MACROECONOMICS I

Lecture 11_12. The Open Economy

Spring, 2014

Class Outline

- The balance of payments
- Introduction to exchange rates (ER)
- Determinants of ER in the short- and long-run
- The trade balance and exchange rates

Total Income =Total Spending

Open Economy

EX

IM

Goods Markets

G

T

Firms

Households

I

S

Factor Markets

$$Y = C + I + G + EX - IM$$

The Balance of Payments for Czech Republic

millions of EUR	I. Q 2012
A. Current Account	913,1
Trade balance	2145,6
Exports	26769,9
Imports	-24624,3
Balance of services	567,6
Credit	3991,7
Debit	-3424,1
Income balance	-1847,4
Credit	1011,2
Debit	-2858,6
Current transfers	47,2
Credit	1101
Debit	-1053,8
B. Capital Account	22,4

millions of EUR	I. Q 2012
C. Financial Account	825,6
Direct investment	1252,3
Abroad	-245,7
In the Czech Republic	1498
Portfolio investment	1008,4
Assets	-891,9
Liabilities	1900,3
Financial derivatives	194,2
Assets	441,1
Liabilities	-247
Other investment	-1629,2
Assets	-2151,9
Liabilities	522,6
Total, Groups A through C	1761
D. Net errors and omissions, valuation	

The Balance of Payments (BoP)

- International accounting record (accounting tool)
- **All** international transactions of a country over a period of time

(year/ quarter/ month)

- A list of all ways national currency is coming in or going out of a country
- Compiled by a central bank or finance ministry

In the US: The US Bureau of Economic Analysis (BEA)

http://www.bea.doc.gov

In Czech Republic: Czech National Bank **www.cnb.cz**

The Trade Balance

- A net flow of goods and services
- The main component of the **Current Account**

Net Flow of Goods = Exports (EX) – Imports (IM)

- Trade balance **surplus:** Exports > Imports
- Trade balance **deficit:** Exports < Imports

TE A Czech resident buys a SONY MP3 player from Japan for 2000 CZK

- Import of goods worth 2000 CZK
- Enters as debit (-): payment to foreigners

TE Your American friend comes to Prague and pays 500 CZK for the stay in Prague Downtown Hostel

- Export of service (accommodation) worth 500 CZK
- Enters as credit (+): payment received from foreigners

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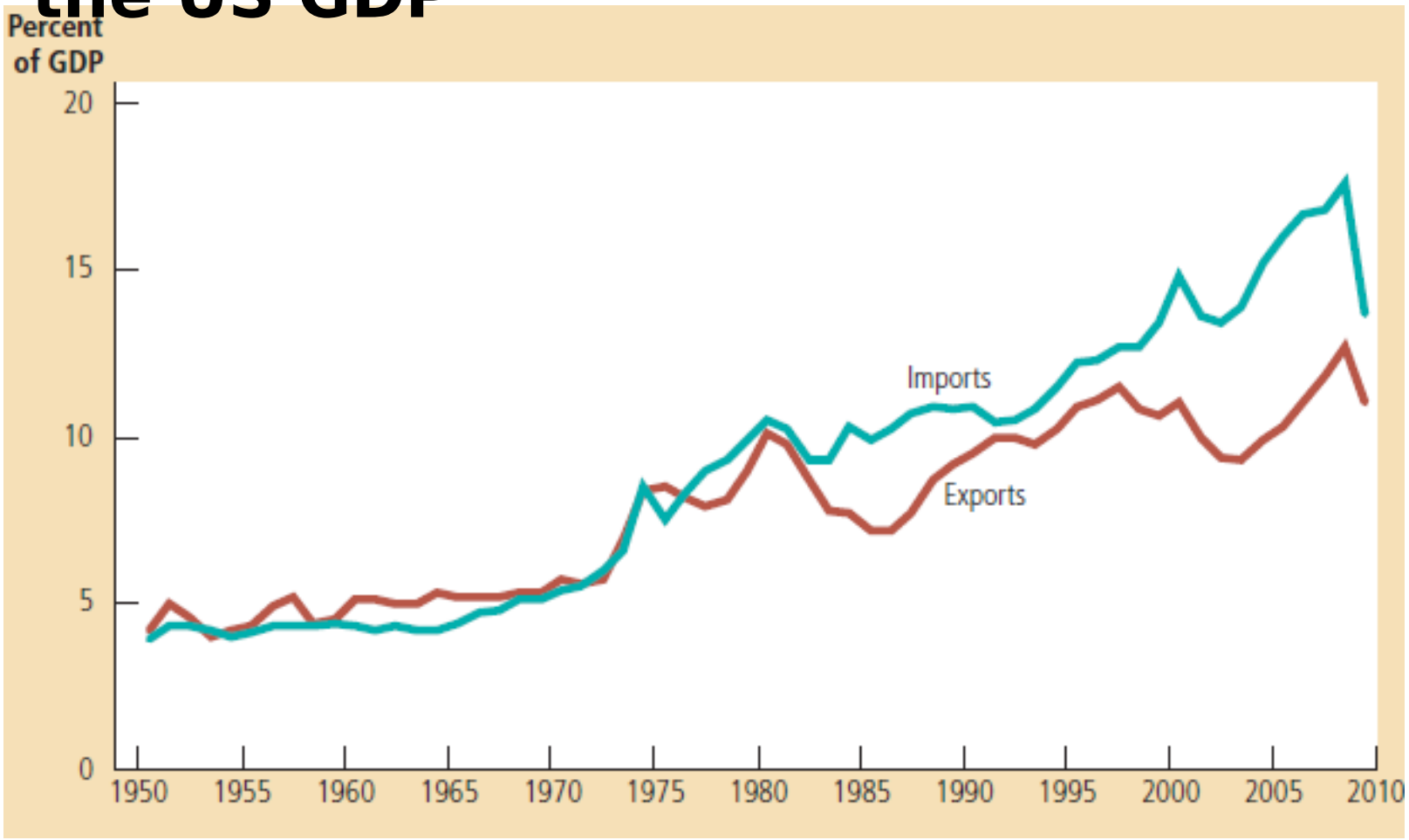
The US Imports and Exports as a share of the US GDP



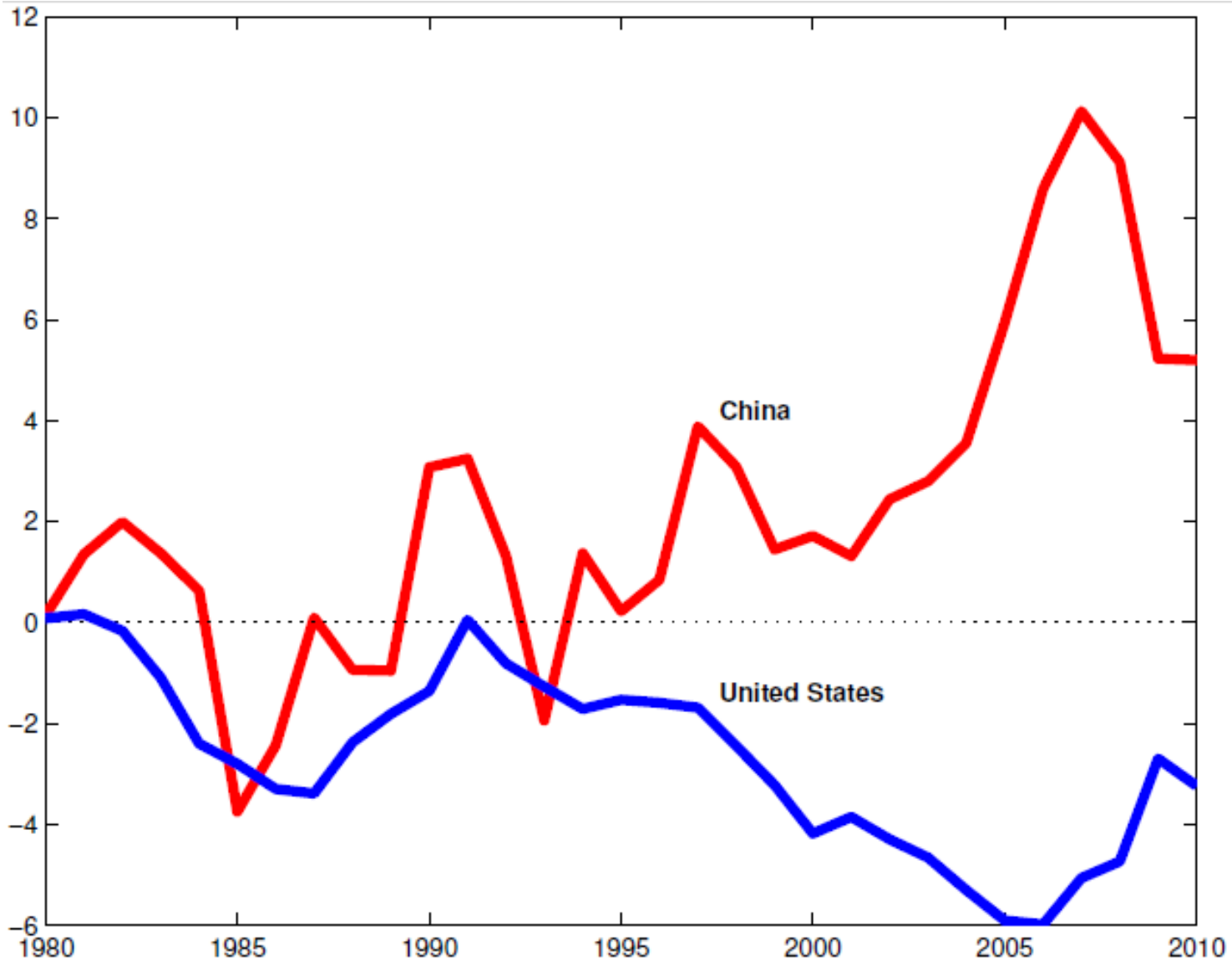
Source: Mankiw, 2011

What can we say about the trade balance of the US?

The US Current Account Balance

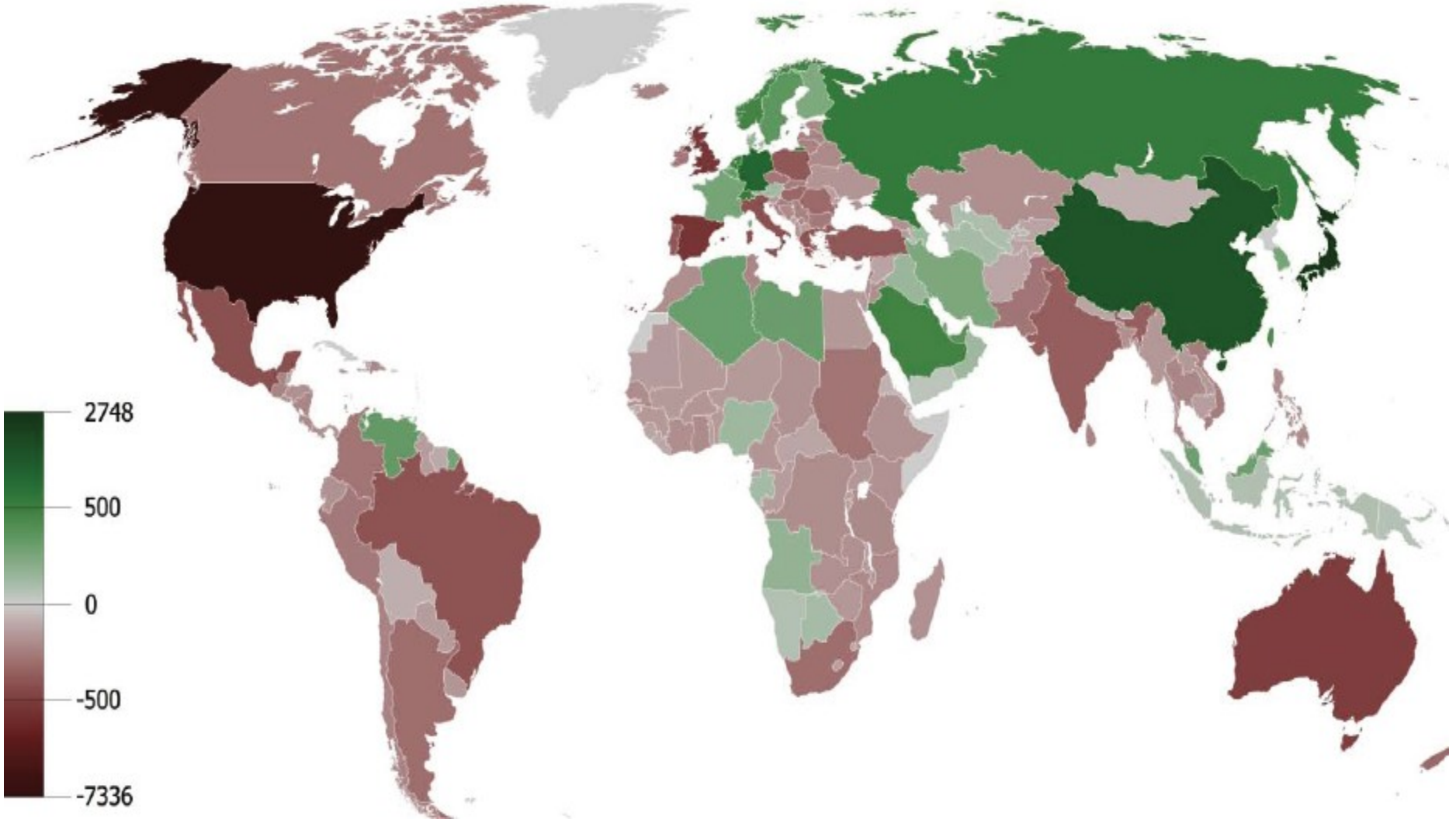
Source: www.bea.gov

- Current Account Balance as a % of GDP in China and the United States



Source: S. Schmitt-Grohe &

The sum of current account balances in billions of U.S. dollars, 1980 - 2008



Source: S. Schmitt-Grohe &

The Trade Deficit

- *What does it mean when a country is running a trade deficit?*

N!B! Avery transaction is an **exchange of value for money**

The US trade deficit: The US dollars flowing out of the country and not used to

purchase the US goods/ services

TE A US resident buys a Japanese car from Toyota Motor Corporation for $50,000. Toyota Motors uses $50,000 to:

- Pay for imports from the US => Imports in the US BoP
- Buy the US financial assets => Foreign investments in the US BoP
- Exchange to Japanese Yens
- Keep it in a form of US dollars in a bank

The Trade Deficit (Cont.)

- Pays for imports from the US

The **US trade balance** is affected: Increase in Imports

Exports (-): $50,000 **Trade balance = Exports - Imports**

Imports (+): $50,000 => The net effect is 0

- Buys the US financial assets (stocks, bonds, securities, property)

⇒Investment into the US financial assets (+)

- Keeps it in a form of the US dollars in a bank

⇒Investment into the US assets (US currency) (+)

- Exchanges to Japanese Yens in the foreign exchange market

N!B! *National currency is a legal tender **only** in the country that issues it*

The Financial Account

- **Trade deficit:** The US dollars flowing out of the country and not returning in a form of imports

- Return in a form of investment into financial assets

Types of investments

Net Capital Outflow (NCO)

The **difference** between:

- The purchase of foreign assets by domestic residents
- The purchase of domestic assets by foreigners

If **NCO > 0**: capital is flowing out of the country

If **NCO < 0**: capital is flowing into the country

- The big fact of accounting

Net Exports = Net Capital Outflow

N!B! Every transaction with abroad affects both sides of the identity

Principle of *double-bookkeeping*

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The Net International Investment Position

Trade surplus: Foreign currency is used to buy foreign assets

Trade deficit: Imports are financed by selling the domestic assets

- The US dollars **invested** into the US assets ≡ The US is borrowing dollars

Trade deficit ≡ Borrowing from abroad

Trade surplus ≡ Lending to abroad

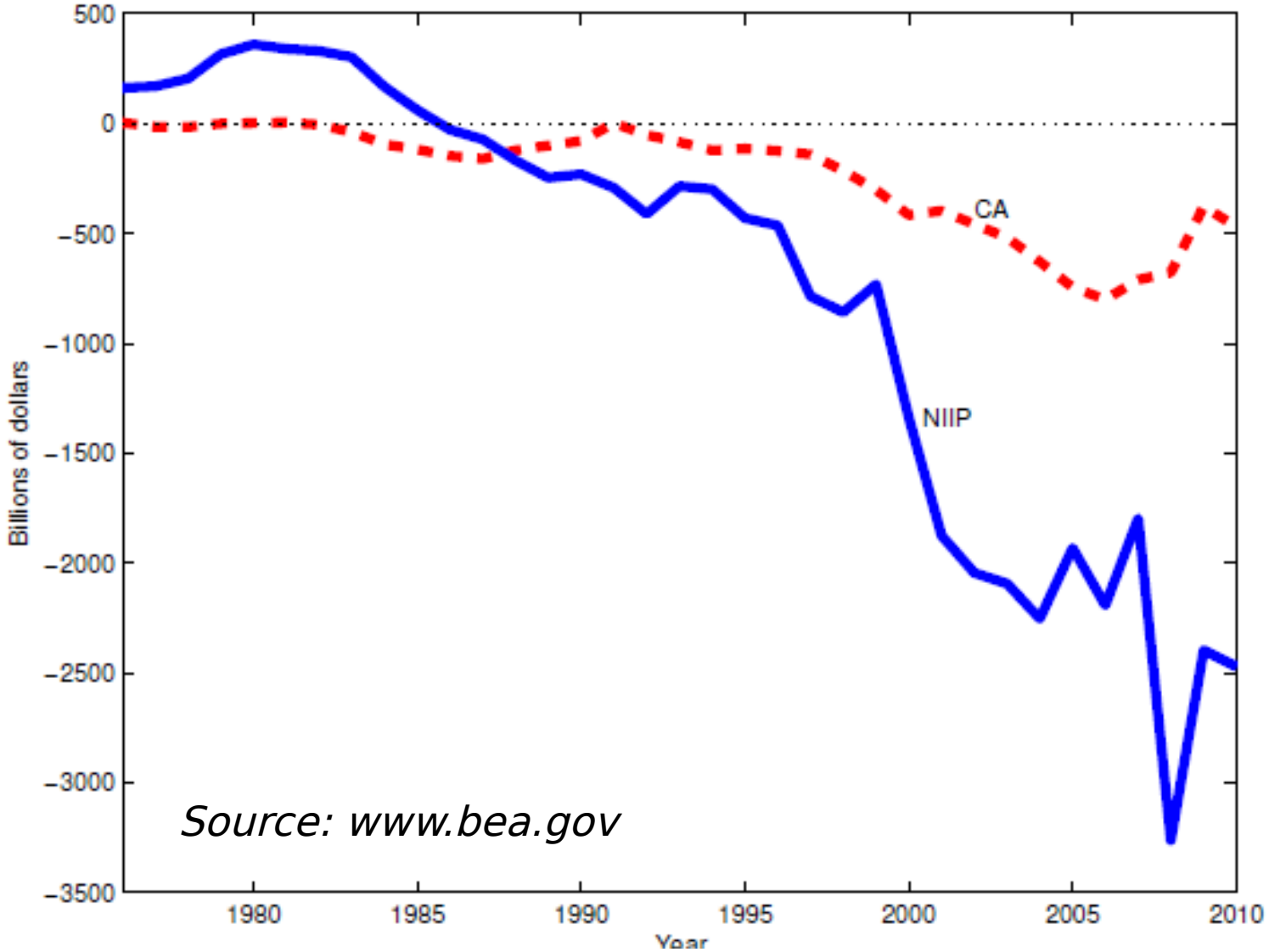
- The Net International Investment Position **(NIIP): CA=ΔNIIP**

  If NIIP > 0 => *creditor nations*

  If NIIP < 0 => *debtor nations*

- A country's overall fiscal responsibility

The US CA and NIIP



The Financial Market Equilibrium

- **Closed economy:** S = I
- **Open economy:** An extra source of capital from abroad

Supply of financial capital: Domestic savings + Inflow of foreign capital

Demand for financial capital: Domestic investment + Government borrowing

National savings and investment identity

Domestic Savings + Inflows of Foreign Capital = Domestic Investment + Government Borrowing

Supply = **Demand**

Trade deficit: An **extra source** of **money** flowing into the economy =>

=> An **extra source** of **capital** which can be borrowed

National Savings and Investment Identity

Domestic Savings		**Domestic Investment**
+	**=**	**+**
Inflows of Foreign Capital		**Government Borrowing**

N!B! The identity holds by definition

TE Economy is running a large budget deficit => ↑ in government borrowing

- **Three possibilities**

1. Domestic firms have less money for private investment
2. People save more
3. Borrowing from abroad or a combination of three

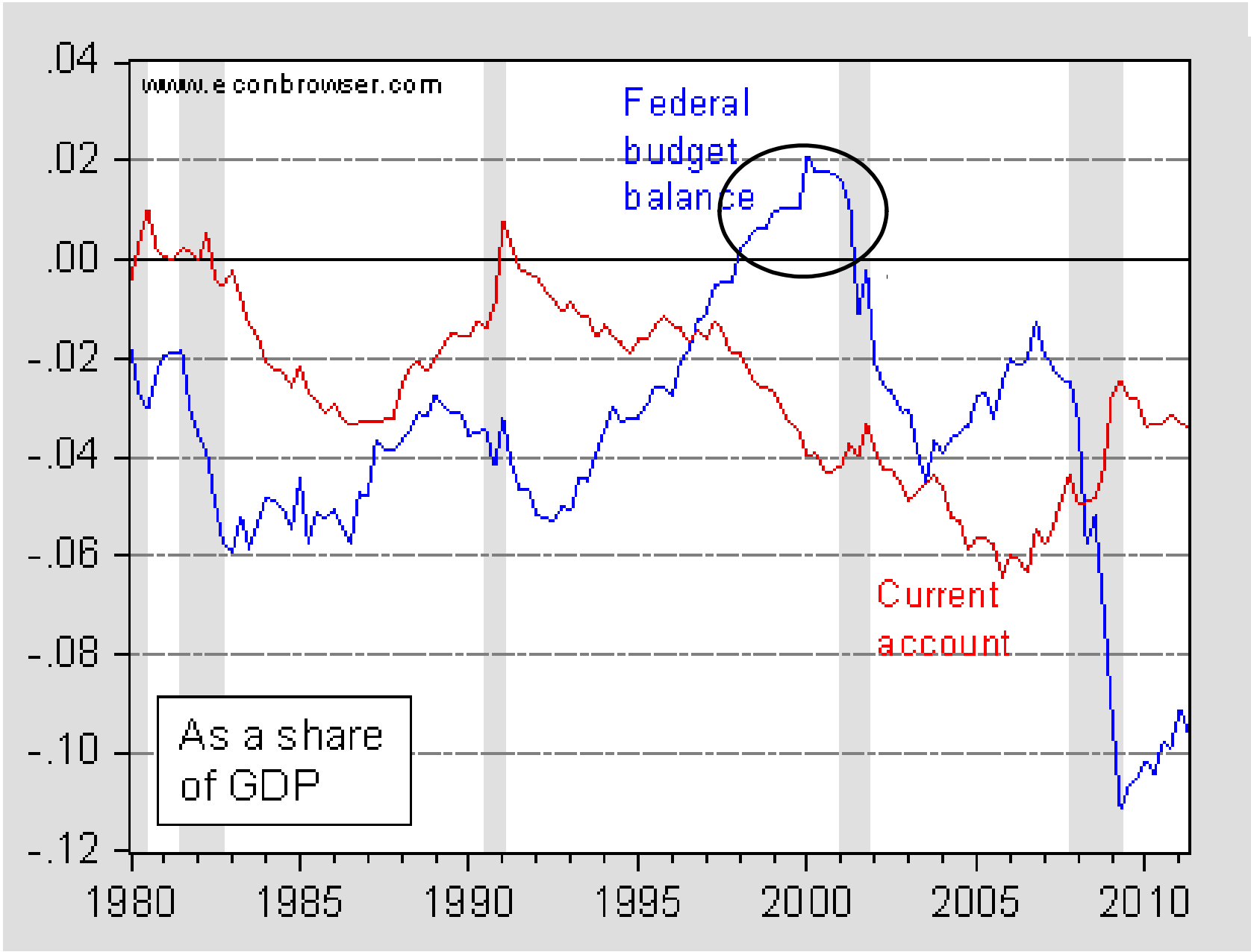
Causes of Trade Deficits

Domestic Savings		**Domestic Investment**
+	**=**	**+**
Inflows of Foreign Capital		**Government Borrowing**

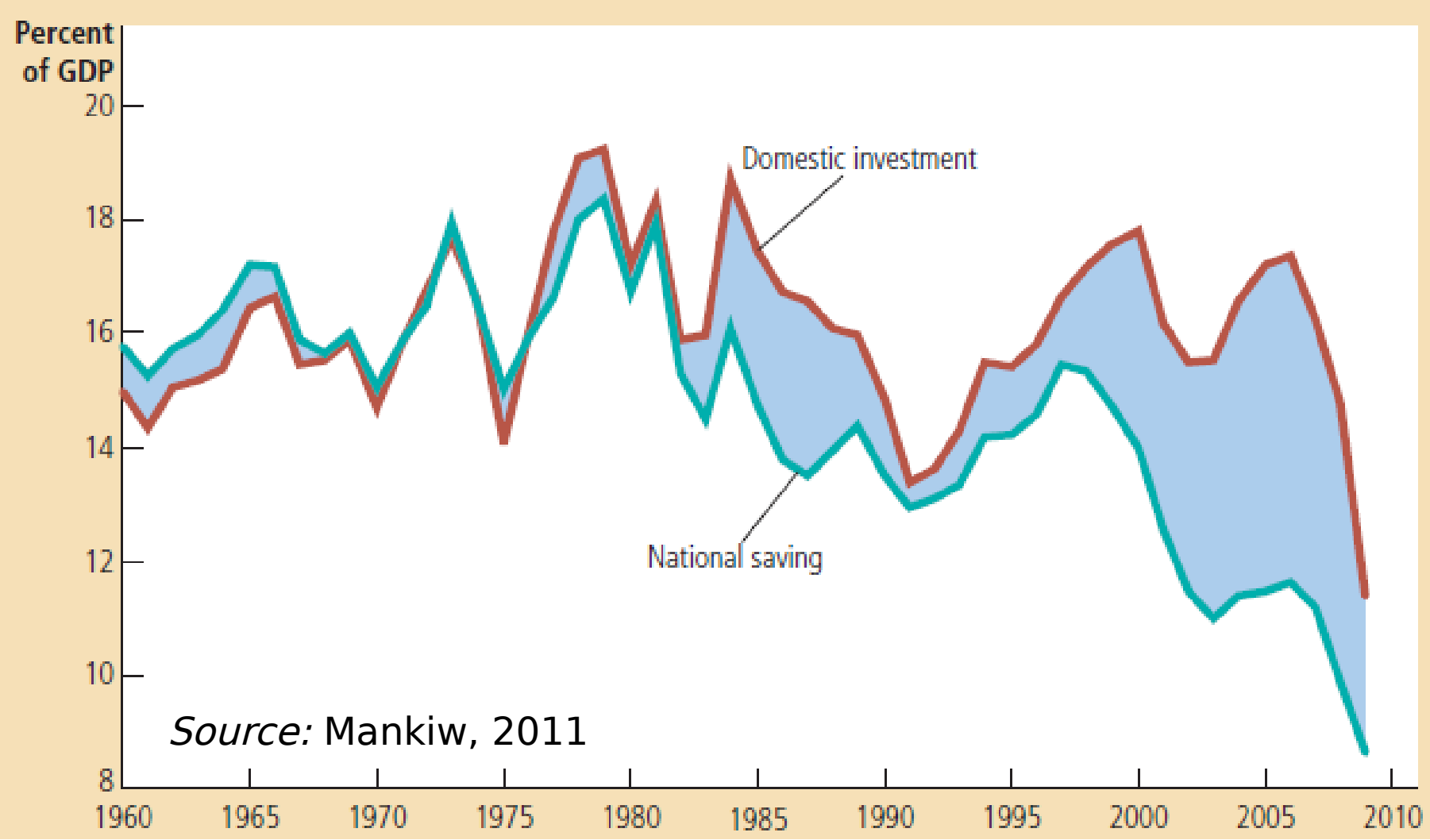
*What are the possible **causes** for trade deficit?*

- Economy is running a large budget deficit => ↑ in government borrowing
- A surge of domestic investments (↑ inflow of foreign investments)
- A sharp drop in private savings rate (↑ inflow of foreign savings)

Conclusion: Macroeconomic factors are driving the trade deficits


www.econbrowser.com
Federal budget balance
Current account
As a share of GDP
.04
.02
.00
-.02
-.04
-.06
-.08
-.10
-.12
1980
1985
1990
1995
2000
2005
2010

The US Net Capital Outflow



Source: Mankiw, 2011

=> Very low domestic savings in the US

Exchange Rate (ER)

- A **price** of one currency in terms of another
- Comparison of prices of goods/services produced in different countries
- Two **representation** of ER

Direct (American): a price of foreign currency in terms of national currency

$$E_{CZK/\$} = \frac{CZK}{\$}$$

- Exchange rate between CZK & US dollar: 1 USD = 18 CZK

Indirect (European): a price of national currency in terms of foreign currency

$$E_{CZK/\$} = \frac{\$}{CZK}$$

- Exchange rate between CZK and US dollar: 1 CZK = 0.05 USD

The Foreign Exchange Market (FOREX)

Supply of CZK

Demand for CZK

The Foreign Exchange Market (Cont.)

- Financial centers: London, New York, Japan, Frankfurt, and Singapore
- The US dollar is a **vehicle currency** (80 % of foreign exchange)
- Other major currencies: Euro and Japanese yen
- Daily volume of FOREX is around **4 trillion USD**
- **“Cross-rates”:** exchange rates between non-dollar currencies

▪ Major **participants**

➢ **Commercial banks**: the exchange of deposits denominated in different currencies; interbank trading (90 %).

➢ **Corporations:** making or receiving payments in different currencies

➢ **Central banks**: foreign exchange interventions

➢ **Nonbank** financial institutions: insurance companies, pension funds, etc.

Changes in Exchange Rates

TE The price of Levi's jeans for Czech consumers

The exchange rate: **1 USD = 18 CZK**

- The price of Levi's jeans in CZK

$$\$45 \times 18\, CZK/\$ = 810\, CZK$$

A NEW exchange rate: 1 USD = 15 CZK

$$\$45 \times 15\, CZK/\$ = 675\, CZK$$

$\Rightarrow$ A depreciation of USD against CZK (a fall in CZK price of the USD)

N! B! *All else equal*, a **depreciation** of a country's currency makes its **goods cheaper for foreigners**

Changes in Exchange Rates (Cont.)

The exchange rate: **1 USD = 18 CZK**

- The price of Levi's jeans in CZK

$$\$45 \times 18\, CZK/\$ = 810\, CZK$$

A **NEW** exchange rate**: 1 USD = 20 CZK**

$$\$45 \times 20\, CZK/\$ = 900\, CZK$$

=> An <u>appreciation of the USD</u> against CZK (an increase in CZK price of the USD)

N!B! All else equal, an **appreciation** of a country's currency makes its **goods more expensive for foreigners**

Changes in Exchange Rates (Cont.)

TE The price of Czech beer for American consumers

The exchange rate: **1 USD = 18 CZK**

- The price of Czech beer in the US dollars

$$\frac{100\,CZK/\$}{18\,CZK} = \$5.6$$

A NEW exchange rate: **1 USD = 15 CZK**

$$\frac{100\,CZK/\$}{15\,CZK} = \$6.7$$

$\Rightarrow$ An appreciation of the CZK against the USD

The Czech beer becomes **more expensive** for the US consumers

Changes in Exchange Rates (Cont.)

TE The price of Czech beer for American consumers

The exchange rate: **1 USD = 18 CZK**

- The price of Czech beer in the US dollars

$$\frac{100\,CZK/\$}{18\,CZK} = \$5.6$$

A NEW exchange rate: **1 USD = 20 CZK**

$$\frac{100\,CZK/\$}{20\,CZK} = \$5$$

⇒ A depreciation of the CZK against the USD

- The Czech beer becomes **cheaper** for the US consumers

Winners and Losers

- How do the exchange rate movements affect participants of FOREX?

	Strong CZK (appreciation)	**Weak CZK** (depreciation)
• A Czech tourist abroad		
• An American tourist in Czech Rep.		
• A foreign firm exporting to Czech Rep.		
• A Czech exporting firm		
• A foreign investor in Czech Rep.		
• A Czech investor abroad		

Winners and Losers (Cont.)

N!B! The gain or loss from the exchange rate movements **depends** on whether you are a buyer or a seller!

- Macroeconomic consequences
- A strong currency *encourages* foreign investments
- A strong currency *causes* a trade deficit : cheaper imports and expensive exports
- A strong currency encourages the inflow of the foreign capital

Real Exchange Rate

- **Nominal ER:** an amount of national currency you pay to get a unit of foreign currency
- **Real ER:** unit of foreign item for the units of domestic item

A rate at which we can trade goods and services of one country for that of another

TE Price of **French** car is equal 10.000 Euros

Price of equivalent **Japanese** car is 2.800.000 yen

- Comparing prices of two cars: converting into *common currency*

Nominal exchange rate: 1 euro = 140 yen

Price of French car = 1.400.000 yen

Price of Japanese car = 2.800.000 yen

=> One Japanese car = Two French cars

Real Exchange Rate (Cont.)

- The overall price levels: P (home country) and P* (foreign country)

Real ER = Nominal ER (P*/ P)

- **Three determinants**: P, P* and nominal ER
- **Aggregation** to a national price level:

$$e_{CZK/\$} = \frac{CZK}{\$} \times \frac{P_{\$}}{P_{CZK}} = E_{CZK/\$} \times \frac{P_{\$}}{P_{CZK}}$$

PCZK- a price level in Czech Rep (in CZK)

P$ - a price level in the US (in $)

- How many **Czech baskets** are needed to buy **one US basket** of goods

A real exchange rate **appreciation** $\downarrow \frac{E_{CZK/\$} \times P_{\$}}{P_{CZK}}$ and **depreciation** $\uparrow \frac{E_{CZK/\$} \times P_{\$}}{P_{CZK}}$

The Exchange Rate in a Long Run

The Purchasing Power Parity (PPP) exchange rate

- Equalizes the prices of traded goods across countries
- A unit of any currency should buy the same amount of goods in all countries

▪ **The Law of One Price**

*In competitive markets, **identical** goods sold in different countries **must** sell for the **same price** expressed in terms of the same currency*

- No transportation costs and trade barriers (tariffs)

TE US dollar exchange rate w/r to CZK: 1 USD = 20 CZK

Levi's jeans sold in the US for $ 45 *should* be sold in Czech Republic for 900 CZK

N!B! PPP is a hypothesis

The Exchange Rate in a Long Run (Cont.)

Arbitrage: buying goods in a cheap country and selling in expensive

TE A price of **gold** in **New York** is 100 USD per ounce

A price of gold in **London** is 100 EUROs per ounce

Existing **exchange rate**: 1 EURO = 1.3 USD

- A person is buying gold in New York and sells it in London

100 EURO x **1.3** USD/EURO = **130** USD

Profit: 30 USD

In the long run: the prices of gold would adjust (be equalized in two locations)

The Purchasing Power Parity (PPP) ER

- **The World Bank International Comparison Program**

- A **basket** of internationally traded goods (oil, rice, TV sets, etc.)

- The **PPP ER**: buying the **same basket** of goods with the **same costs**

If PPP holds, what is the real exchange rate?

$$e_{CZK/\$} = \frac{E_{CZK/\$} \times P_{\$}}{P_{CZK}} = 1$$

$$P_{CZK} = E_{CZK/\$} \times P_{\$}$$

$$E^{PPP}_{CZK/\$} = \frac{P_{CZK}}{P_{\$}}$$

- The price levels are measured by CPI or GDP Deflator

The Big Mac Index: Testing the Law of One Price

- Constructed by ***The Economist*** since 1986
- The Big Mac PPP
- The ER that makes burgers cost the same everywher

TE A Big Mac price in China: 10.5 Yuan /burger

A Big Mac price in the US: 3.1 USD/burger

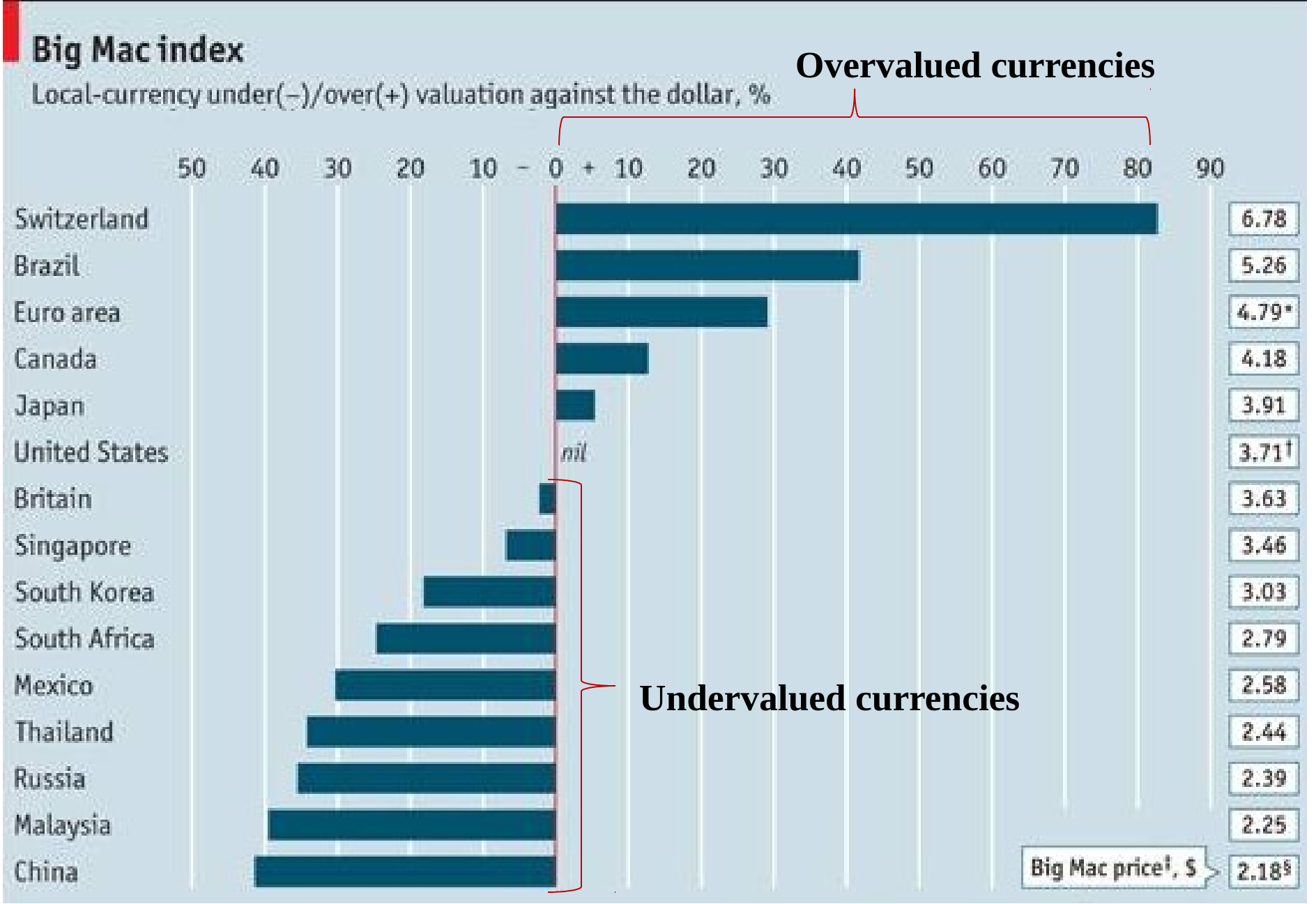
The **implied PPP**: $P_{BM}^{China} = P_{BM}^{USA} \times E_{Yuan/USD}$

$$E_{Yuan/USD} = \frac{P_{BM}^{China}}{P_{BM}^{USA}} = \frac{10.5}{3.1} = 3.39 \; {}_{Yuan/USD}$$

- **The market exchange rate** $E_{Yuan/USD} = 8.03_{Yuan/USD}$

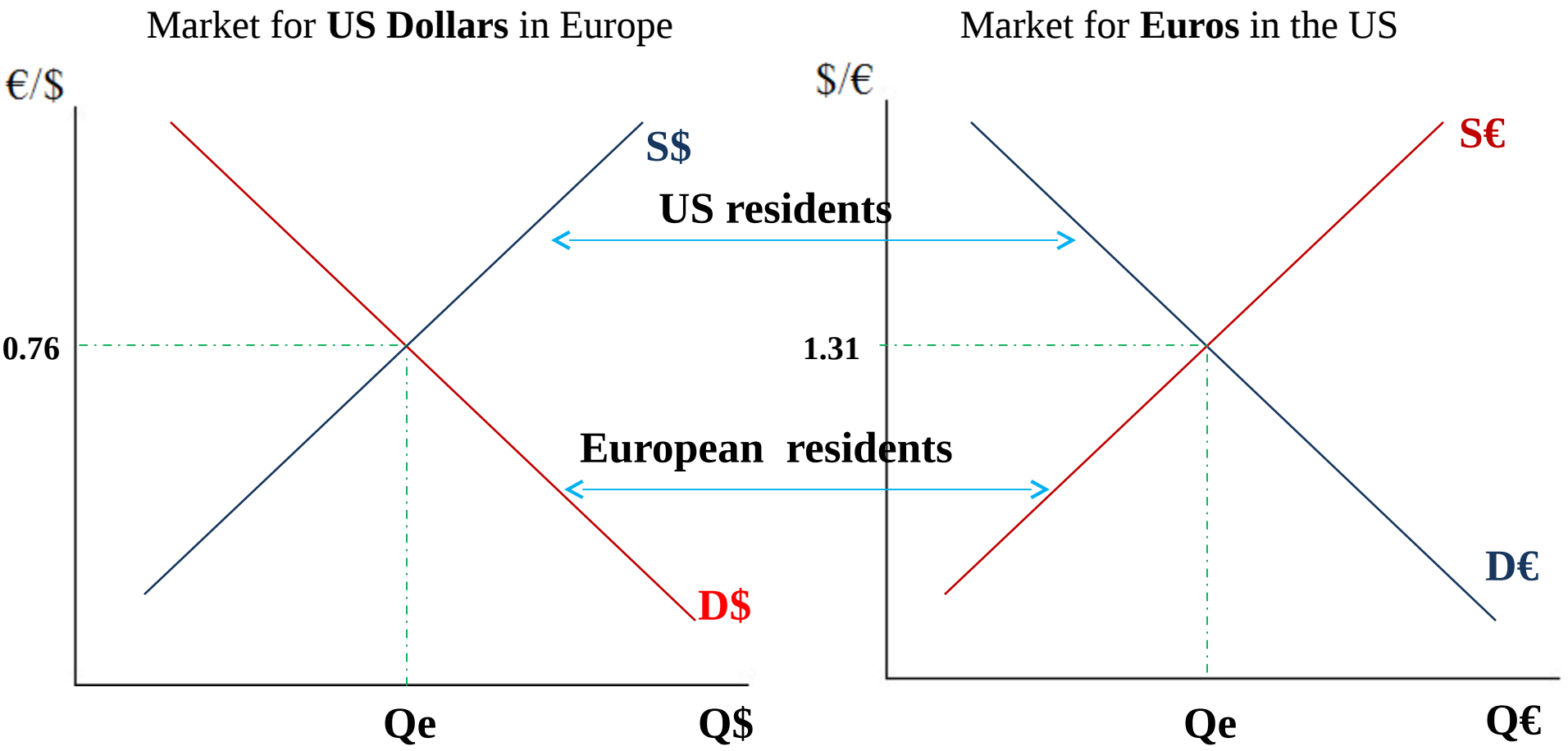
$$\frac{PPP - E}{E} = \frac{3.39 - 8.03}{8.03} = -0.58$$

Conclusion: The Yuan is 58 % **“undervalued”** against the dollar



Source: The Economist, 2010

Determinants of Exchange Rate in a Short Run



Nominal **exchange rate (08/05/2013)**: 1 € = 1.31 $ or 1$ = 0.76 €

Determinants of Exchange Rate (Cont.)

- Changes in **demand (US residents)**
- Increase in the US household **income** => Increasing demand for imports
- Increases in the European **interest rate** => Increasing demand for European assets
- **Inflation** in the US =>

European goods are relatively cheaper

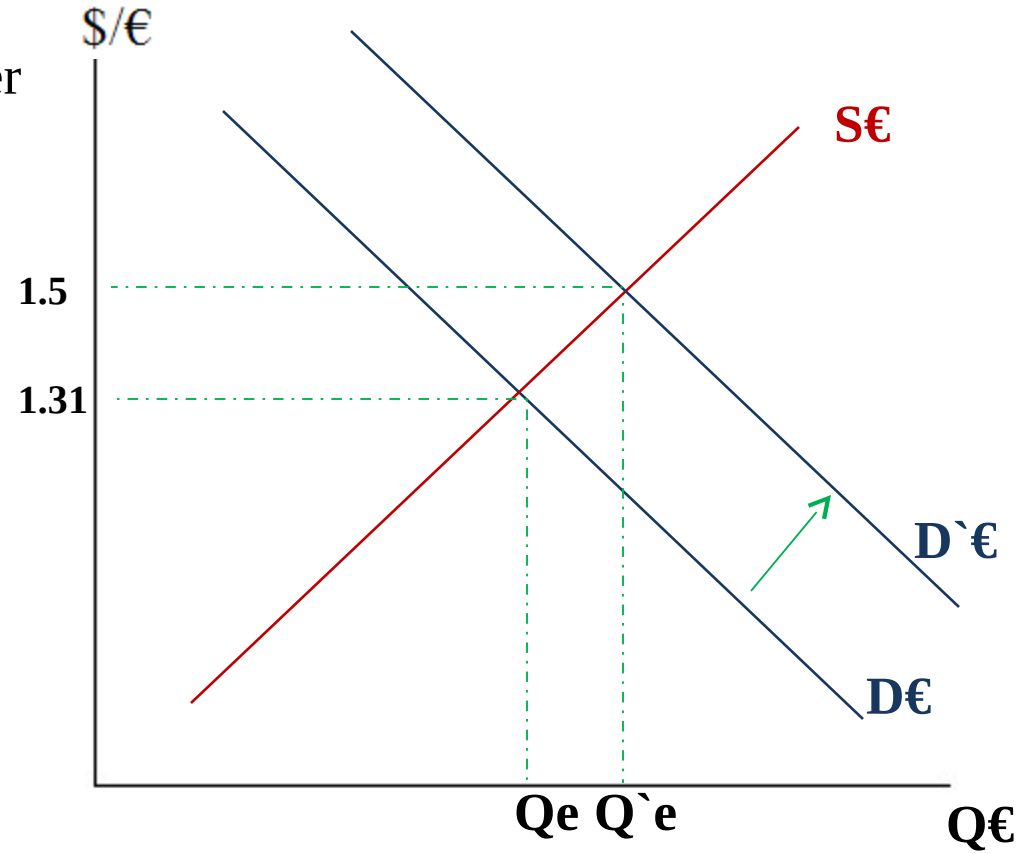
- **Speculations** among US investors

About increase in the value of €

⬇

Outcome: Appreciation of €

Market for **Euros** in the US



Determinants of Exchange Rate (Cont.)

- Changes in **supply (European residents)**
- Increase in European household **income** => Increasing demand for imports
- Increases in the US **interest rate** => Increasing demand for American assets
- **Inflation** in Europe=>

American goods are relatively cheaper

- **Speculations** among European

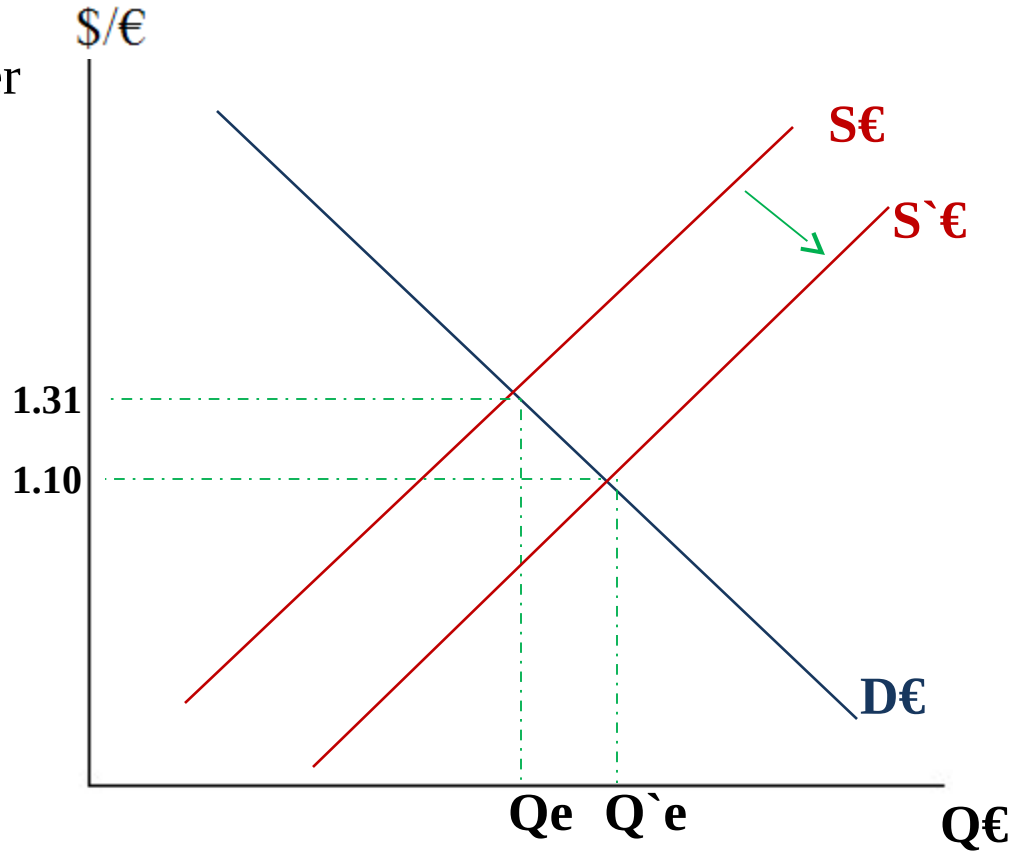
Investors about increase in the value

of $

⬇

Outcome: Depreciation of €

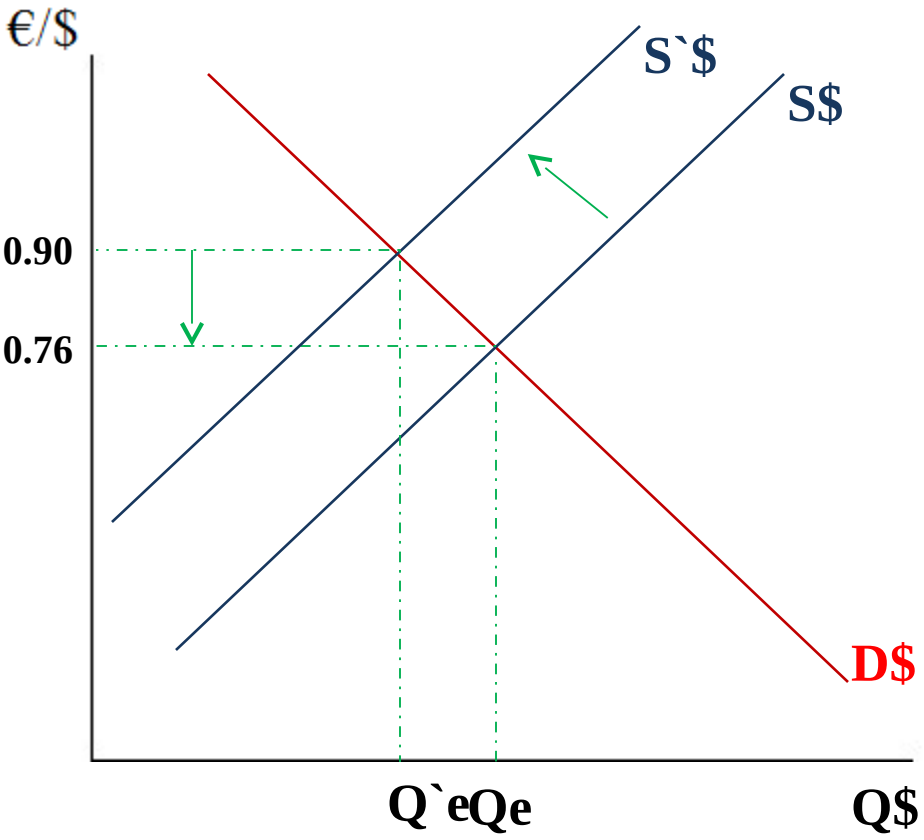
Market for **Euros** in the US



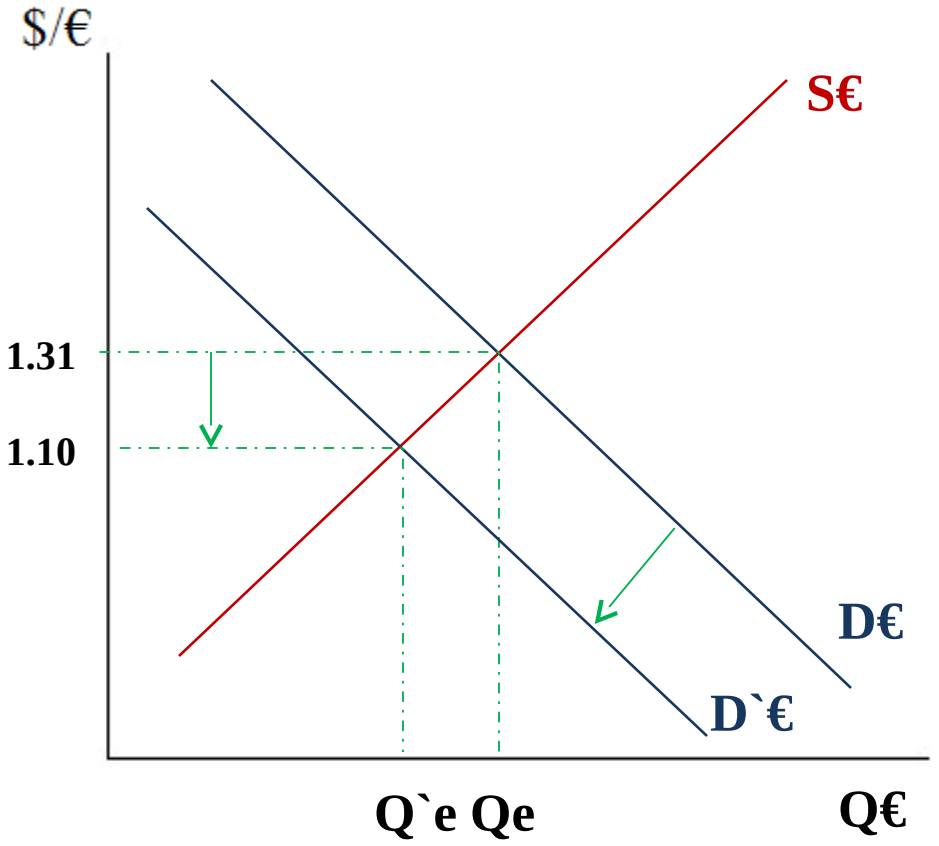
Changes in Interest Rates

- Expansionary monetary policy of the ECB => Drop in the EU interest rate

Market for **US Dollars** in Europe



Market for **Euros** in the US



↓ IREurope =>↓ D€ =>↓ S$ => $ appreciates and **€ depreciates**

Changes in Interest Rates (Cont.)

- The effect of the expansionary monetary policy on the aggregate demand in EU?

$$M^S \uparrow \Rightarrow i \downarrow \Rightarrow C \uparrow \& I \uparrow \Rightarrow Y \uparrow$$

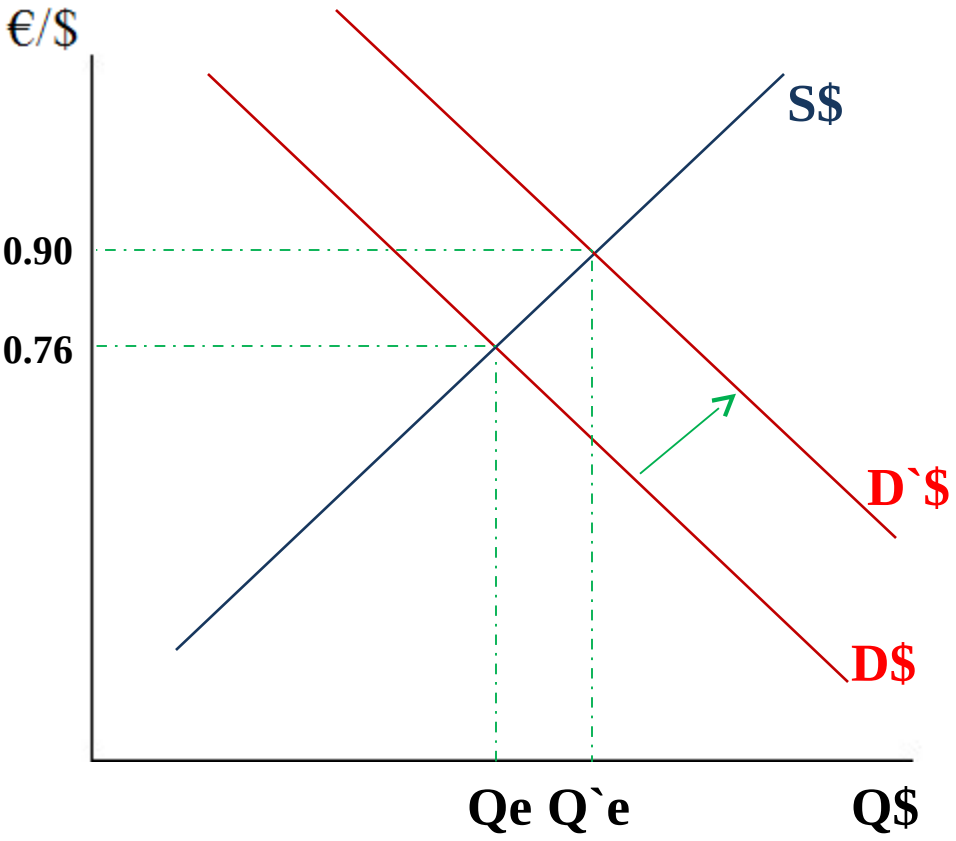
$$\Rightarrow i \downarrow \Rightarrow Euro\ depreciates \Rightarrow EX \uparrow \& IM \downarrow \Rightarrow NE \uparrow$$

- **Outcome:** Higher AE => Higher Y* & higher prices in EU

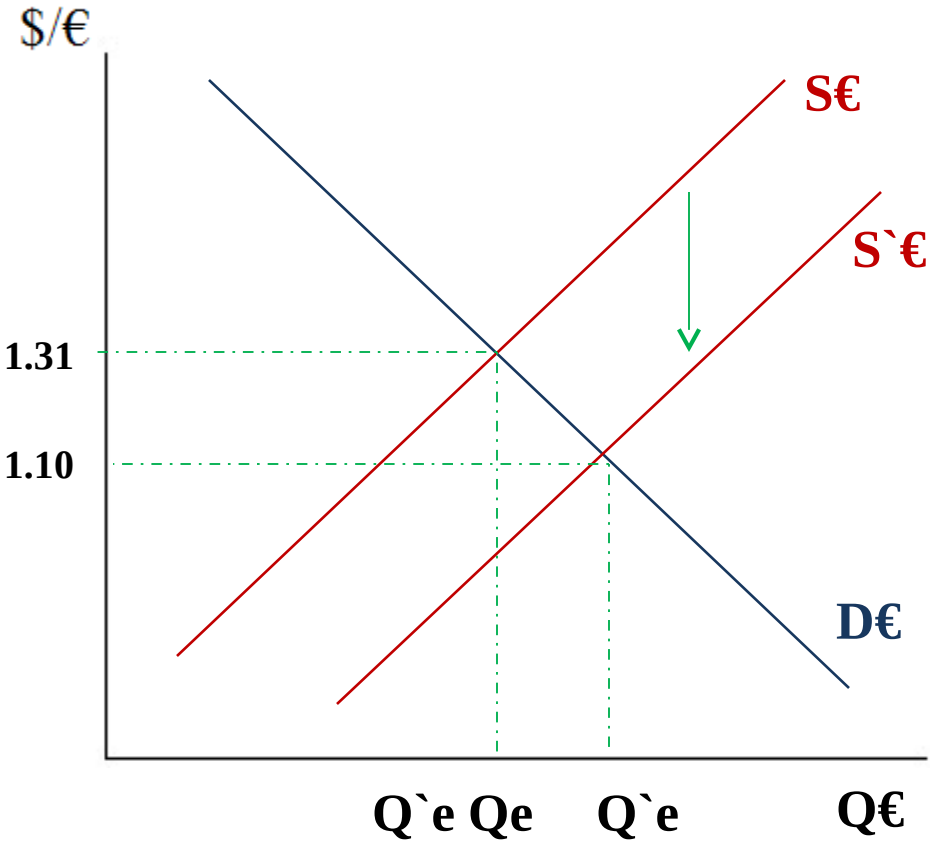
Speculations

- **Expectation** that the value of a currency would increase/decrease in the future

Market for **US Dollars** in Europe



Market for **Euros** in the US



Expectation of ↑ value of $ => ↑ D$ => $ appreciates => S €↑ => € depreciates

Speculations (Cont.)

- The effect of speculations on the aggregate demand in the US?

$$USD\ appreciates \Rightarrow EX \downarrow \& IM \uparrow \Rightarrow NE \downarrow \Rightarrow Y \downarrow$$

- **Outcome:** Fall in net exports=> lower Y*

Trade Balance and Exchange Rates

- Foreign exchange interventions: the purchase and sale of currencies in FOREX by a country's monetary authority (central bank)
- The **spectrum** of ER regimes: How actively the government intervenes

⟹ The ER target level

⟹ The ER target level is changed frequently

⟹ The ER in horizontal bands (hybrid)

⟹ The ER is determined by the market