

## **Lecture 6: Intermediate macroeconomics, autumn 2012**

Lars Calmfors

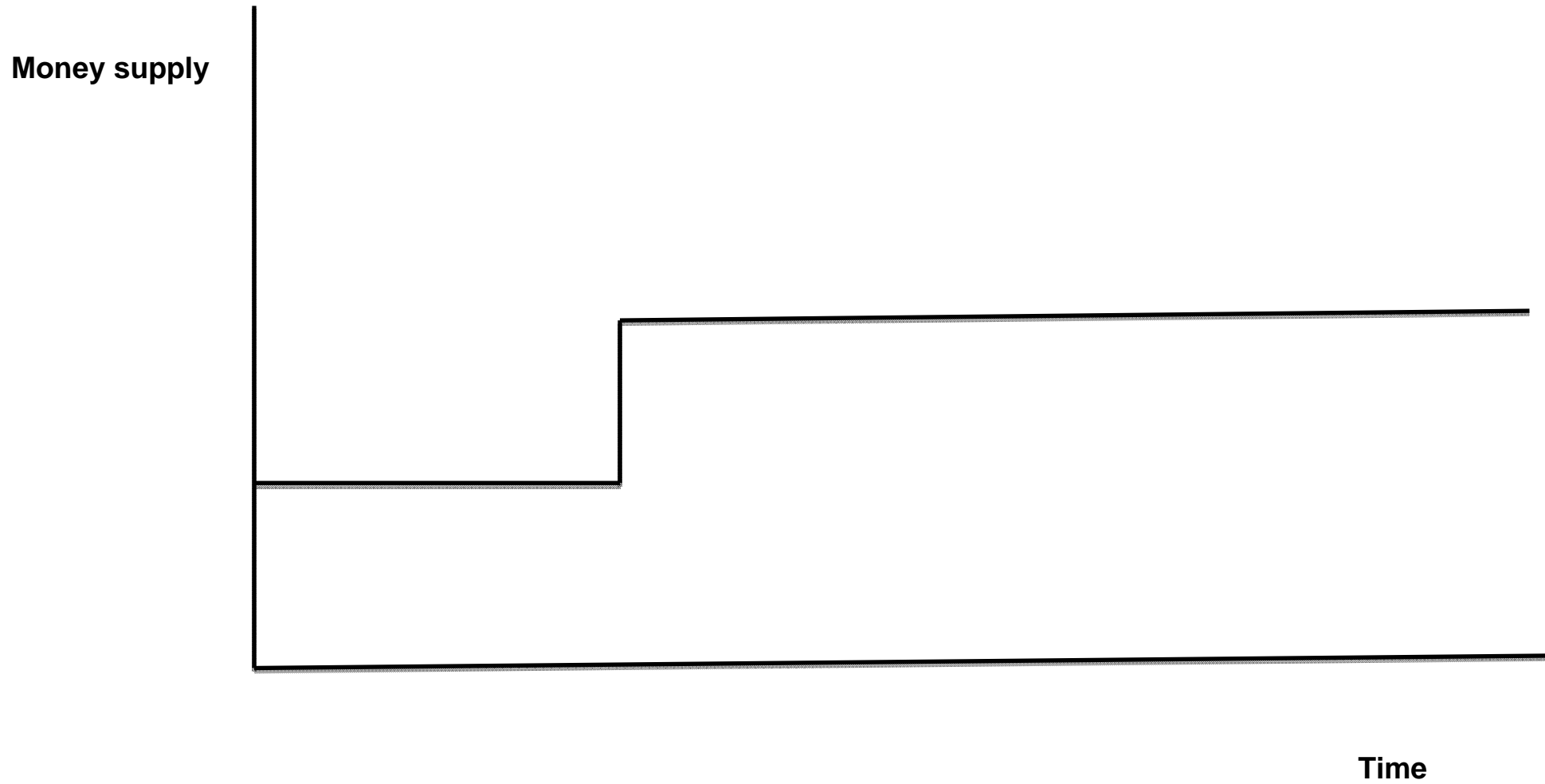
*Literature: Krugman-Obstfeld-Melitz, Chapters 17-18*



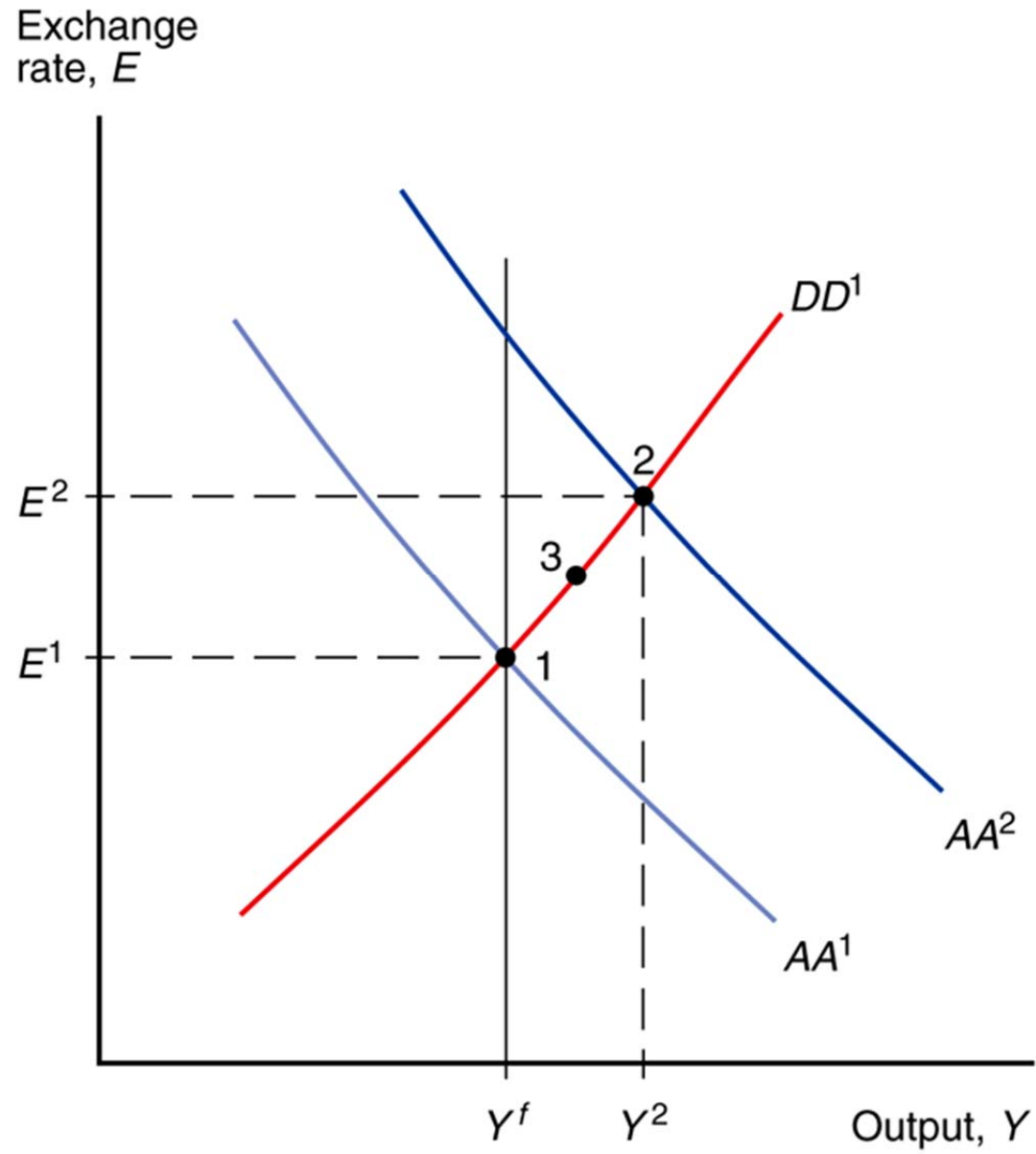
## Topics

- **Stabilisation policy under a flexible exchange rate**
- **Zero interest rates and the liquidity trap**
- **Systems of fixed exchange rates**
- **Interest rate parity under a fixed exchange rate**
- **Stabilisation policy under a fixed exchange rate**
- **Why devalue?**
- **Speculative attacks**
- **The Baltic economies and the current crisis**
- **China's exchange rate policy**
- **The gold standard, the Bretton Woods system and the ERM**

A permanent change in money supply

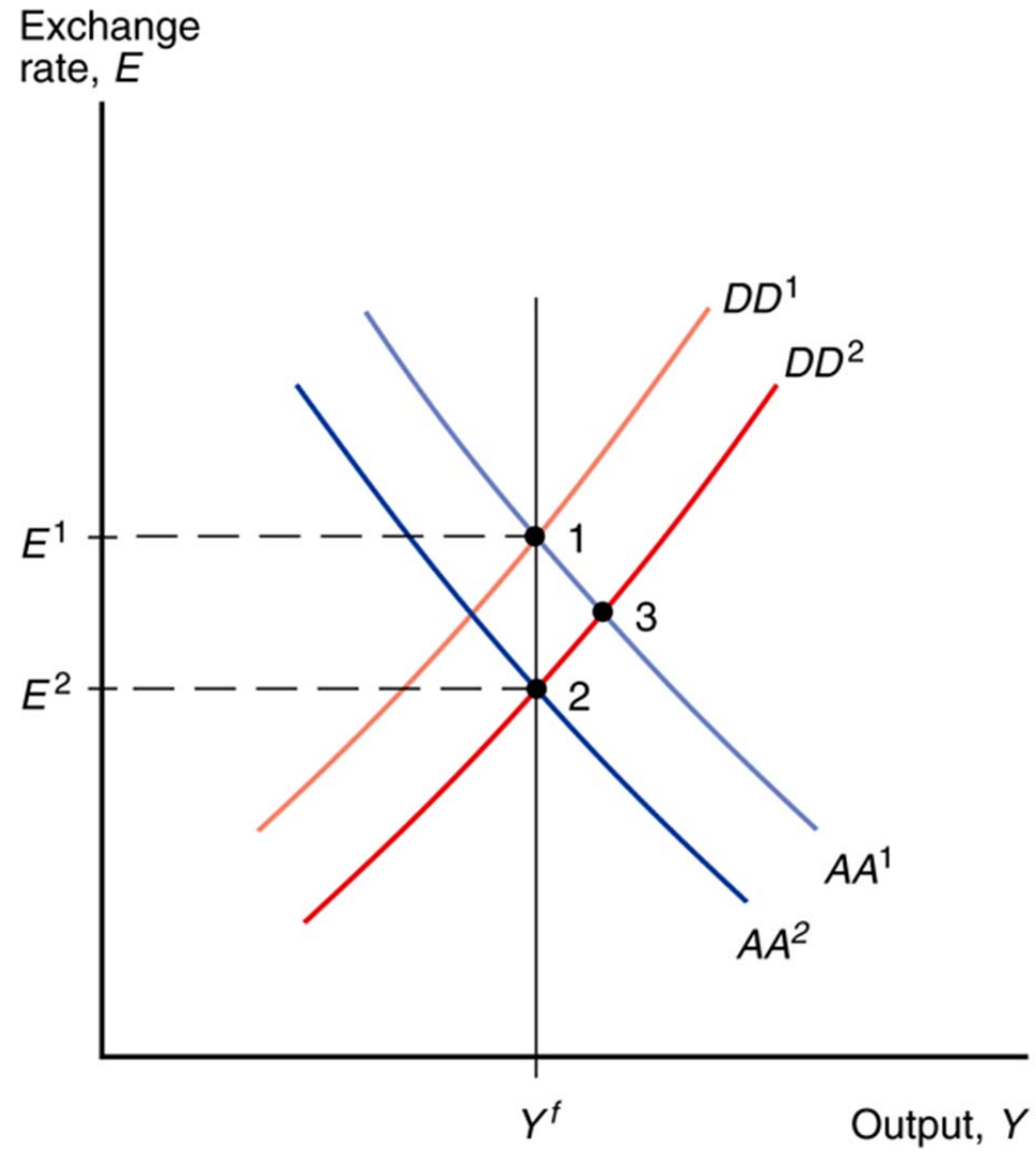


**Fig. 17-14: Short-Run Effects of a Permanent Increase in the Money Supply**





**Fig. 17-16: Effects of a Permanent Fiscal Expansion**



### Why has a permanent fiscal policy no output effects?

- In the long run we have  $Y = Y_f$  och  $R = R^*$  (output and interest rate at their equilibrium levels). Because  $P = M^s/L(Y_f, R^*)$ ,  $P$  must be unchanged in the long run.
- In the short run  $M^s/P$  is given. Assume that  $Y \uparrow$ . Then  $R \uparrow$ . From interest rate parity we then have  $(E^e - E) \uparrow$ . A nominal exchange rate depreciation is expected.
- But an expected nominal depreciation must also imply an expected real depreciation as  $P$  is given in the long run. This cannot be true because  $Y$  must then increase even more in the long run than in the short run and can then never return to its equilibrium level  $Y_f$ .
- But everything will fit together if  $Y$  never changes, so that  $Y = Y_f$  even in the short run.

## The mathematics of a permanent fiscal expansion

$$\frac{M^s}{P} = L(Y, R) \quad (1)$$

$$R = R^* + (E^e - E)/E \quad (2)$$

$$Y = D(EP^*/P, Y-T, I, G, Y^*) \quad (3)$$

If  $\uparrow \Rightarrow E = E^e \downarrow$  so that  $Y$  remains constant according to equation (3), equations (1) and (2) are also fulfilled.



## **The liquidity trap**

- **Monetary policy becomes inefficient when the interest rate reaches zero**
- **1930s**
- **Japan from 1999**
- **Several economies in the recent recession**

**The liquidity trap (cont.)**

$$R = R^* + (E^e - E)/E$$

$$R = 0 \Rightarrow 0 = R^* + (E^e - E)/E$$

$$E = E^e / (1 - R^*)$$

- **When the domestic interest rate has reached zero, further increases in money supply *cannot* affect the exchange rate.**

**Fig. 17-19: A Low-Output Liquidity Trap**

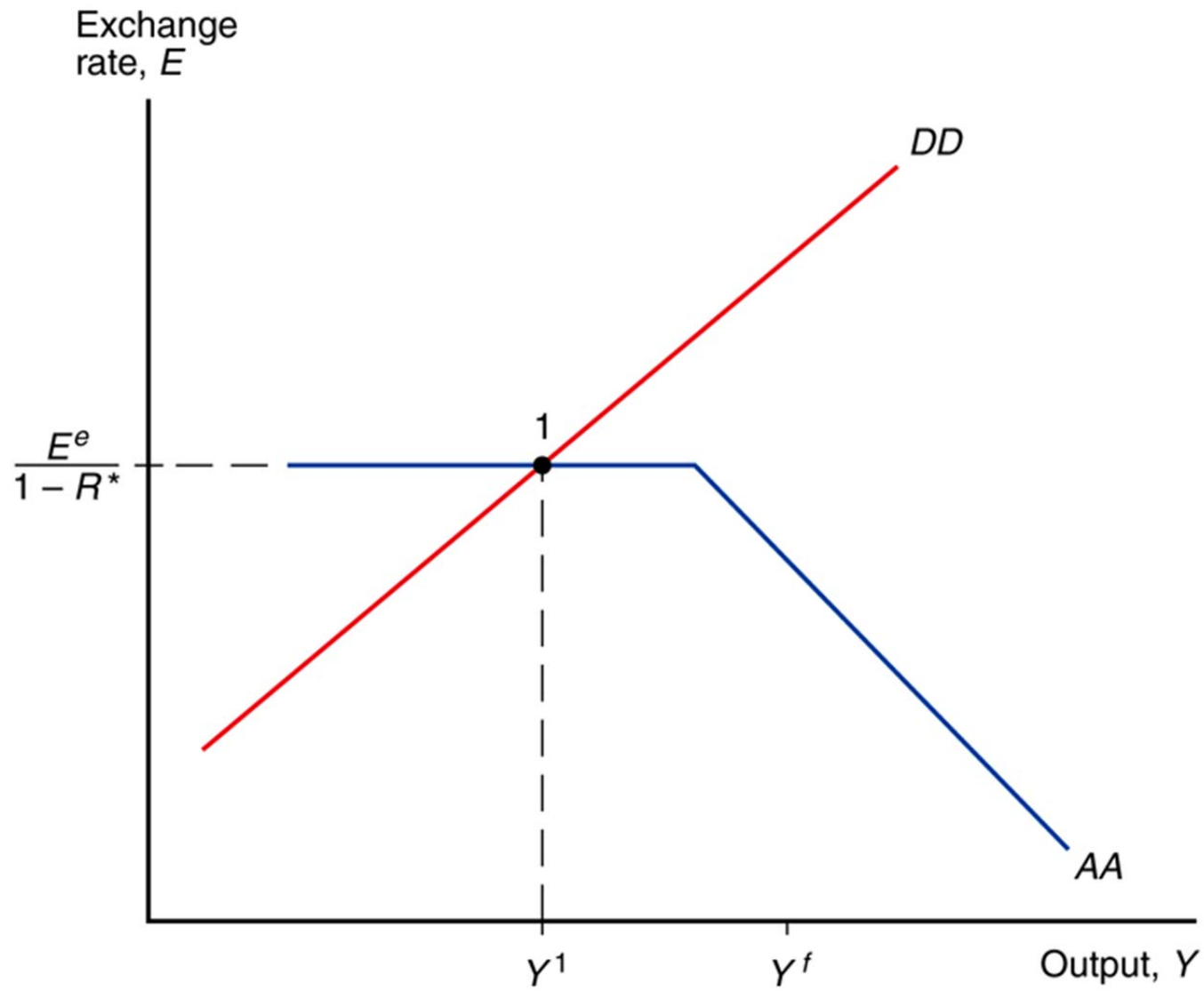
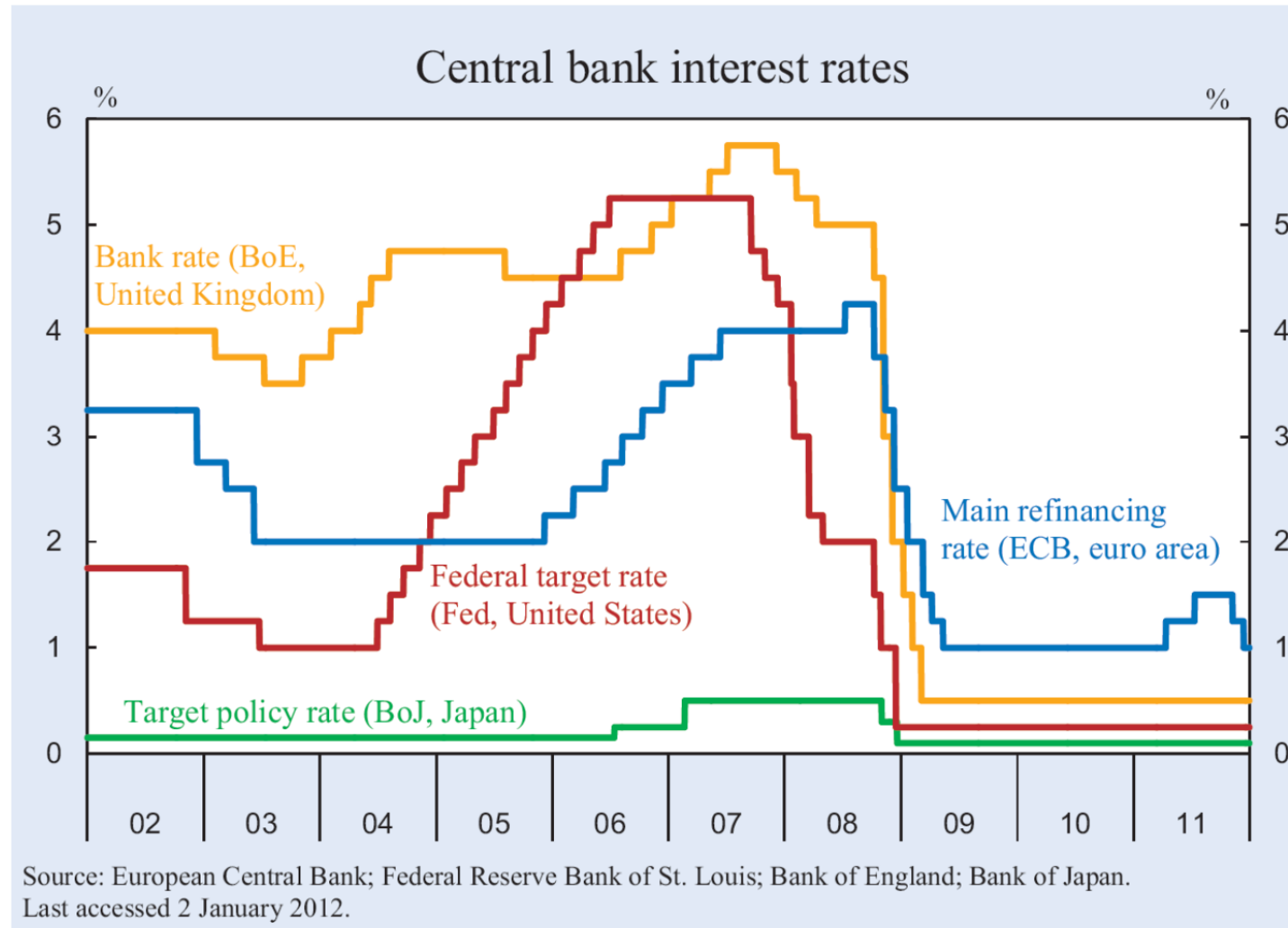
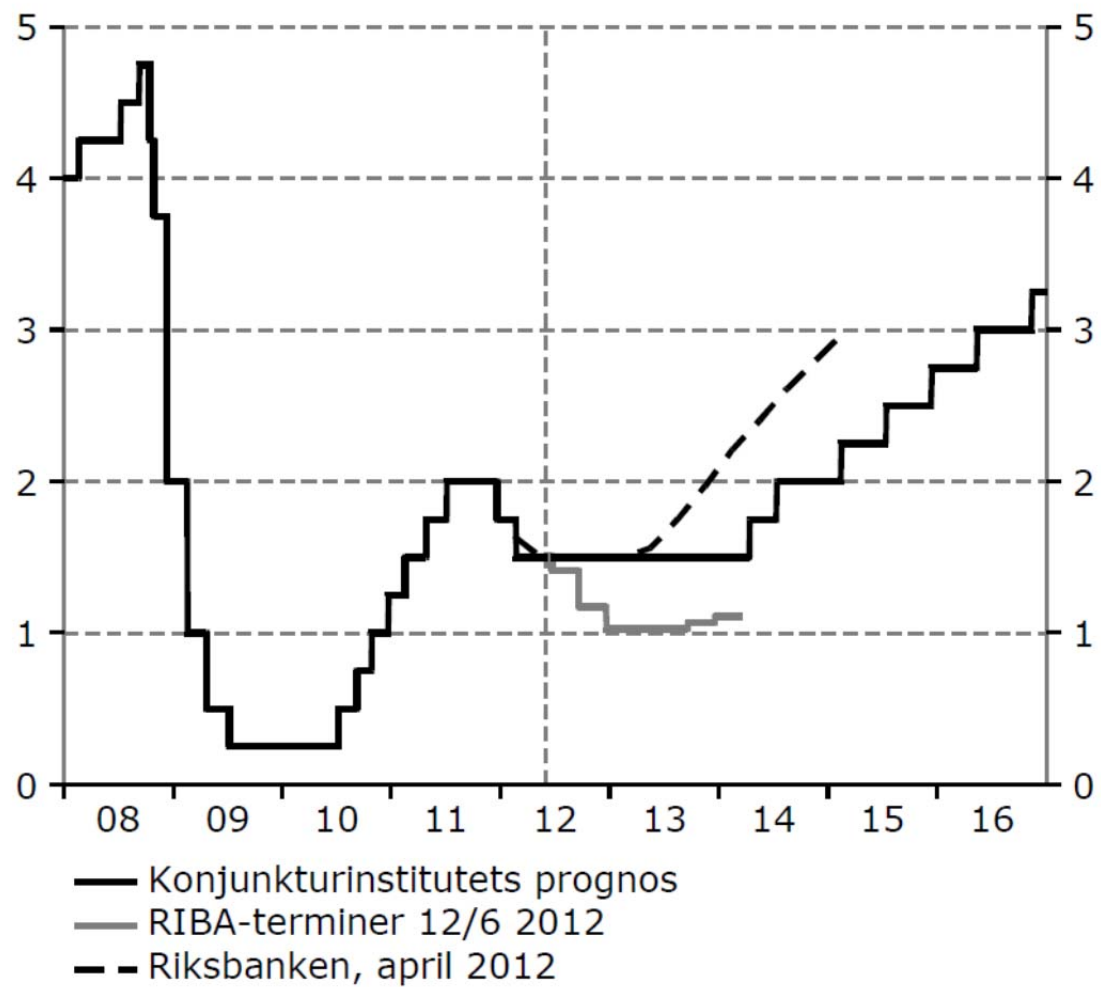


Figure 1.18



## Diagram 35 Reporänta

Procent, dagsvärden



Källor: NASDAQ OMX, Riksbanken och Konjunkturinstitutet.

## **How to deal with a liquidity trap**

- **Credible promise to raise the money supply *permanently***
- **Unconventional monetary policy**
  - **buy long-term bonds to reduce long-term interest rates**
  - **buy shares**
  - **buy property**
- **Use fiscal policy**

## Fixed exchange rates historically

- **Gold standard: 1871-1915**
- **Failed attempts to restore the gold standard: 1920s**
- **Bretton-Woods system: 1945 – 1973**

## Current situation

- **From 1973 floating exchange rates between most OECD currencies.**
- **But many small open economies have chosen to peg their currencies to large currencies (dollar, the British pound, euro – earlier the D-mark or the French franc) or a currency basket (a weighted average of currencies).**
- **Some countries have a "crawling peg" (depreciation against another currency at a given rate) or a "managed float" (the central bank tries to influence a floating exchange rate but does not change it according to a predetermined plan).**

## Sweden

- **1945 – 73: Fixed exchange rate within the Bretton Woods system (devaluation 1949)**
- **1973 –77: Fixed exchange rate to the D-mark within the European "snake" (devaluation 1976)**
- **1977 – 91: Fixed exchange rate to a trade-weighted basket with extra weight for the dollar (repeated devaluations: 1977, 1981 and 1982)**
- **1991 – 92: Fixed exchange rate to the ecu (weighted average of the currencies within the EU). Abandoned after exchange rate crisis.**
- **1992 - ?: Freely floating exchange rate with inflation target for the central bank**
- **? - ?: EMU membership with the euro as the common currency?????**



**ERM (European Exchange Rate Mechanism) established 1979. Exchange rate band +/- 2.25% around central parity. Widened band after exchange rate crises 1992/93 to +/- 15 %, but Belgium, Denmark, France, Germany and the Netherlands maintained the earlier narrow bands.**

**ERM 2 after the start of EMU: 1999 – 2000 Denmark + Greece + euro area. Today Denmark, Latvia, Lithuania + euro area. Condition for EMU entry: ERM membership for two years. Slovenia, Cyprus, Malta, Slovak Republic and Estonia have been ERM members but are now in the euro area.**

## The central bank balance sheet

<b>Assets</b>	<b>Liabilities</b>
Foreign assets	Deposits held by private banks
Domestic assets	Currency in circulation

### The central bank balance sheet (cont.)

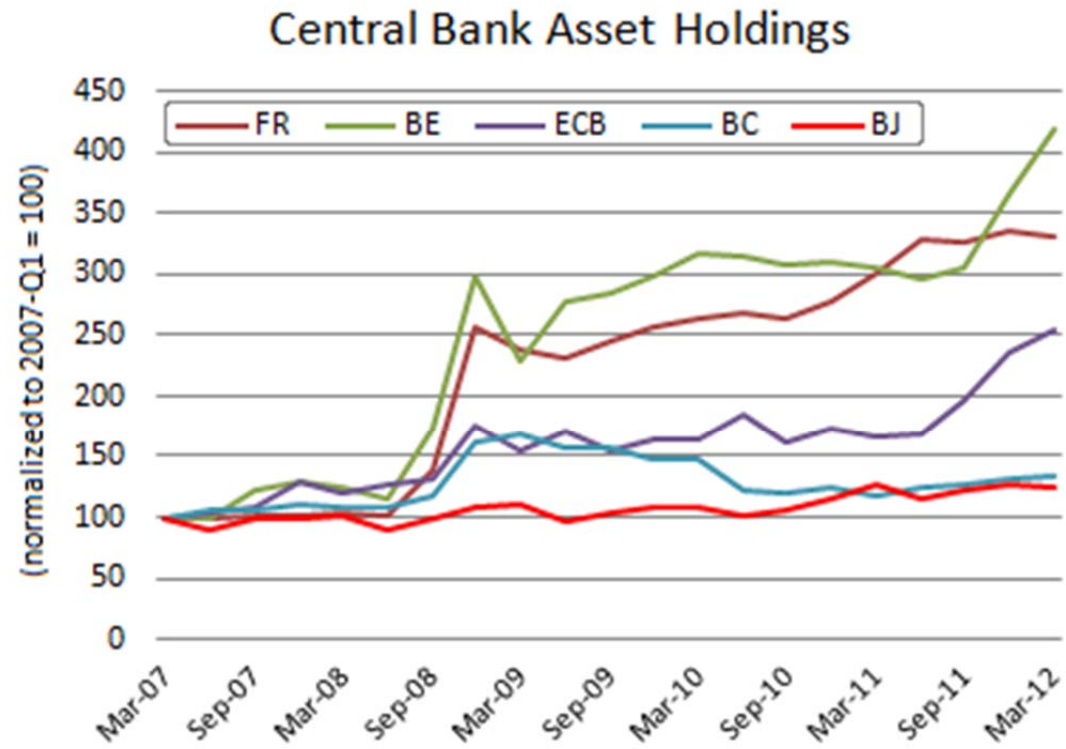
- **Foreign assets: foreign currency bonds owned by the central bank (international reserves). Affected by the central bank's interventions in the foreign exchange market. Gold included.**
- **Domestic assets: the central bank's claims on its own citizens and domestic institutions. Typically domestic government bonds and loans to domestic private banks.**
- **Deposits by private bank: may be withdrawn from the central bank at any time**
- **Currency in circulation: notes and coins**
- **Assets = liabilities + net worth**
- **Assume that the bank's net worth is constant: changes in the central bank's assets will be mirrored in the central bank's liabilities  $\Rightarrow$  changes in the central bank's assets affect the domestic money supply.**
- **Central bank liabilities = the monetary base = central bank money**
- **The money supply is a multiple of the monetary base**

## **How can the central bank increase the money supply?**

- **Purchase foreign assets (increase the foreign exchange reserves)**
- **Purchase domestic assets (the stock of assets held by the private sector decreases)**
  - **The money the central bank uses to pay for the purchase directly enters the money supply and causes it to expand**
  - **Repurchase (repo) transactions: if the central bank purchases government bills, it also enters an agreement to sell the bills at a given future date.**
  - **Repo transactions affect the repo rate, i.e. the short-term interest rate.**

## **Money supply and the current crisis**

- **Normally central banks only make transactions in short-term papers**
- **In the economic crisis central banks have increased the money supply also through transactions in longer-term papers (quantitative easing, unconventional measures)**
  - **purchase of government and commercial bonds**
  - **lending to banks against corporate debt collateral**
  - **lending to banks on longer term**
- **Huge expansion of central bank balance sheets**



Note: Data are not seasonally adjusted.

Source: Haver Analytics

## A fixed exchange rate and interest rate parity

**Interest rate parity:  $R = R^* + (E^e - E)/E$**

**Credible fixed exchange rate  $\Rightarrow E^e = E$ .**

**This implies:  $R = R^*$**

**Monetary policy must be pursued such that:**

**$M/P = L(R^*, Y)$**

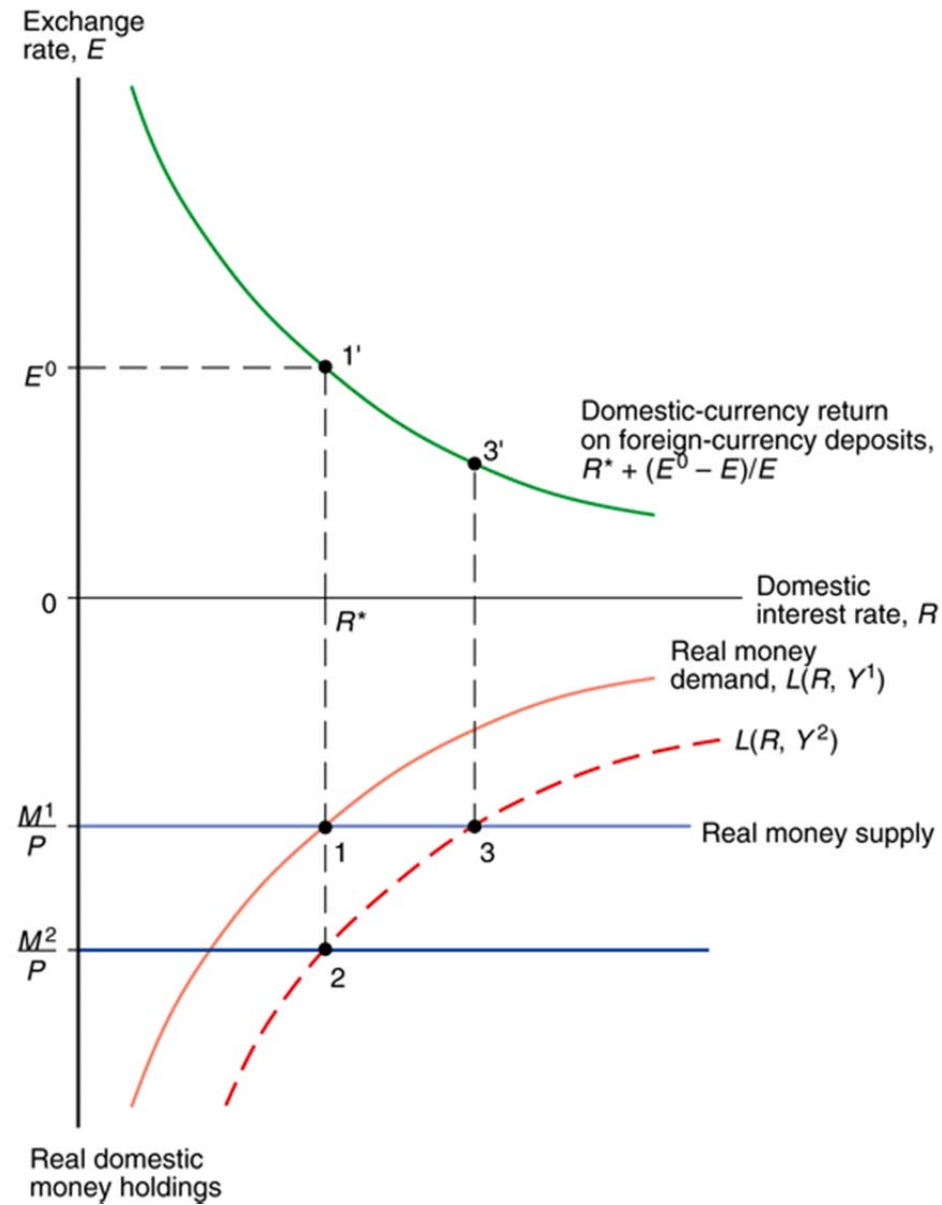
**$Y \uparrow \Rightarrow L \uparrow$ . This must be matched by  $M \uparrow$**

## **Monetary policy and fixed exchange rates**

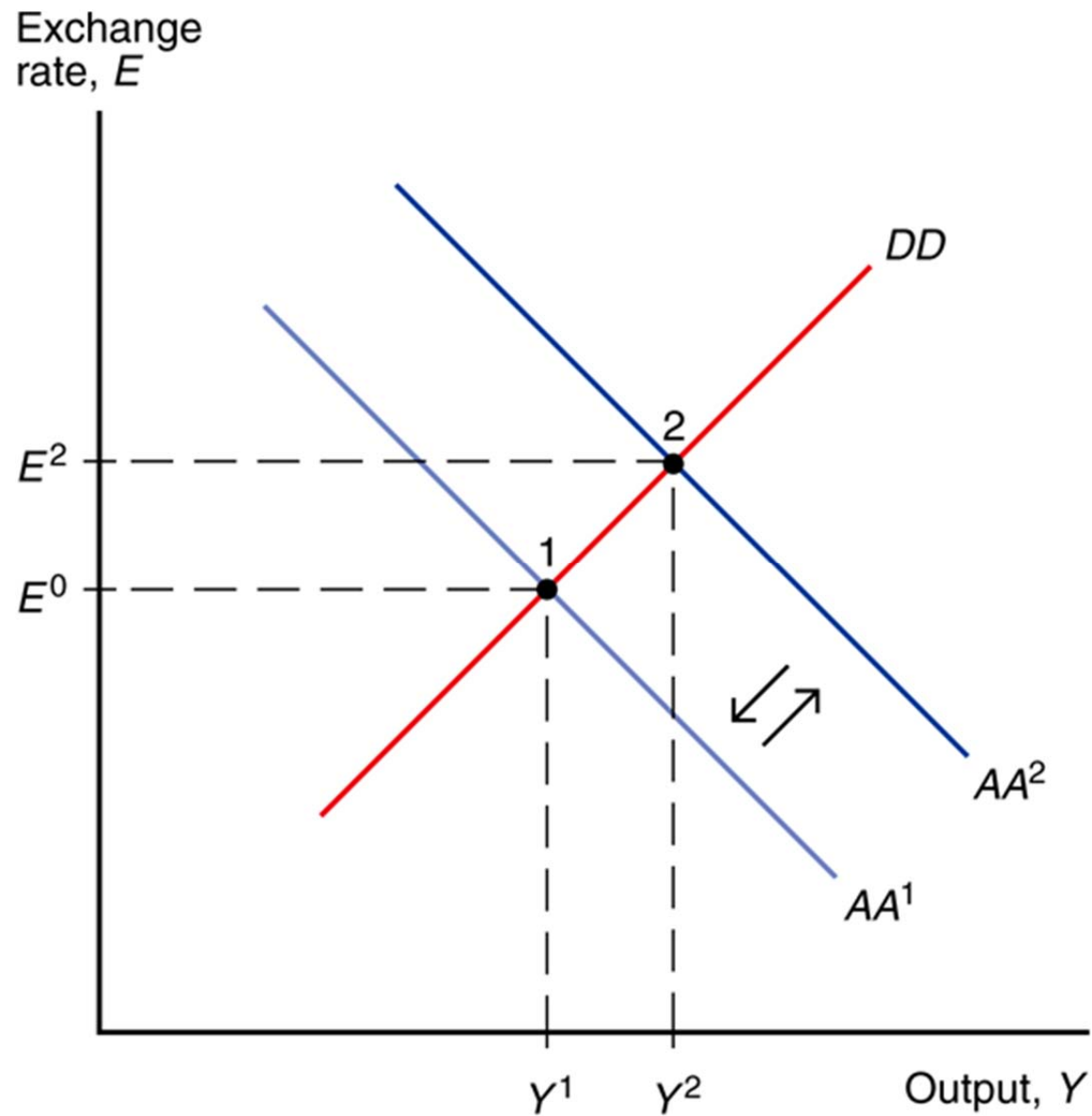
- **Under a fixed exchange rate the central bank buys and sells foreign assets to keep the exchange rate fixed and to maintain domestic interest rates equal to foreign interest rates**
- **Under a fixed exchange rate the central bank is not able to adjust domestic interest rates to attain other goals**
- **Monetary policy is therefore ineffective in influencing output and employment**



**Fig. 18-1: Asset Market  
Equilibrium with a Fixed  
Exchange Rate,  $E^0$**



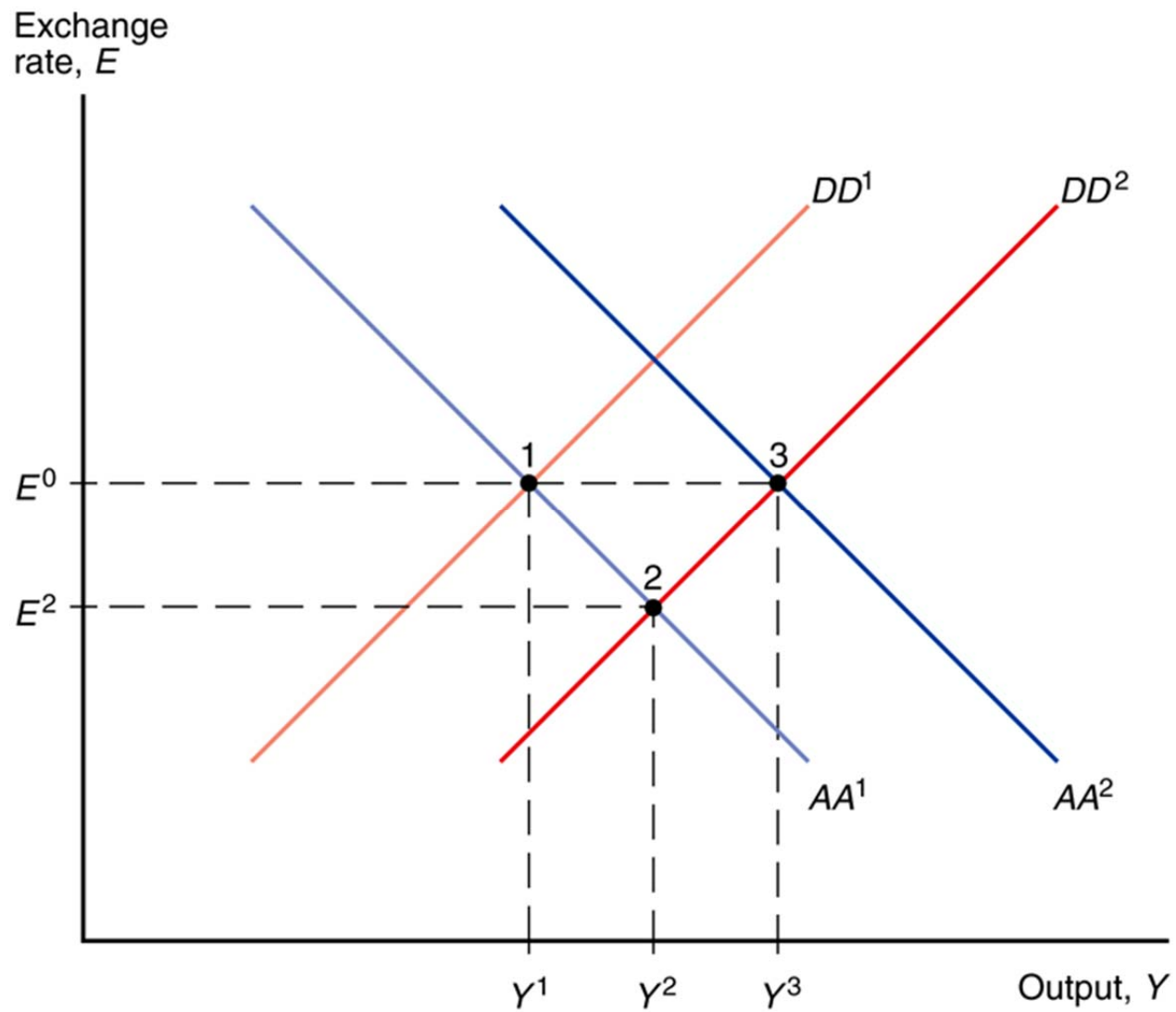
**Fig. 18-2: Monetary Expansion Is Ineffective Under a Fixed Exchange Rate**



## **Fiscal policy and fixed exchange rates in the short run**

- **Expansionary fiscal policy increasing output and income raises demand of real monetary assets, putting upward pressure on interest rates and on the domestic currency.**
- **To prevent an appreciation of the domestic currency, the central bank buys foreign assets, thereby increasing the money supply and decreasing interest rates.**

**Fig. 18-3: Fiscal Expansion Under a Fixed Exchange Rate**



## **Conclusions on stabilisation policy**

- **Flexible exchange rate**
  - **Monetary policy is the primary stabilisation tool**
  - **Fiscal policy is not so effective (exchange rate offset)**
  
- **Fixed exchange rate**
  - **Monetary policy is ineffective (tied down by interest rate parity)**
  - **Fiscal policy is the only effective stabilisation tool**

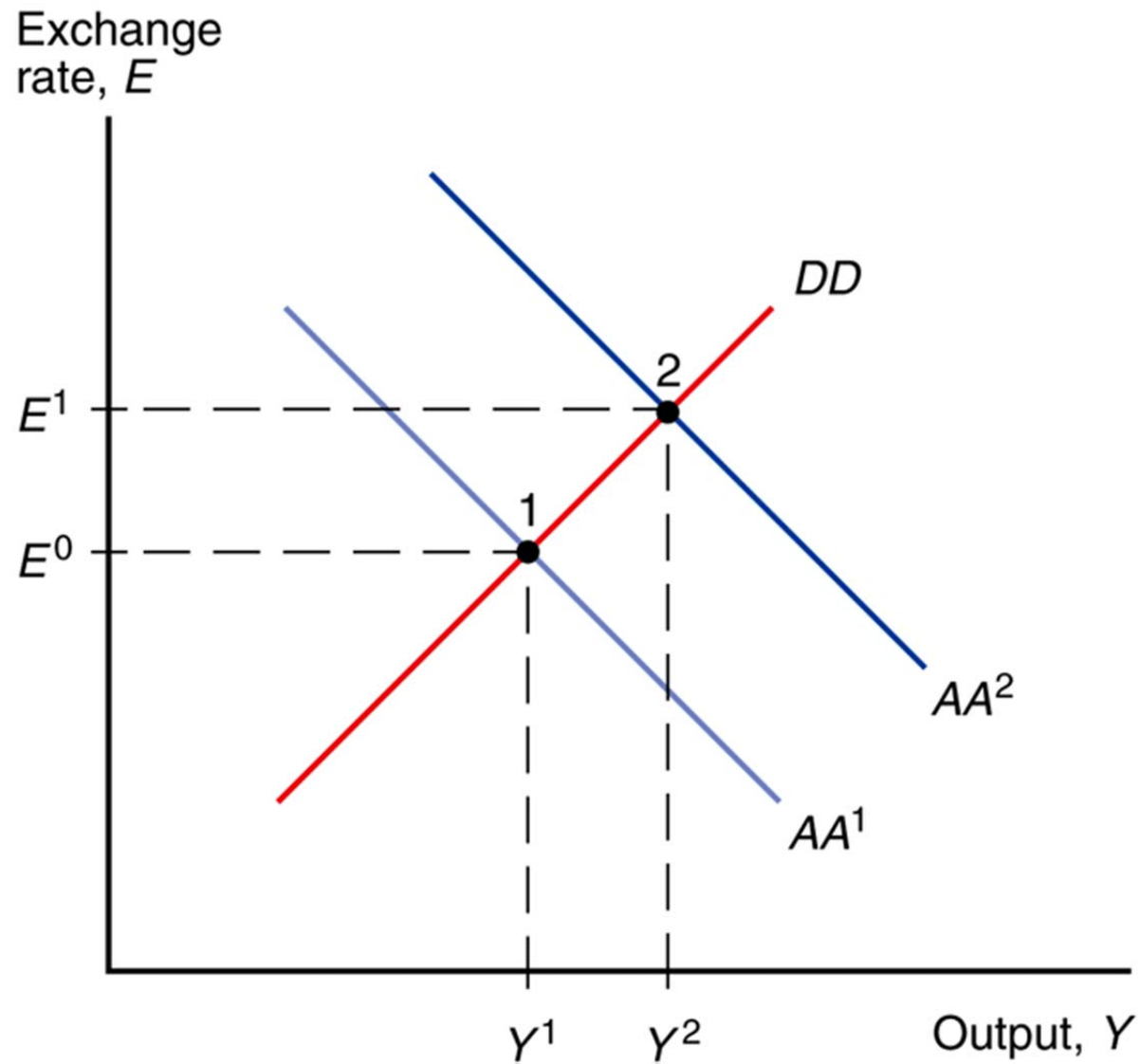
## Devaluations and revaluations

- **Depreciations and appreciations: changes in the value of a currency under a floating exchange rate. Governed by markets.**
- **Devaluations and revaluations: changes in the value of a currency under a fixed exchange rate. Governed by the central bank.**
- **Devaluation: a unit of domestic currency is made less valuable, so that more units must be exchanged for one unit of foreign currency.**
- **Revaluation: a unit of domestic currency is made more valuable, so that fewer units need to be exchanged for one unit of foreign currency.**

## Devaluation

- **The central bank buys foreign assets  $\Rightarrow$  the money supply increases and domestic interest rates fall, causing a fall in the rate return on domestic currency deposits.**
- **Domestic products become less expensive relative to foreign products  $\Rightarrow$  aggregate demand and output increase.**
- **Official international reserve assets, i.e. foreign bonds, increase.**

**Fig. 18-4: Effect of a Currency Devaluation**





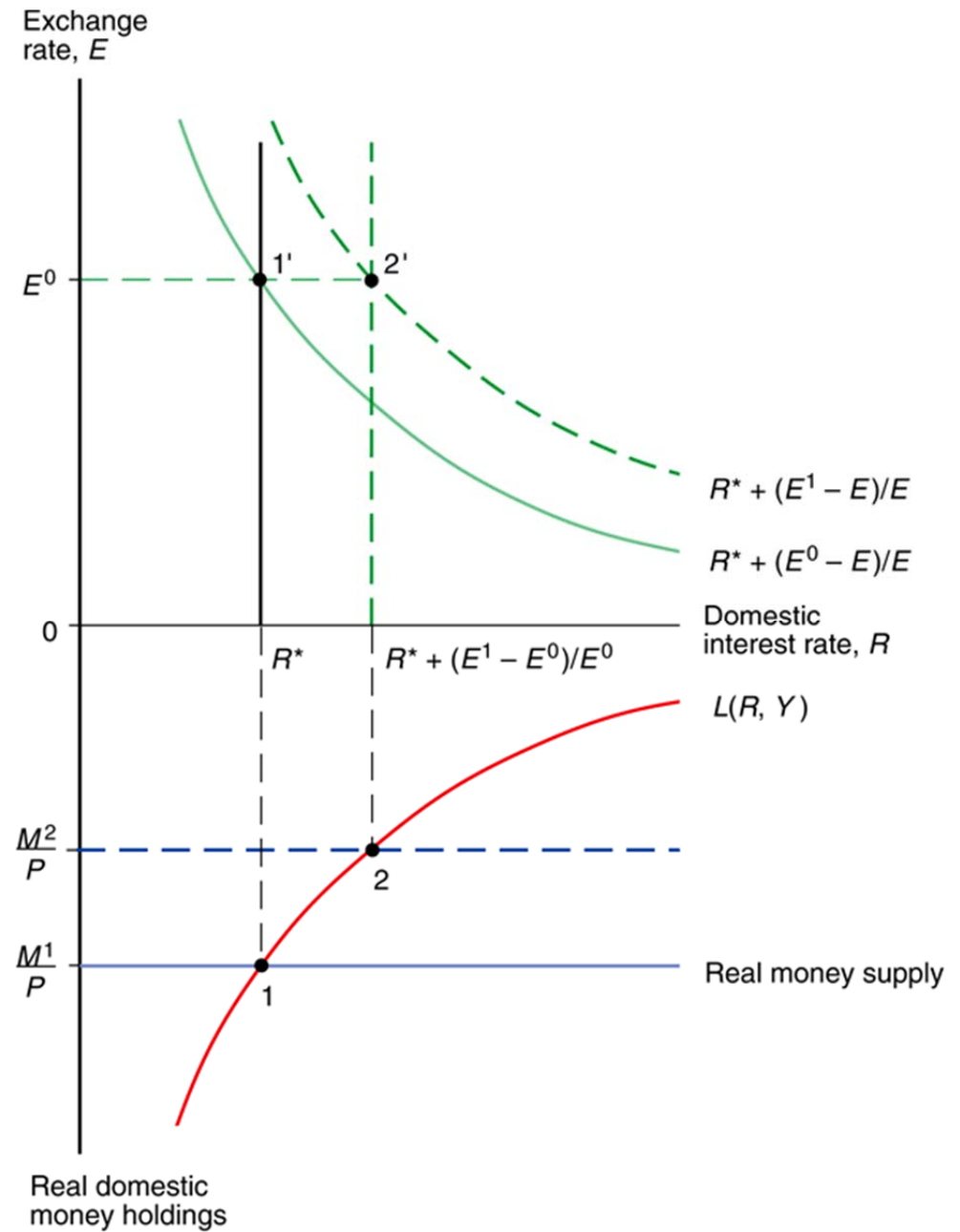
## **Why does a country devalue?**

- 1. Expansionary fiscal policy may be impossible because of large budget deficits and large government debt: Sweden 1992 or Argentina 2001.**
- 2. Under a fixed exchange rate and free capital movements an exchange rate devaluation is the only way of using monetary policy.**
- 3. Past inflation may have deteriorated international competitiveness and “priced a country out of international markets”.**
- 4. Foreign exchange reserves may be depleted, for example because of large current account deficits.**

## **Balance of payment crisis**

- **A balance of payments crisis arises if the central bank does not have enough international reserves to maintain the fixed exchange rate.**
- **To sustain a fixed exchange rate the central bank must have enough foreign assets to sell to meet the demand for the national currency at the fixed exchange rate.**
- **If investors expect that the domestic currency will be devalued, they will demand foreign assets instead of domestic assets (whose value is expected to fall).**
- **This fear exacerbates the crisis:**
  - **Investors exchange domestic currency for foreign currency depleting the foreign exchange reserves even more.**
  - **Financial capital is moved to foreign assets: capital flight. The government can seek to keep capital in the country by raising the interest rate, i.e. by decreasing the money supply.**
- **The outcome is high interest rates, low money supply, low aggregate demand, low output and low employment.**

**Fig. 18-5: Capital Flight, the Money Supply, and the Interest Rate**



## **Speculative attacks**

- 1. Response to future unavoidable development**
- 2. Self-fulfilling expectations (multiple equilibria)**

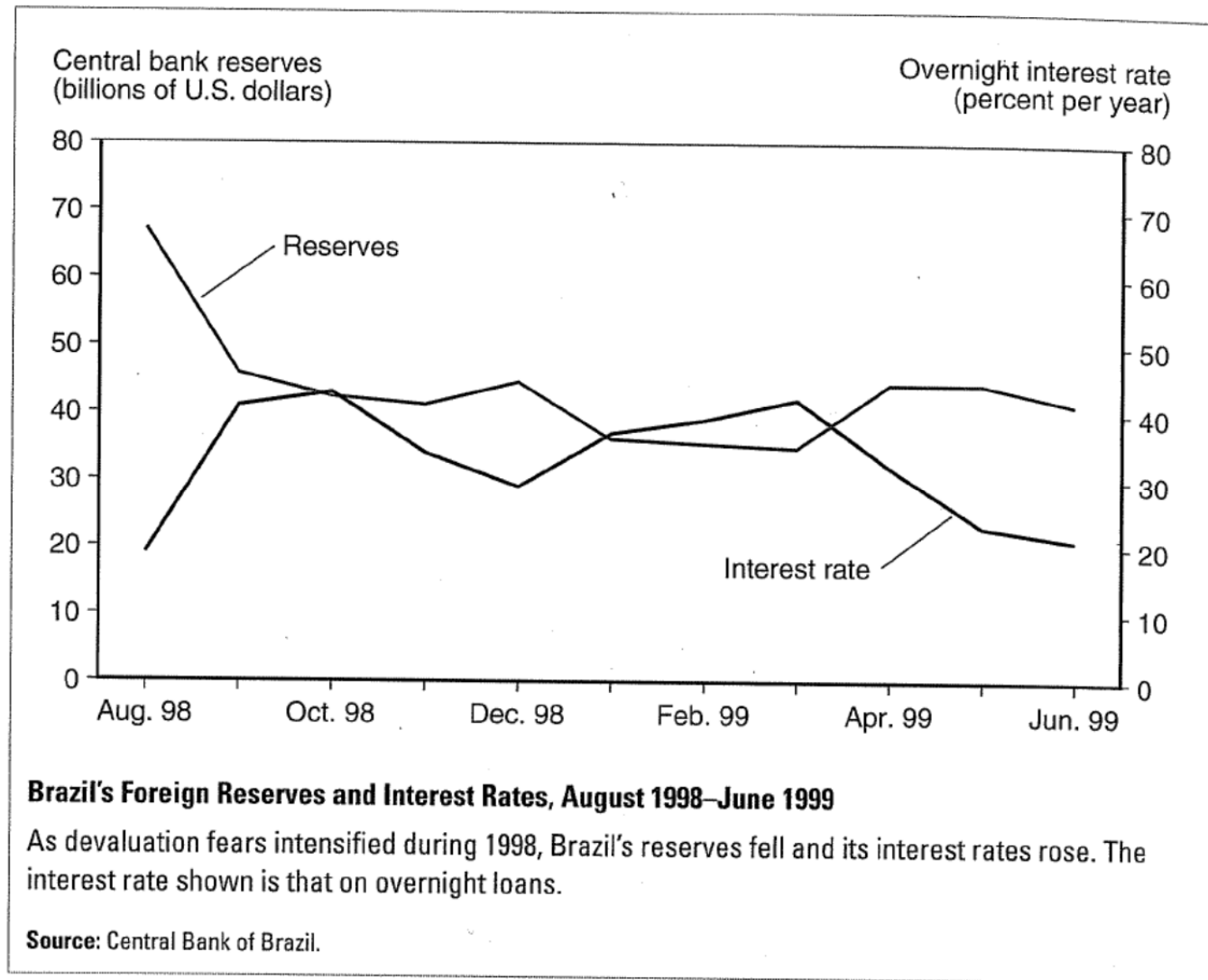
**It is always “technically possible” to defend a fixed exchange rate through selling foreign currency from foreign exchange reserves or currency obtained from borrowing: the problem is the goal conflicts caused by high interest rates**

- Lower employment**
- Higher interest rates on government debt and thus larger government budget deficits**
- Private sector bankruptcies (banks and financial firms)**

**Examples: Sweden 1992, Mexico 1994, Brazil 1998-99,**

**Argentina 2001**

- Dramatic increases in unemployment**
- Huge government budget deficits**
- Bankruptcies of banks, financial firms and real estate firms**



## The Baltic economies

- **Fixed exchange rates vis-à-vis the euro**
  - **currency boards**
  - **all outstanding central bank debt backed by foreign currency reserves**
  
- **Typical emerging-market crisis**
  - **earlier large current-account deficits and capital inflows (Swedish banks)**
  - **reckless lending by Swedish banks**
  - **high inflation and lost cost competitiveness**
  - **capital flow reversals**
  - **expectations of exchange rate depreciations**
  - **interest rate hikes**
  - **deep recessions**
  
- **Need to restore competitiveness through wage and price cuts**

$$- \frac{EP^*}{P} \uparrow \text{ by lowering } P \text{ at constant } E$$

## Why didn't the Baltic economies devalue?

- Violation of EMU entry criterion
- Fixed exchange rate seen as anchor for low inflation
- Most of private-sector debt is in euros (foreign currency)
- Devaluation would increase the domestic-currency value of debt denominated in euros

$$D = ED^*$$

- But what matters is the real burden of debt

$$\frac{D}{P} = \frac{ED^*}{P}$$

- The real burden of debt increases also if  $P \downarrow$
- Main difference: it takes longer time to achieve real exchange rate depreciation through wage/price cuts than through exchange rate devaluation
- But surprisingly large cuts in nominal wages and unit labour costs

**GDP change**

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Estonia</b>	<b>6.9</b>	<b>-5.1</b>	<b>-13.9</b>	<b>3.1</b>	<b>4.9</b>
<b>Lavia</b>	<b>10.0</b>	<b>-4.2</b>	<b>-18.0</b>	<b>-0.3</b>	<b>3.3</b>
<b>Lithuania</b>	<b>9.8</b>	<b>2.9</b>	<b>-14.7</b>	<b>1.3</b>	<b>5.0</b>



**Change in nominal wage cost**

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Estonia</b>	<b>24.6</b>	<b>10.1</b>	<b>-3.3</b>	<b>-0.2</b>	<b>4.4</b>
<b>Lavia</b>	<b>35.1</b>	<b>15.7</b>	<b>-12.2</b>	<b>-6.5</b>	<b>1.5</b>
<b>Lithuania</b>	<b>13.9</b>	<b>14.3</b>	<b>-11.1</b>	<b>-1.3</b>	<b>3.4</b>

**Nominal unit labour cost (2000 = 100)**

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Estonia</b>	<b>153.0</b>	<b>177.8</b>	<b>179.8</b>	<b>165.6</b>	<b>171.9</b>
<b>Lavia</b>	<b>184.1</b>	<b>224.5</b>	<b>208.8</b>	<b>186.6</b>	<b>186.1</b>
<b>Lithuania</b>	<b>127.5</b>	<b>140.6</b>	<b>136.7</b>	<b>126.3</b>	<b>127.0</b>

**Nominal unit labour cost = Cost per unit produced =  $WL/Q$**

**W = Wage cost per worker**

**L = Number of Workers**

**Q = Output**

**Current account balance (as a percentage of GDP)**

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Estonia</b>	<b>-17.2</b>	<b>-8.8</b>	<b>4.5</b>	<b>2.8</b>	<b>1.8</b>
<b>Lavia</b>	<b>-22.3</b>	<b>-13.1</b>	<b>8.6</b>	<b>3.6</b>	<b>-0.3</b>
<b>Lithuania</b>	<b>-15.1</b>	<b>-13.1</b>	<b>2.6</b>	<b>1.8</b>	<b>0.2</b>

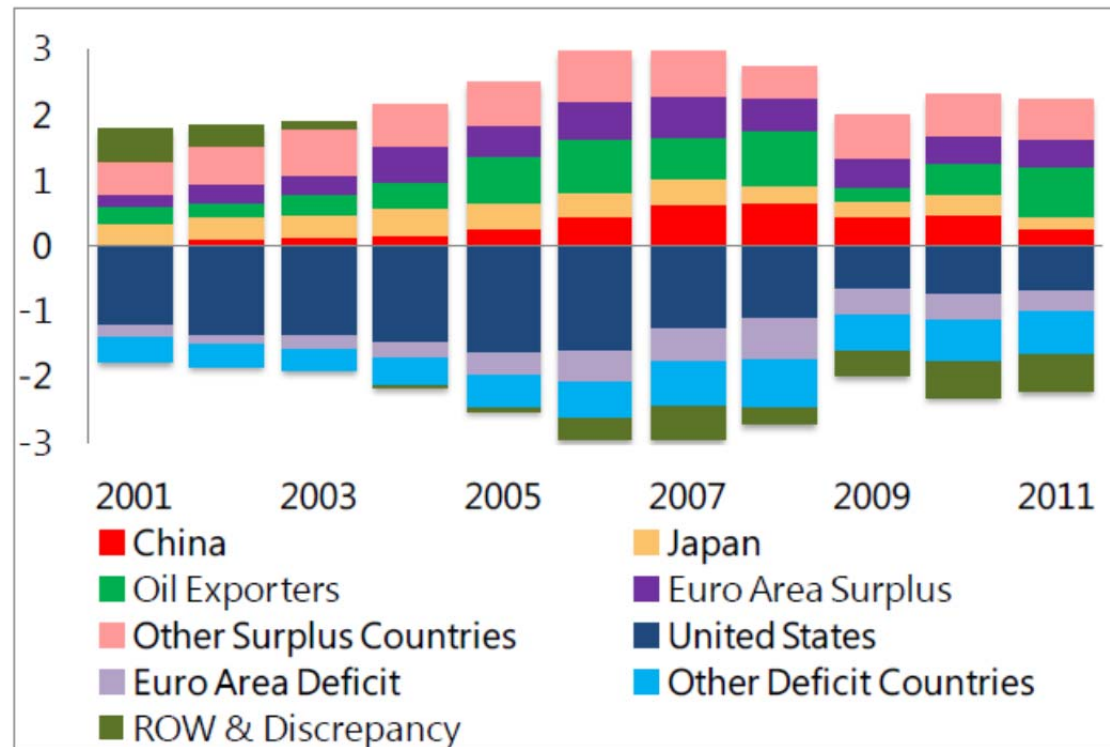
*Source:* EU Commission Forecasts, Statistical Annex

## **China's exchange rate policy**

- **Undervalued exchange rate has been maintained through central bank purchases of dollar: accumulation of dollar assets by the central bank**
  - **Large current account surpluses**
  - **The largest foreign currency reserves in the world: 20 percent of world reserves**
- **Explanations**
  - **High private savings because of underdeveloped social security and pension system**
  - **Undervalued exchange rate helps industrialisation through strategy of "export-led growth"**
  - **Precautionary motive for accumulating assets: ability to meet capital outflows (cf Asian crisis)**
- **Problems:**
  - **Distorted relative prices: imports are too expensive**
  - **Overinvestment in export sector**
  - **Low purchasing power for domestic consumers**
- **Problems associated with appreciation**
  - **Exchange rate losses on accumulated dollar reserves**
  - **Many export firms that are profitable today would become unprofitable**
  - **Risks of financial crisis**

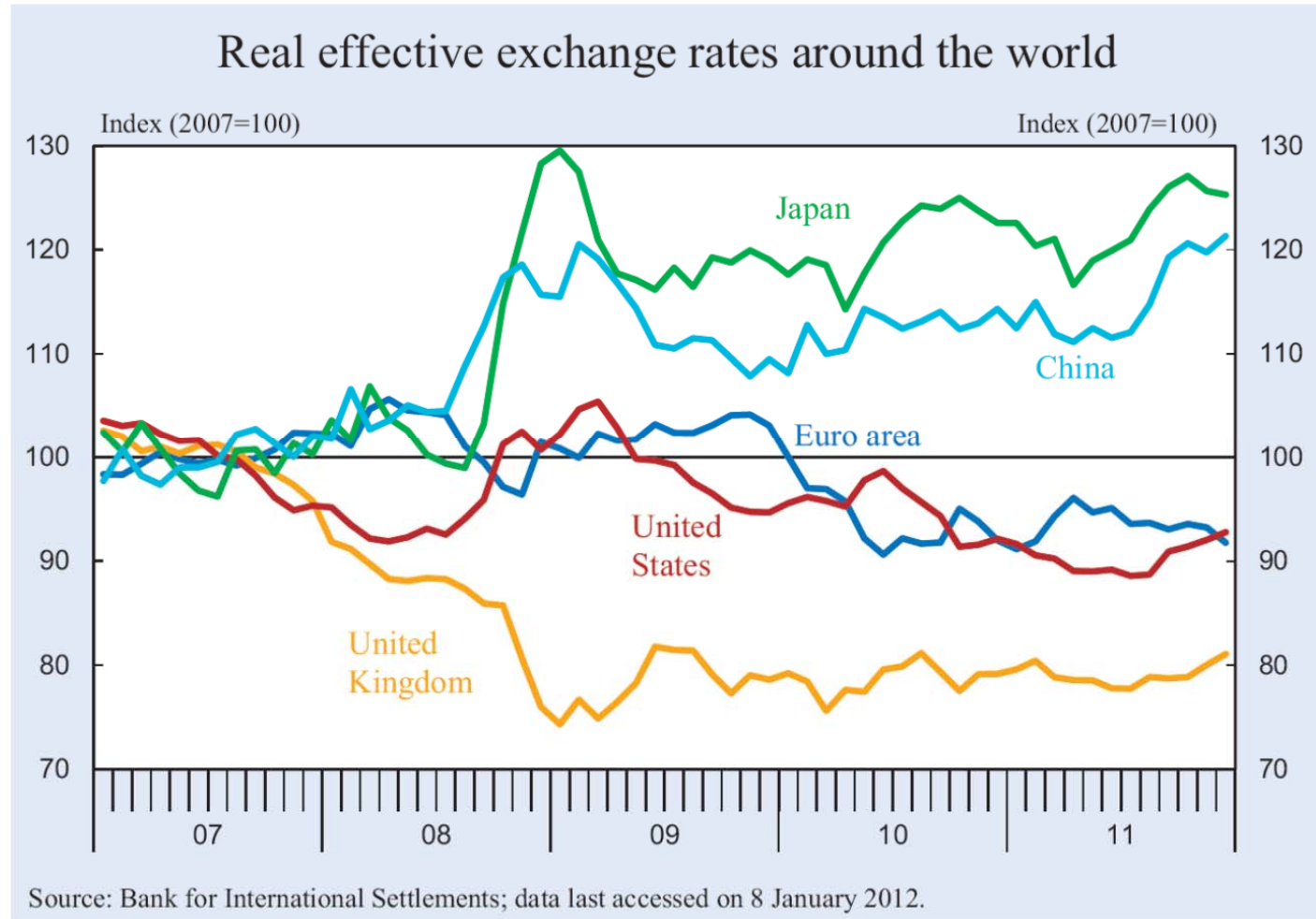
## Figure 1. Global Current Account, 2001–11

All Countries: Actual Unadjusted  
Current Account, 2001–11  
(Percent of world GDP)

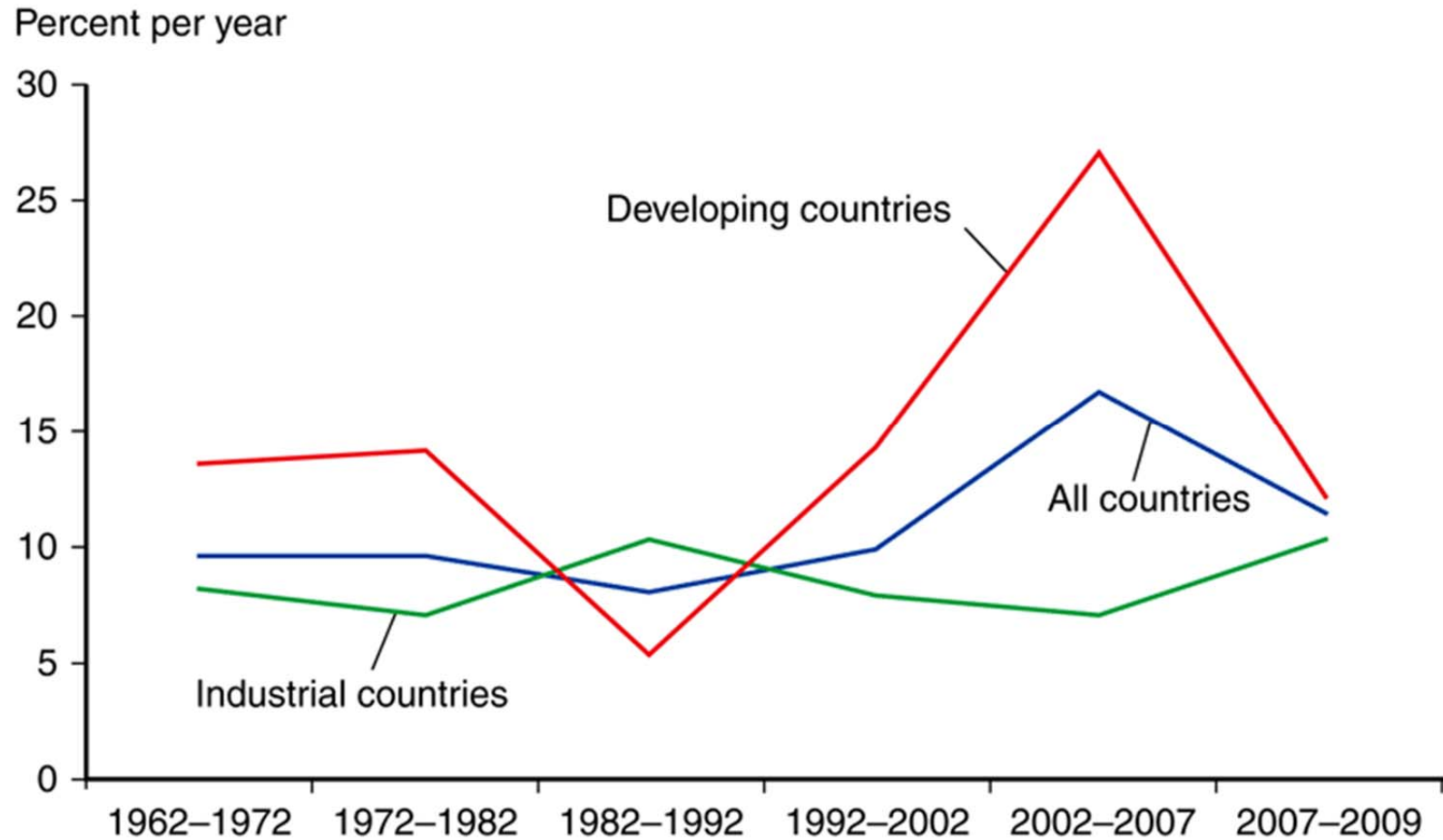


Source: IMF, World Economic Outlook Database

Figure 1.25



**Fig. 18-7: Growth Rates of International Reserves**



Source: Economic Report of the President, 2010.

## **The historical gold standard**

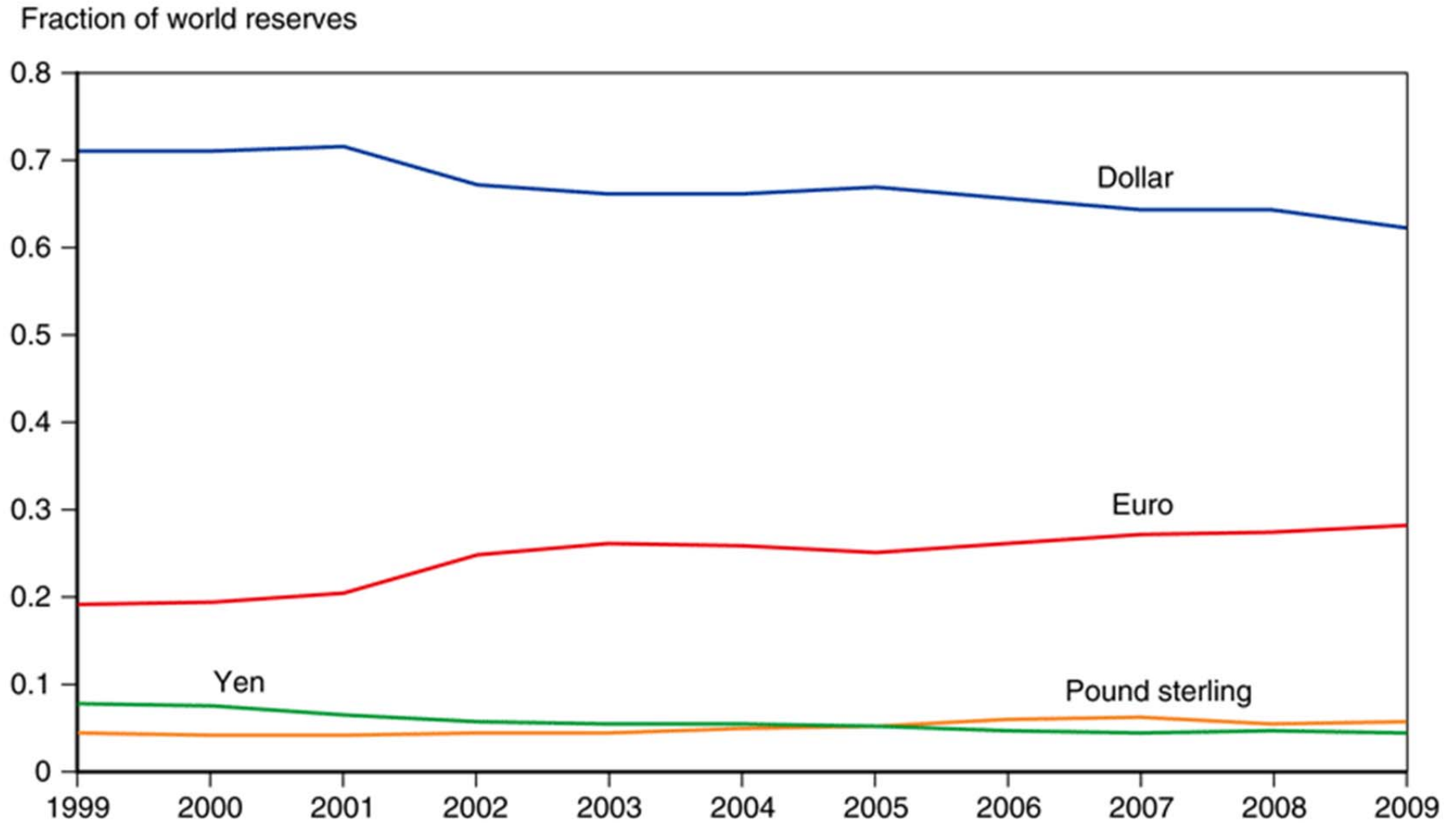
- **During the gold standard central banks guaranteed that currencies could be converted into gold at a fixed price**
- **The gold standard thus implied a fixed price of different currencies in gold: this locked all cross exchange rates between different currencies**
- **The gold standard tied changes in money supply to changes in the gold stock: this ensured that inflation would not run away**
- **The gold standard was abandoned only during deep crises (usually wars): implicit commitment to return to earlier parities afterwards**
- **Long-run price movements tied to changes in the gold stock associated with swings in gold production**
- **Monetary policy could not be used for stabilisation of the business cycle**



## **Gold-dollar exchange standard in the Bretton Woods system**

- **The dollar functioned as a reserve currency**
- **$N - 1$ -problem: With  $N$  currencies only  $N - 1$  countries need to maintain fixed exchange rates (because there are only  $N - 1$  exchange rates)**
- **The reserve currency country (the US) can choose any rate of change of money supply: the others must adjust their money supply increases and interest rates so that they maintain fixed exchange rates vis-à-vis the dollar.**
- **The system worked until the US started printing money and create inflation in the 1960s (financing of the Vietnam war and domestic social reforms)**
- **Other countries (Germany, France, Japan) were not prepared to maintain fixed exchange rates, as this implied that they would import inflation**
- **The Bretton-Woods system broke down after a series of serious exchange rate crises**

**Fig. 18-8: Currency Composition of Global Reserves**



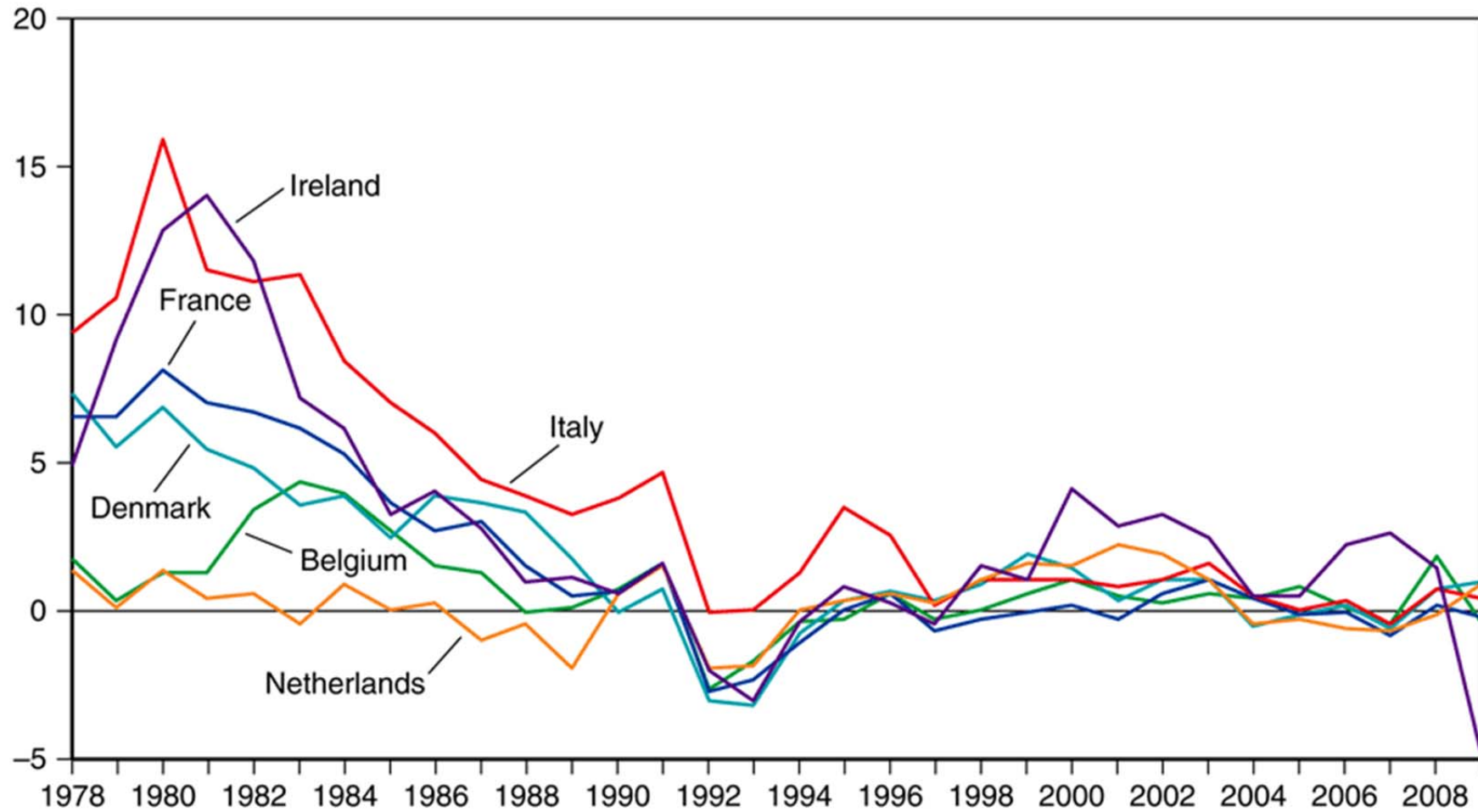
Source: International Monetary Fund, Currency Composition of Foreign Exchange Reserves (as of June 30, 2010), at <http://www.imf.org/external/np/sta/cofer/eng/index.htm>. These data cover only the countries that report reserve composition to the IMF, the major omission being China.

## ERM system in the 1980s and 1990s

- **Germany functioned as reserve currency country**
- **Germany determined the inflation rate in the ERM area (other countries could import price stability from Germany)**
- **But German monetary policy aimed at stabilising the German business cycle**
- **In the early 1990s after German unification there was a strong boom in Germany at the same time as Europe went into recession. German high interest rates to keep down domestic inflation aggravated the recession in the rest of Europe.**
- **EMU was seen by many (France in particular) as a way of replacing German control of European monetary policy with common European decision making in a common European Central Bank.**

**Fig. 20-2: Inflation Convergence for Six Original EMS Members, 1978–2009**

Country's annual inflation less Germany's annual inflation  
(percent per year)



Source: CPI inflation rates from International Monetary Fund, *International Financial Statistics*.

