I = NX$$

- **Net exports are the difference between saving and investment.**
- **Net exports = trade balance**
- **Saving minus investment = net capital outflow (net foreign investment)**

$$Y = C + I + G + NX$$

$$GDP = C + I + G + NX$$

$$GNP = GDP + NFIA$$

**NFIA = Net Factor Income from Abroad = Factor Payments from Abroad – Factor Payments to Abroad**

**Current Account Balance = Net Exports + Net Factor Income from Abroad + Net Unilateral Transfers**

**A simple model of a small open economy**

$$r = r^*$$

$$Y = \bar{Y} = F(\bar{K}, \bar{L})$$

$$C = C(Y - \bar{T})$$

$$I = I(r)$$

$$NX = (Y - C - \bar{G}) - I = S - I$$

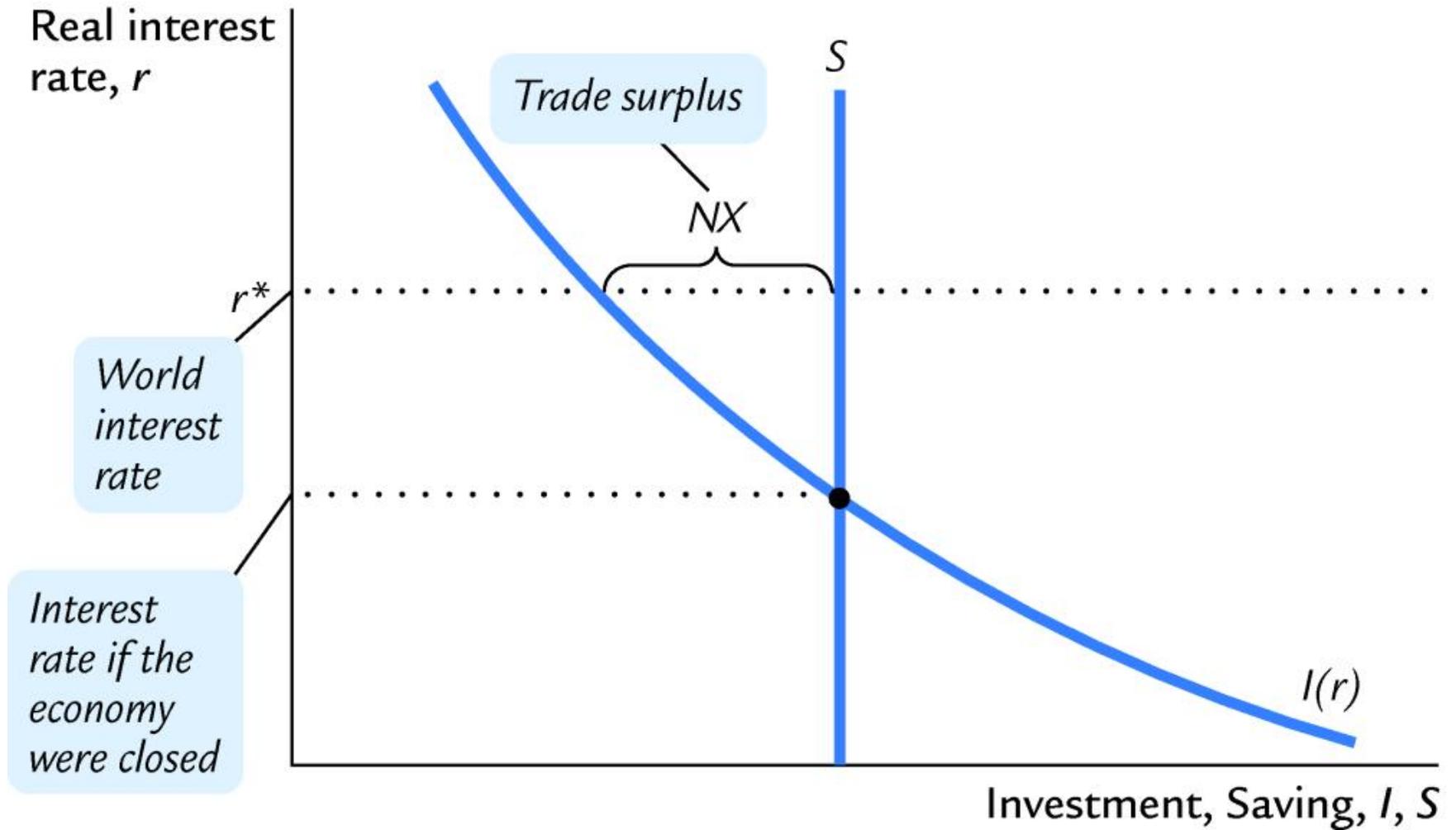
**Reduced form**

$$NX = \left[ \bar{Y} - C(\bar{Y} - \bar{T}) - \bar{G} \right] - I(r^*)$$

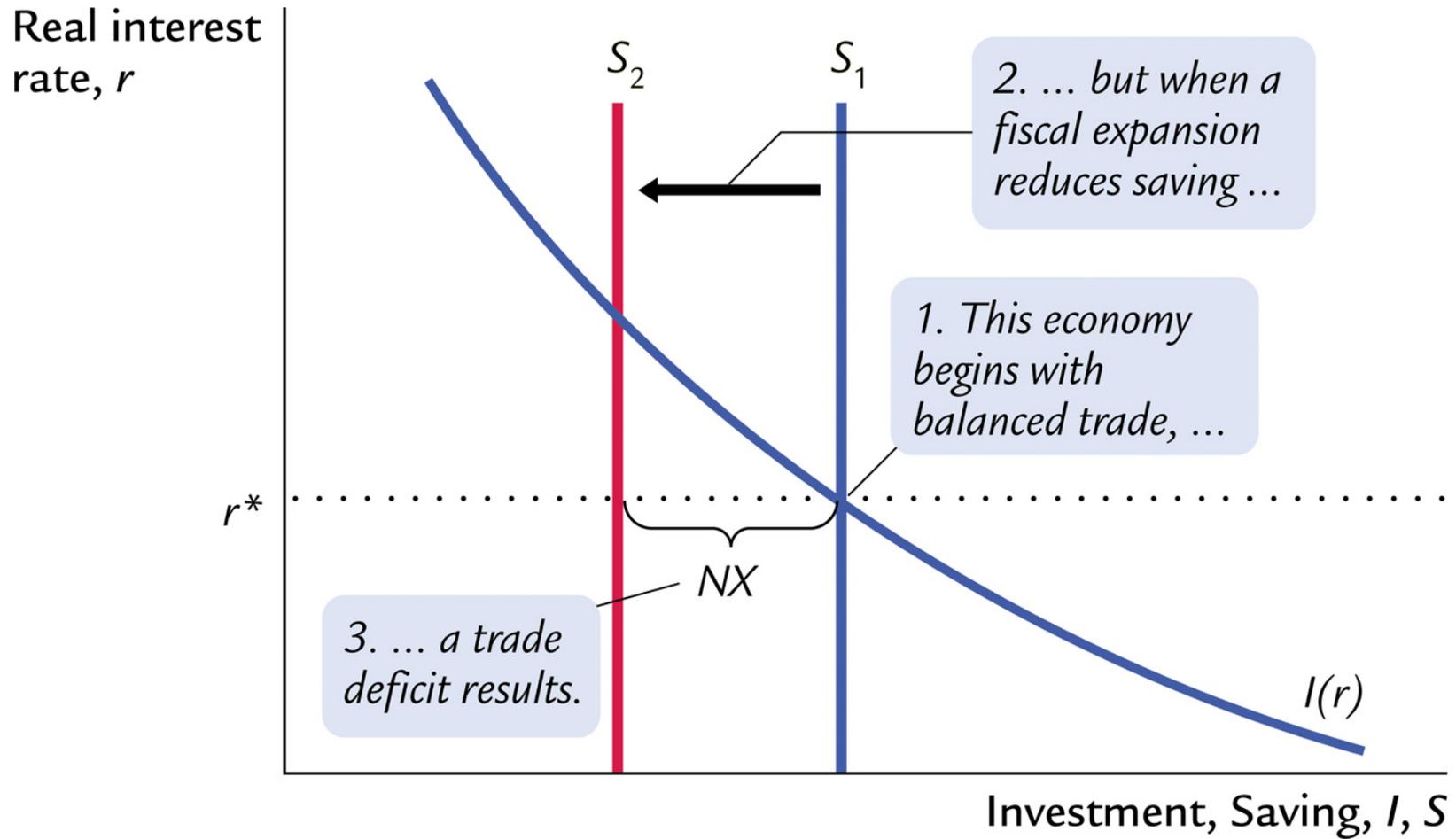
$$NX = \bar{S} - I(r^*)$$

Net export equals the difference between saving and investment at the given world market real rate of interest

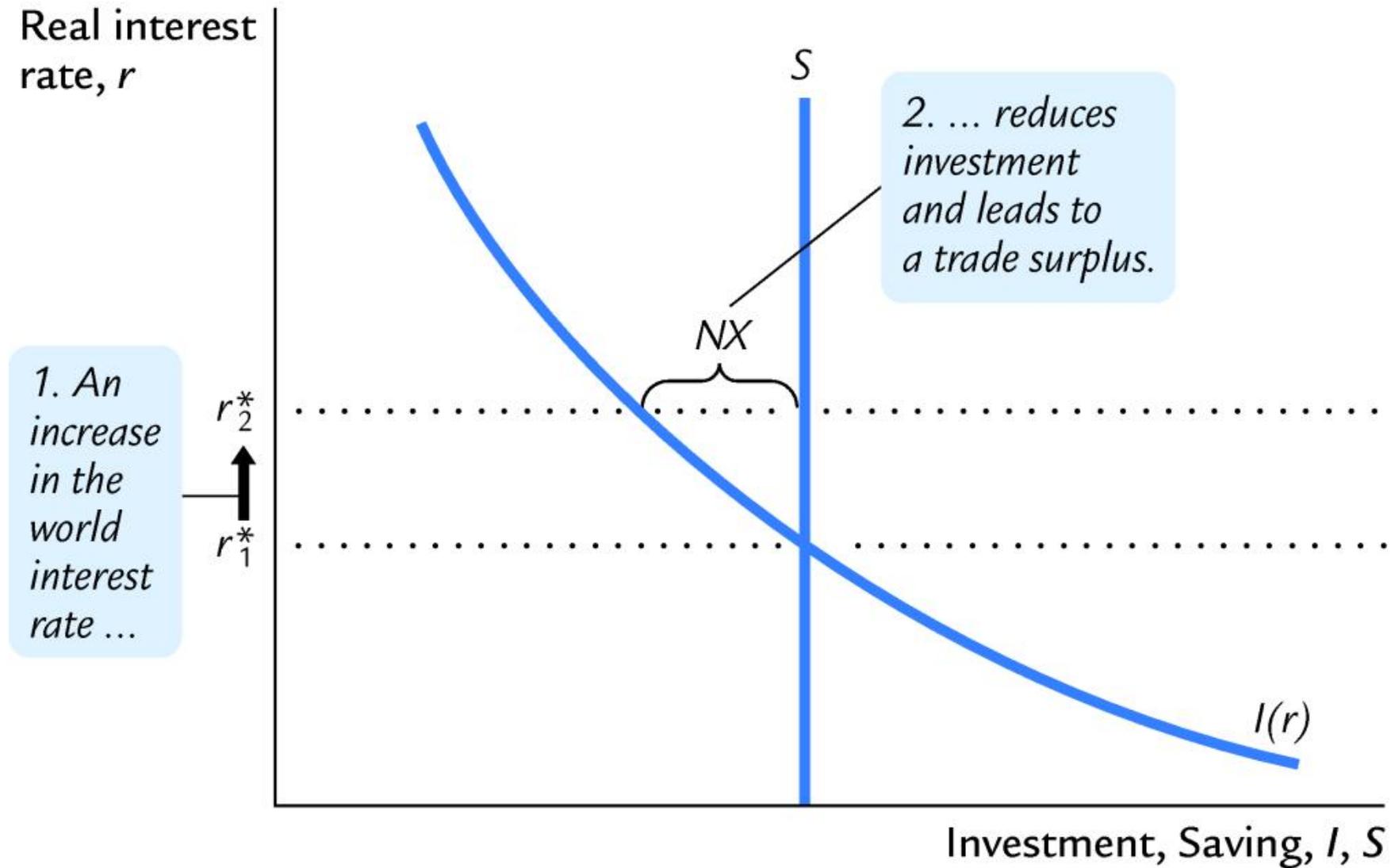
**Figure 5-3: Saving and investment in a small open economy**



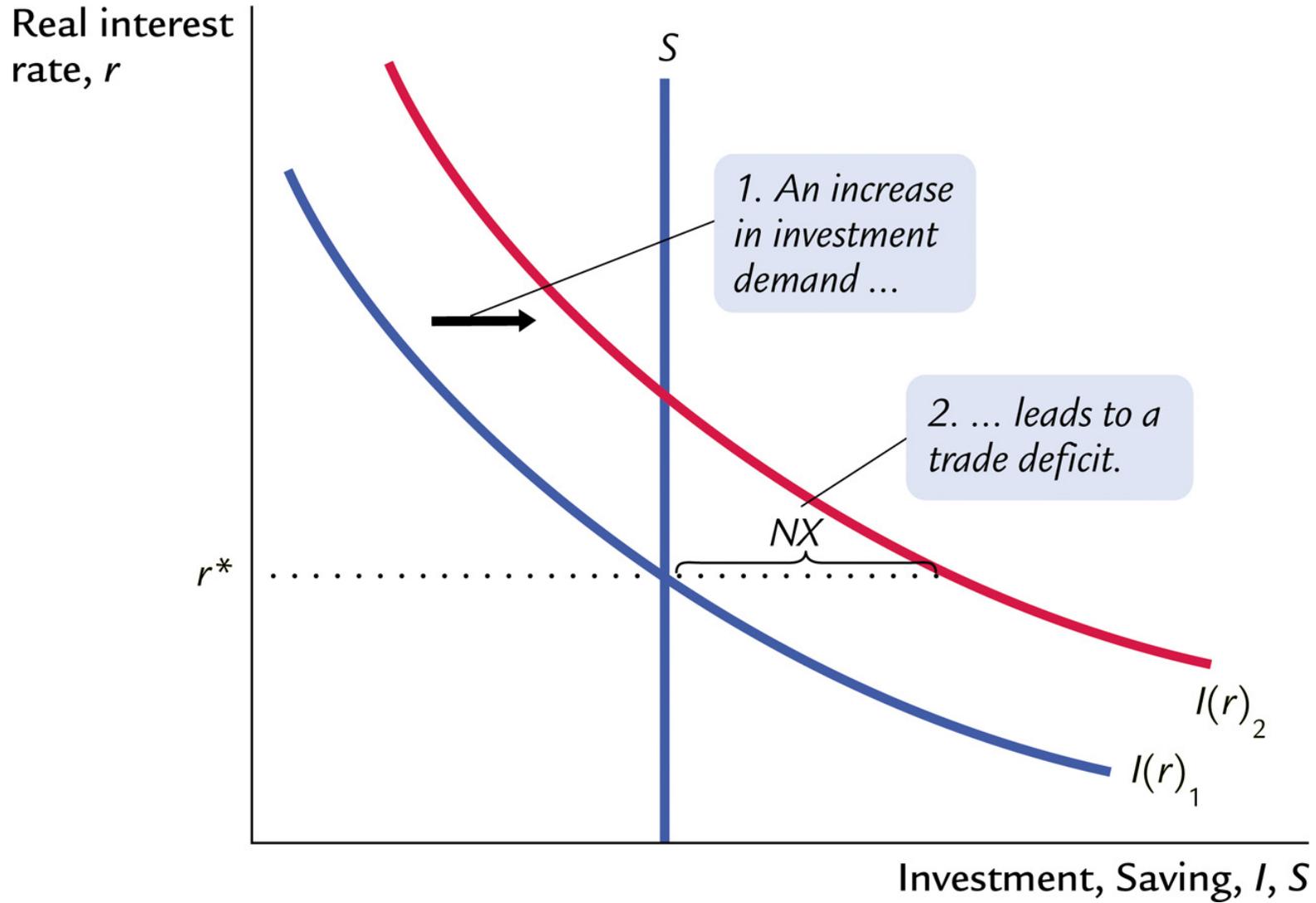
**Figure 5-4: A Fiscal expansion at home in a small open economy**



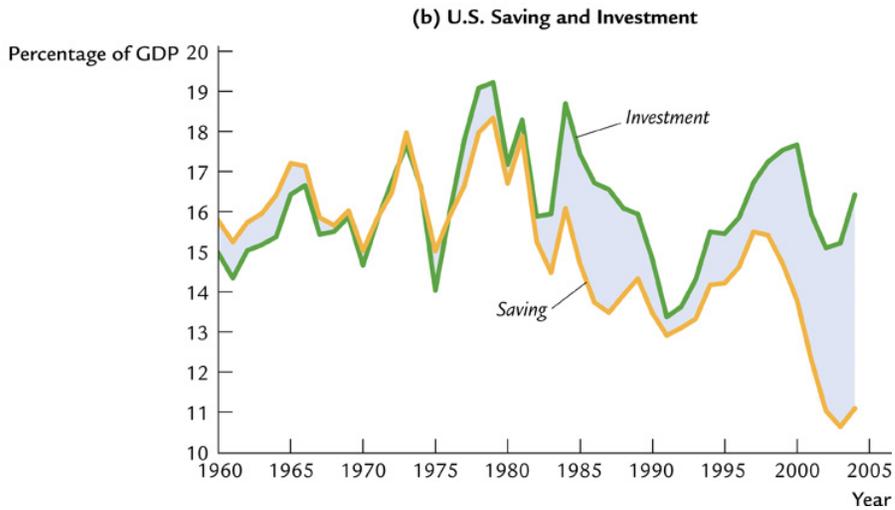
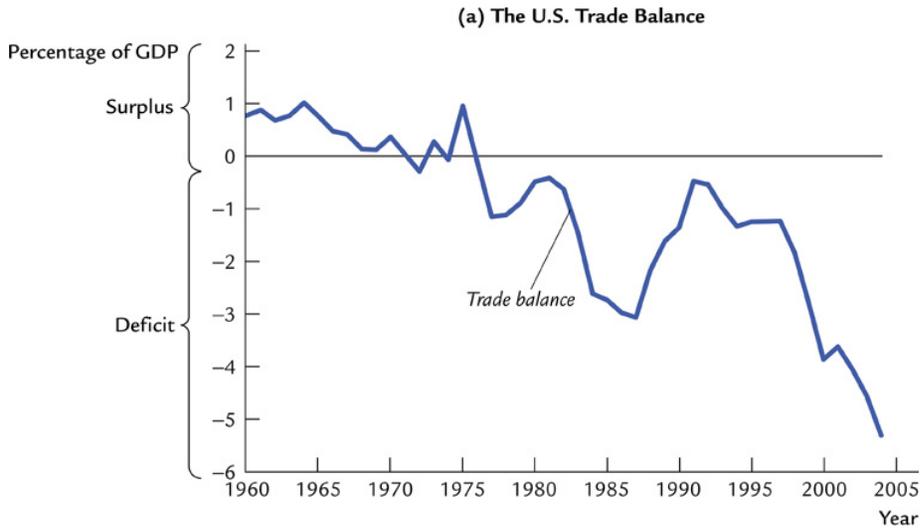
**Figure 5.5 A fiscal expansion abroad in a small open economy**



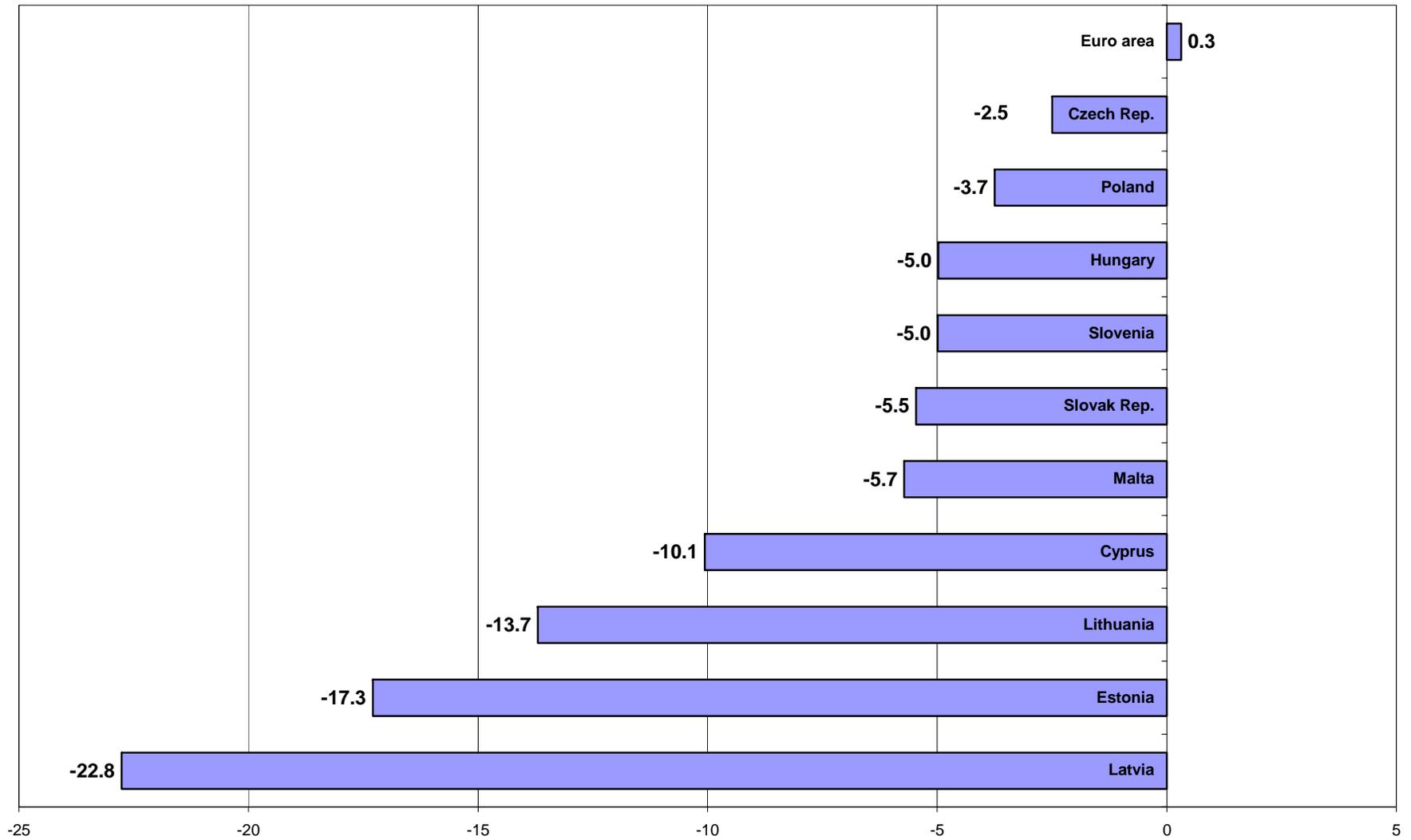
**Figure 5-6: A Shift in the investment schedule in a small open economy**

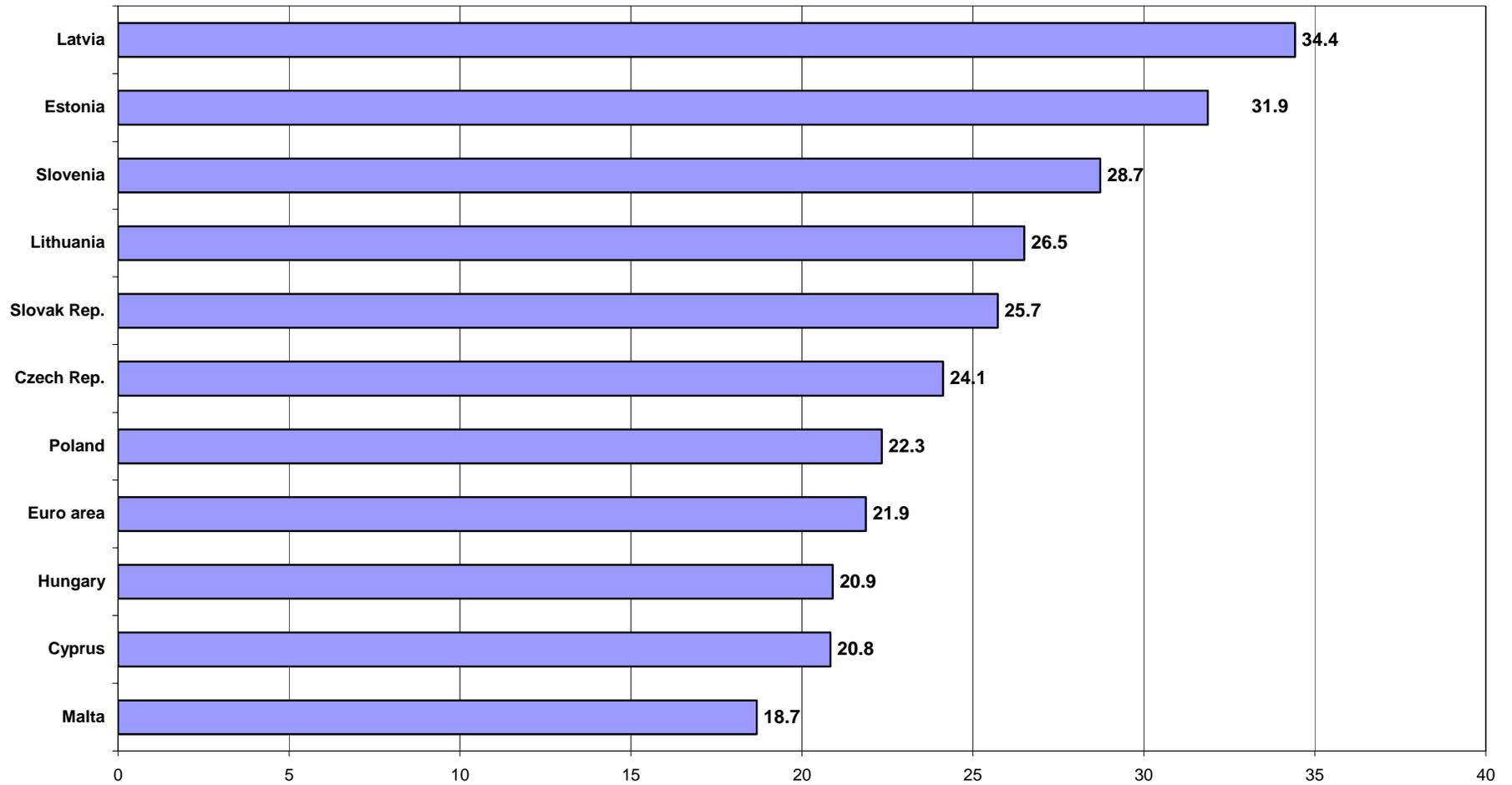


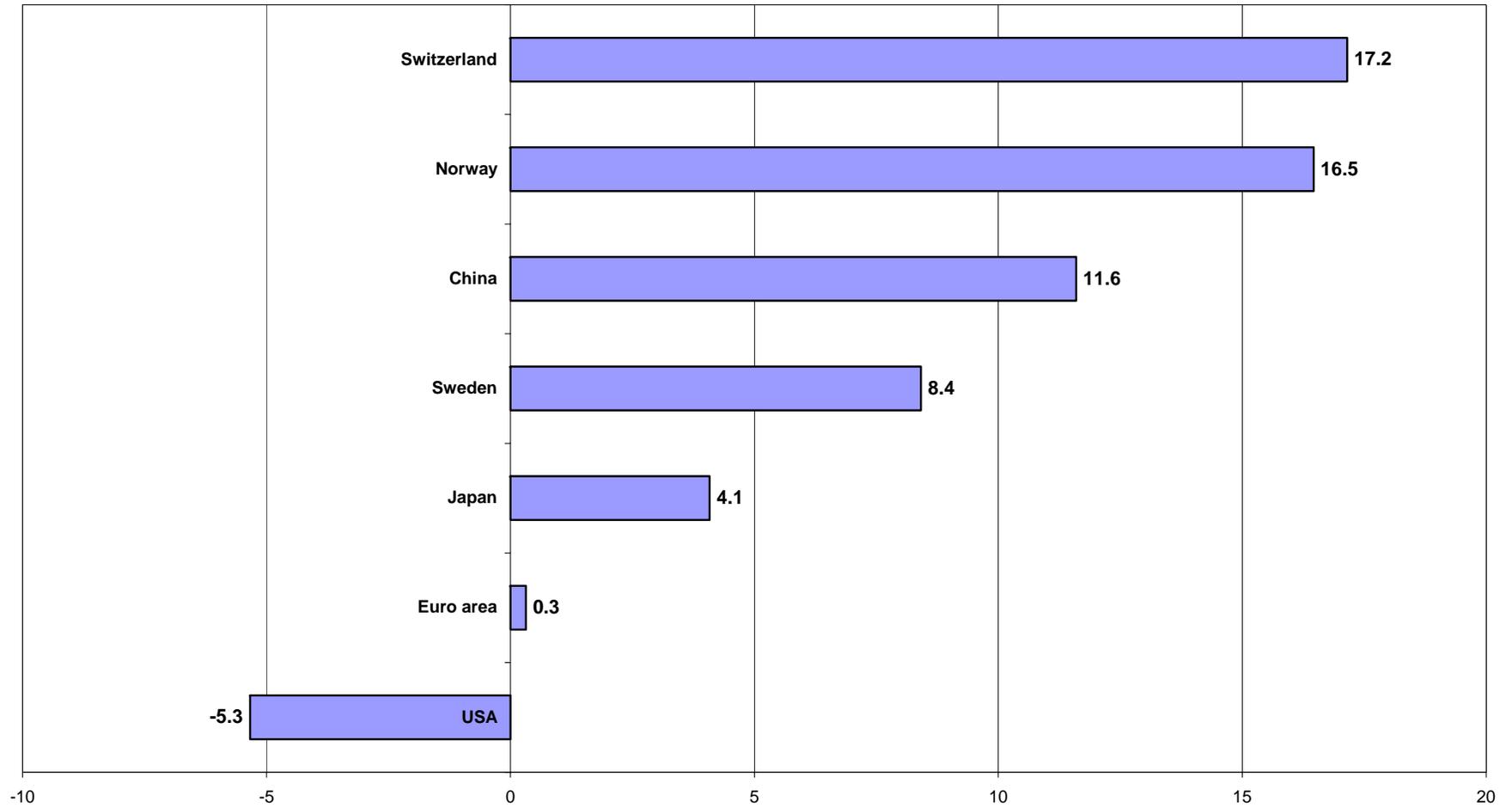
**Figure 5.7 The trade balance, saving, and investment: the U.S. experience**



### Current account balance, 2007, percent of GDP



**Gross fixed investment, 2007, percent of GDP**

**Current account balance, 2007, percent of GDP**

### The real exchange rate

**Real exchange rate = the relative price between domestic and foreign goods**

$p$  = Swedish product price in SEK

$p^*$  = foreign product price (in \$)

$e$  = nominal exchange rate (units of foreign currency per unit of domestic currency, \$/SEK)

$\varepsilon$  = real exchange rate

**Real exchange rate = nominal exchange rate (\$/SEK) x Swedish product price (SEK) / foreign product price (\$)**

$$\varepsilon = e \times (p/p^*)$$

$$\frac{\Delta\varepsilon}{\varepsilon} \approx \frac{\Delta e}{e} + \frac{\Delta p}{p} - \frac{\Delta p^*}{p^*}$$

**Percentage change in real exchange rate  $\approx$  percentage change in nominal exchange rate + percentage change in Swedish product price – percentage change in foreign product price**

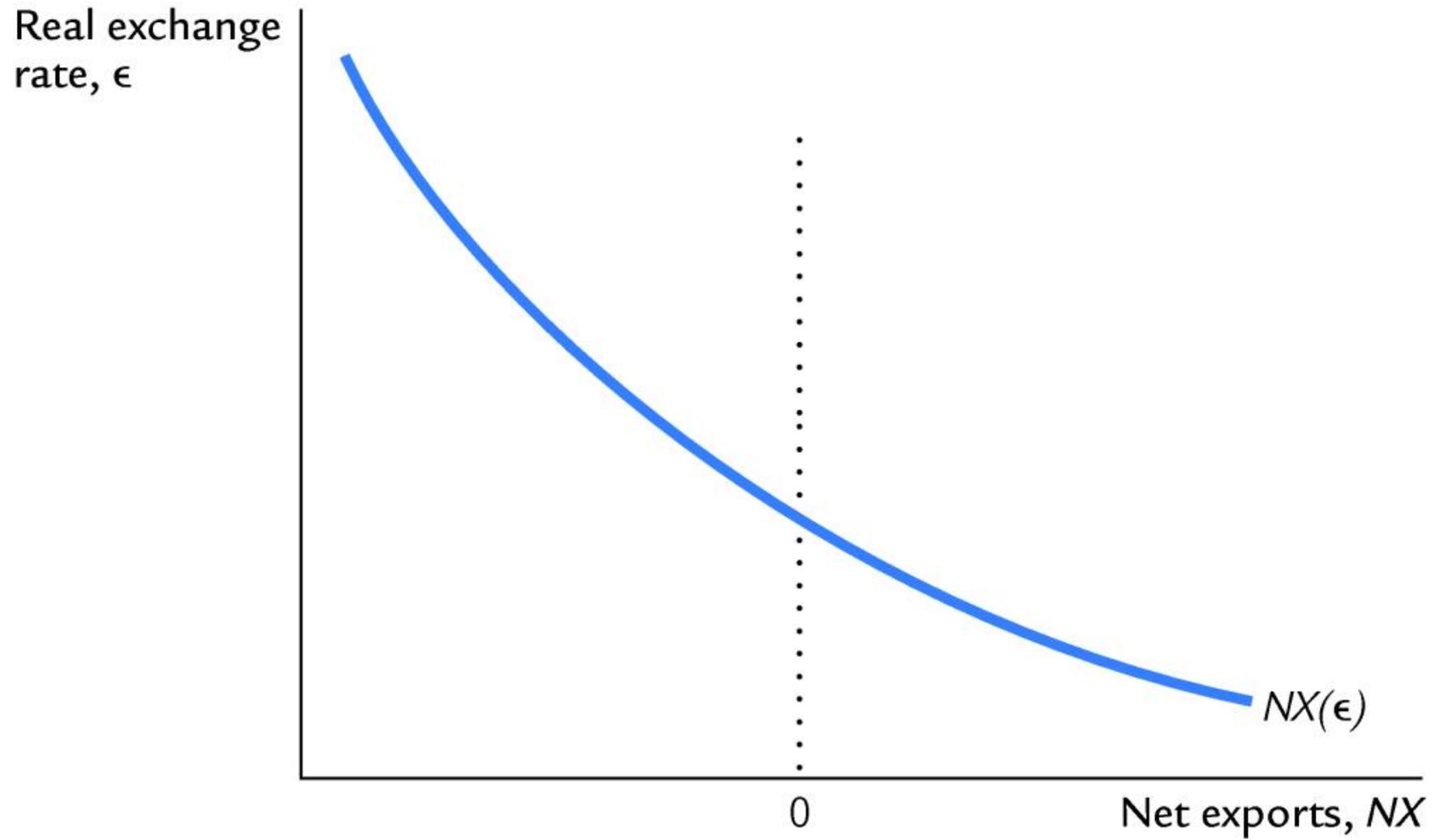
$\varepsilon \uparrow \Leftrightarrow$  real appreciation (the relative price of domestic goods increases)

$\varepsilon \downarrow \Leftrightarrow$  real depreciation (the relative price of domestic goods falls)

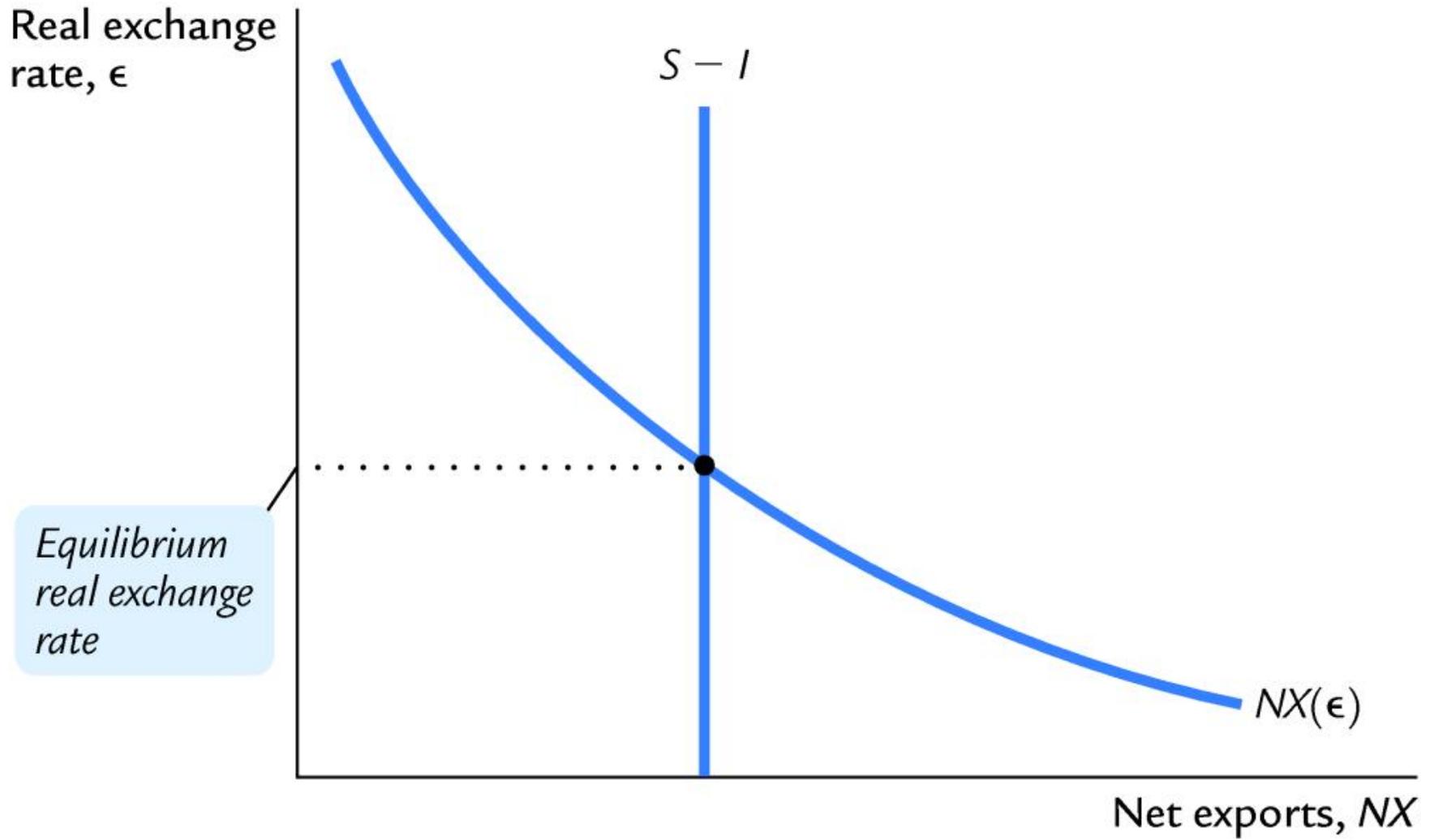
$$NX = NX(\varepsilon) \quad \varepsilon \uparrow \Rightarrow NX \downarrow$$

**Net export is negatively related to the real exchange rate (the relative price of domestic goods)**

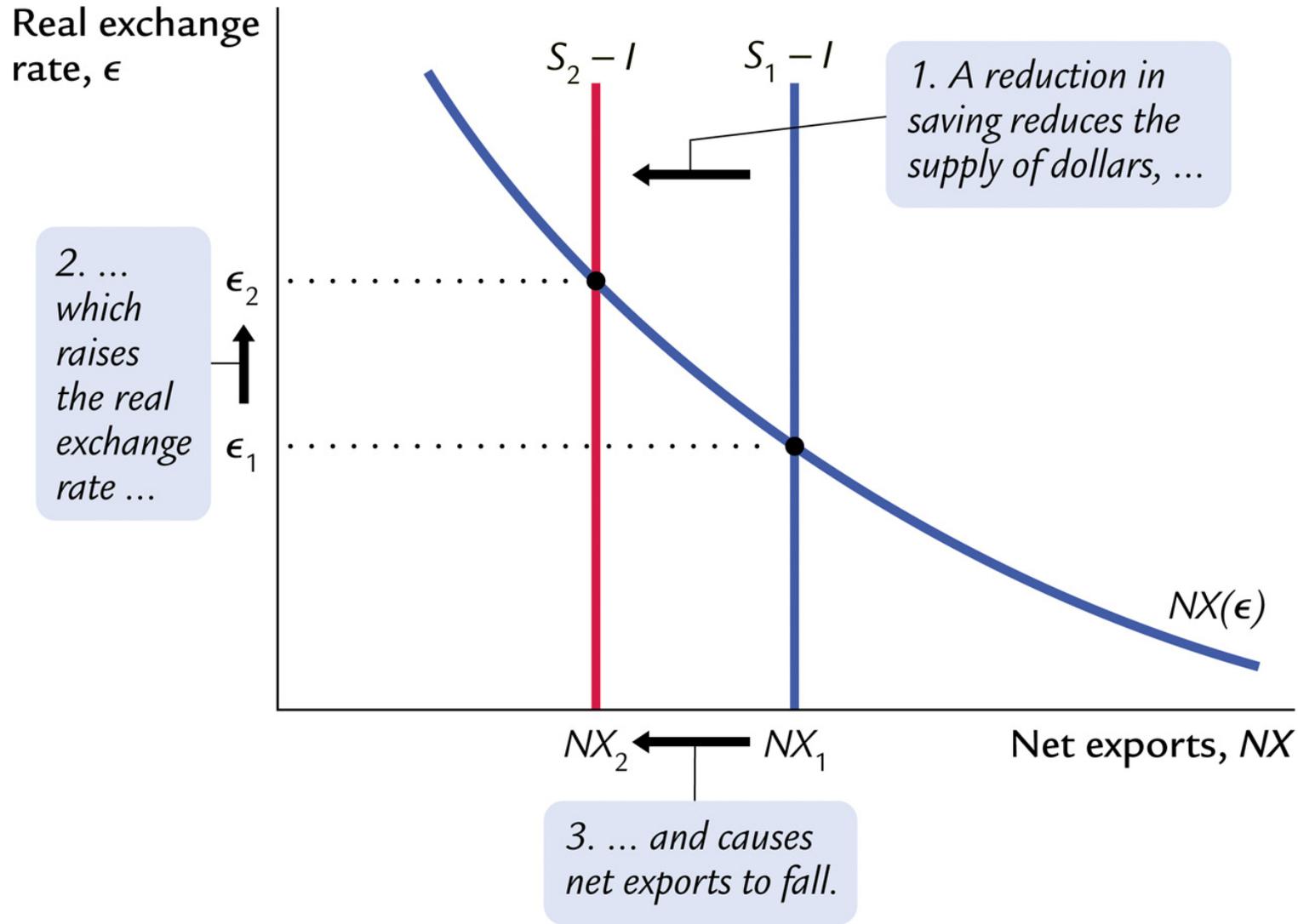
Figure 5-8: Net exports and the real exchange rate



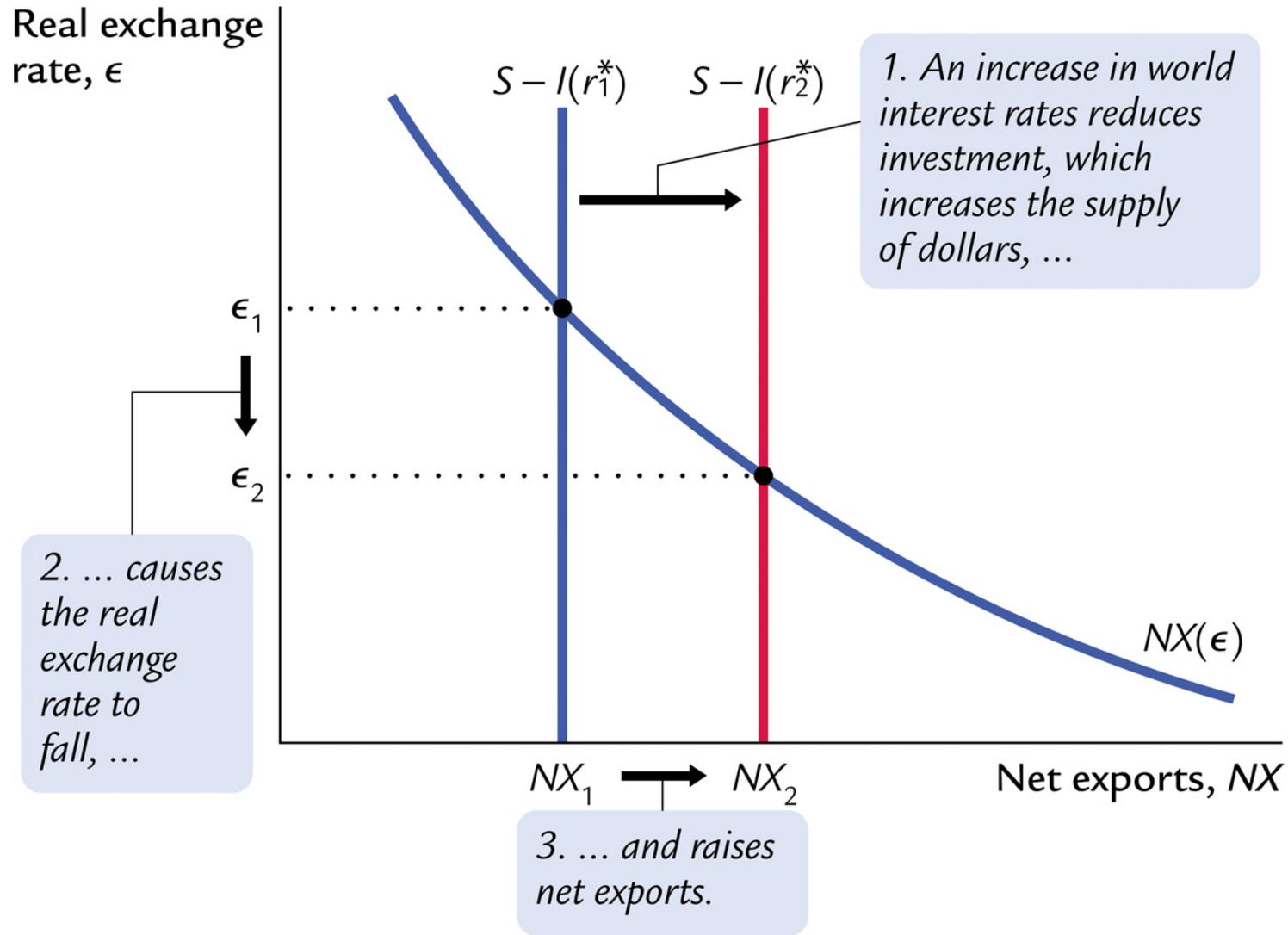
**Figure 5-9: How the real exchange rate is determined**



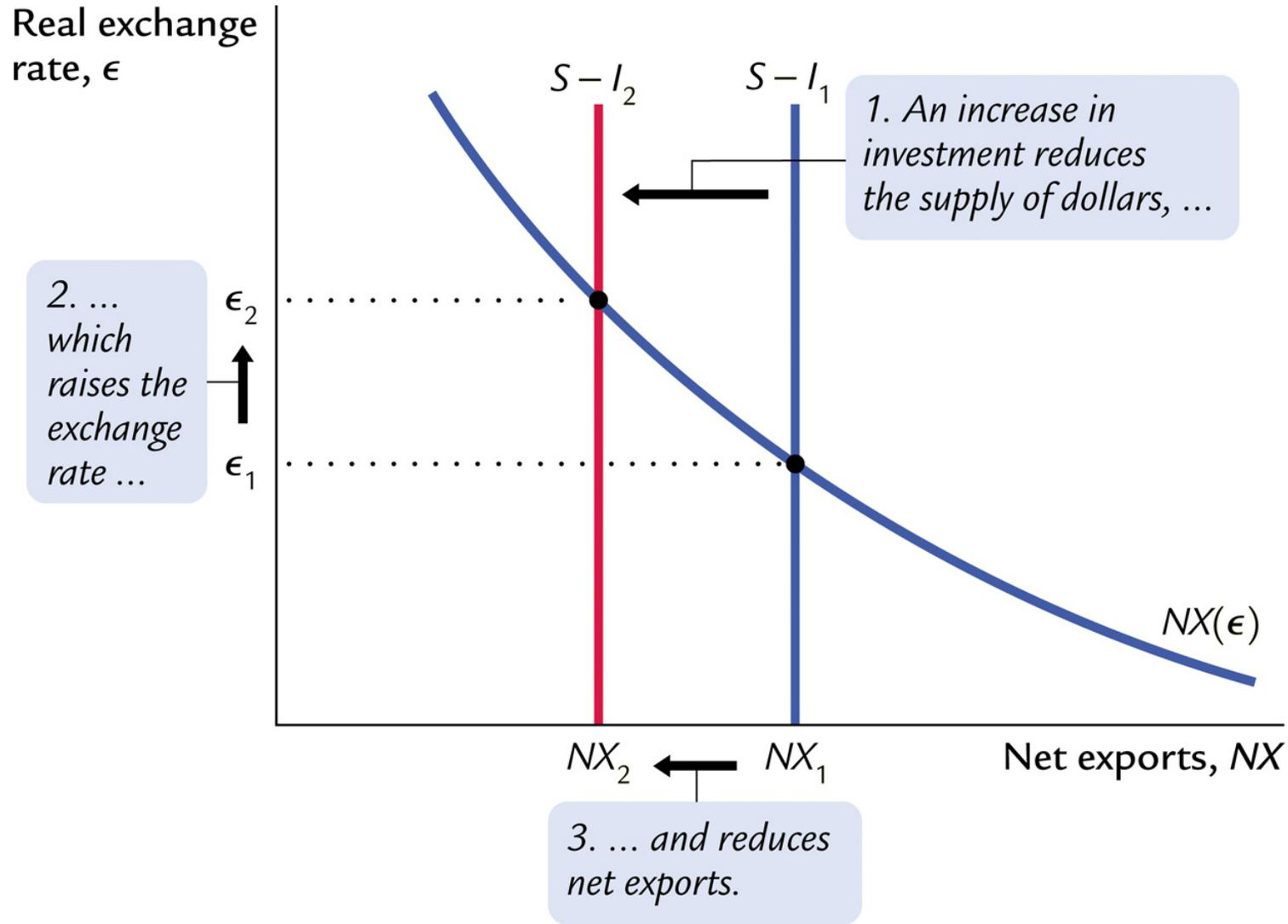
**Figure 5-10: The impact of expansionary fiscal policy at home on the real exchange rate**



**Figure 5-11: The impact of expansionary fiscal policy abroad on the real exchange rate**



**Figure 5-12: The impact of an increase in investment demand on the real exchange rate**



## **What explains the global imbalances?**

- 1. Low US savings (governments and households)**
  - 2. "Saving glut" in the rest of the world (China and other Asian Countries)**
  - 3. Strategy for "export-led growth" in China and other Asian countries**
    - fixed exchange rate**
    - desire to build up foreign exchange reserves (precautionary motive)**
- Elimination of US current account deficit requires large US real exchange rate depreciation**
    - but net US debt is reduced**
    - US borrowing is in dollars**
    - US assets in foreign currency**
    - no risk of foreign debt crisis**
  - What happens to the euro and European exports?**

Fig. 1.7

## Exchange rate of the euro and renminbi against the US dollar



Sources: Federal Reserve Bank of St. Louis; calculations by the EEAG.

**EEAG Report 2008**

## Exchange rate crisis in Sweden 1991-92

### Large nominal (and real) exchange rate depreciation

- Increase in private saving
- Fall in investment
- Higher “world” interest rate

Need for real exchange rate depreciation to achieve increase in net export :  $ep/p^* \downarrow$

- Lower price increases in Sweden (very slow method)
- Higher price increases abroad (process of disinflation in the euro area)
- Nominal depreciation was the only remaining method

**Sweden 1991-92**Saving ↑  
Investment ↓