Portfolio balance approach and the interest rate parity

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Rate of return from different assets

- The demand for various foreign currency deposits varies depending on the rate of return derived from them converted to a common currency → how the investor makes the decision?

- Suppose that an investor has a million PLN that wants to invest for 6 months. Following are the options:

  o Investment in PLN bearing interest rate of 8% p a.
  o Investment in the euro with interest rate of 4% p a.
  o The current rate is PLN / EUR 3.93
  o The investor expects that in six months, the rate will be equal to PLN / EUR 3.98

- To make a rational decision the investor must compare the actual rate of return on both investments denominated in the same currency

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Foreign exchange market equilibrium – interest rate parity

- In the equilibrium, the rate of return on domestic assets must equal the rate of return on foreign assets: the national interest rate equals the foreign interest rate plus the expected rate of appreciation of foreign currency (depreciation of home currency)
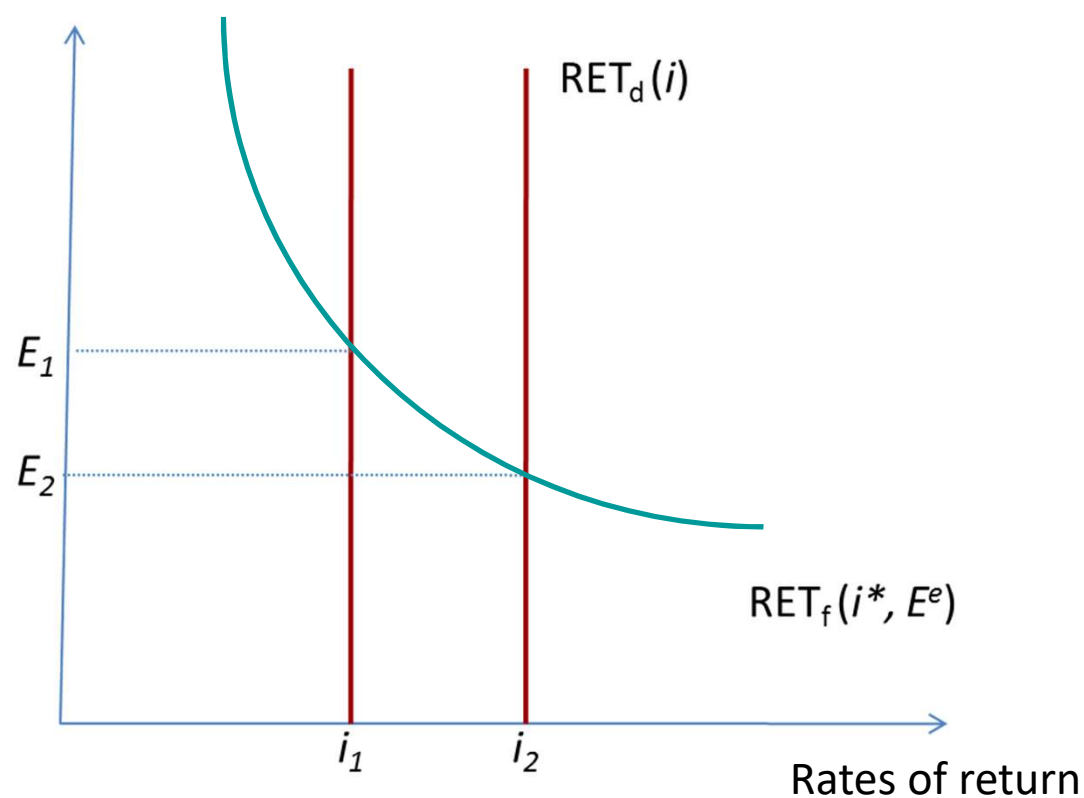
- Covered interest rate parity:

$$1+i = \frac{1}{E}(1+i^*)E^F \Rightarrow i = i^* + \frac{E^F - E}{E}$$ where E^F is forward exchange rate

- Uncovered interest rate parity:

$$1+i = \frac{1}{E}(1+i^*)E^e \Rightarrow i = i^* + \frac{E^e - E}{E}$$

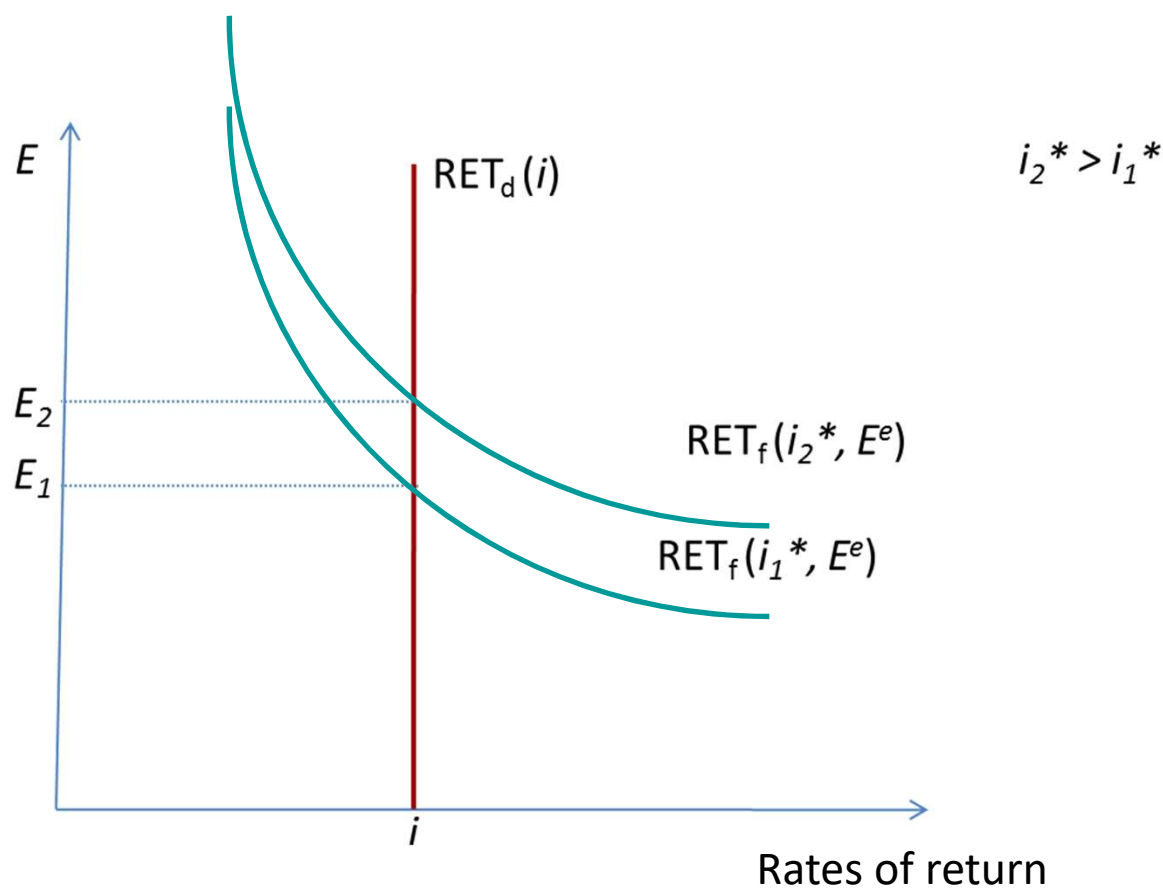where E^E is expected exchange rate

IRP as a model of current exchange rate: growth of *i*

IRP as a model of current exchange rate: growth of i^* and E^e

Adding money market equilibrium

- Exchange rate model based on the IRP can easily be extended by posing the question: what determines the interest rate?

- The interest rate is determined at the money market

- Having said that, we can better understand the factors determining the exchange rate in the short term

- Aggregated demand for money may be expressed as:

$$M^d = P \times L(i, Y)$$

where:
- P is a price level
- Y real GDP
- i is nominal interest rate
- $L(i, Y)$ aggregated demand for money in real terms

or:

$$M^d/P = L(i, Y)$$

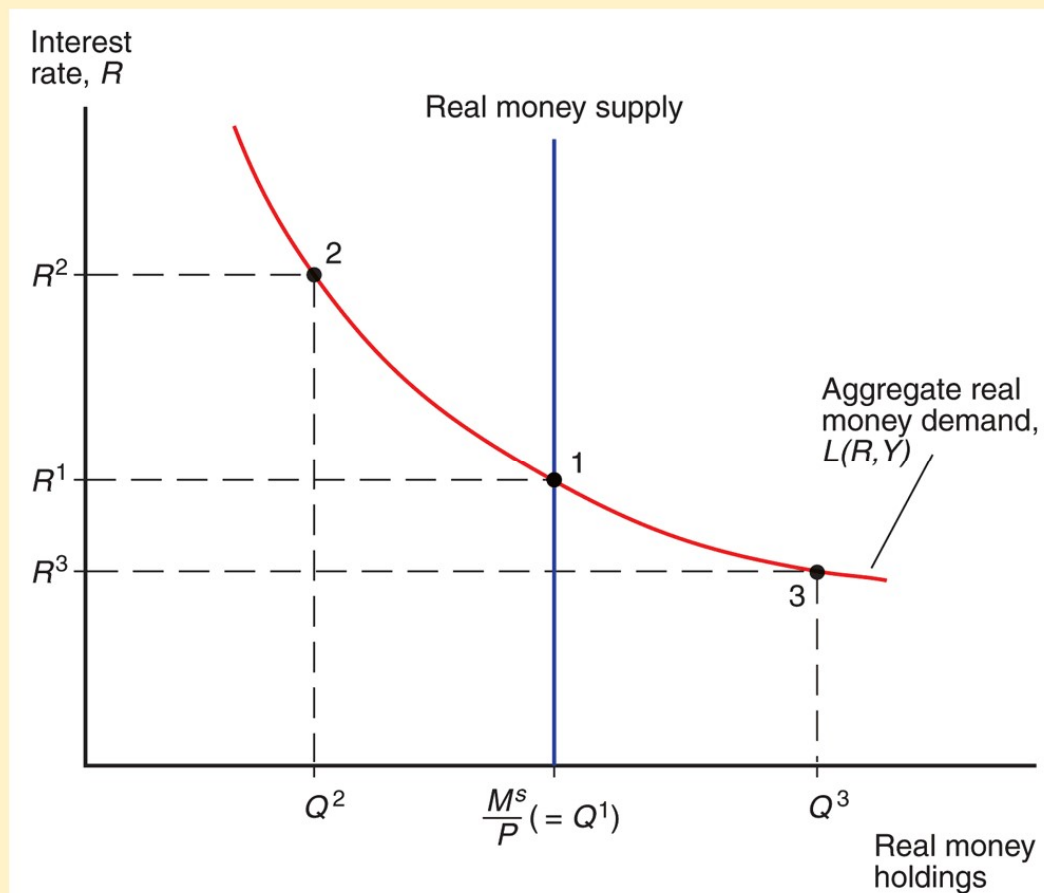- Real demand for money is a function of the interest rate and real GDP

Money market equilibrium

Figure 14-3

Determination of the Equilibrium Interest Rate

With P and Y given and a real money supply of M^s/P, money market equilibrium is at point 1. At this point aggregate real money demand and the real money supply are equal and the equilibrium interest rate is R^1.
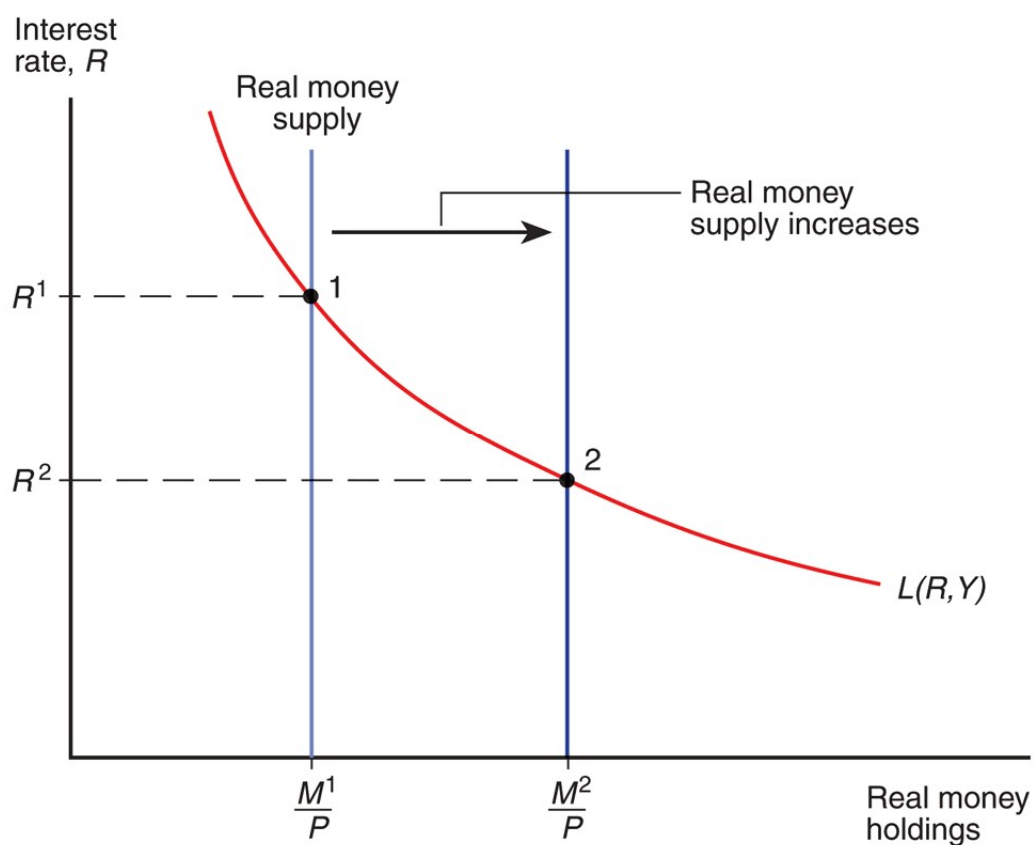
Change in money supply

Figure 14-4

Effect of an Increase in the Money Supply on the Interest Rate

For a given price level, P, and real income level, Y, an increase in the money supply from M^1 to M^2 reduces the interest rate from R^1 (point 1) to R^2 (point 2).
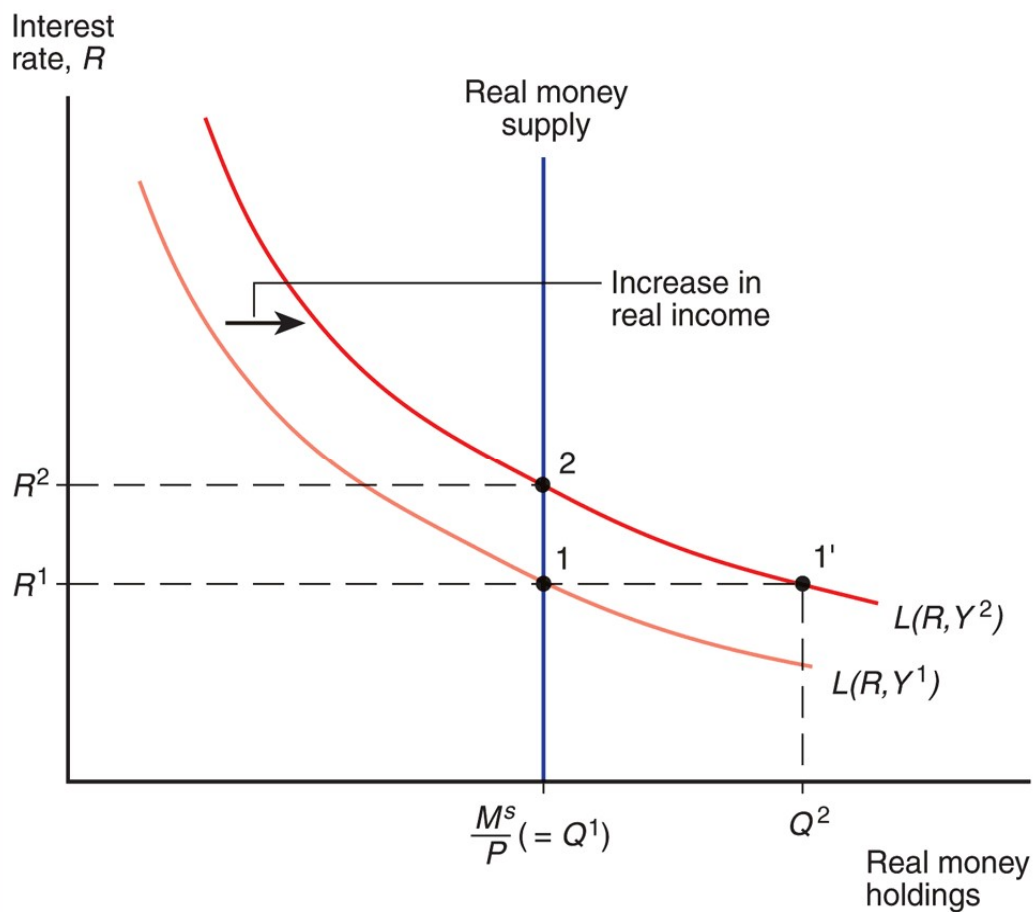
Change in GDP

Figure 14-5

**Effect on the Interest Rate of a Rise in Real Income**

Given the real money supply, $M^s/P(=Q^1)$, a rise in real income from Y^1 to Y^2 raises the interest rate from R^1 (point 1) to R^2 (point 2).

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Link between money market and foreign exchange market

- Since domestic interest rate can be considered as a rate of return on domestic assets than any change in money market equilibrium affects the domestic rate of return level.
- The intersection of domestic rate of return curve and foreign rate of return curve determines the spot exchange rate in equilibrium (assuming that interest rate parity holds).
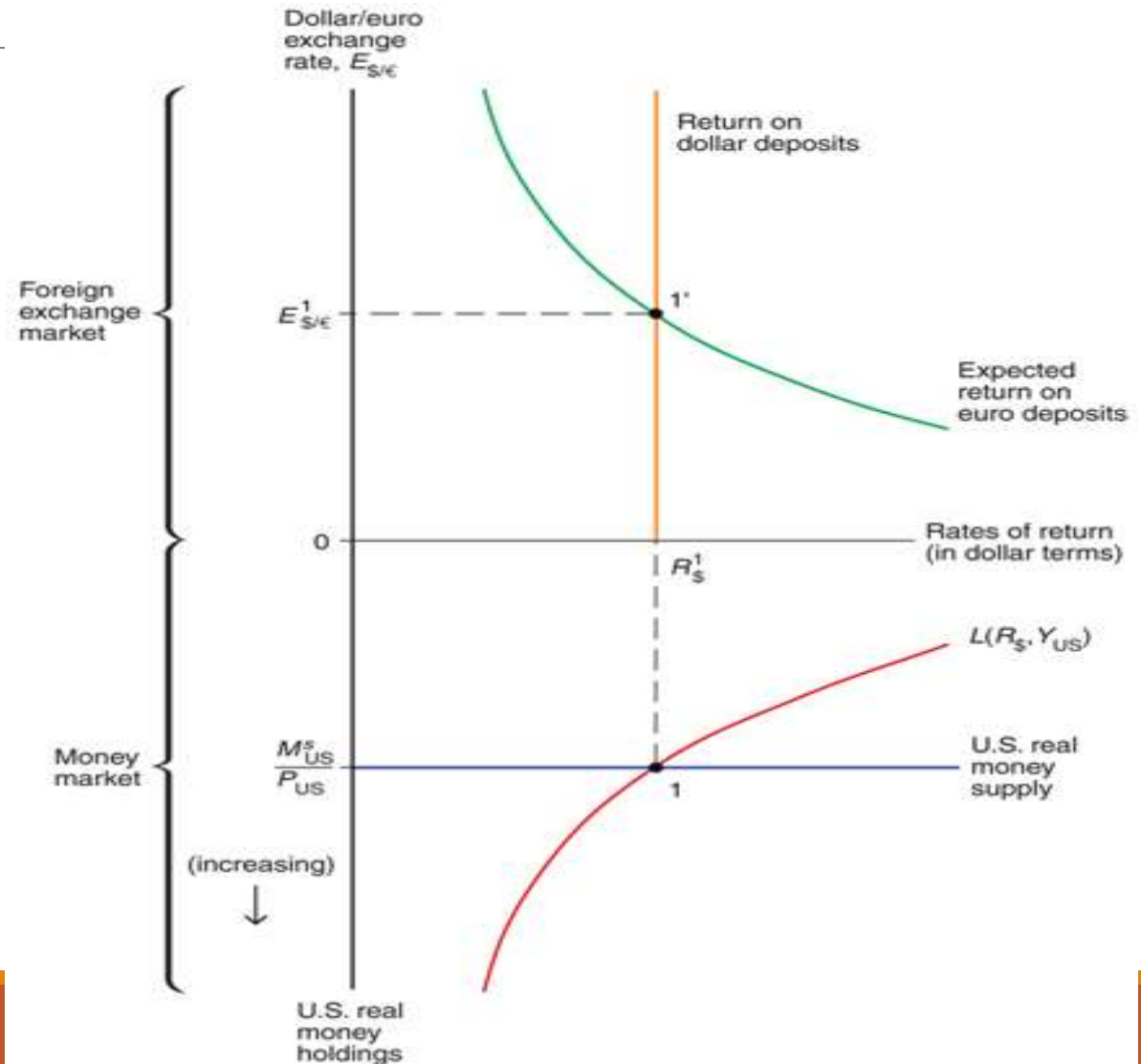
Question 1. Calculate the dollar rates of return on the following assets:

- A rare stamp whose price grows from $1500 to $2200;

- A bottle of a rare Burgundy, Domaine de la Romanee-Conti 1978, whose price rises from €200 to €250 between 1999 and 2000. At the same time € appreciates against $ by 5%;

- A painting whose price rises from 100000 GBP to 115000 GBP in a year while the exchange rate turns from 1.60 $/£ to 1.50 $/£;

- A deposit in a London bank in a year when the interest rate on pounds is 4.5% percent and the $ depreciates against the £ by 10%.

Question 2. The one year Treasury bill rate in the U.S. is 5%, and the one year rate in the UK is 8%. The current spot rate (E) is 1.60 $/£ and the one year forward rate (E^F) is 1.568 $/£.

a) Does interest rate parity hold? Show your work

b) Individual A in the U.S. has $100,000 to invest for one year. Compare how much they would have at the end of one year by investing $100,000 in the U.S., compared to investing $100,000 in the U.K. for one year, using a one-year forward contract to cover currency risk.

c) How would covered interest rate arbitrage restore interest rate parity? Address each of the four variables (S, F, i_{US} and i_{UK}) indicate the direction of the change.

d) Go back to the analysis in part b, and assume that investing in the U.K. at 8% involves a commission to buy the one-year security of 0.5% of the $100,000 investment (payable in dollars to a broker in the U.S.), and that there is a fixed fee of $350 to arrange the forward contract to sell the pounds in one year. Investing in the U.S. at the 5% interest rate includes all commissions and fees. Which country would you now invest in?

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Question 3. The current ex-rate for the British pound is 1.67 $/£. Interest rates for one year bank CDs are 4% in the U.S. and 8% in the U.K. Assuming interest rate parity holds, what are the expected forward rates for the British pound in 90 days, 180 days, and in one year?

Question 4. In the table below you can find the 90-day spot and forward exchange rates of $/€ and $/CAD, as well as yearly interest rates in Germany and Canada.

	Germany	Canada
Spot	1.2541	0.8799
Forward	1.2600	0.8822
i per annum	3.48%	4%

a) What should be the 90-day interest rate in the US in order that US investor receives the highest rate of return investing in domestic assets (as compared with foreign assets).

b) If the spot rate change the way that interest rate parity holds, what spot rate of CAD/€ should be expected the next day?

<u>Question 5.</u> Use (uncovered) interest rate parity to explain why it might not be the deal of a lifetime to lend to the Reserve Bank of Zimbabwe, where deposits earn several thousand percent (nominal) interest.

<u>Question 6.</u> Please, verify the following statement: if the uncovered interest rate parity holds, other things remaining constant, an increase in the U.K. nominal interest rate will increase the current value of the U.S. dollar against the British pound.

<u>Question 7.</u> Lets assume that the interest rate parity holds. Using graphical presentation of the interest rates parity model, explain how would the following influence the spot exchange rate:
a) a decrease in home interest rate (i_{HC});
b) an increase in foreign interest rate (i_{FC});
c) a decrease in expected exchange rate ($E^e_{HC/FC}$)

Question 8. Let's suppose again that the interest rate parity holds. Using graphical presentation of the interest rates parity model and the monetary market model (both on the same chart), explain how would the following influence the spot exchange rate:

a) an increase in foreign income;

b) an increase in home income;

c) an increase in nominal money supply in home country;

d) an increase in price level in home country;

e) an increase in home elasticity of money demand with respect to the interest rate.