

## **Lecture 6:** Intermediate macroeconomics, autumn 2009

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## **Topics**

- **Systems of fixed exchange rates**
- **Interest rate parity under a fixed exchange rate**
- **Stabilisation policy under a fixed exchange rate**
- **Why devalue?**
- **The Baltic economies and the current crisis**
- **Speculative attacks**
- **Liquidity traps**

*Literature: Krugman-Obstfeld chapter 17*

*OECD Economic Outlook chapter 1, pp. 46-52*

### **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).**
- **China used to have a fixed exchange rate to the dollar. Official change to a "managed float" against a currency basket 2005. Fixed rate to the dollar again in the current crisis.**

## **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  $\pm 2.25\%$  around central parity. Widened band after exchange rate crises 1992/93 to  $\pm 15\%$ , 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, Estonia, Latvia, Lithuania + euro area. Condition for EMU entry: ERM membership for two years. Slovenia, Cyprus, Malta and Slovak Republic have been ERM members but have now entered 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**
- **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.**

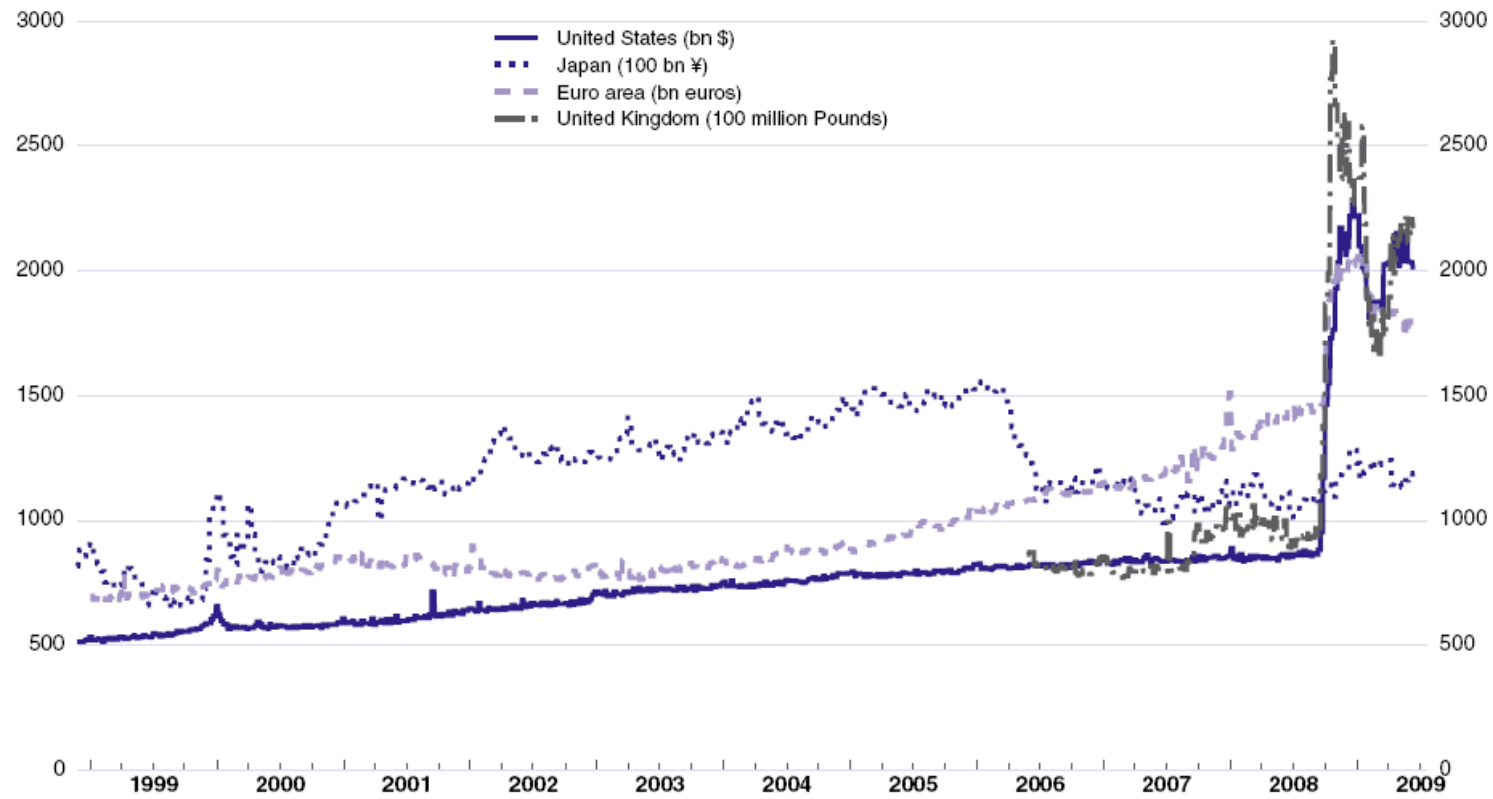


### **Money supply and the current crisis**

- **Normally central banks only make transactions in short-term papers**
- **In the current 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**

Figure 1.20. **Unconventional measures have led to expansion of central banks' balance sheets**

Latest available date: 11 June 2009



Source: Datastream.

**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:**

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

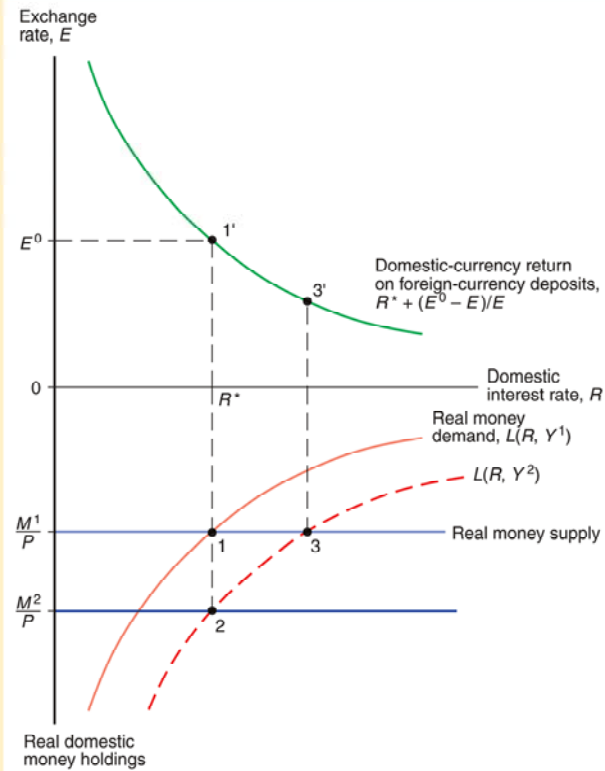
**$Y \uparrow \Rightarrow L \uparrow$ . This must be matched by  $M \uparrow$**

### **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**

**Figure 17-1****Asset Market Equilibrium with a Fixed Exchange Rate,  $E^0$** 

To hold the exchange rate fixed at  $E^0$  when output rises from  $Y^1$  to  $Y^2$ , the central bank must purchase foreign assets and thereby raise the money supply from  $M^1$  to  $M^2$ .



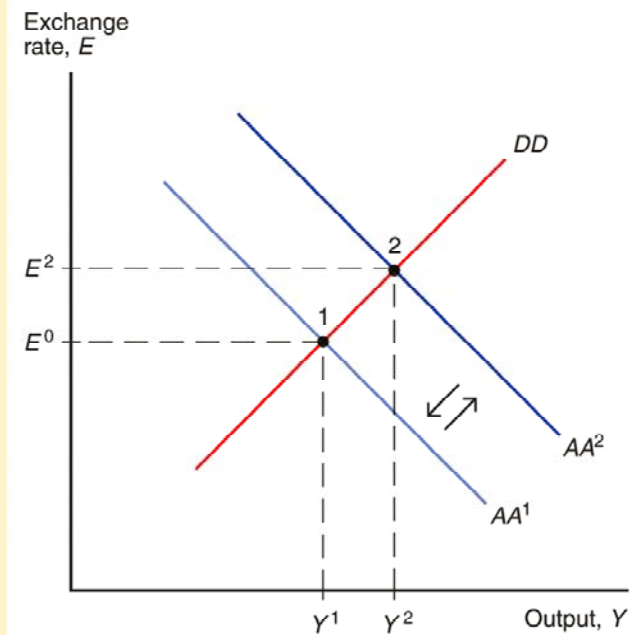
## Fixed Exchange Rates

## Monetary Policy and Fixed Exchange Rates (cont.)

**Figure 17-2**

**Monetary Expansion Is Ineffective Under a Fixed Exchange Rate**

Initial equilibrium is shown at point 1, where the output and asset markets simultaneously clear at a fixed exchange rate of  $E^0$  and an output level of  $Y^1$ . Hoping to increase output to  $Y^2$ , the central bank decides to increase the money supply by buying domestic assets and shifting  $AA^1$  to  $AA^2$ . Because the central bank must maintain  $E^0$ , however, it has to sell foreign assets for domestic currency, an action that decreases the money supply immediately and returns  $AA^2$  back to  $AA^1$ . The economy's equilibrium therefore remains at point 1, with output unchanged at  $Y^1$ .



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

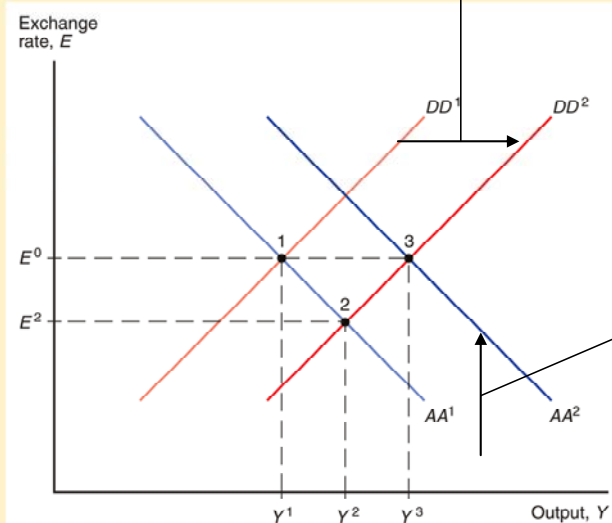
- Temporary changes in fiscal policy are more effective in influencing output and employment in the short run.
- Expansionary fiscal policy increasing output and income raises demand of real monetary assets, putting upward pressure on interest rates and on the domestic currency.
- To prevent an appreciation of the domestic currency, the central bank buys foreign assets, thereby increasing the money supply and decreasing interest rates.

## Fiscal Policy and Fixed Exchange Rates in the Short Run (cont.)

**Figure 17-3**

### Fiscal Expansion Under a Fixed Exchange Rate

Fiscal expansion (shown by the shift from  $DD^1$  to  $DD^2$ ) and the intervention that accompanies it (the shift from  $AA^1$  to  $AA^2$ ) move the economy from point 1 to point 3.



A fiscal expansion increases aggregate demand

To prevent the domestic currency from appreciating, the central bank buys foreign assets, increasing the money supply and decreasing interest rates.



### **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**

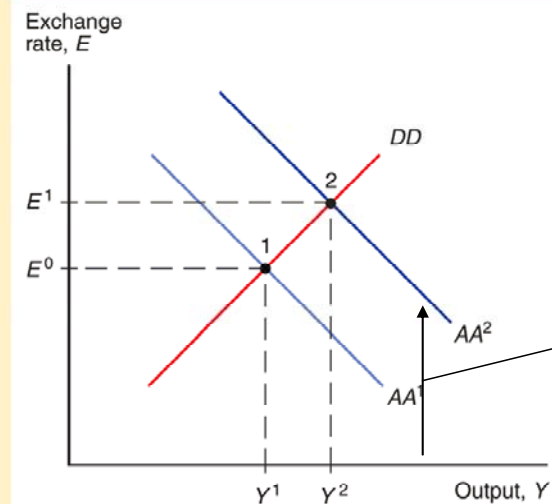
- **The central bank buys foreign assets  $\Rightarrow$  the money supply increases and domestic interest rates fall, causing a fall in the rate return on domestic currency deposits.**
- **Domestic products become less expensive relative to foreign products  $\Rightarrow$  aggregate demand and output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

## Devaluation (cont.)

**Figure 17-4**

**Effect of a Currency Devaluation**

When a currency is devalued from  $E^0$  to  $E^1$ , the economy's equilibrium moves from point 1 to point 2 as both output and the money supply expand.



If the central bank devalues the domestic currency so that the new fixed exchange rate is  $E_1$ , it buys foreign assets, increasing the money supply, decreasing the interest rate and increasing output

### **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**

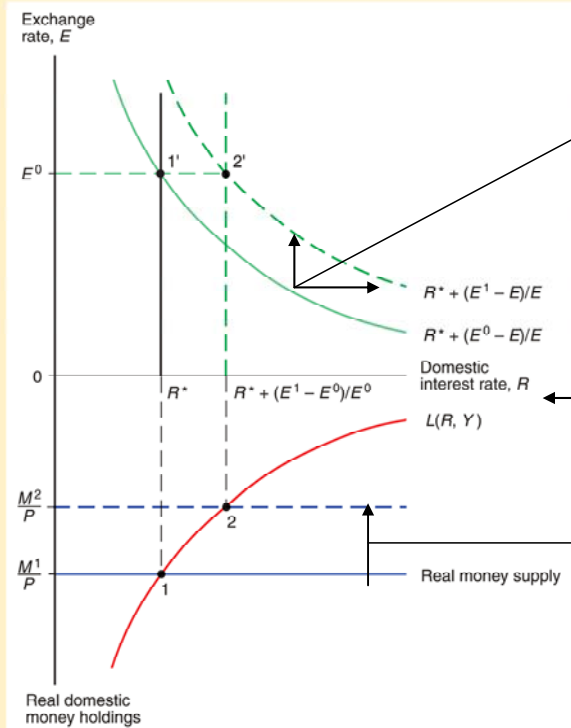
- **A balance of payments crisis arises if the central bank does not have enough international reserves to maintain the fixed exchange rate.**
- **To sustain a fixed exchange rate the central bank must have enough foreign assets to sell to meet the demand for the national currency at the fixed exchange 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.**

## Financial Crises and Capital Flight (cont.)

**Figure 17-5**

**Capital Flight, the Money Supply, and the Interest Rate**

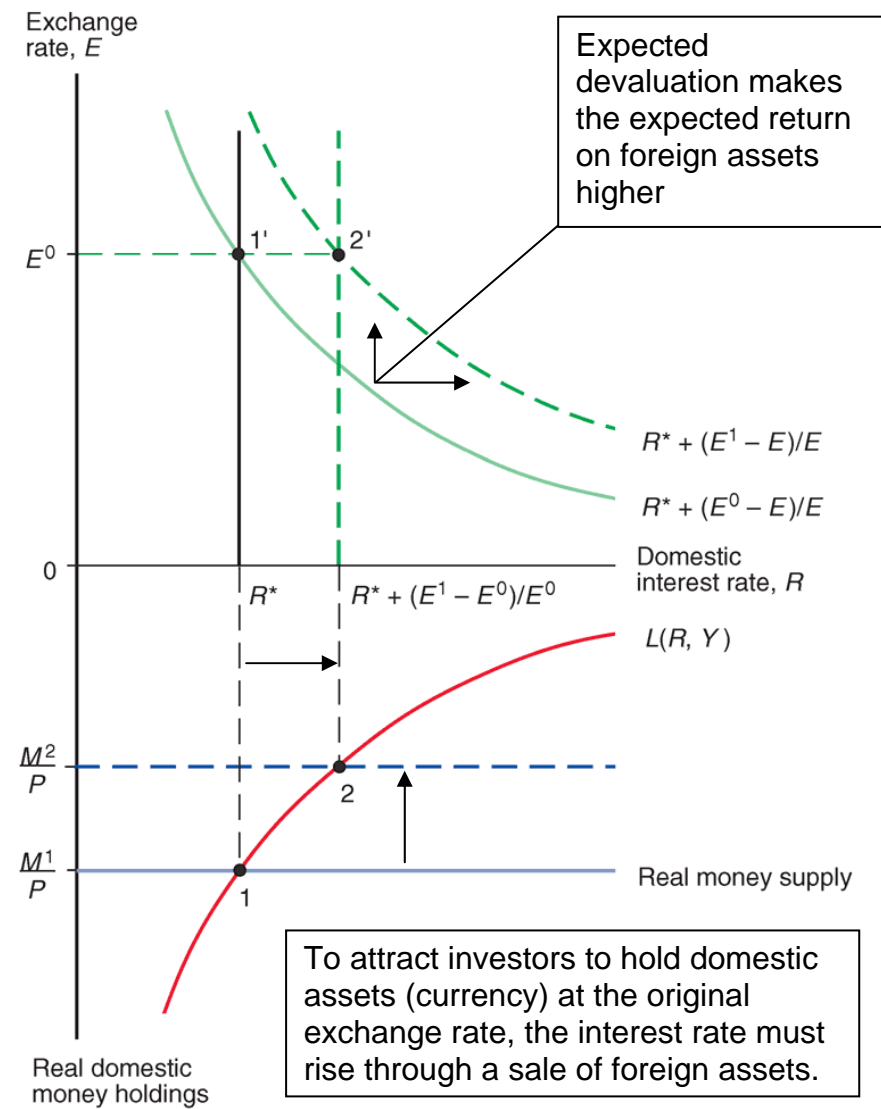
To hold the exchange rate fixed at  $E^0$  after the market decides it will be devalued to  $E^1$ , the central bank must use its reserves to finance a private financial outflow that shrinks the money supply and raises the home interest rate.



Expected devaluation makes the expected return on foreign assets higher

To attract investors to hold domestic assets (currency) at the original exchange rate, the interest rate must rise through a sale of foreign assets.

Fig. 17-5: Capital Flight, the Money Supply, and the Interest Rate





### **Speculative attacks**

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

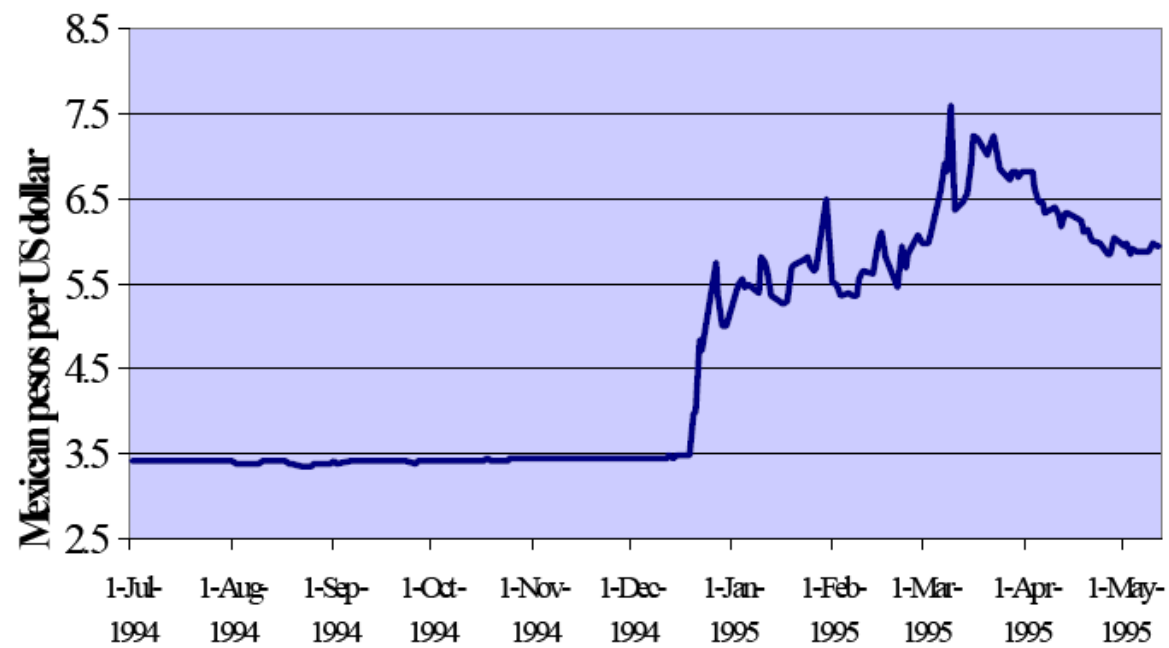
**It is always “technically possible” to defend a fixed exchange rate through selling foreign currency from foreign exchange reserves or currency obtained from borrowing: the problem is the goal conflicts caused by high interest rates**

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

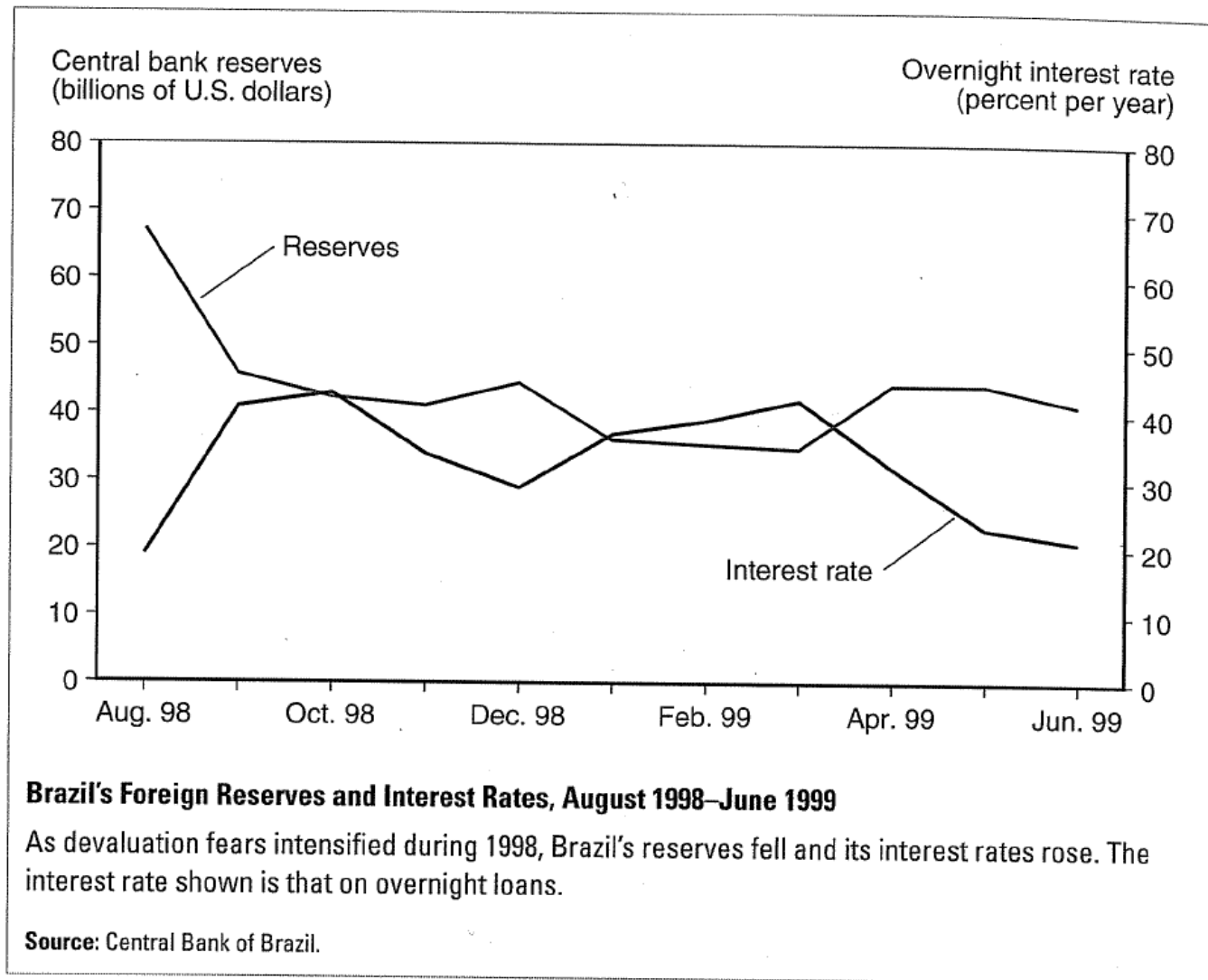
**Examples: Sweden 1992, Mexico 1994, Brazil 1998-99, Argentina 2001**

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

## Case Study: The Mexican Peso Crisis, 1994–1995



Source: Saint Louis Federal Reserve



## **Current crisis in the Baltic states**

- **Fixed exchange rates vis-à-vis the euro**
  - **currency boards**
  - **all outstanding central bank debt is 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**
- **Attempts to restore competitiveness through wage and price cuts**

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

## **Why don'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**

$$\text{- } D = ED^*$$

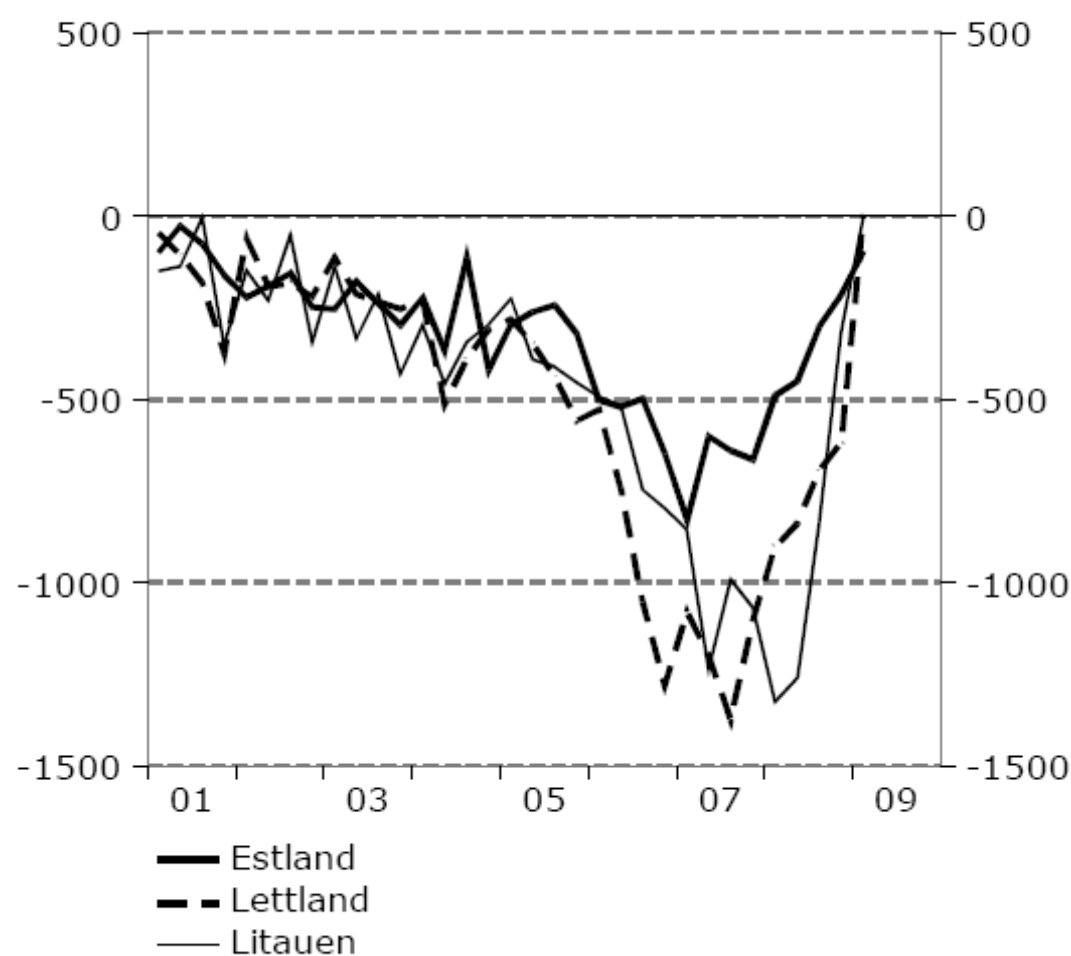
- **But what matters is the real burden of debt**

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

- **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**
- **hence more time for Swedish banks to compensate credit losses through operating profits on their other activities**

# Diagram 36 Bytesbalans i Baltikum

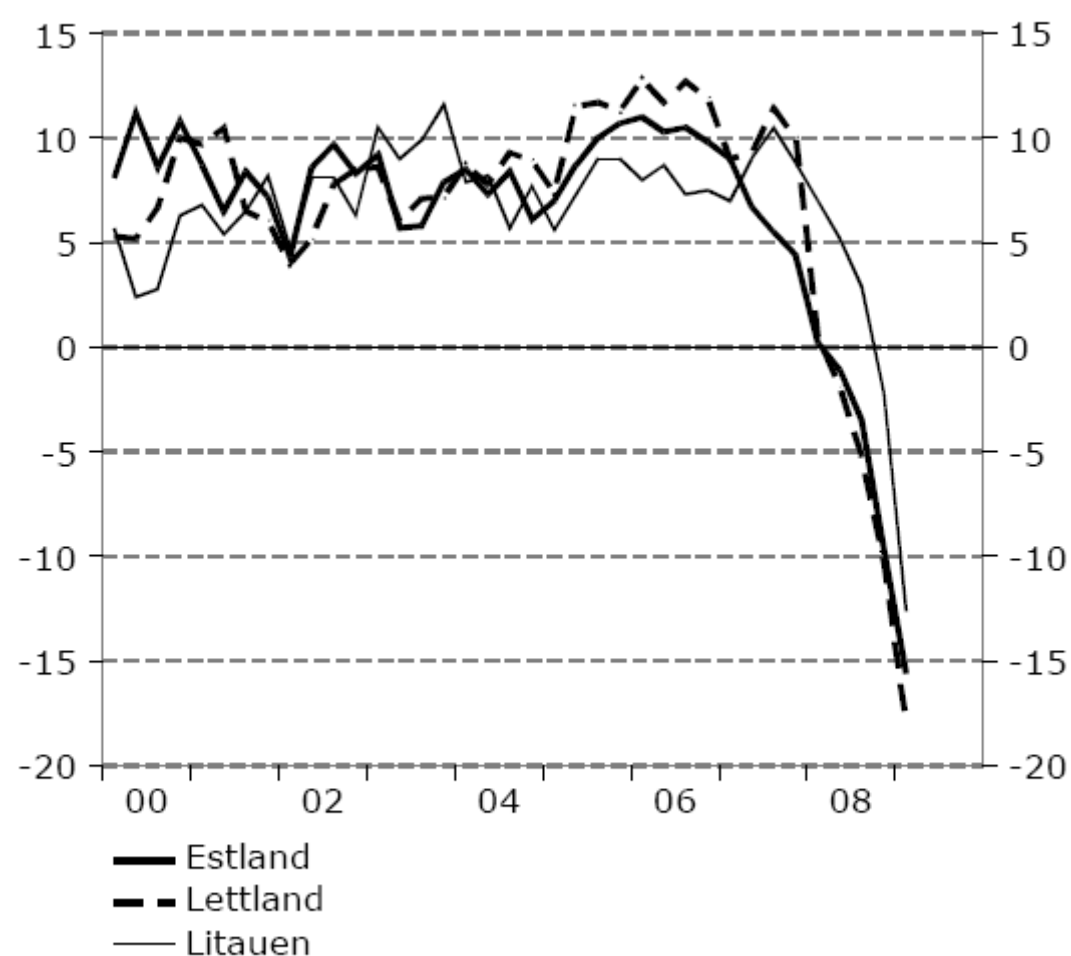
Nivå i euro, kvartalsvärden



Källor: Ländernas centralbanker.

## Diagram 35 BNP i Baltikum

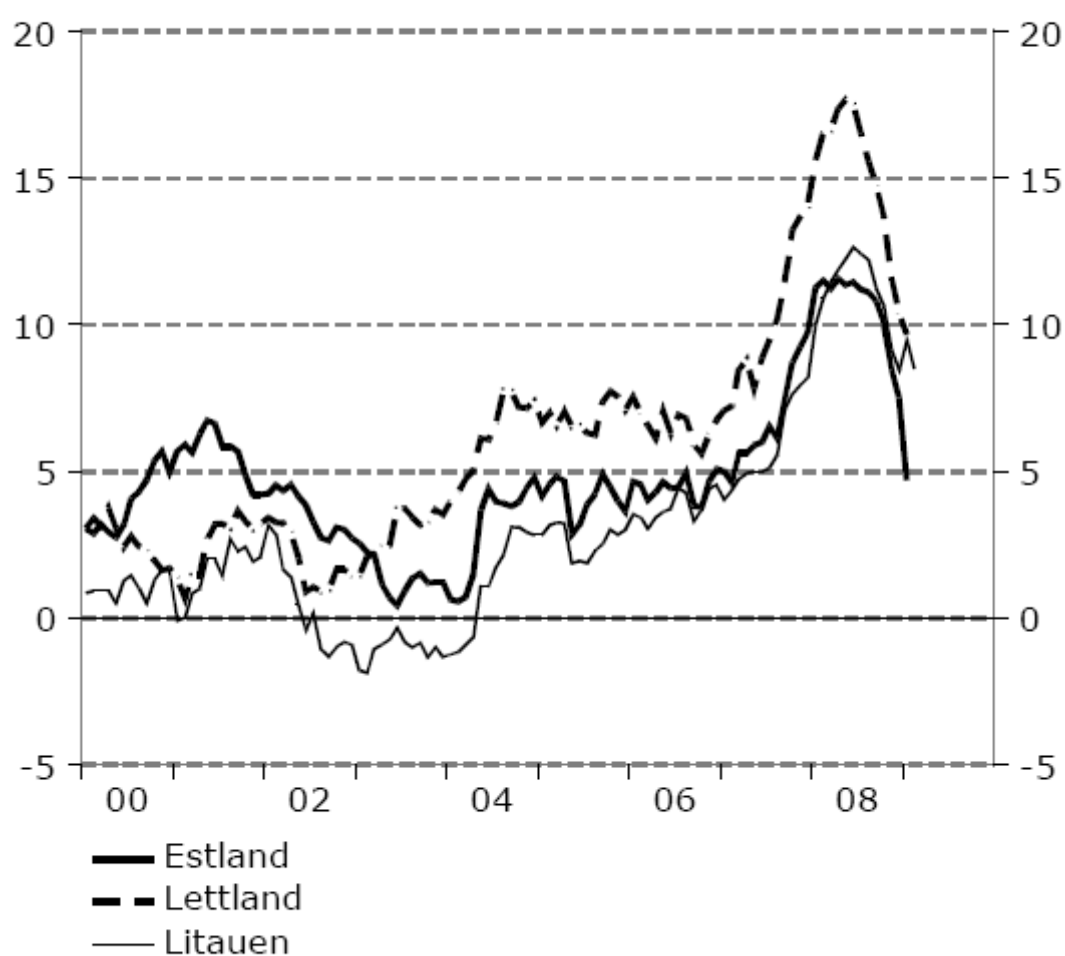
Årlig procentuell förändring, kvartalsvärden



Källa: Eurostat.

### Diagram 37 Inflation (HIKP) i Baltikum

Årlig procentuell förändring, månadsvärden



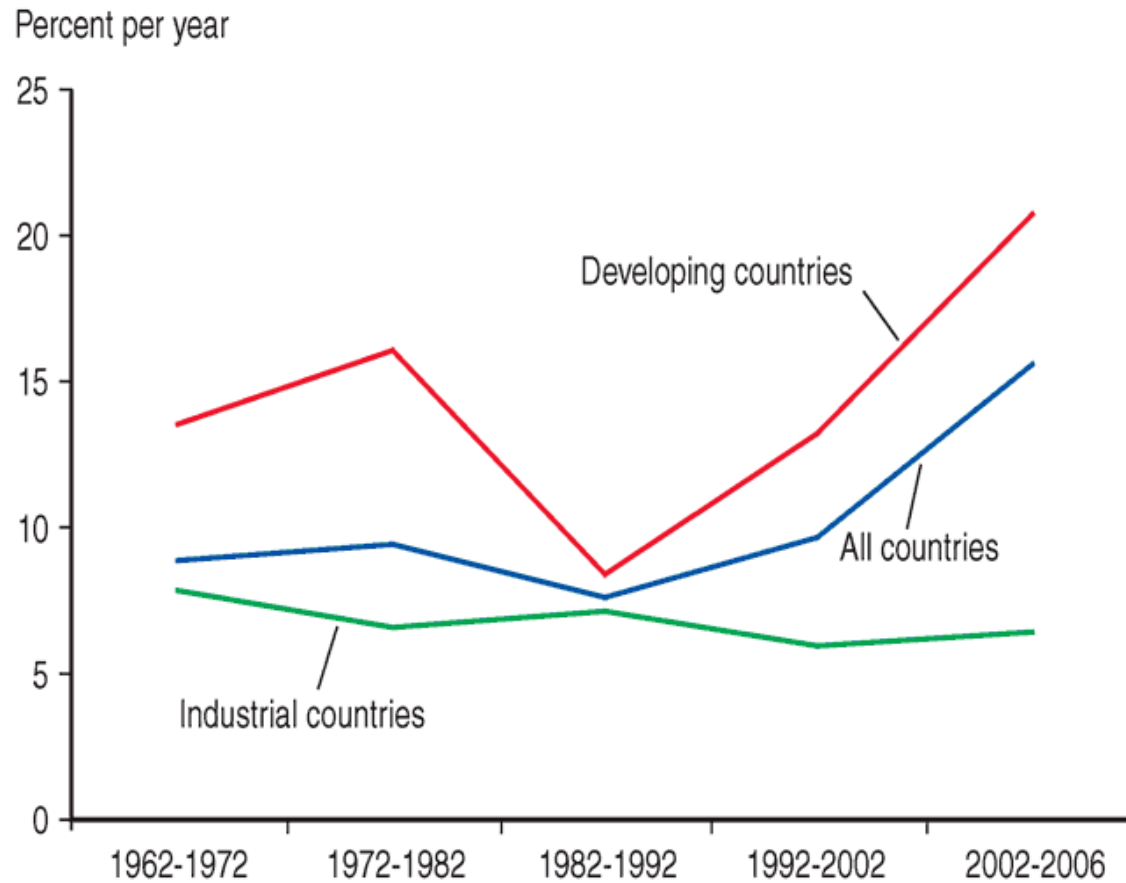
Källa: Ländernas statistiska centralbyråer.



### **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**
  - **Current account surplus in 2008: 10 percent of GDP**
  - **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**

Fig. 17–7 Growth Rates of International Reserves



Source: Economic Report of the President.

**More on interest rates and exchange rates: liquidity traps**

- **Liquidity trap: occurs when nominal interest rate,  $R$ , falls to zero. The central bank cannot encourage people to hold more money.**
- **Nominal interest rates cannot fall below zero – agents would then have to pay to deposit their money in banks.**
- **$R = 0 \Rightarrow$  people are indifferent between holding money and interest-bearing assets.**

### Liquidity trap (cont.)

- **Interest rate parity:**

$$R = R^* + \frac{E^e - E}{E} = 0$$

- **Set  $R = 0$  and solve for  $E$ :**

$$E = \frac{E^e}{1 - R^*}$$

- **Then nominal exchange rate is now determined by  $R^*$  and  $E^e$ .  
A temporary change in the money supply does not affect output as in the standard AA-DD framework.**
- **When the foreign interest rate is given, the only way for the central bank to influence the exchange rate is by affecting expectations,  $E^e$ .**
- **A permanent monetary expansion will raise expectations of inflation and cause markets to expect a depreciation of the currency. This will depreciate the currency and raise output.**

### **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

### **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.**

## Convergence of Inflation Rates Among EMS Members, 1978–2000

