

Lecture 13

The foreign exchange market

The Foreign Exchange Market

Definitions:

1. Spot exchange rate
2. Forward exchange rate
3. Appreciation
4. Depreciation

Currency appreciates, country's goods prices $\uparrow$ abroad
and foreign goods prices $\downarrow$ in that country

1. Makes domestic businesses less competitive
2. Benefits domestic consumers

FX traded in over-the-counter market

1. Trade is in bank deposits denominated in different currencies



Determinants of exchange rate

- ▶ Determinant in long run: (explained by goods market)
 - Law of one price
 - Theory of purchasing power parity

 - ▶ Determinant in short run: (explained by asset market)
 - Comparing expected return on domestic and foreign assets
 - Interest parity condition
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Law of One Price

Example: American steel \$100 per ton, Japanese steel 10,000 yen (¥) per ton. Exchange rate should be 100 ¥ per \$

If $E = 200 \text{ ¥} / \$$ then prices are:

	American Steel	Japanese Steel
In U.S.	\$100	\$50 ($¥10,000 \div 200 \text{ ¥}/\$$)
In Japan	¥20,000 ($\$100 * 200 \text{ ¥}/\$$)	¥10,000

Demand for US steel goes to zero $\rightarrow$ excess supply of US steel will be eliminated only if exchange rate = 100 ¥ per \$. Making price of US and Japanese steel the same in both countries.

Law of one price $\Rightarrow E = 100 \text{ yen}/\$$

	American Steel	Japanese Steel
In U.S.	\$100	\$100
In Japan	¥10,000	¥10,000

Purchasing Power Parity (PPP)

PPP $\Rightarrow$ Exchange rate between any two currencies will adjust to reflect change in the price levels of the two countries. (PPP is application of law of one price to national levels rather than individual price.)

$$S = P_{JP} / P_{US}$$

where: "S" represents exchange rate of currency JP to currency US

" P_{JP} " represents the cost of good "x" in currency JP

" P_{US} " represents the cost of good "x" in currency US

If foreign price level $\uparrow$ 10%, domestic currency $\uparrow$ 10%

For example: Yen price of JP steel $\uparrow$ from ¥10,000 to ¥11,000.

Dollar price of steel is unchanged at \$100. Law of one price suggest that exchange rate must be ¥11,000/\$100 = 110 ¥/\$ (10% appreciation of USD)



Purchasing Power Parity (PPP)

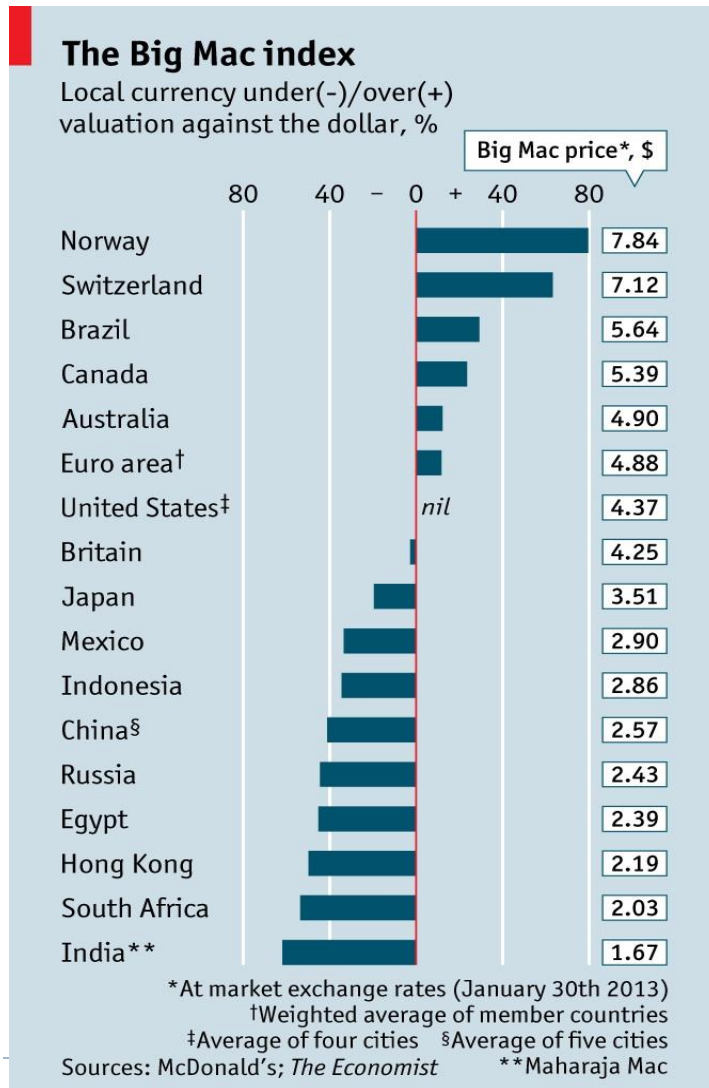
Problems with PPP

1. All goods not identical in both countries: Toyota vs Chevy
2. Many goods and services are not traded across borders: e.g. housing, land, haircuts, golf lesson.

Hence, even though price of these items increase, exchange rate was not directly affected.

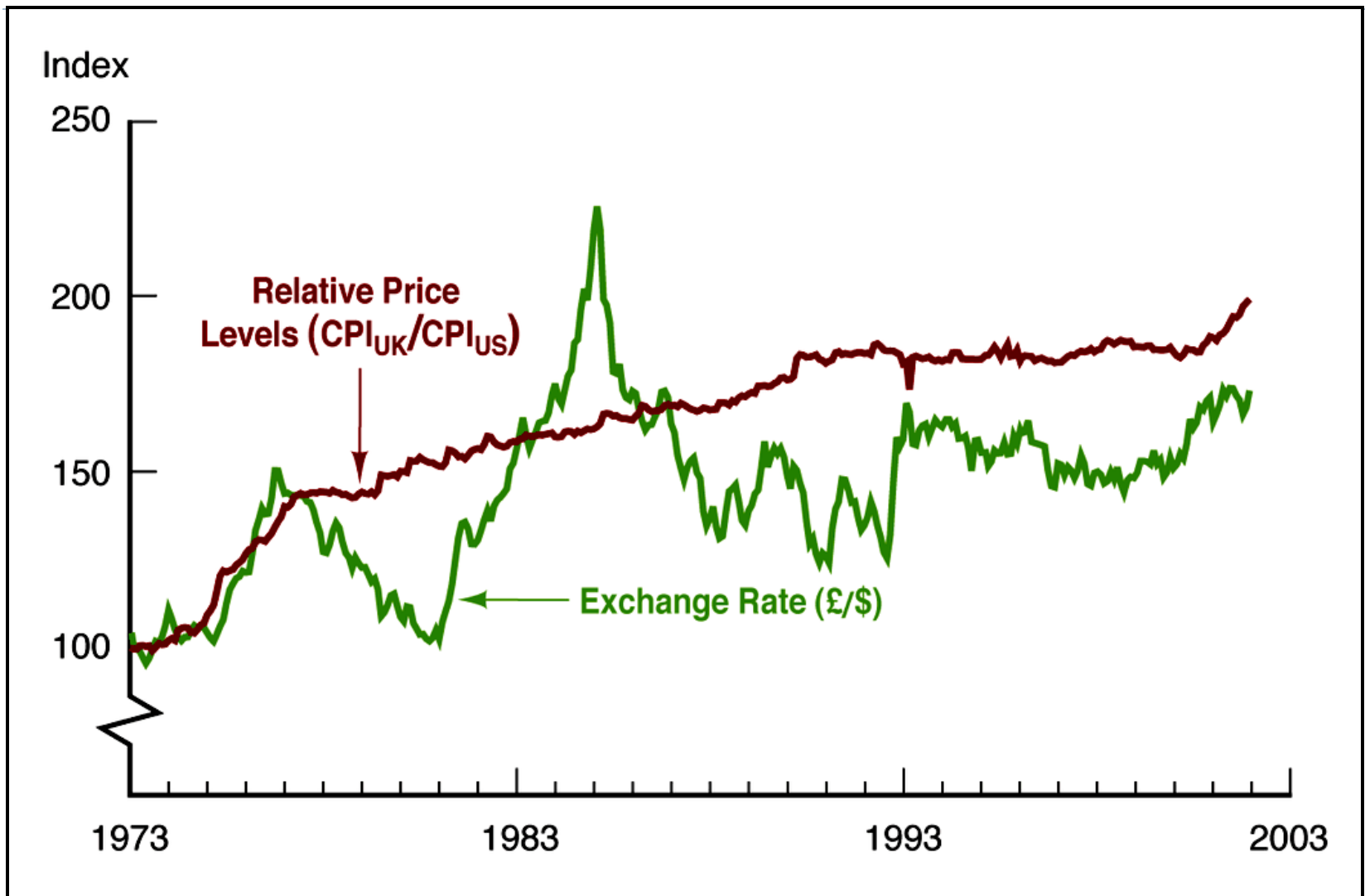


Big Mac Index



“THE Big Mac index is a lighthearted guide to whether currencies are at their “correct” level. It is based on the theory of purchasing-power parity (PPP), the notion that global exchange rates should eventually adjust to make the price of identical baskets of tradable goods the same in each country. Our basket contains just one thing, a Big Mac hamburger.”, The economist.

PPP: U.S. and U.K



Factors Affecting E in Long Run

SUMMARY Table 1 Factors That Affect Exchange Rates in the Long Run

Factor	Change in Factor	Response of the Exchange Rate, E^*
Domestic price level†	↑	↓
Trade barriers†	↑	↑
Import demand	↑	↓
Export demand	↑	↑
Productivity†	↑	↑

*Units of foreign currency per dollar: ↑ indicates domestic currency appreciation; ↓, depreciation.

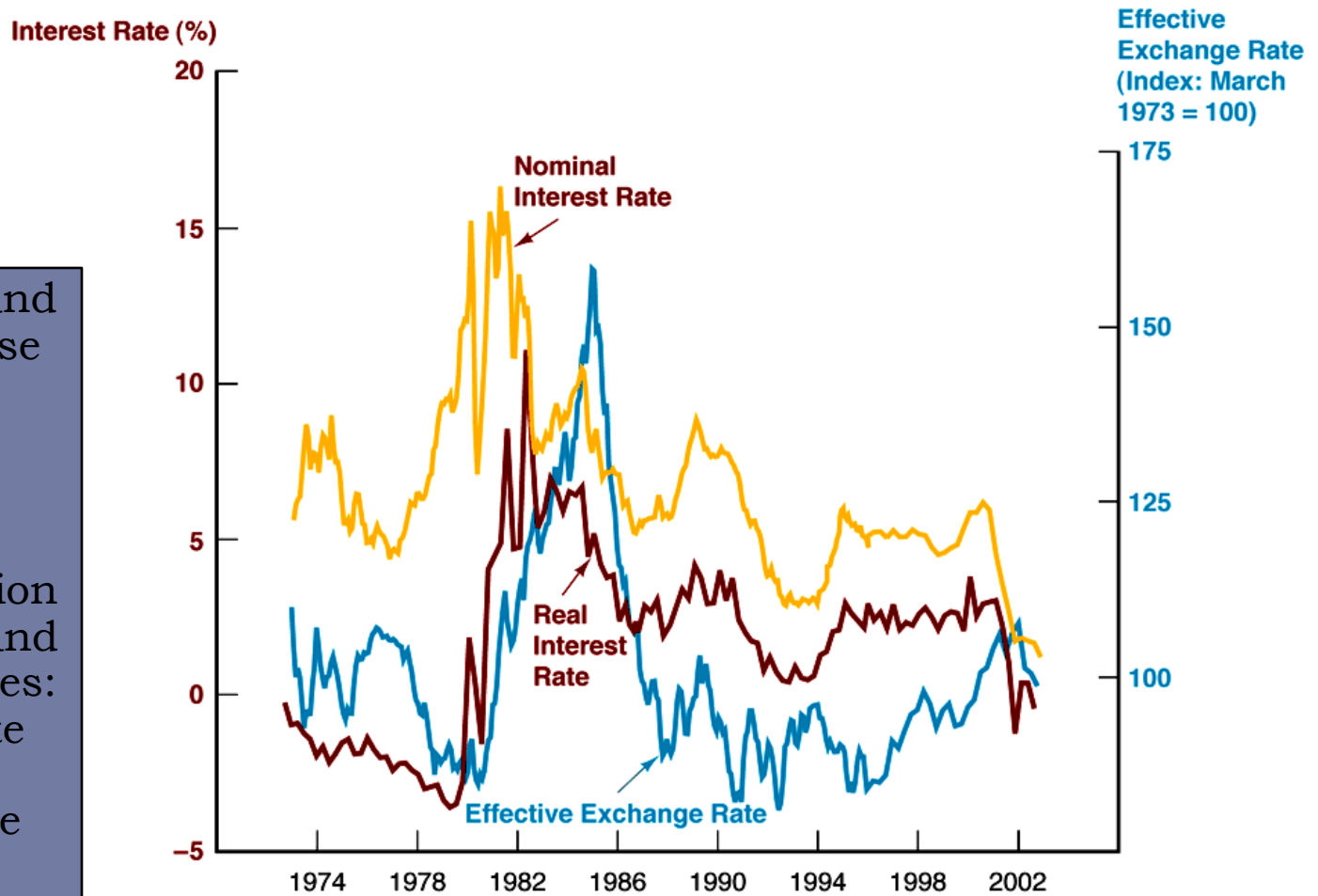
†Relative to other countries.

Note: Only increases (↑) in the factors are shown; the effects of decreases in the variables on the exchange rate are the opposite of those indicated in the “Response” column.

Basic Principle: If factor increases demand for domestic goods relative to foreign goods, E ↑

The Dollar and Interest Rates

1. Value of \$ and real rates rise and fall together, as theory predicts
2. No association between \$ and nominal rates: \$ falls in late 70s as nominal rate rises



Exchange rates in the short run

- ▶ Look at factor determining day-to-day change in exchange rate.
- ▶ Exchange rate is the price of domestic assets (bank deposits, bonds, equities, etc. denominated in domestic currency) in terms of foreign assets.
- ▶ Over short period, decision to hold domestic or foreign assets have much greater role in exchange rate determination than demand for exports and imports does.



Comparing expected return on domestic and foreign assets

- ▶ Theory of asset demand suggest that the most important factor affecting the demand for domestic (dollar) assets and foreign (euros) asset is the expected return on these assets relative to each other.
- ▶ When the expected return on dollar asset is higher relative to return on foreign asset, there is higher demand for dollar assets and corresponding lower demand for euros assets.



Expected Returns and Interest Parity

Investors must convert returns into currency unit they use ($E = \text{€} / \text{\$}$).

- ▶ Interest return on \$ asset, in term of \$ (i^D)

$$i^D = i^F - (E_{t+1}^e - E_t) / E_t$$

- ▶ Interest return on € asset, in term of € (i^F)

$$i^F = i^D + (E_{t+1}^e - E_t) / E_t$$

	R^e for	
	European	American
\$ Deposits	$i^D + (E_{t+1}^e - E_t) / E_t$	i^D
€ Deposits	i^F	$i^F - (E_{t+1}^e - E_t) / E_t$
Relative R^e	$i^D - i^F + (E_{t+1}^e - E_t) / E_t$	$i^D - i^F + (E_{t+1}^e - E_t) / E_t$

Interest Parity Condition: \$ and € deposits perfect substitutes

Example:

if $i^D = 10\%$ and expected appreciation of \$,
 $(E_{t+1}^e - E_t) / E_t = 5\% \Rightarrow i^F = 15\%$ (expected return on \$ deposit,
in term of €)

Interest parity condition

- ▶ Assume that financial assets are perfect substitute (similar risk and liquidity) and there is capital mobility.
- ▶ If the expected return on dollar assets is above that on foreign assets, both local and foreigner will want to hold only dollar assets and will be unwilling to hold foreign assets.
- ▶ In the end, there will be no difference in expected returns

$$i^D = i^F - (E_{t+1}^e - E_t) / E_t$$

- ▶ If $i^D > i^F$, there is positive expected appreciation of foreign currency, which compensates for the lower foreign interest rates.
 - ▶ Hence, interest parity simply means the expected return are the same on both domestic and foreign assets
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Demand and supply for domestic asset

- ▶ Determinant of the demand curve is the relative expected return of domestic assets.
- ▶ Relative expected return equals the difference between interest rate paid on dollar asset and interest rate paid on foreign asset, plus the expected appreciation of dollar.

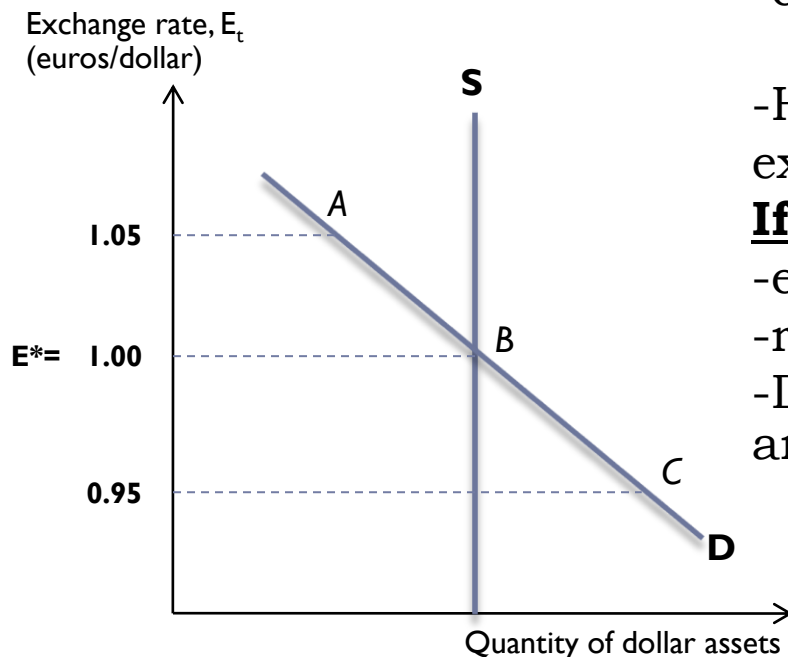
$$\text{Relative expected return} = i^D - i^F + (E_{t+1}^e - E_t) / E_t$$



Demand and supply for domestic asset

**Suppose domestic and foreign interest rate are both 5%
(expected interest differential is zero)**

Expected exchange rate next period (E_{t+1}^e) is 1 €/\$.



If current exchange rate is 1.05 €/€;

-expected appreciation of dollar $= (1 - 1.05) / 1.05 = -4.8\%$

-Holding dollar asset give negative relative expected return. Demand for \$ asset will be low.

If current exchange rate is 1.00 €/€;

-expected appreciation of dollar is zero.

-relative expected return is zero.

-Dollar asset are now a better deal, amount of dollar asset demand is higher

If current exchange rate is 0.95 €/€;

-expected appreciation of dollar and relative expected return of dollar asset $= (1 - 0.95) / 0.95 = 5.2\%$

-Demand for \$ asset rise even further.

Demand and supply for domestic asset

► Demand curve:

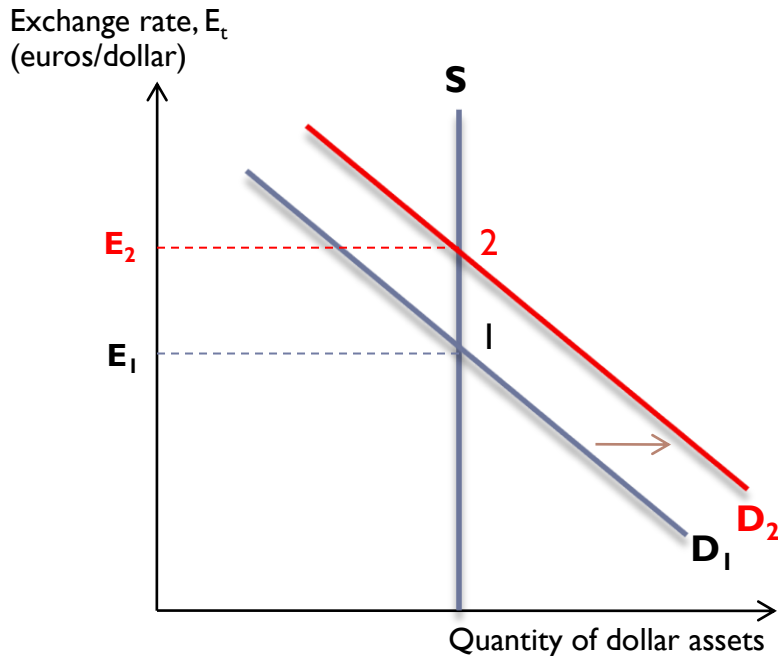
- Downward sloping: the current exchange rate (E_t) $\downarrow \rightarrow$ expected appreciation of dollar $(E_{t+1}^e - E_t)/E_t \uparrow$, $\rightarrow$ expected return on dollar asset relative to foreign asset $\uparrow \rightarrow$ quantity demand for dollar asset $\uparrow$

► Supply curve:

- Vertical line: quantity supply at any exchange rate does not change.
- Excess supply of \$ asset $\rightarrow$ \$ depreciate until point B
 - Excess demand for \$ asset $\rightarrow$ \$ appreciate until point B



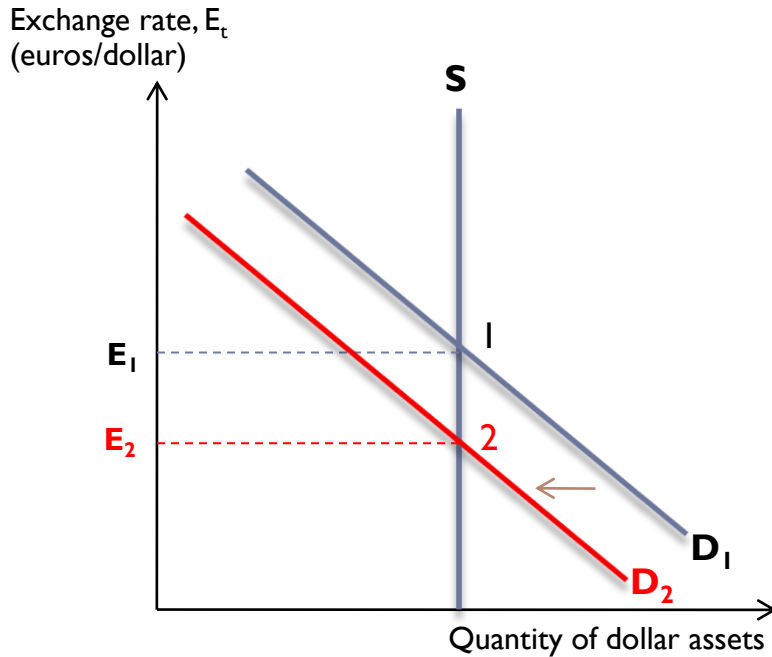
Factors determining relative expected return of dollar assets are:



1. Domestic interest rates, i^D

$i^D \uparrow \rightarrow$ return on dollar asset relative to foreign asset $\uparrow \rightarrow$ demand for domestic asset shift right $\rightarrow$ domestic currency appreciate

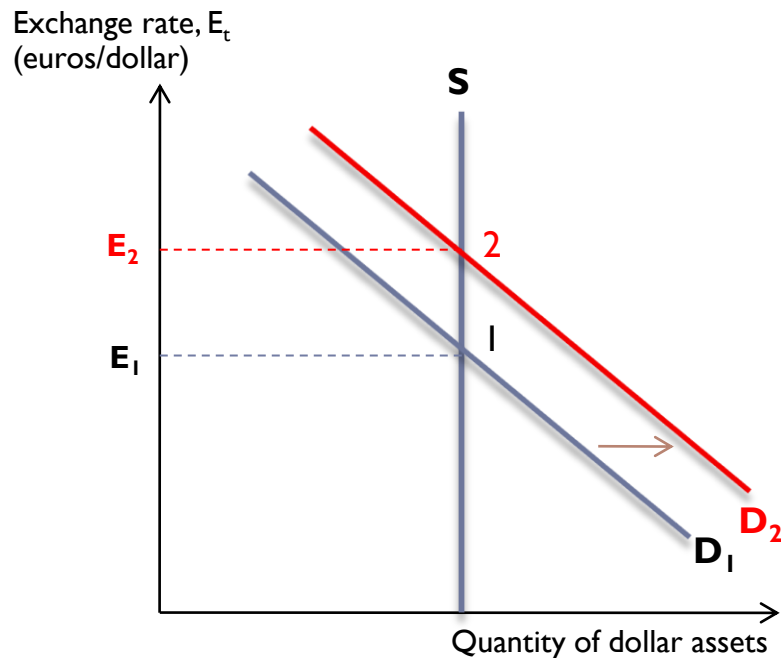
Factors determining relative expected return of dollar assets are:



2. Foreign interest rates, i^F

$i^F \uparrow \rightarrow$ return on foreign asset relative to dollar asset $\uparrow \rightarrow$ demand for domestic asset shift left $\rightarrow$ domestic currency depreciate

Factors determining relative expected return of dollar assets are:



3. Expected future exchange rates, E_{t+1}^e

Demand for domestic asset depend on future resale price.

Expected appreciation of dollar $\uparrow \rightarrow$

Relative expected return on dollar asset $\uparrow$

$\rightarrow$ demand for domestic asset shift right

$\rightarrow$ domestic currency appreciate

Factors influence expected future exchange rate are:

1. relative price level,
2. relative trade barrier,
3. import & export demand,
4. relative productivity

Factor determining exchange rate in short run

Factor	Change in factor	Change in Quantity demand of domestic assets at each exchange rate	Response of exchange rate, E_t	Shift of the demand curve
Domestic interest rates	↑	↑	↑	R
Foreign interest rates	↑	↓	↓	L
Expected domestic price level	↑	↓	↓	L
Expected trade barriers	↑	↑	↑	R
Expected import demand	↑	↓	↓	L
Expected export demand	↑	↑	↑	R
Expected productivity	↑	↑	↑	R



Application: effect of changes in interest rates on equilibrium exchange rate

- ▶ Fisher equation: nominal i^D = real i^D + expected inflation

1. Increasing nominal i^D due to real interest rate $\uparrow$

- expected inflation is unchanged $\rightarrow$ expected appreciation of \$ is unchanged
- relative expected return of dollar asset $\uparrow \rightarrow$ dollar asset demand $\uparrow \rightarrow$ demand curve shift right $\rightarrow$ dollar appreciate

2. Increasing nominal i^D due to expected inflation $\uparrow$

- Expected appreciation of dollar $\downarrow \rightarrow$ typically its effect is larger than nominal $i^D \uparrow \rightarrow$ relative expected return on dollar asset $\downarrow \rightarrow$ demand curve shift to the left $\rightarrow$ domestic currency depreciate

