International Economics
Fall 2011
Balance of Payments & Introduction to FX Market

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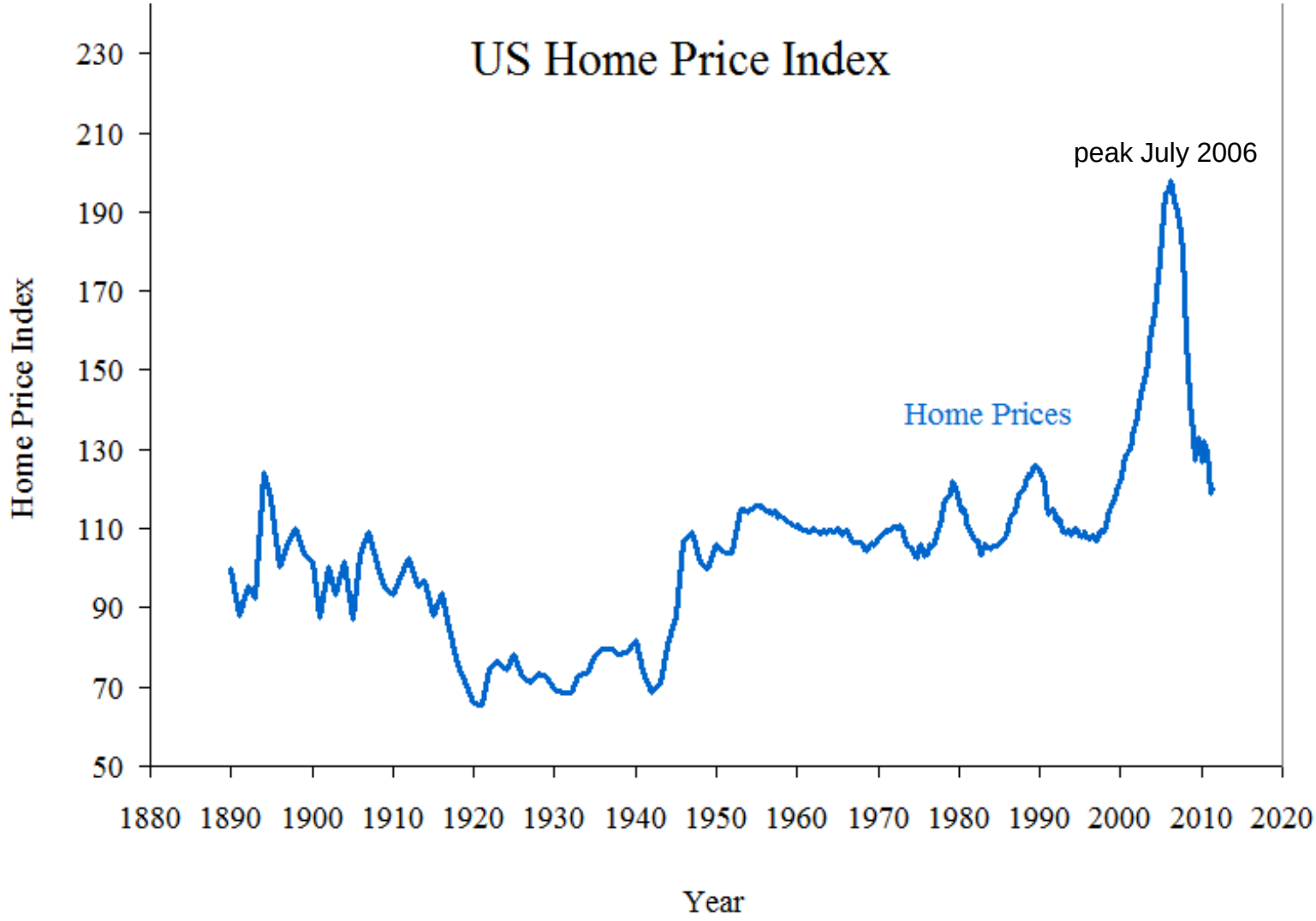
Sept. 22, 2011

US housing market is still in depression…



Today's Plan

- Brief review of National Income Accounting (NIA)
- Balance of payments (BoP)
- Introduction to FX market
- Understand interest parity condition

National Income Accounts

- Closed economy:

  Y = C + I + G

  C: private consumption – spending by private households on final goods and services

  *I: investment – spending on **new** capital goods and changes in inventories*

  G: government consumption and investment

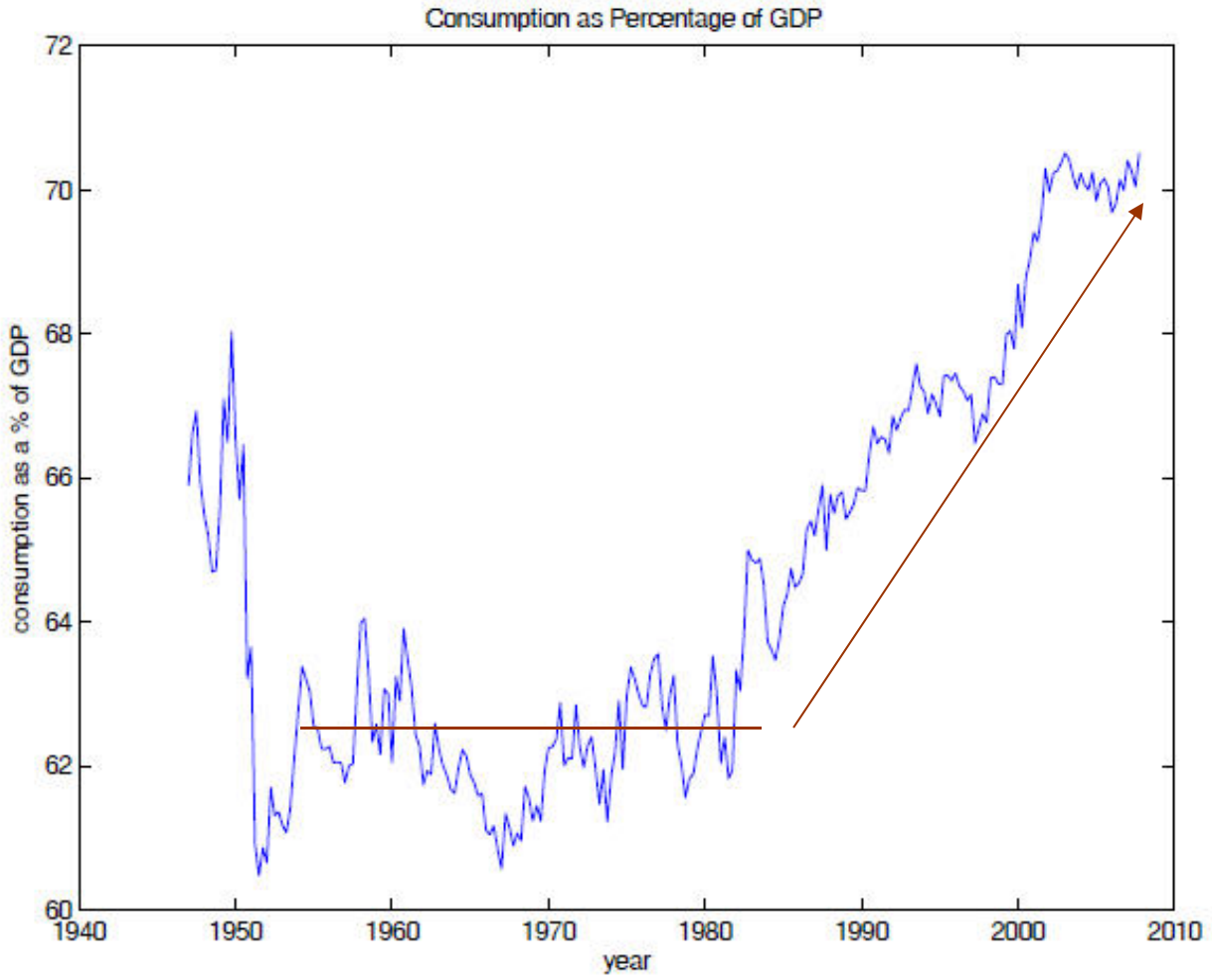
- National product = National income
  - The reason for this equality is that every dollar used to purchase goods or services automatically ends up in somebody's pocket as income.
  - In reality, due to measurement errors, these two can be different, but still roughly the same.

- Open economy

  Y = C + I + G + (EX – IM) (note: EX-IM=NX, or net exports)

  Current account, CA, and NX = CA = EX – IM = Y – (C + I + G)

In the last decade, US consumption rose to 70% of its GDP

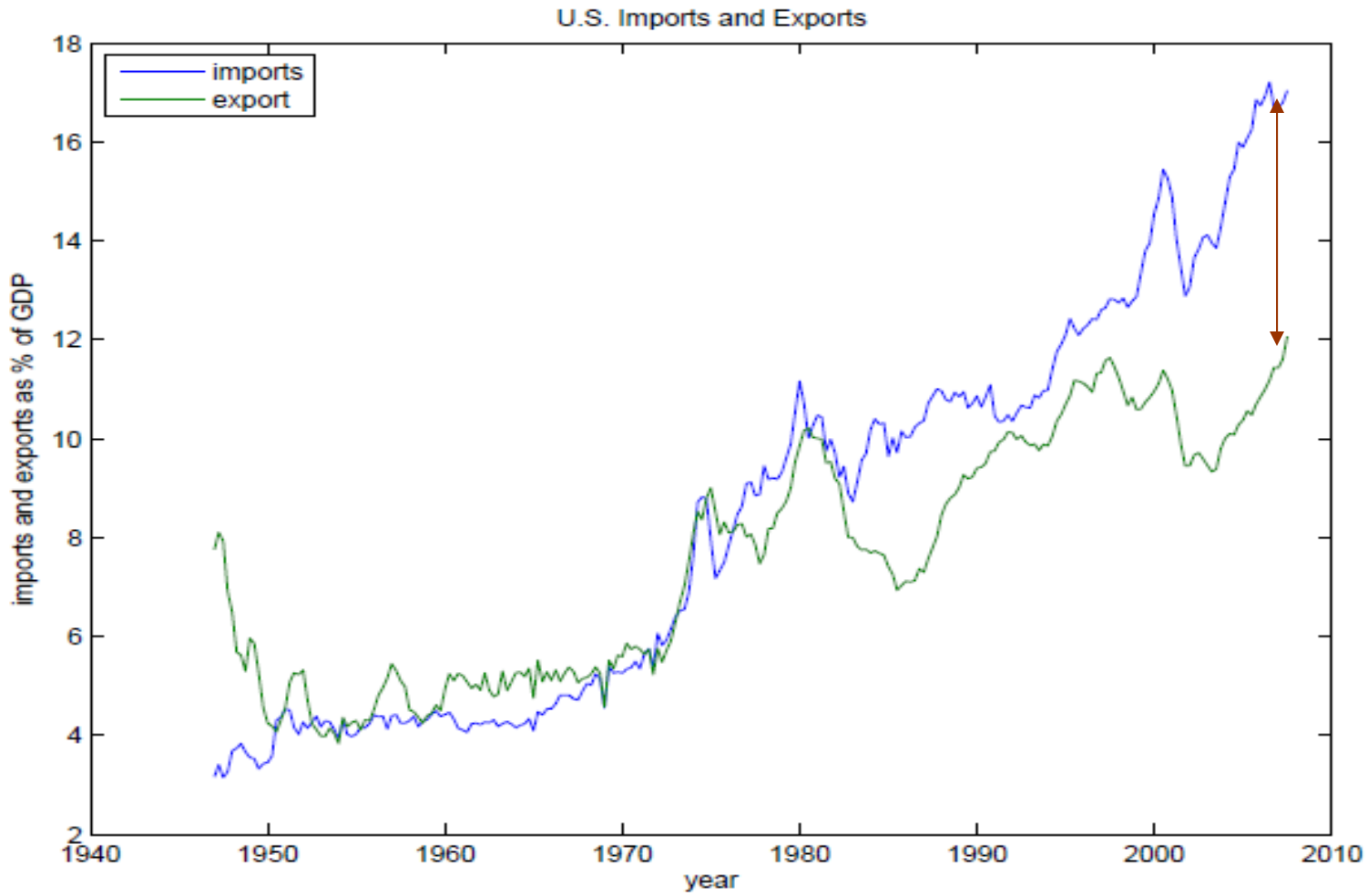


Expenditure and production in an open economy

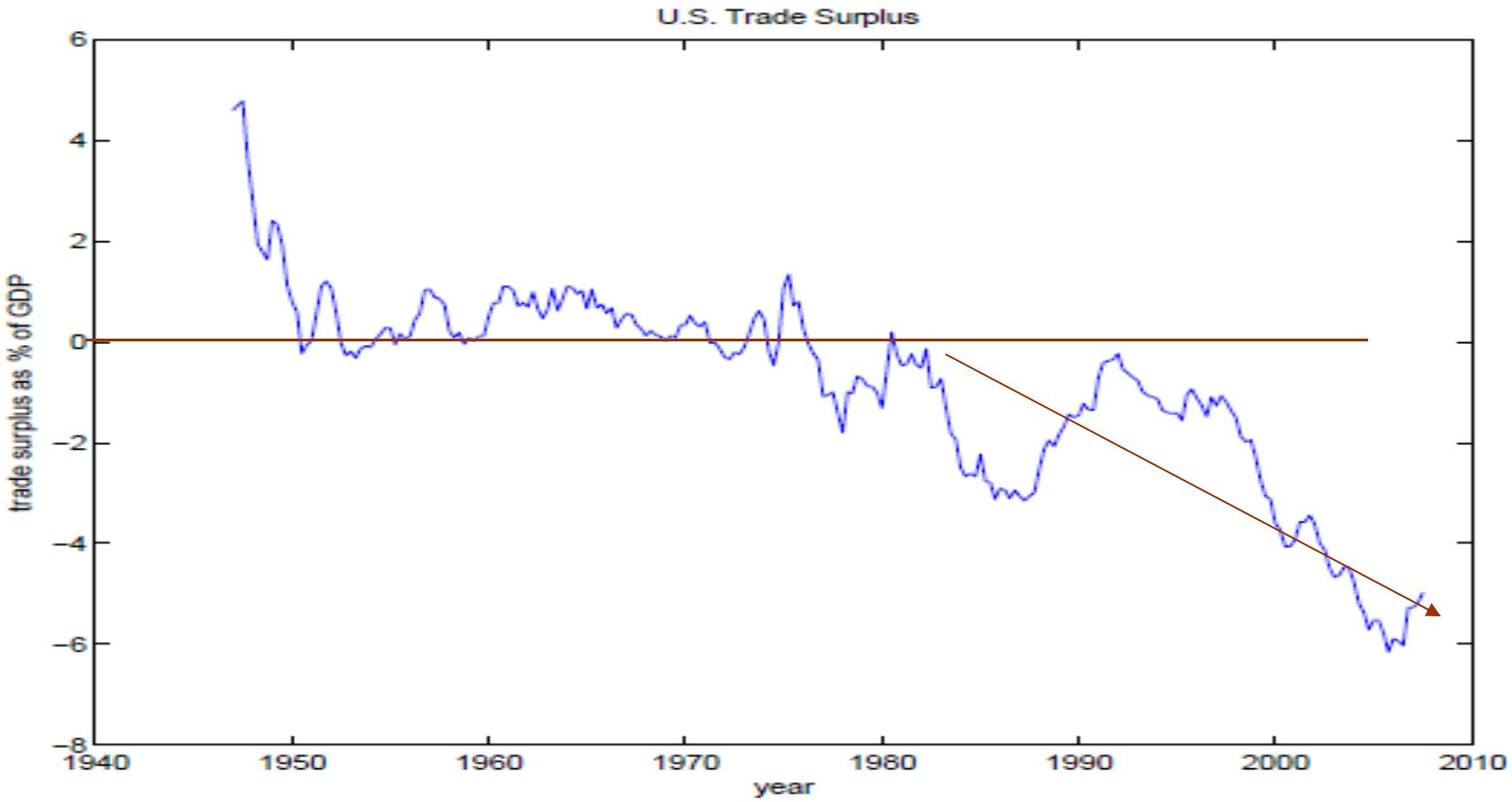
$$CA = EX - IM = Y - (C + I + G)$$

- It says:
  - When production > domestic expenditure, including C, I and G, we have exports > imports, which implies current account >0
  - when a country exports more than it imports, it earns more income from exports than it spends on imports, thus net foreign wealth is increasing
- Conversely,
  - When production < domestic expenditure, we have exports < imports, which means current account < 0
  - when a country exports less than it imports, it earns less income from exports than it spends on imports, thus net foreign wealth is decreasing

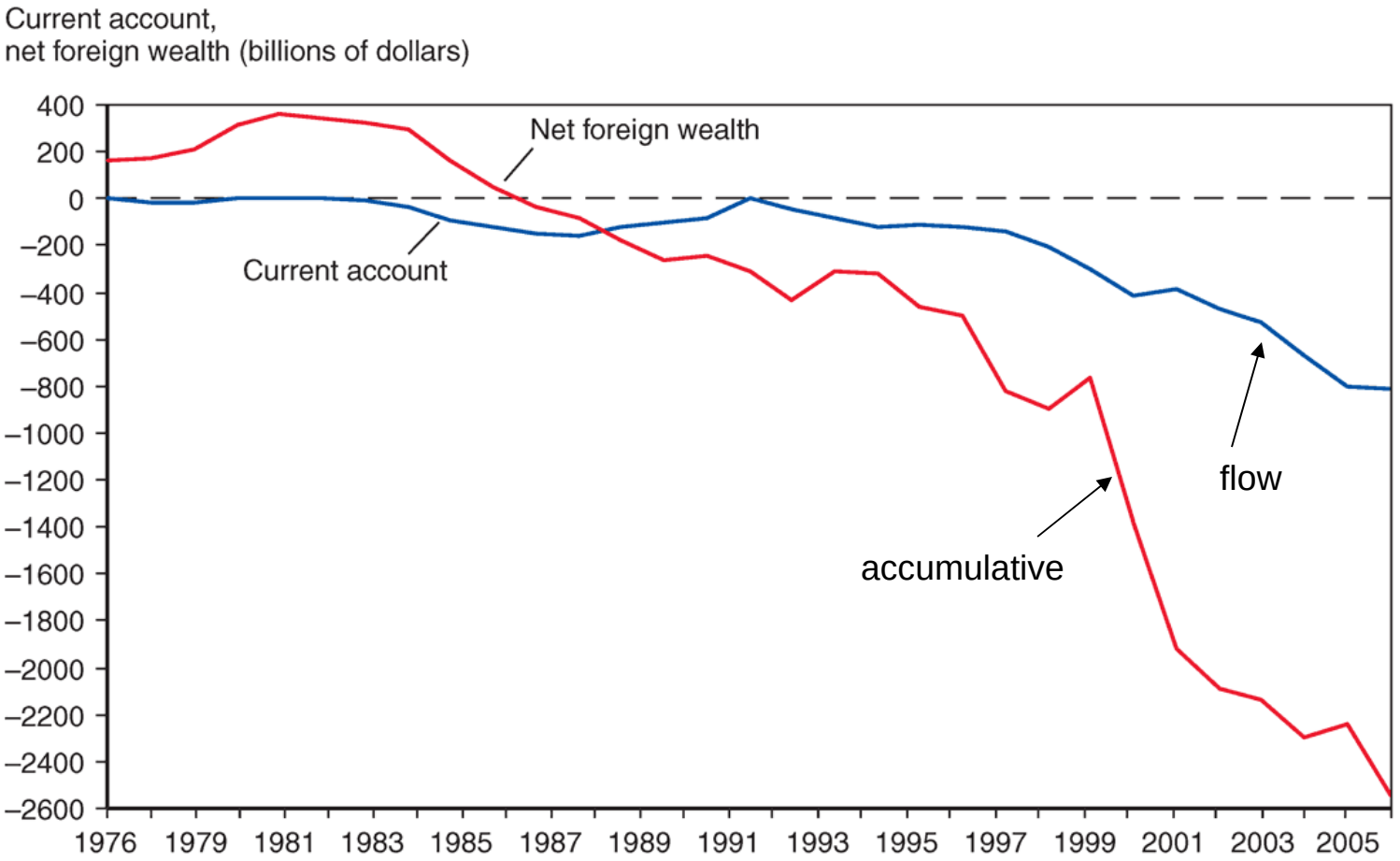
US has run persistent trade deficits since mid 1970s



US Current Account

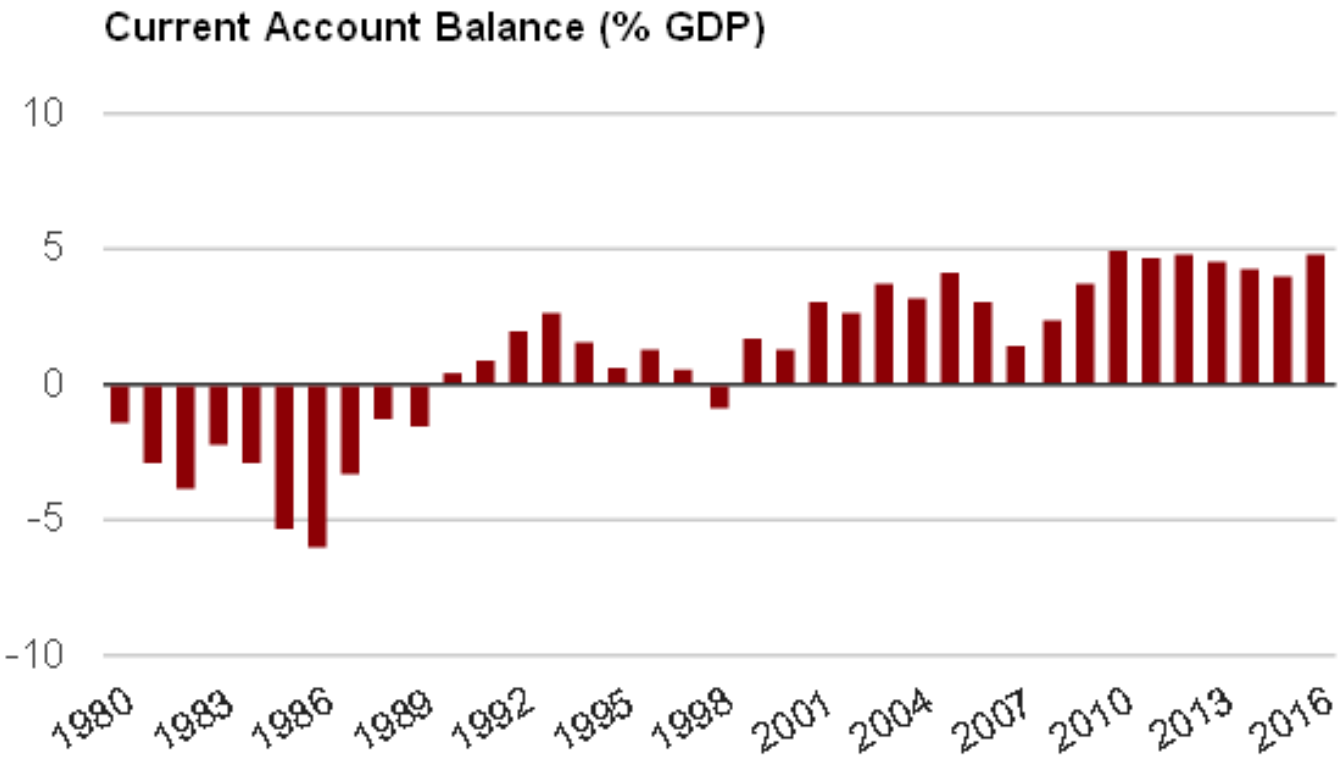


U.S. Current Account and Net Foreign Wealth, 1976–2006



Source: U.S. Department of Commerce, Bureau of Economic Analysis, June 2007 release

What about Denmark?



Roughly, the relative proportion of Denmark's GDP:

C+I+G+CA = 60% + 20% + 15% + 5%

Source: tradingeconomics.com

How saving and current account are connected

- National Saving:
  $S = Y - C - G$
- In a closed economy:
  - Since $Y = C + I + G$, so $I = Y - C - G$
  - So $S = I$, i.e., mathematically, national saving must equal investment in a closed economy
- In an open economy:
  - $Y = C+I+G+CA$
  - Since $S = Y-C-G$, so $S = I + CA$
  - This means saving roughly equals investment plus revenue from net exports

Balance of Payments (BoP) Accounts

- BoP accounts are separated into 3 broad accounts:

  1. Current Account includes:

  - *net* value of goods trade
  - *net* value of services trade
  - *net* payments received
    1. net foreign income, incl. interest, dividends & profits from assets owned
    2. unilateral transfers: for example, remittances, charity and foreign aid

  2. Financial Account: accounts for flows of financial assets (financial capital).

  3. Capital Account: flows of special categories of assets (capital): typically non-market, non-produced, or intangible assets like debt forgiveness, copyrights and trademarks. Very small.

Examples of BoP Accounting

- You (US consumer) bought a BMW (made by Germany) in San Francisco
- The German producer of BMW deposits the money in its bank account in San Francisco. The bank credits the account by the amount of the deposit.

BMW purchase (current account)	–$50K
Credit (“sale”) of deposit in account by bank (financial account)	+$50K

Example of BoP Accounting (cont.)

- You (US citizen) invest in Danish stocks by buying $500 of Vestas stock through New York Stock Exchange (NYSE)
- Vestas' US subsidiary deposits the money in its California bank account. The bank credits the account by the amount of the deposit.

Purchase of Vestas stock (financial account)	-$500
Credit ("sale") of deposit in account by bank (financial account)	+$500

How do the BoP accounts balance?

- To determine whether it should be a debit (-) or credit (+) in BoP account, look at the direction of money flow:
  - If it's money flowing into the country, it is recorded as credit or "+"
  - If it's money flowing out of the country, it's recorded as debit or "-"

U.S. Balance of Payments Accounts for 2006 (billions of dollars)

	Credits	Debits
Current Account		
(1) Exports	+2,096.2	
Of which:		
Goods	+1,023.1	
Services	+422.6	
Income receipts	+650.5	
(2) Imports		−2,818.0
Of which:		
Goods		−1,861.4
Services		−342.8
Income payments		−613.8
(3) Net unilateral current transfers		−89.6
Balance on current account [(1) + (2) + (3)]		−811.5
Capital Account		
(4)		−3.9

CA deficit

very small

U.S. Balance of Payments Accounts for 2006 (billions of dollars, cont.)

Financial Account		
(5) U.S. assets held abroad, excluding financial derivatives (increase −)		−1,055.2
Of which:		
Official reserve assets	+2.4	
Other assets		−1,057.6
(6) Foreign assets held in U.S., excluding financial derivatives (increase +)	+1,859.6	
Of which:		
Official reserve assets	+440.3	
Other assets	+1,419.3	
(7) Financial derivatives, net	+28.8	
Balance on financial account [(5) + (6) + (7)]	+833.2	
Statistical discrepancy [sum of (1) through (7) with sign reversed]		−17.8

capital outflow

capital inflow

= -811.5-3.9+833.2

Source: U.S. Department of Commerce, Bureau of Economic Analysis, June 15, 2007, release. Totals may differ from sums because of rounding.

A very important BoP relationship

- Due to the double entry of each transaction, the balance of payments accounts will balance by the following equation:

  current account + financial account + capital account = 0

  Since capital account is often negligible, so roughly we have,

  current account = - financial account

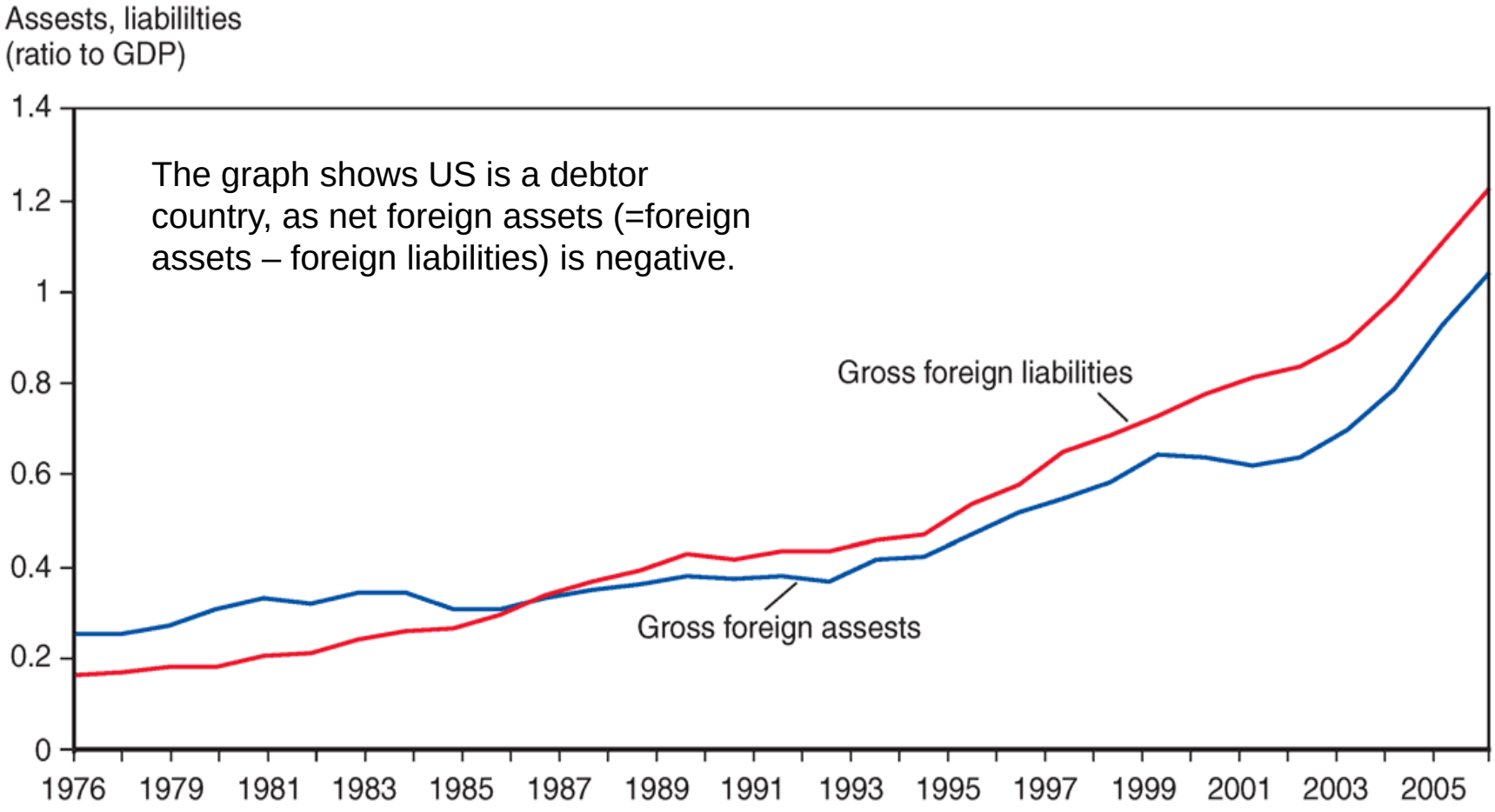
  This means:

  - Any current account surplus *should* be matched by roughly equal amount of capital outflow
  - Any current account deficits *should* be matched by roughly equal amount of capital inflow

Balance of Payments (cont.)

- What is BoP in previous US example?
- US BoP = - official reserve assets = -(440.3 + 2.4) = - 442.7 billion
- If BoP is bigger than official reserve assets, which means not enough money can be borrowed from foreigners, BoP account is not balanced, or we say this country runs a BoP deficit.
- If a country's BoP deficit is very big or has accumulated no foreign exchange reserves to cover the deficit, this country will likely to suffer a BoP crisis.
- In the US' case, BoP account is balanced, because foreigners are willing to lend money to the US.
- Also, remember US dollar is international reserve currency, so foreign central banks are willing to hold US dollar, just like gold. Foreign central banks will hold US dollar so long as the dollar remains strong and stable (a big question mark these days)

U.S. Gross Foreign Assets and Liabilities, 1976-2006



Source: U.S. Department of Commerce, Bureau of Economic Analysis, June 2007

Introduction of FX Markets

The major players:

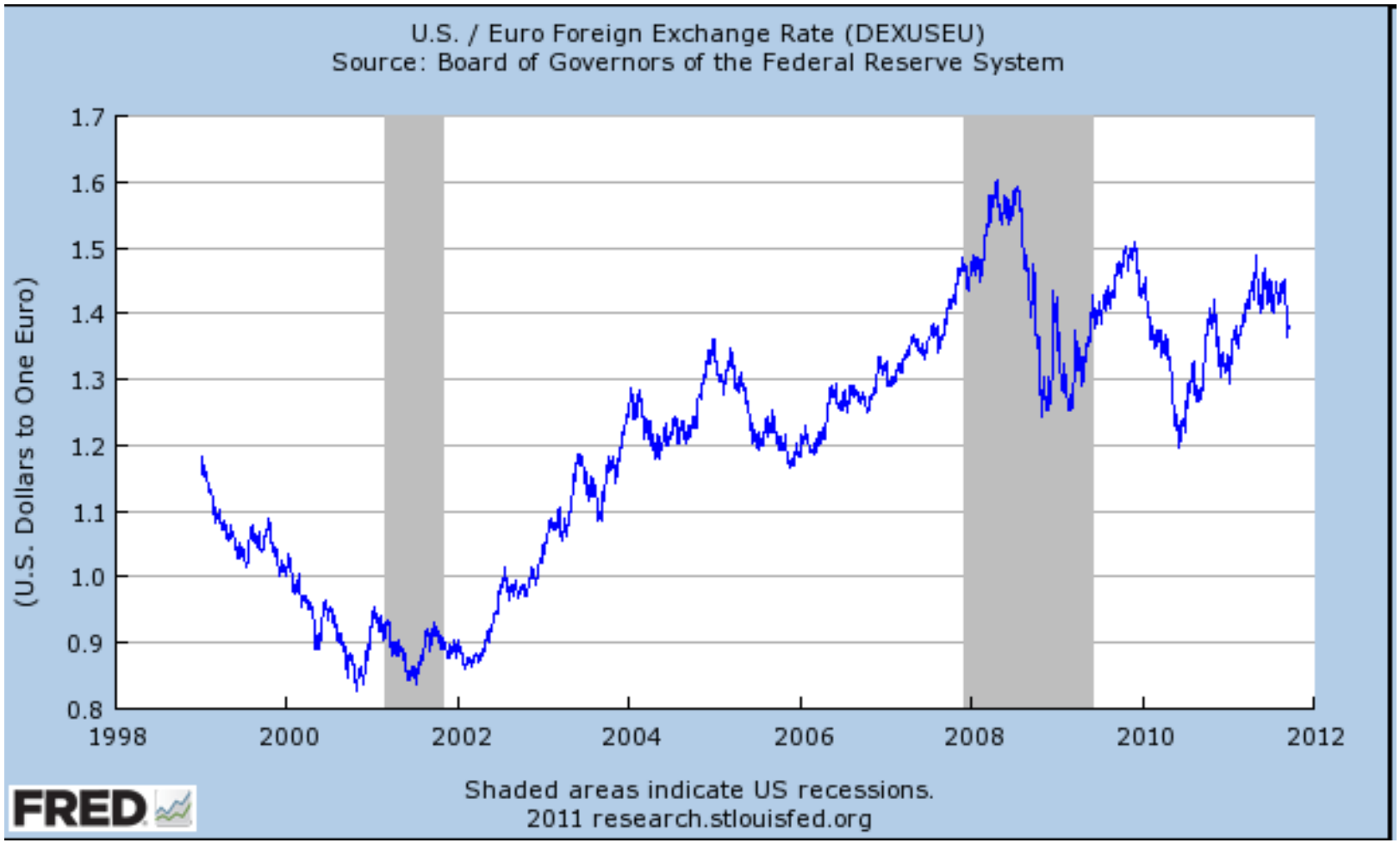
1. **Commercial banks** and other depository institutions: transactions involve buying/selling of deposits in different currencies for investment purposes, e.g., JP Morgan Chase, Deutsche Bank.
2. **Corporations** conduct foreign currency transactions to buy/sell goods, services and assets. The operations of these corporations often involve currency risk, e.g. oil companies.
3. **Non-bank financial institutions** (mutual funds, hedge funds, securities firms, insurance companies, pension funds) may buy/sell foreign assets for investment purpose.
4. **Central banks**: conduct official international reserves transactions. For example, the recent currency market intervention by Japanese central bank.

Characteristics of FX Market

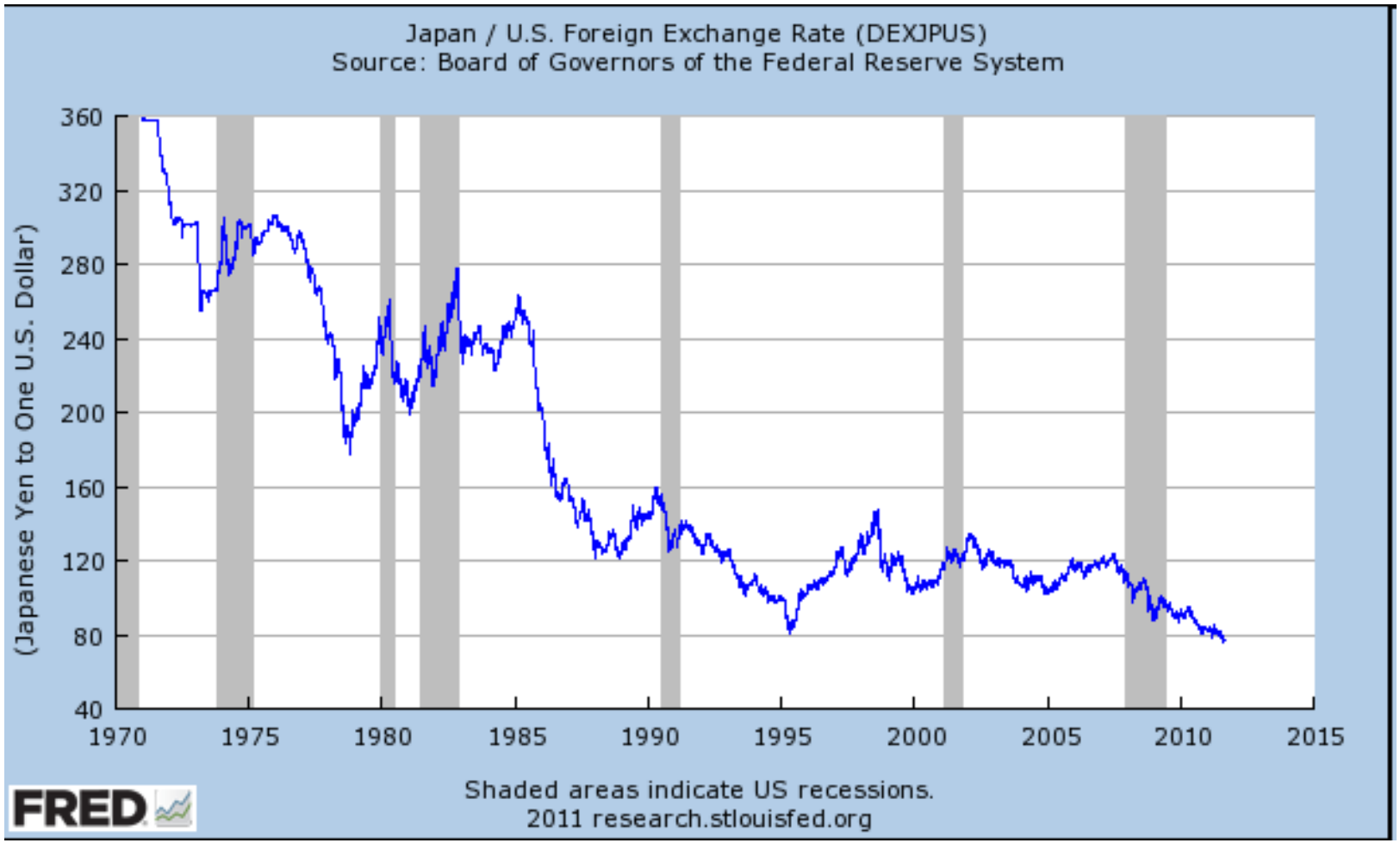
- The size of FX market is huge
  - In 2007, averaged at $3.2 trillion, **per day!**
  - Compared to international trade, the annual total world export value was $16 trillion. In other words, one-year of world total exports only equals 5 days of FX trading value.
- Concentrated in five major centers:
  - London (the largest)
  - NYC, Tokyo, Frankfurt and Singapore
- Because these centers cover different time zones, so we have almost 24 hours of continuous FX trading.

Now, get yourself familiar with these very important currency pairs ➔

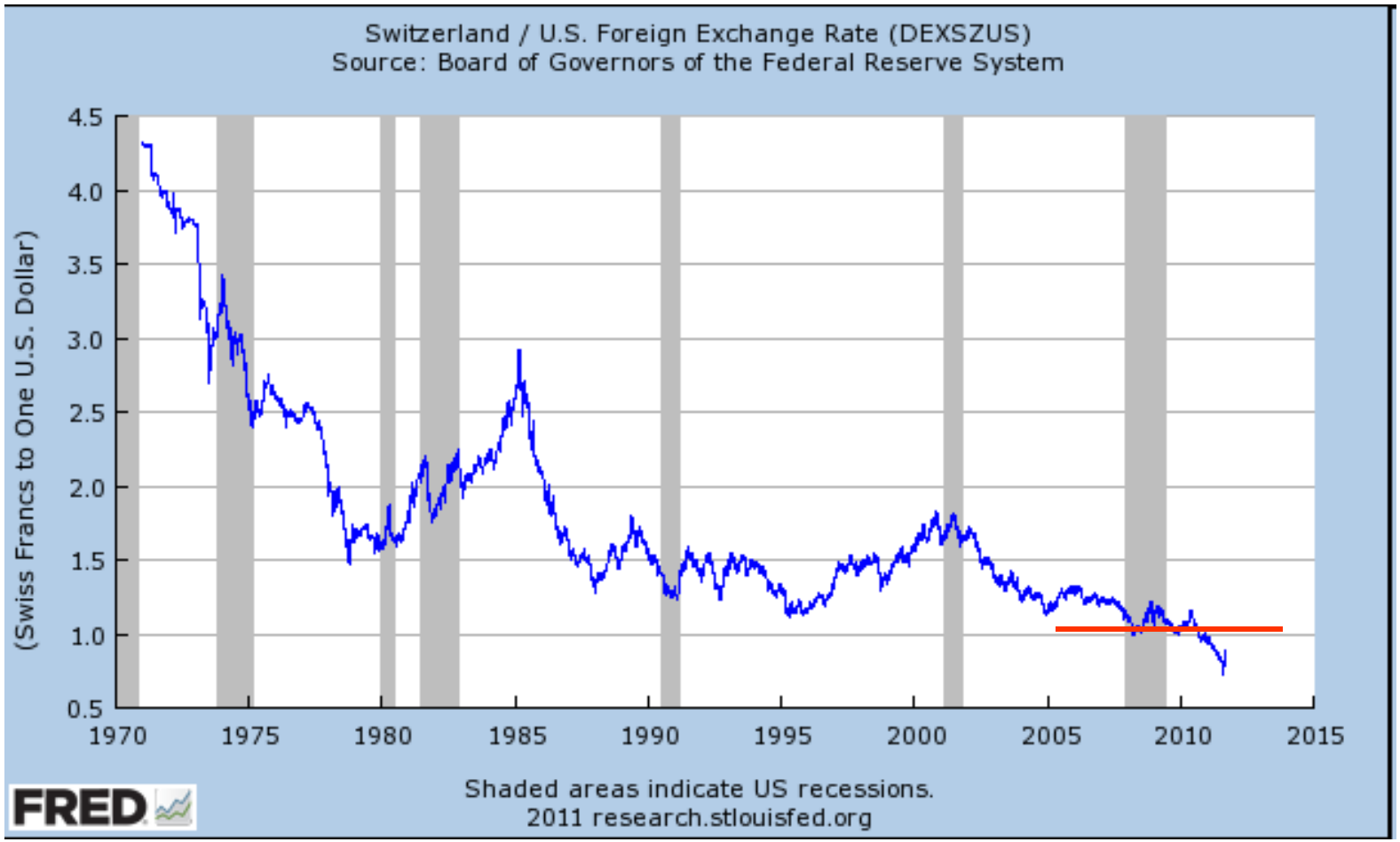
Exchange rate: US $ per Euro



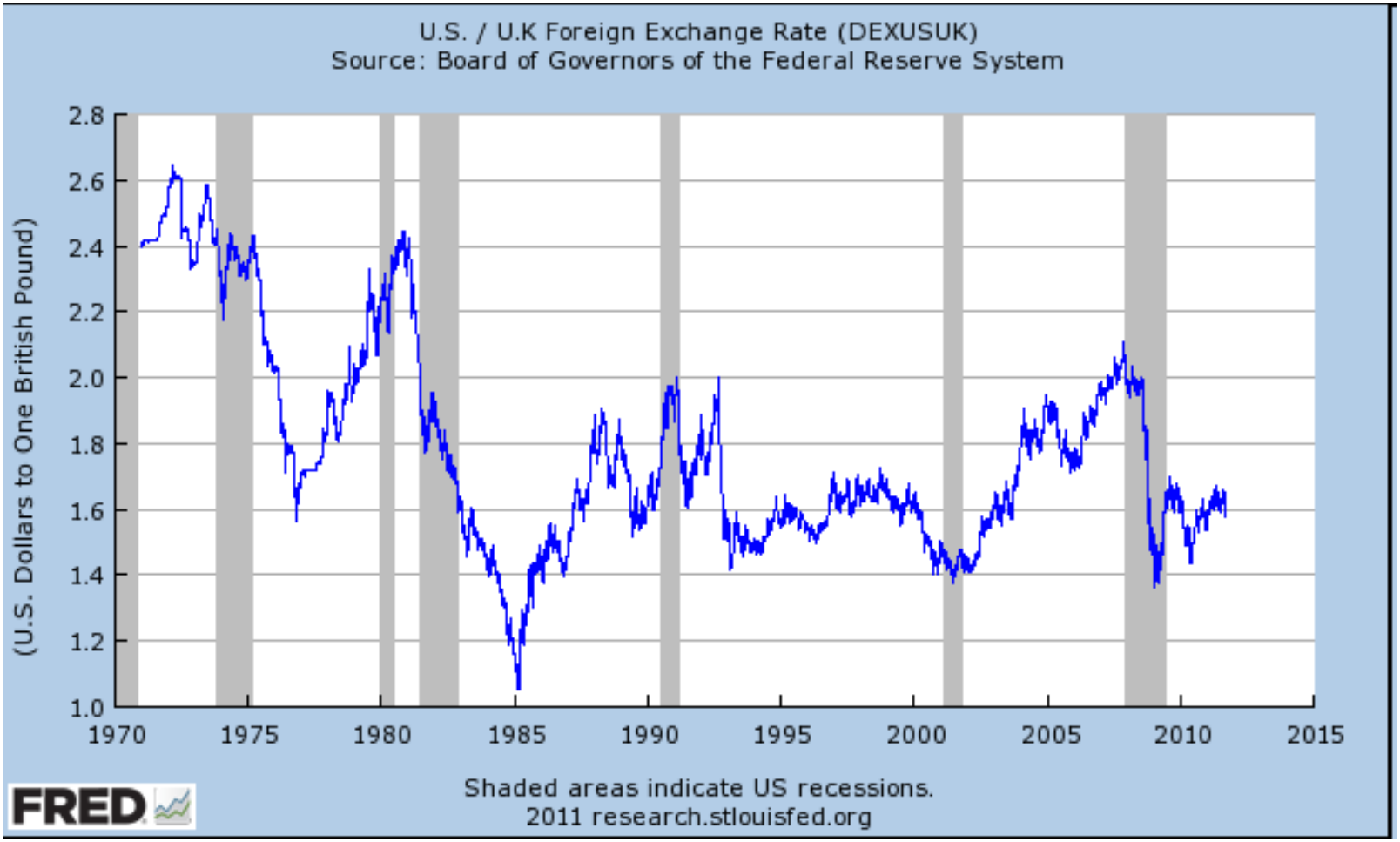
Exchange rate: Japanese Yen per USD



Exchange rate: Swiss Francs per US$

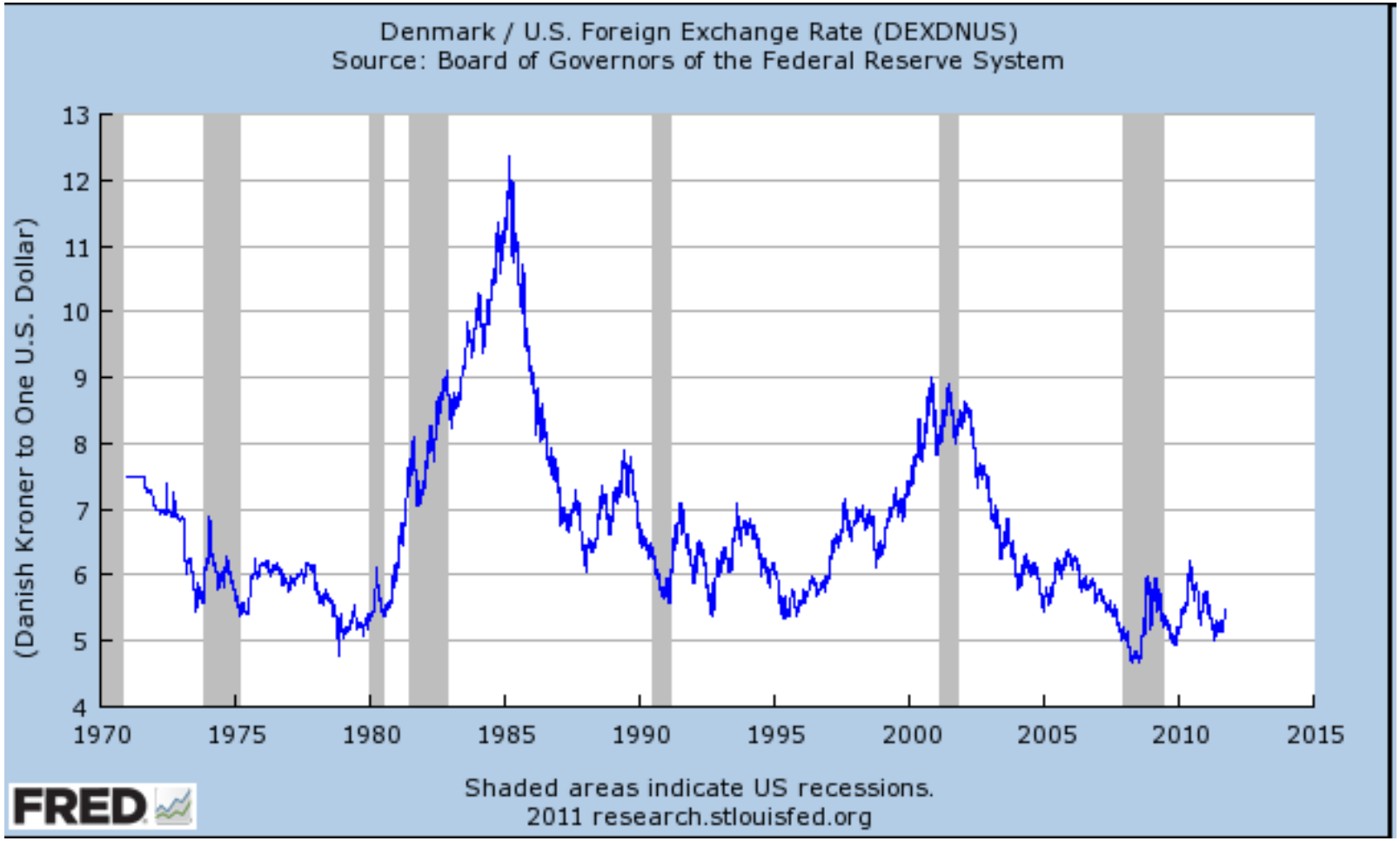


Exchange rate: US $ per British Pound



Exchange rate: Danish Kroner per Euro

Exchange rate: Danish Kroner per US $



Spot Rates and Forward Rates

- **Spot rates** are exchange rates for currency exchanges "on the spot", or when trading is executed at the moment.
- **Forward rates** are exchange rates for currency exchanges that will occur at a future ("forward") date.
  - Forward dates are typically 30, 90, 180, or 360 days in the future.
  - Rates are negotiated between two parties in advance, but the exchange take place on a future specified date.

Exchange Rate Quotations

Currencies

July 23, 2007

U.S.-dollar foreign-exchange rates in late New York trading

Country/currency	Mon in US$	Mon per US$	US$ vs, YTD chg (%)
Americas			
Argentina peso*	.3199	3.1260	**2.2**
Brazil real	.5427	1.8426	**–13.7**
Canada dollar	.9552	1.0469	**–10.2**
1-mos forward	.9558	1.0462	**–10.2**
3-mos forward	.9568	1.0452	**–10.1**
6-mos forward	.9580	1.0438	**–10.0**
Chile peso	.001943	514.67	**–3.3**
Colombia peso	.0005224	1914.24	**–14.5**
Ecuador US dollar	1	1	**unch**
Mexico peso*	.0930	10.7550	**–0.4**
Peru new sol	.3168	3.157	**–1.2**
Uruguay peso†	.04220	23.70	**–2.8**
Venezuela bolivar	.000466	2145.92	**unch**
Asia-Pacific			
Australian dollar	.8827	1.1329	**–10.6**
China yuan	.1322	7.5620	**–3.1**
Hong Kong dollar	.1279	7.8215	**0.6**
India rupee	.02492	40.128	**–9.0**
Indonesia rupiah	.0001102	9074	**0.9**
Japan yen	.008250	121.21	**1.9**
1-mos forward	.008286	120.69	**1.8**
3-mos forward	.008347	119.80	**1.9**
6-mos forward	.008440	118.48	**1.9**
Malaysia ringgit§	.2934	3.4083	**–3.4**
New Zealand dollar	.8057	1.2412	**–12.6**
Pakistan rupee	.01653	60.496	**–0.5**
Philippines peso	.0223	44.803	**–8.6**
Singapore dollar	.6629	1.5085	**–1.6**
South Korea won	.0010927	915.16	**–1.6**
Taiwan dollar	.03048	32.808	**0.7**
Thailand baht	.03350	29.851	**–15.8**

Country/currency	Mon in US$	Mon per US$	US$ vs, YTD chg (%)
Europe			
Czech Rep. koruna**	.04892	20.442	**–1.9**
Denmark krone	.1855	5.3908	**–4.6**
Euro area euro	1.3801	.7246	**–4.3**
Hungary forint	.005611	178.22	**–6.4**
Malta lira	3.2147	.3111	**–4.3**
Norway krone	.1745	5.7307	**–8.1**
Poland zloty	.3668	2.7263	**–6.1**
Russia ruble‡	.03935	25.413	**–3.5**
Slovak Rep koruna	.04176	23.946	**–8.3**
Sweden krona	.1502	6.6578	**–2.7**
Switzerland franc	.8285	1.2070	**–1.0**
1-mos forward	.8306	1.2039	**–1.0**
3-mos forward	.8340	1.1990	**–0.8**
6-mos forward	.8391	1.1918	**–0.7**
Turkey lira**	.8017	1.2473	**–11.9**
UK pound	2.0578	.4860	**–4.8**
1-mos forward	2.0568	.4862	**–4.8**
3-mos forward	2.0547	.4867	**–4.7**
6-mos forward	2.0505	.4877	**–4.5**
Middle East/Africa			
Bahrain dinar	2.6526	.3770	**unch**
Egypt pound*	.1763	5.6725	**–0.7**
Israel shekel	.2382	4.1982	**–0.4**
Jordan dinar	1.4116	.7084	**–0.1**
Kuwait dinar	3.4854	.2869	**–0.8**
Lebanon pound	.0006614	1511.94	**unch**
Saudi Arabia riyal	.2666	3.7509	**unch**
South Africa rand	.1468	6.8120	**–2.6**
UAE dirham	.2723	3.6724	**unch**
SDR††	1.5358	.6511	**–2.0**

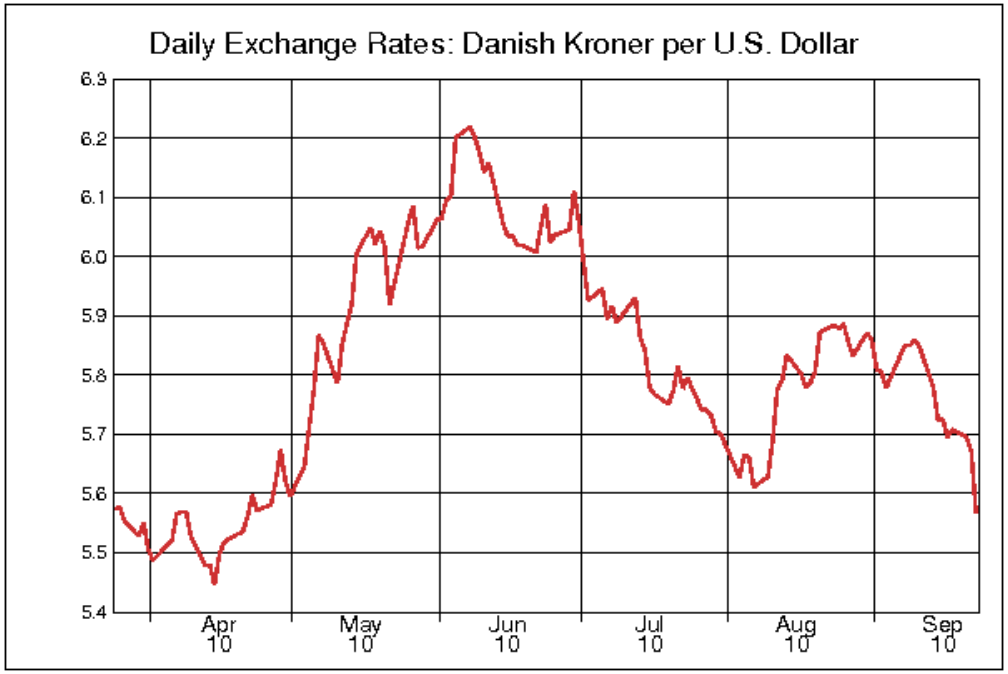
*Floating rate †Financial §Government rate ‡Russian Central Bank rate **Rebased as of Jan 1, 2005
††Special Drawing Rights (SDR); from the International Monetary Fund; based on exchange rates for U.S., British and Japanese currencies.
Note: Based on trading among banks of $1 million and more, as quoted at 4 p.m. ET by Reuters.

Source: Data from "Currencies," *Wall Street Journal*, July 24, 2007, p. C5.

An example of using currency forward contract to hedge currency risk

- In Sept. 2010, **Fona**, the electronics retailer in Denmark, will pay a US supplier in 30 days for a shipment arriving then. The shipment costs 1 million USD. During this period, the exchange rate (ER) between DKK and US dollar will fluctuate. Fona wants to hedge such currency risk.

- Say, for example, the current spot ER (as of 15.09.2010) is 5.6 DKK per USD; and in 30 days, Danish Kroner depreciates to 6 DKK per USD, and the potential loss for Fona is (6-5.6) x 1m = 0.4 m DKK or 400,000 DKK. This is not a small amount.



Example: Hedging currency risk using currency forward contract

- Fona could buy currency forward contract to lock in today's exchange rate:
  - Fona buys forward contract from Danske Bank at 5.625 DKK per US $, the difference between 5.625 DKK and spot ER rate 5.6 DKK covers bank's expense and expected profit for writing the forward contract.
  - Then 30 days later, Fona converts DKK to US $ at 5.6 DKK per US$ as stipulated in the forward contract. The only extra cost to Fona is the cost of buying forward contract, which costs Fona 0.025x1m=25,000 DKK, but this cost is much smaller than the potential loss from currency depreciation, which is 400,000 DKK.
  - In other words, Fona transferred its current risk exposure to Danske Bank, and the bank will have to hedge its own currency risk too, through other means.

Exchange Rates and Asset Returns

- Transactions in FX market could be currency risk hedging related to international trade, such as the Fona's example.

- But there are other motives for people to trade currencies:
  - Carry Trade: people move money from one country to another because interest rates charged for bank deposits (or returns on financial assets, such as stocks and bonds) are different in different countries
  - Currency is usually volatile; it goes up and down. As such, people can also engage in short-term speculative trading on currencies based on their expectations of future currency movements (similar to stock market).

Exchange Rates and Asset Returns

- For the carry-traders, i.e., individuals or institutions that move money around to explore the interest rate differentials, the question they have to ask is: “what is my real rate of return in terms of local currency?”:
  - The interest rate in Japan is 1%, while the interest rate in the US is 5%. So the **interest rate differential** is 4%. But this does not mean your real rate of return is 4%. Eventually you’ll have to convert US $ back to Yen to realize your return in $ investment – you were either a Japanese investor, or you borrowed money from a Japanese bank at lower interest rate.
  - When you convert $ to Yen in the future, there is currency risk. You could lose money if the $ depreciates against Yen more than 4%. However, you will make money if US $ did not depreciate, or depreciates less than 4%, or even appreciate.

Exchange Rates and Asset Returns

For example:

The spot ER is 100 yen per USD on 01/01/2005, you borrow 1 million Yen at 1% interest from a bank in Japan and deposit in a US bank, earning 5% interest.

The interest rate differential is:

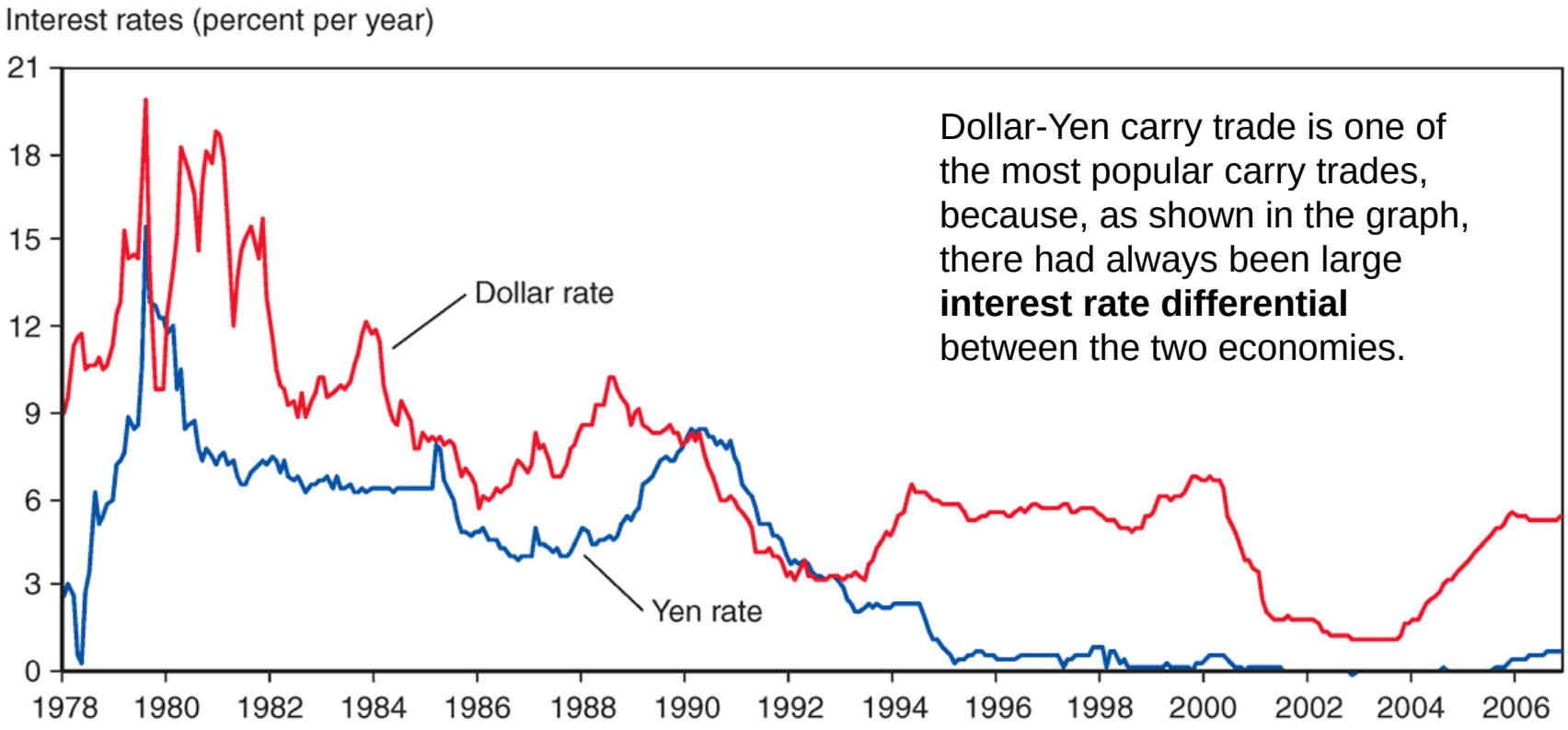
$$R_{US} - R_{JP} = 5\% - 1\% = 4\%$$

One year later (01/01/2006), you need to convert $ back to Yen to pay back the loan from the Japanese bank, from which you borrowed money. At that day, the spot exchange rate changed to 95 Yen per USD, so the Yen had appreciated by 5%= (100-95)/100 in one year.

So your final real return is roughly 4% - 5%= -1%, or -10,000 Yen. You lost money!! ☹

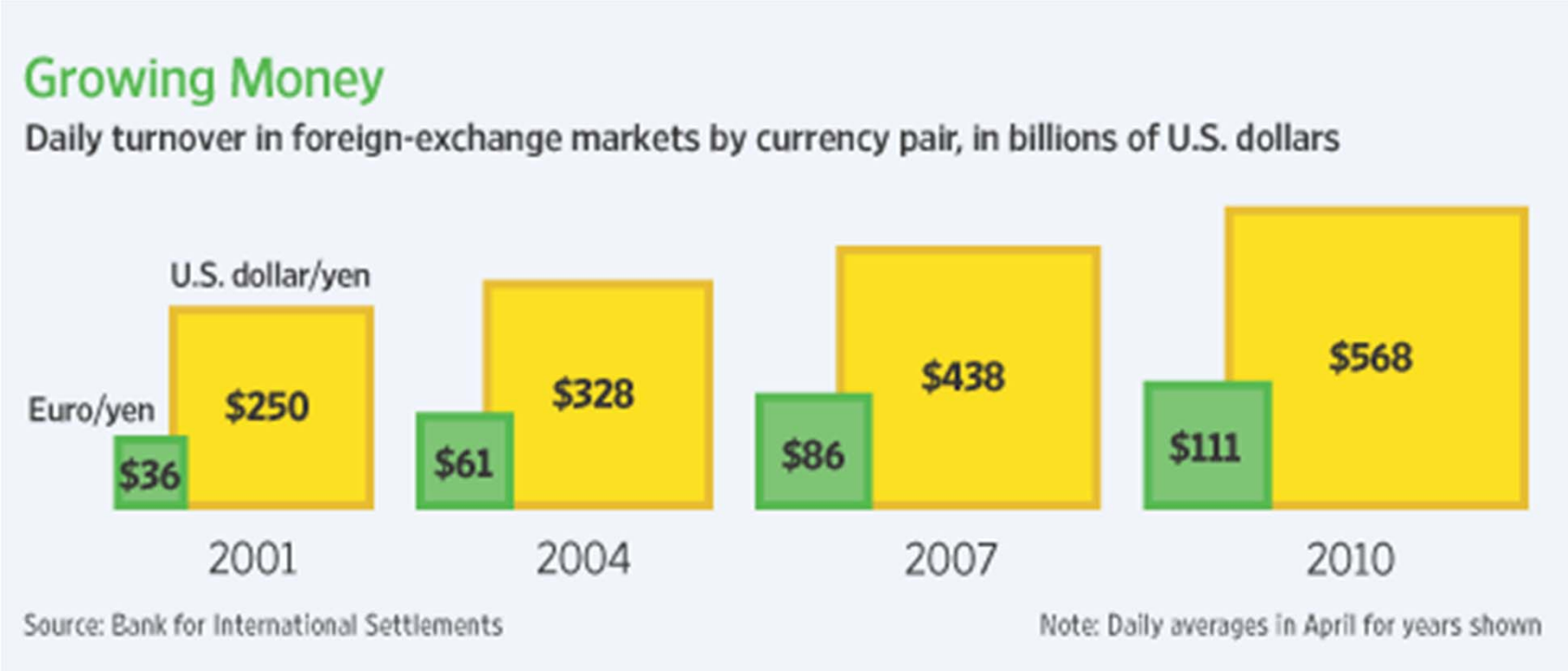
But if the exchange rate changed to 98 Yen per USD on 01/01/2006, i.e., when Japanese Yen only appreciated by 2% =(100-98)/100, because 4%>2%, you will still make money. ☺

Interest Rates on Dollar and Yen Deposits, 1978–2007

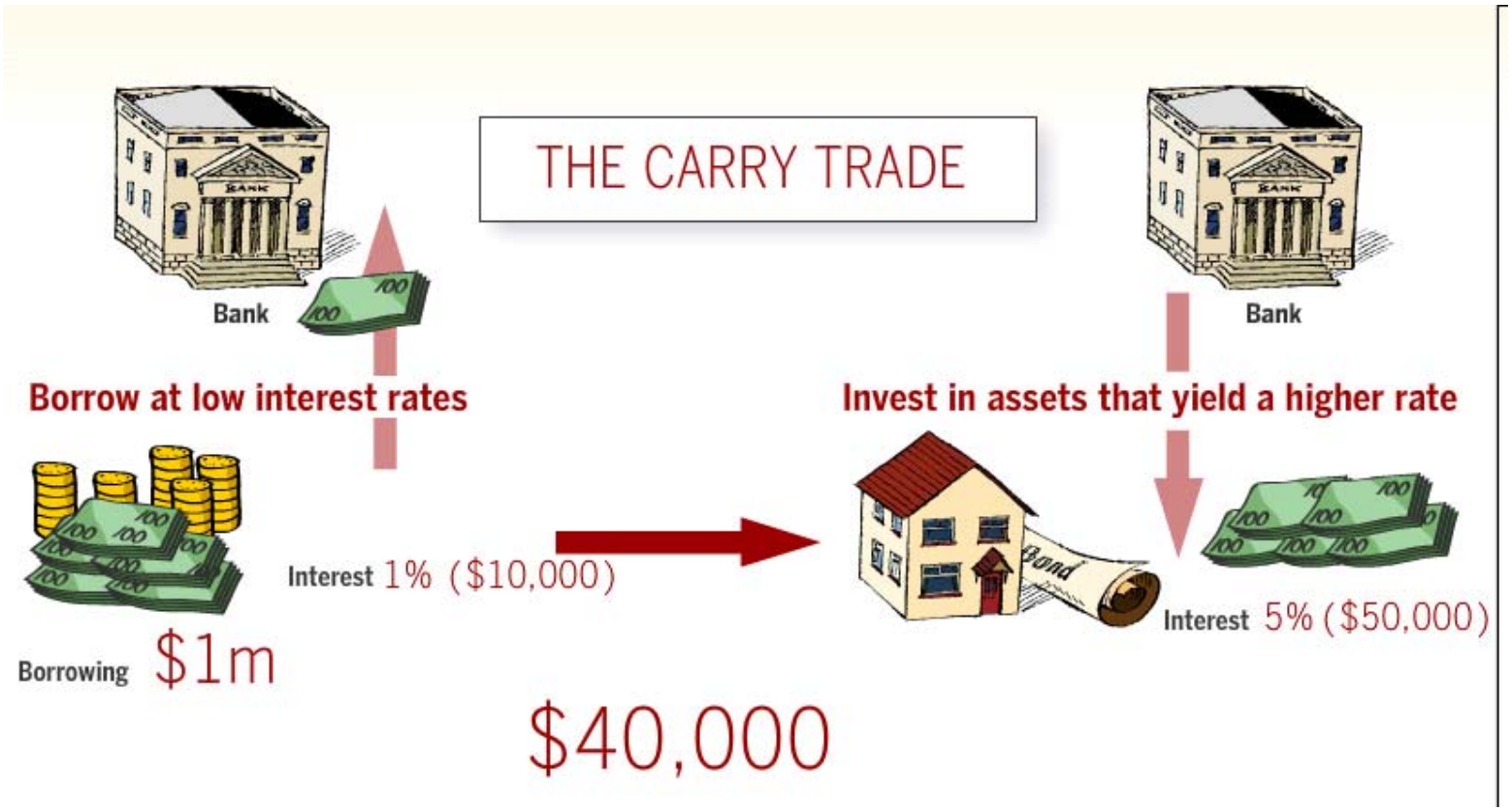


Source: *Datastream*. Three-month interest rates are shown.

Two popular carry-trades compared



The Carry Trade Explained...



Watch this nice video explaining to you what is carry trade:
http://www.ft.com/intl/cms/bee93552-b9b8-11de-a747-00144feab49a.swf

Interest Parity Condition

- The foreign exchange market is in equilibrium when deposits of all currencies offer the same expected rate of return.

$$R = R^{*} + (E_{/*}^{\ e} - E_{/*}) / E_{/*}$$

R: interest rate in home country, R*: interest rate in foreign country
$E_{/*}^{e}$: expected future exchange rate of foreign currency in terms of home currency
$E_{/*}$: spot exchange rate foreign currency in terms of home currency

- The above equation is called interest parity condition. **When it holds**, people (e.g. carry traders) have no incentives to move money across borders.
- In other words, if the parity condition does not hold, there are always arbitrage opportunities for people to make money. This is mostly the case in reality, especially in short term.

Interest Parity Condition

- We may rewrite the previous condition in the following form:

$$R^* - R = -(E_{/*}^{\,e} - E_{/*}) / E_{/*}$$

Interest rate differential

Future expected appreciation rate of home currency

UIP vs. CIP

- **Covered interest parity** (CIP) relates to interest rates, **forward** exchange rates and the spot exchange rate:

$$R_{\$} = R_{€} + (F_{\$/€} - E_{\$/€})/E_{\$/€} ,$$

where $F_{\$/€}$ is the forward exchange rate.

- To differentiate, the previous equation $R_{\$} = R_{€} + (E^{e}_{\$/€} - E_{\$/€})/E_{\$/€}$ is called "uncovered" interest rate parity.

- <u>The only difference</u> is that covered interest parity replaces ***expected*** exchange rate in the equation with ***forward*** exchange rate. Since forward rate hedges currency risk (as in the Fona example), so we say the currency risk is "covered".

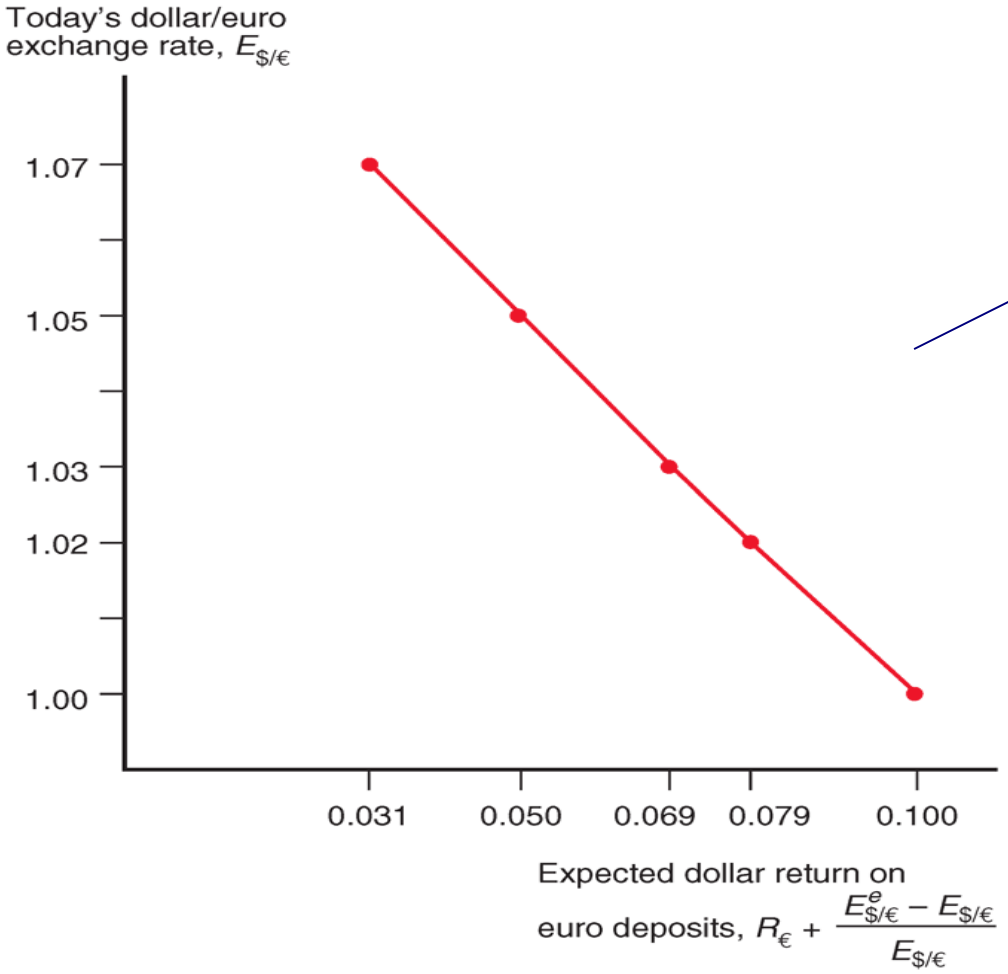
Derive the Equilibrium Exchange Rate

- Now we look at how change in today's exchange rate affect the expected return of a carry trade, with everything else unchanged.

Today's Dollar/Euro Exchange Rate and the Expected Dollar Return on Euro Deposits holding that $E^e_{\$/€}$ = \$1.05 per Euro

Today's Dollar/Euro Exchange Rate	Interest Rate on Euro Deposits	Expected Dollar Depreciation Rate Against Euro	Expected Dollar Return on Euro Deposits
$E_{\$/€}$	$R_€$	$\frac{1.05 - E_{\$/€}}{E_{\$/€}}$	$R_€ + \frac{1.05 - E_{\$/€}}{E_{\$/€}}$
1.07 ↓	0.05	−0.019	0.031 ↑
1.05	0.05	0.00	0.05
1.03	0.05	0.019	0.069
1.02	0.05	0.029	0.079
1.00 ↓	0.05	0.05	0.10 ↑

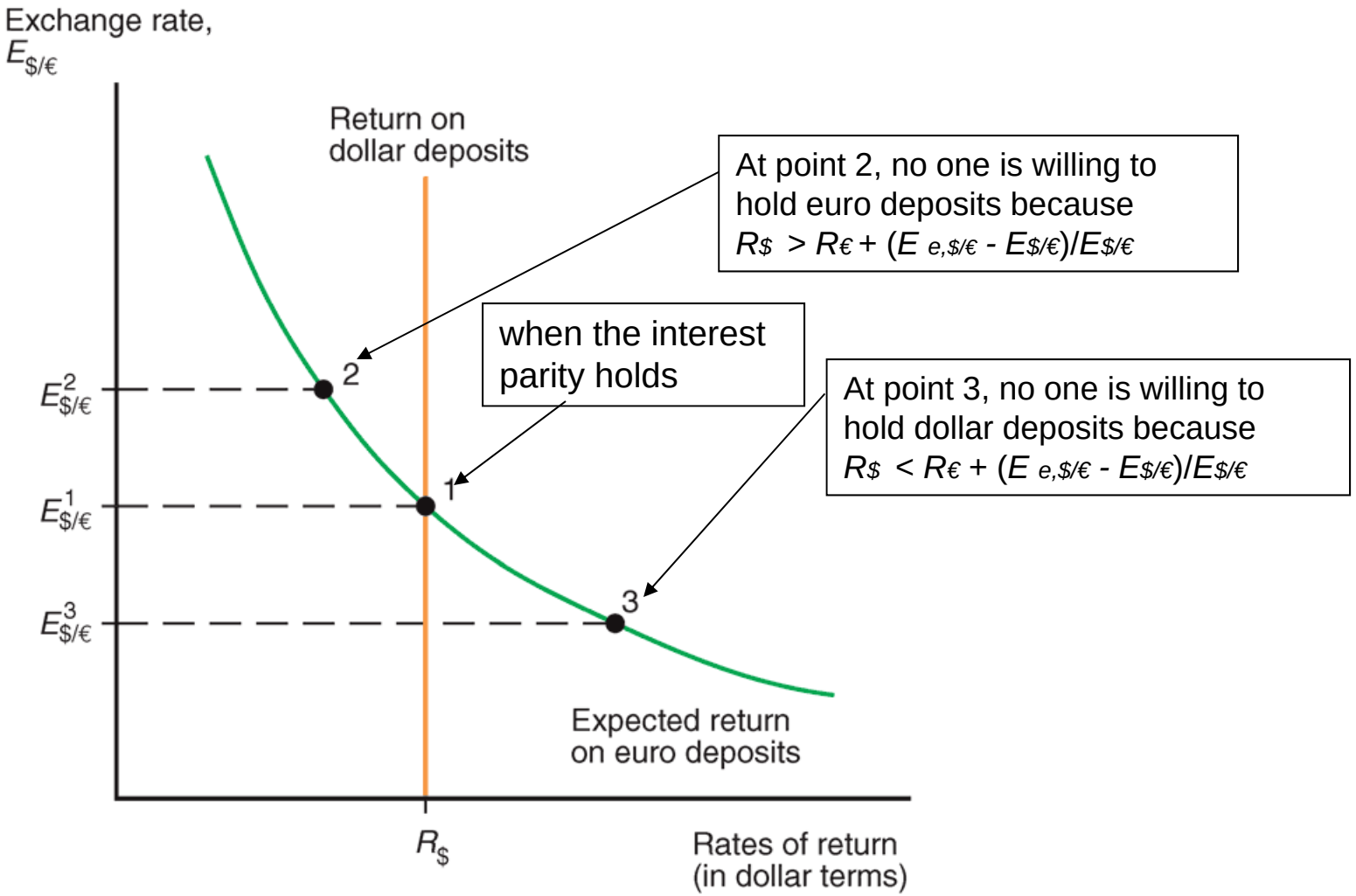
Derive the Equilibrium Exchange Rate



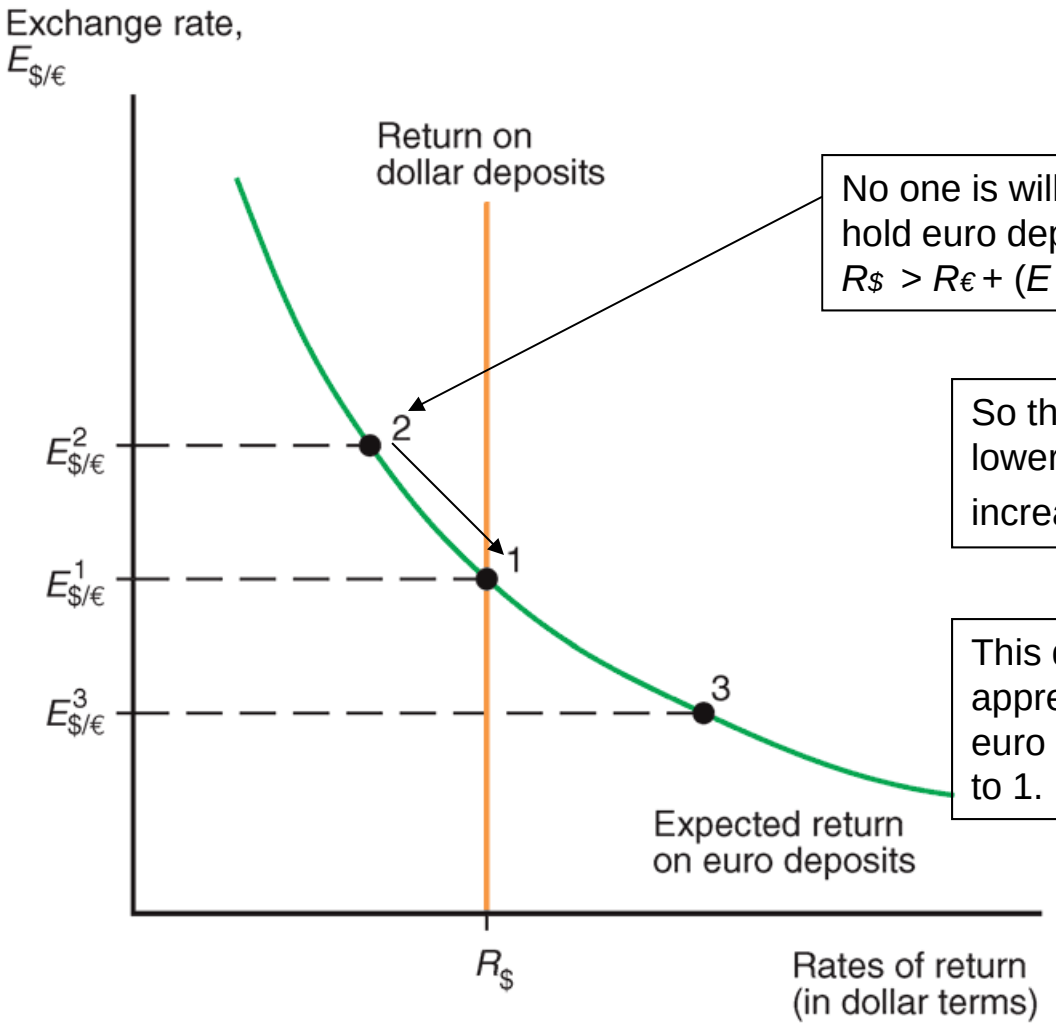
The higher today's exchange rate of US dollar (in terms of US $ per Euro), the lower expected dollar return on Euro deposits in the future.

The intuition behind it is at higher exchange rate (again in terms of $ per Euro), your money in $ today can exchange for less euros, so your starting level of $ carry investment is lower.

Equilibrium Exchange Rate



Equilibrium Exchange Rate

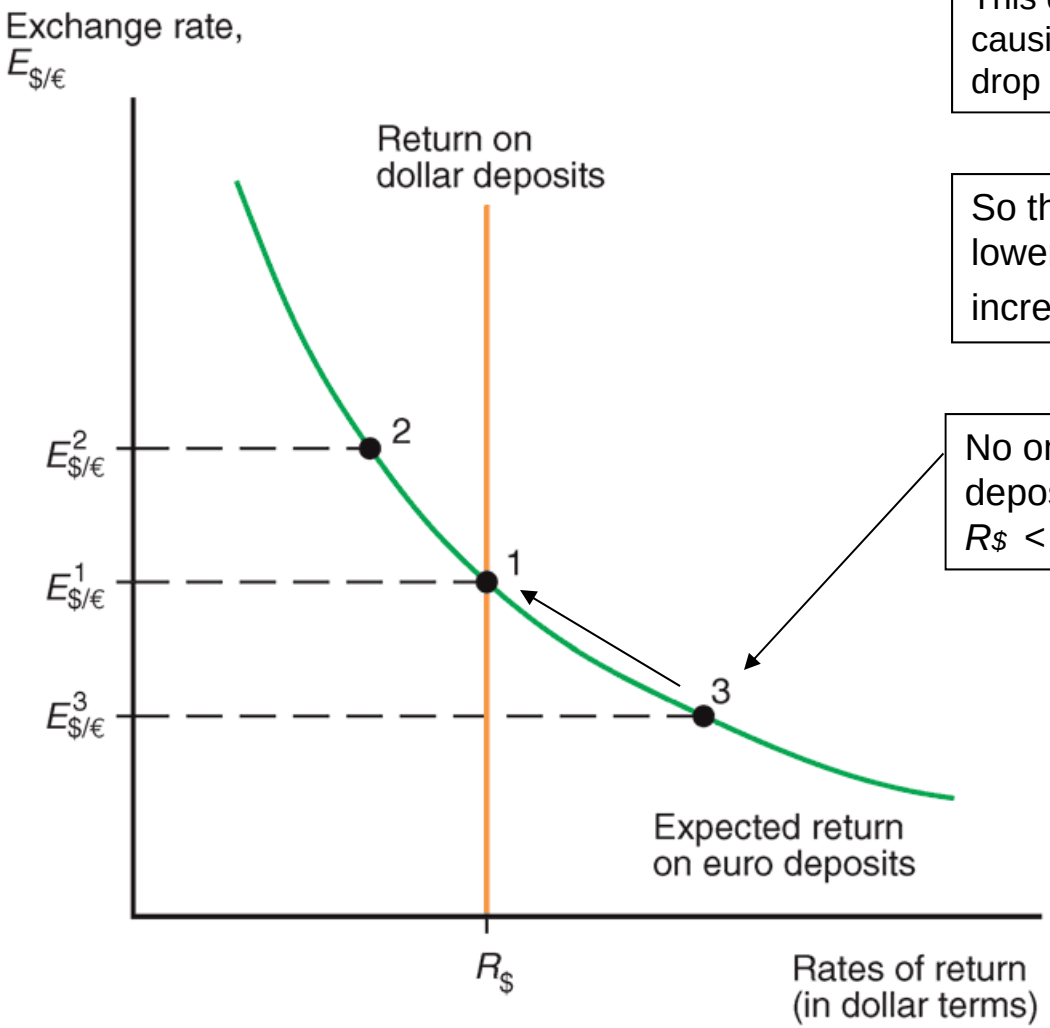


No one is willing to hold euro deposits because $R\$ > R€ + (E_{e,\$/€} - E_{\$/€})/E_{\$/€}$

So they sell euros for $, which lowers demand for euro and increase demand for $.

This depreciates euro, appreciates $, causing dollar-euro exchang rate to rise from 2 to 1.

Equilibrium Exchange Rate



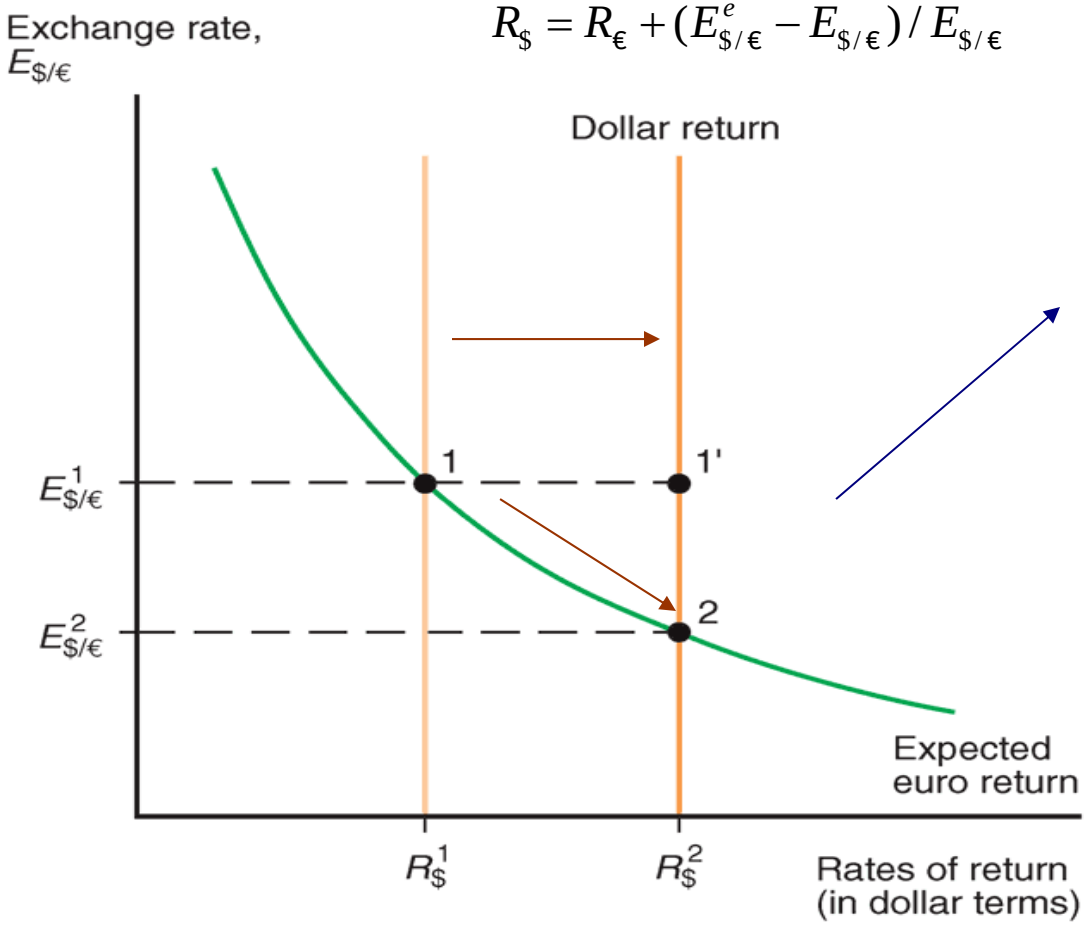
This devalues $, appreciates euro, causing dollar-euro exchang rate to drop from 3 to 1.

So they sell $ for euro, which lowers demand for $ and increase demand for euro.

No one is willing to hold dollar deposits because
$R\$ < R€ + (E_{e,\$/€} - E_{\$/€})/E_{\$/€}$

How exchange rate is determined under UIP?

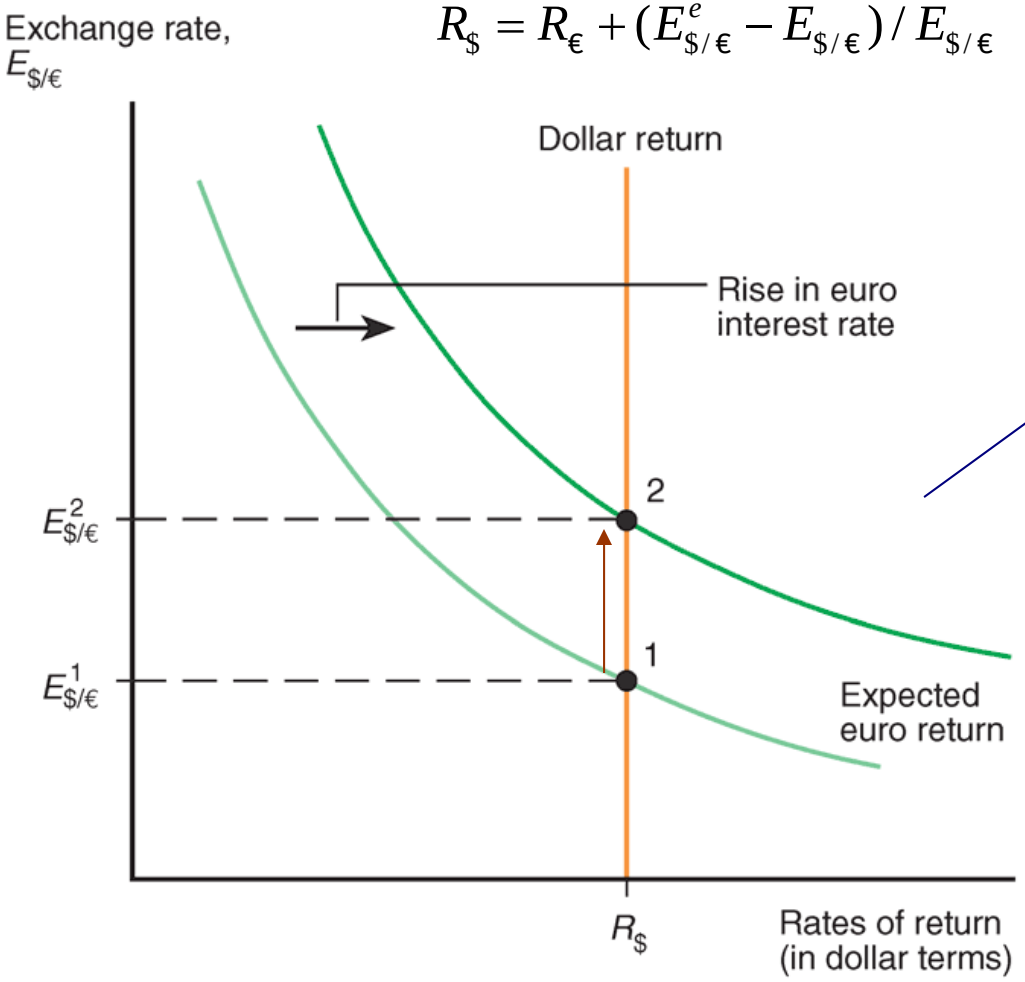
$$R_{\$} = R_{€} + (E^{e}_{\$/€} - E_{\$/€}) / E_{\$/€}$$



If interest parity holds, a rise in dollar return (or dollar interest rate) will imply an appreciation of the dollar against euro (point 1 to 2).

How exchange rate is determined under UIP?

$$R_{\$} = R_{€} + (E^{e}_{\$/€} - E_{\$/€}) / E_{\$/€}$$



Under interest parity condition, a rise in euro return (or euro interest rate) shifts the euro expected return curve outward, and the new equilibrium moves from point 1 to 2, and it implies an appreciation of the euro or depreciation of the dollar.

How exchange rate is determined under interest parity condition?

- The above analysis sounds logically perfect and quite intuitive
- But…
  - We haven't really talked about how *Ee,$/€* will move during the process (we always assumed it stays as a constant);
  - And so far we also assumed as if investors can always sell/buy currencies immediately, at zero cost, and without any restrictions. The reality is quite different.
  - These factors make interest parity condition often not hold, at least in the short term

For the next class…

- See course website for required readings