

FETP/MPP8/Macroeconomics/Riedel

Money, Interest Rates and the Exchange Rate

Money, Interest Rates and the Exchange Rate

In the previous lecture we learned that the exchange rate between two currencies depends on interest rates in the two countries. The natural next question, is what determines interest rates in the two countries? The answer, as we will see, is the money supply and demand. Why money supply and demand? Because the interest rate is, in effect, the price of money and so like every price, its equilibrium value depends of supply and demand.

In this lecture we discuss the following issues:

1. What is money?
2. What determines the supply of money?
3. What determines the demand for money?
4. How does money supply and demand influence the exchange rate?
5. How is the relation between money, interest rates and exchange rates different in the short-run and the long-run?

What is money?

Money is a financial asset, like bonds, but it is different from bonds in that it is a much more liquid asset than a bond. It can easily be used as a means of payment for goods and services without the high transactions cost involved if you had to pay for this with bonds, stocks or other illiquid assets.

There is no one definition of money, but rather several definitions each of which is successively broader:

- CC = Currency in circulation (coins and fiat money)
- M1 = CC + checking deposits + debit card accounts
- M2 = M1 + saving and time deposits + certificates of deposit
- M3 = M2 + money market funds + other larger liquid deposits

What money is used for:

- Means of payment (superior to other less liquid assets)
- Store of wealth (inferior return compared to other less liquid assets)
- Unit of account

Money demand

Money demand represents the amount of monetary assets that people are willing to hold (instead of illiquid assets). The aggregate demand for money derives from its several uses:

1. **Income:** Money is demanded in order to facilitate transaction (buying goods at the store, paying the rent, etc.). The amount of money demand for transactions purposes depends on the volume of transactions, which is closely related to the size of the economy, i.e. real national income ($Y = \text{GNP}$). Therefore, as Y goes up the demand for money goes up.
2. **Prices:** The price (P) of goods and services influences the transactions demand for money since the higher the price level the more money will be needed to buy the same amount of goods and services. Therefore, as P goes up the demand for money goes up.
3. **Interest rates:** Since monetary assets pay little or not interest, the interest rate on non-monetary assets (like bonds) is the opportunity cost of holding monetary assets. Therefore, the higher the interest rate the lower the demand for money.

Money demand

The aggregate demand for money can be express by the following equation:

$$M^D = P \times L(R, Y)$$

where:

P is the price level

Y is real national income

R is the interest rate on non-monetary assets

$L(R, Y)$ is the aggregate demand for real monetary assets

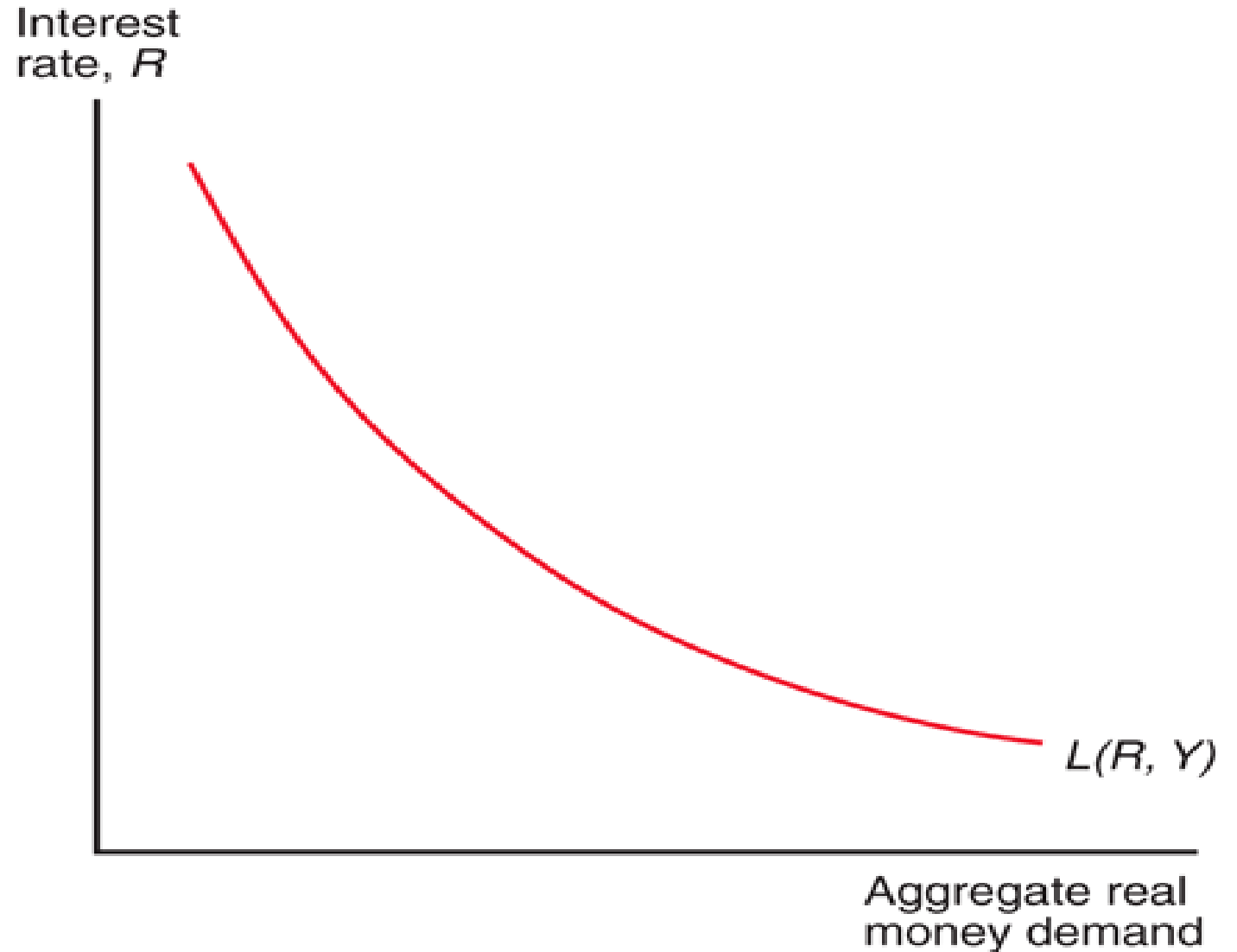
Alternatively:

$$M^D / P = L(R, Y) \quad \text{where } dL/dR < 0 \quad \text{and} \quad dL/dY > 0$$

In words: the aggregate demand for real money balances is a positive function of real national income (Y) and a negative function of the price level (P).

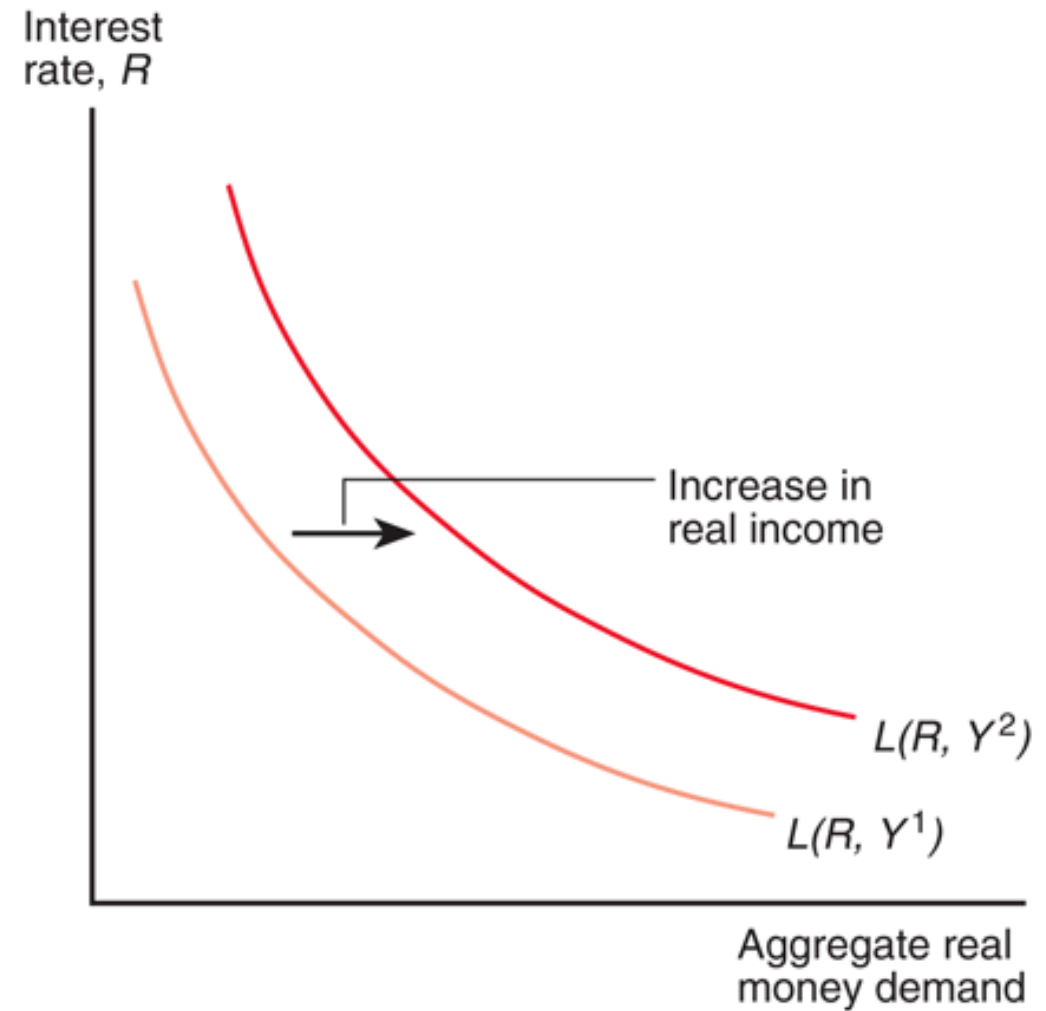
Money demand

This figure shows the relation between the interest rate and aggregate real money demand for a given level of income.



Money demand

This figure shows the effect of a rise in income on the real money demand schedule.



Money market equilibrium

Equilibrium in the domestic money market obtains when money demand (M^D) is equal to money supply (M^S)

$$M^S = M^D$$

Alternatively, when the quantity of real monetary assets matches the quantity of real monetary assets demanded, we have money market equilibrium:

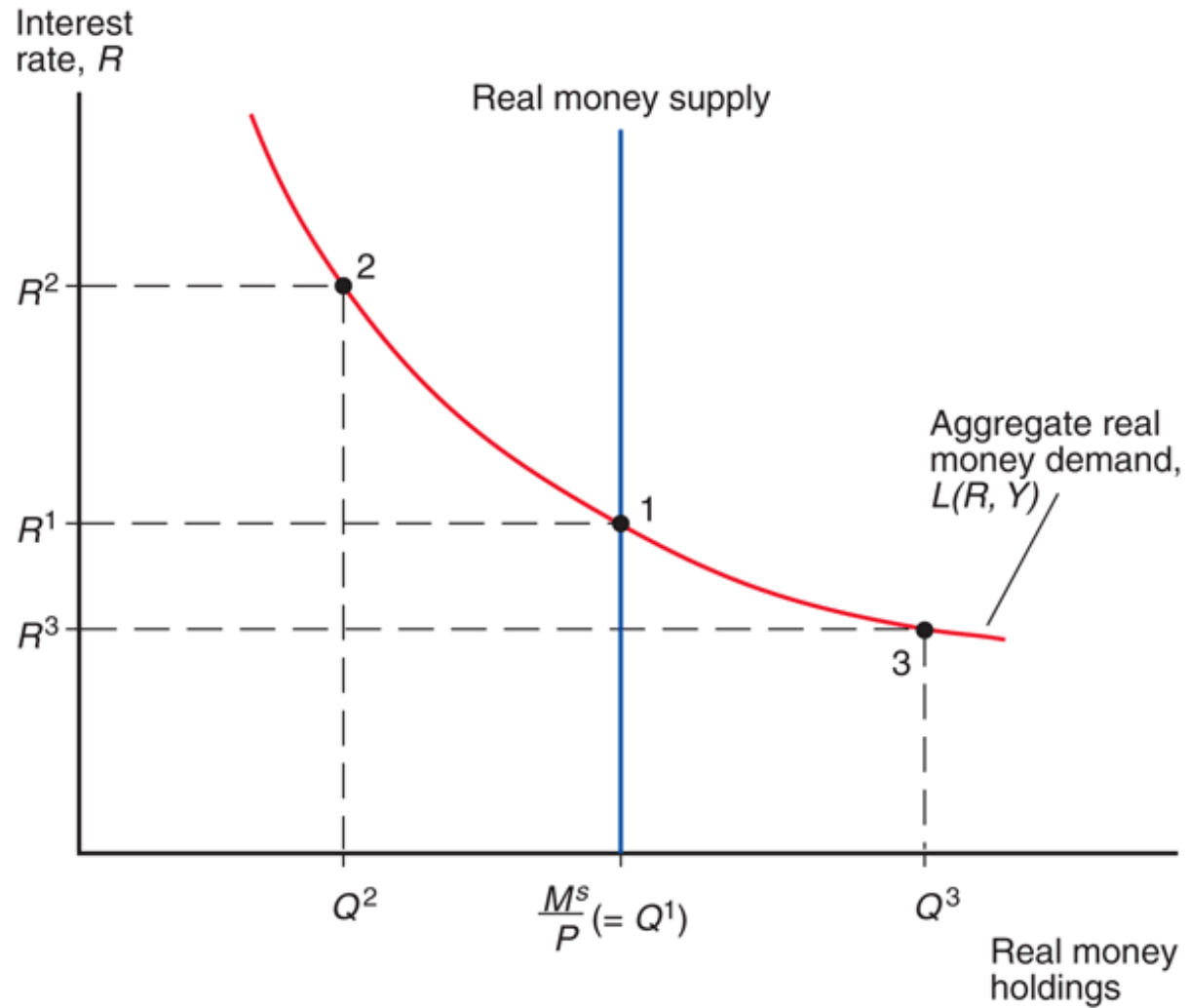
$$M^S/P = L(R, Y)$$

Note:

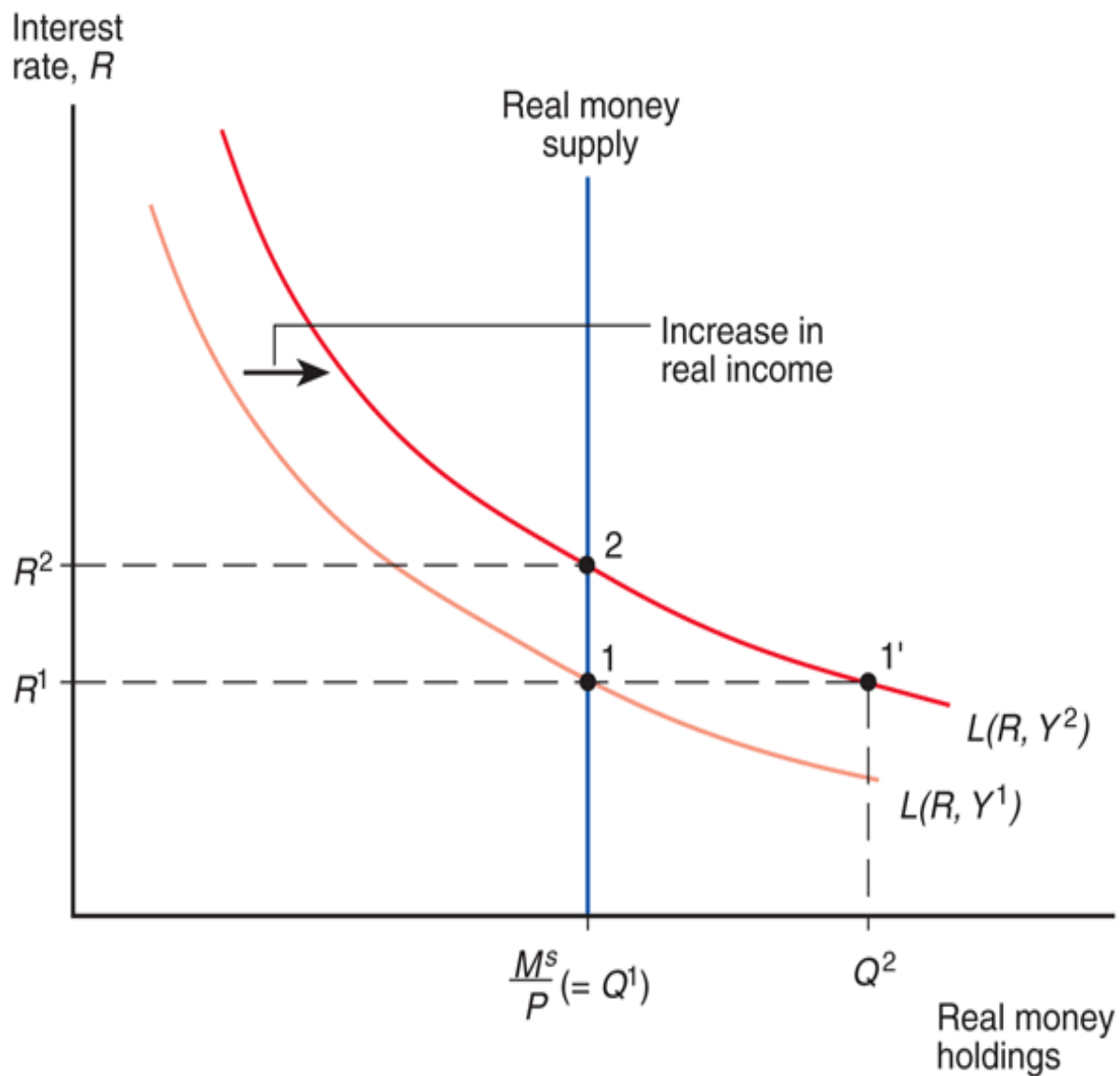
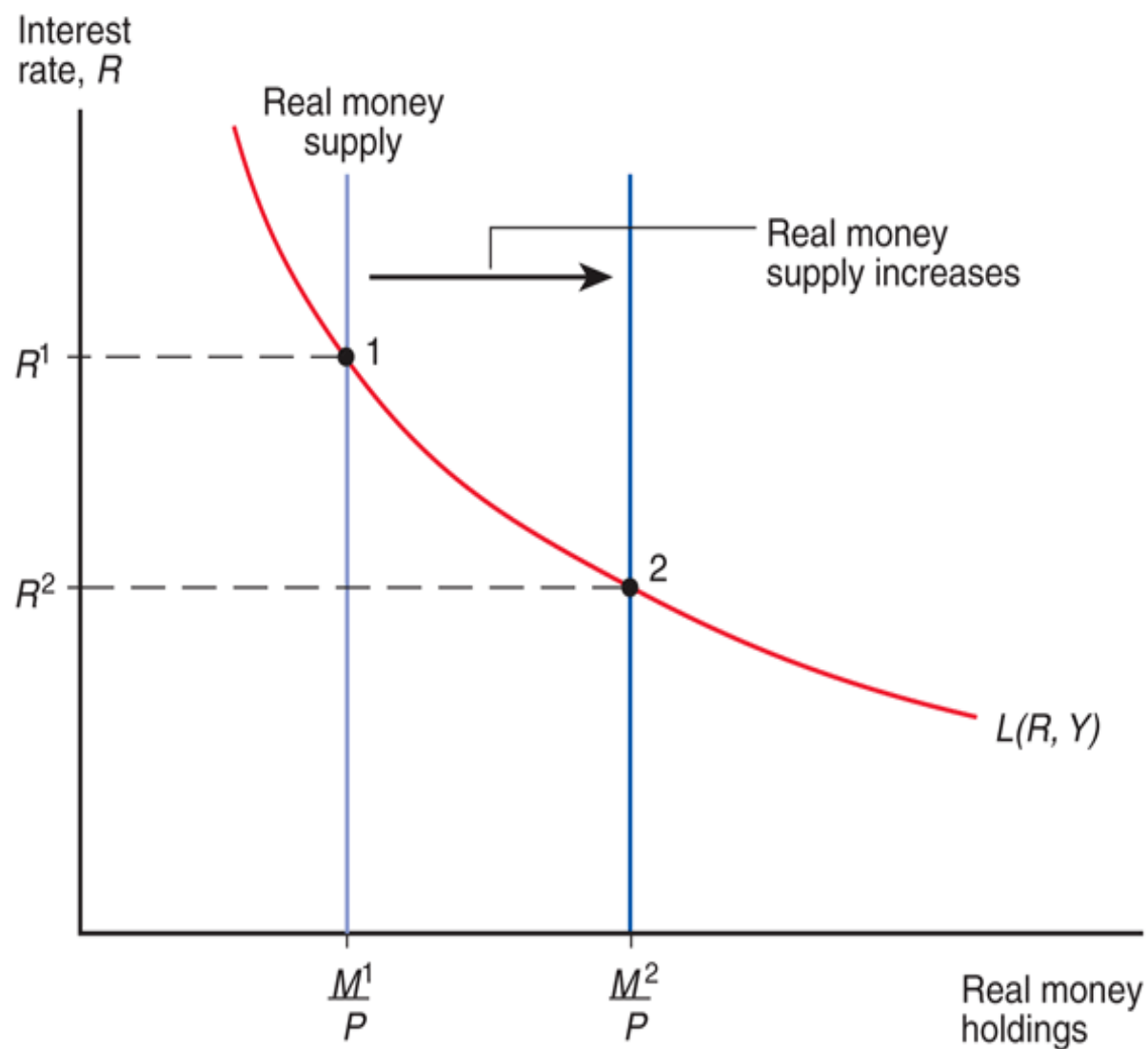
1. When there is an excess supply of monetary assets, there is an excess demand for interest-bearing (non-monetary assets) like bonds and long-term deposits. The excess demand for bond will drive the price of a bond up and the interest rate on a bond down. (R^2, Q^2 in the following slide.)
2. When there is an excess demand for monetary assets, there is an excess supply on non-monetary assets (e.g. bonds). The excess supply of bonds will drive there price down and interest rates up. (R^3, Q^3 in the following slide.)

Money market equilibrium

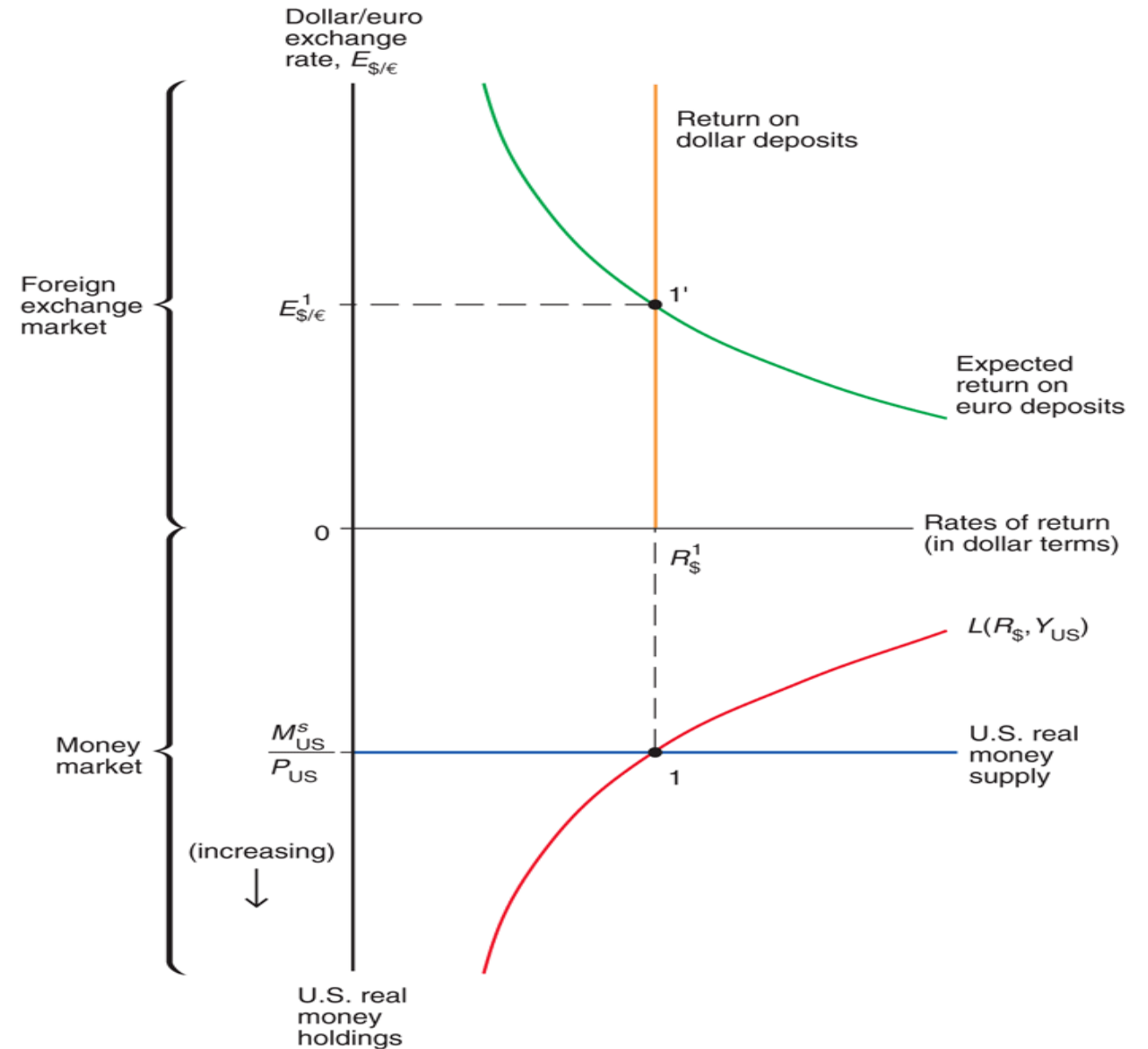
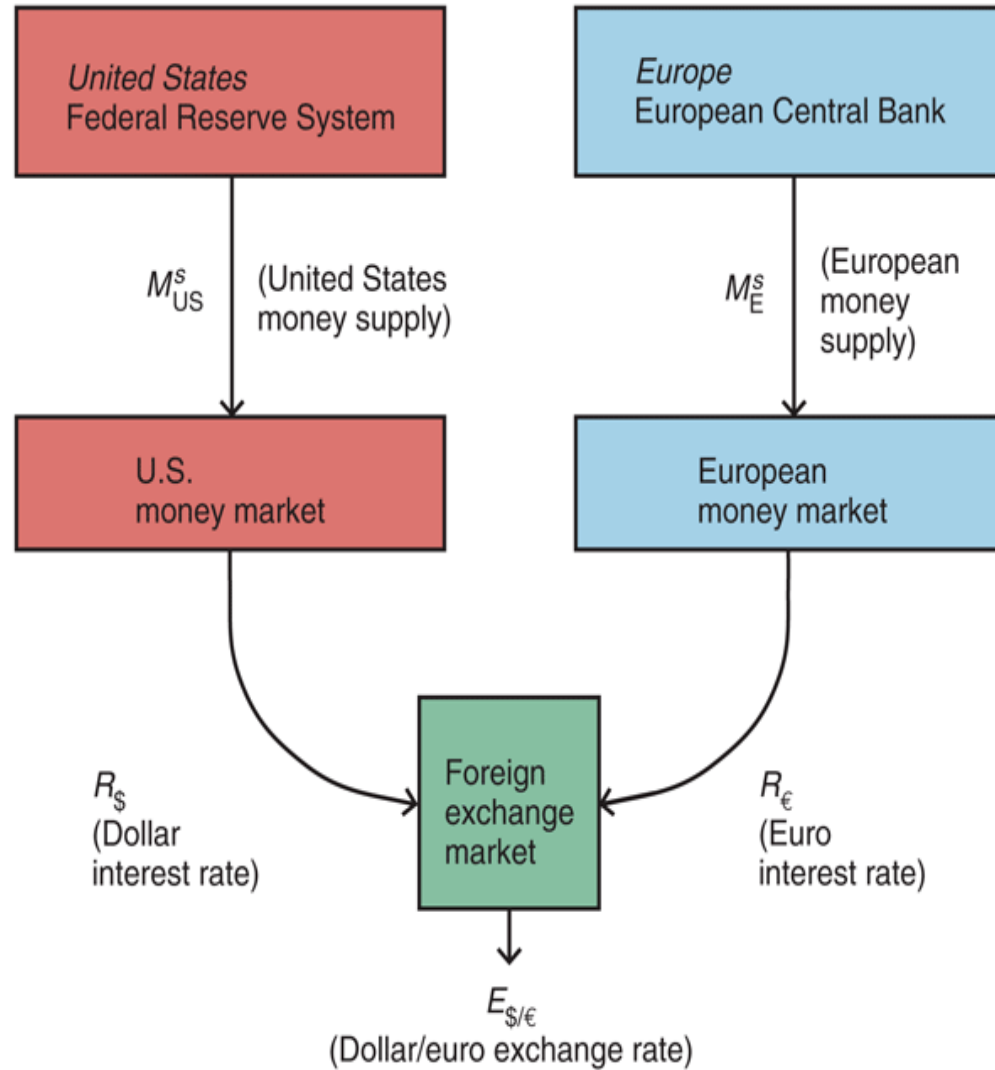
This figure shows the equilibrium interest rate (R^1) for given values of Y , P and M^S .



The effect of an increase in the money supply and the level of real income



Simultaneous Equilibrium in the Money Market and Foreign Exchange Market



The Effect of Monetary Shocks on Money Market and Foreign Exchange Market

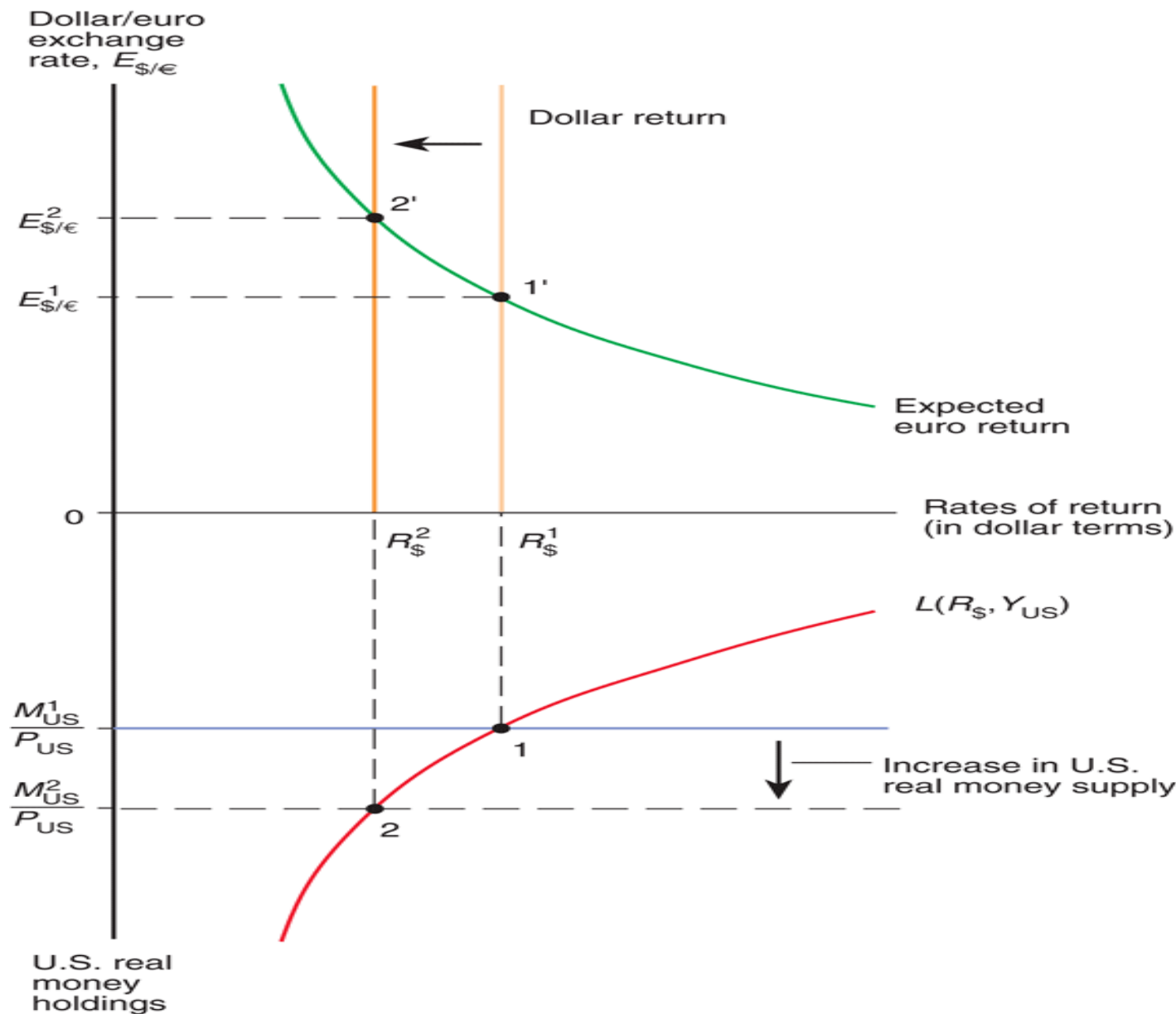
The effect on an increase in the US money supply (all other variables constant) on the interest rate and exchange rate.

$$M^S \uparrow \Rightarrow R \downarrow \Rightarrow E \uparrow$$

A fall in the money supply:

$$M^S \downarrow \Rightarrow R \uparrow \Rightarrow E \downarrow$$

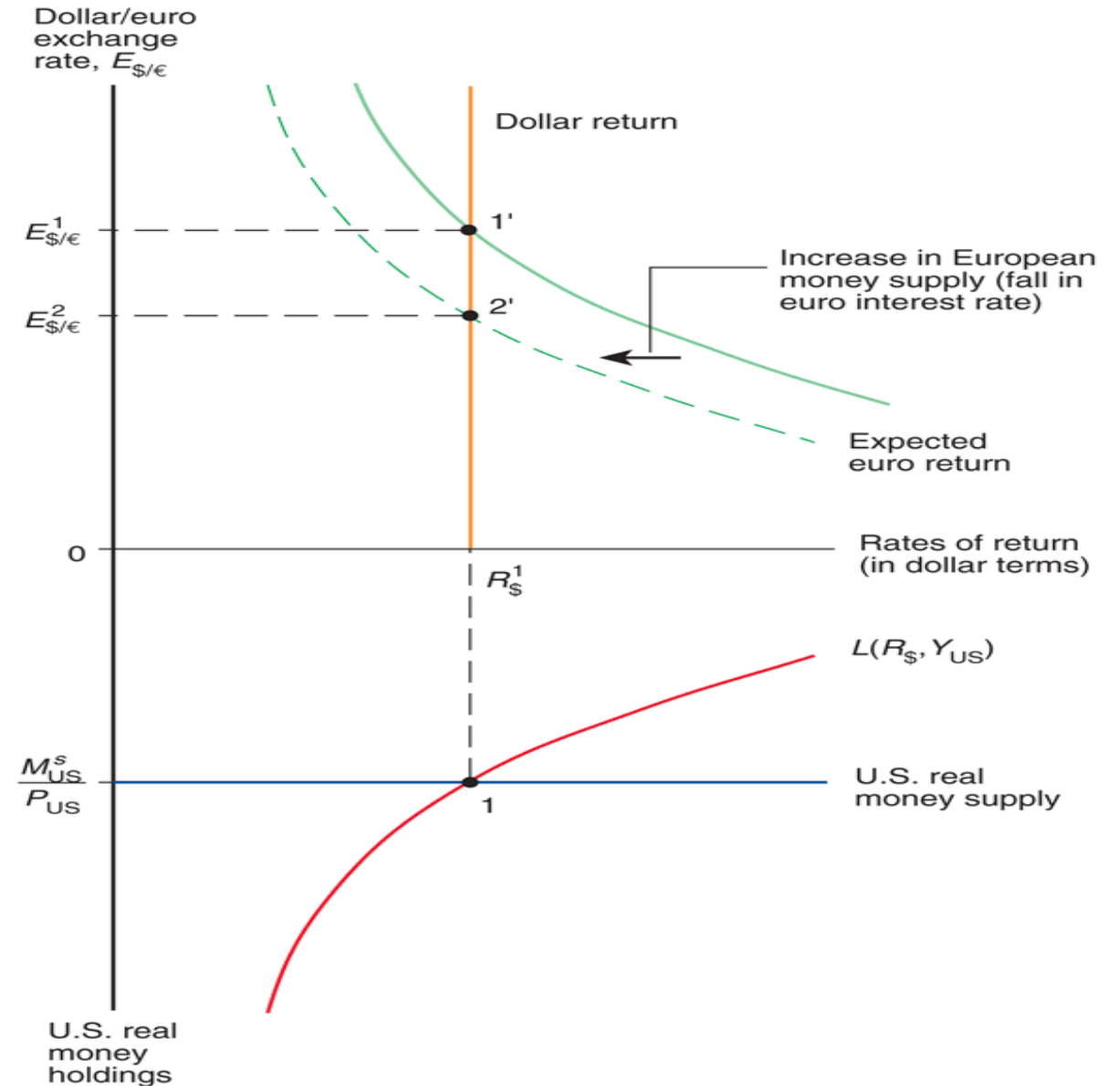
How would a change in the foreign country money supply influence domestic interest rates and the exchange rate?



The Effect of Monetary Shocks on Money Market and Foreign Exchange Market

A rise in the foreign country money supply lowers foreign interest rates, lowering the expected return on foreign assets (shifting UIP curve downward). As a result, with the domestic interest rate given, the domestic currency appreciates.

Note: increase in the foreign money supply does not influence domestic money market, only the foreign exchange market.



Long Run versus Short Run Adjustment

In Macro theory what differentiates the long run from the short run is price flexibility. In the short run, it is assumed that prices are “sticky” (inflexible).

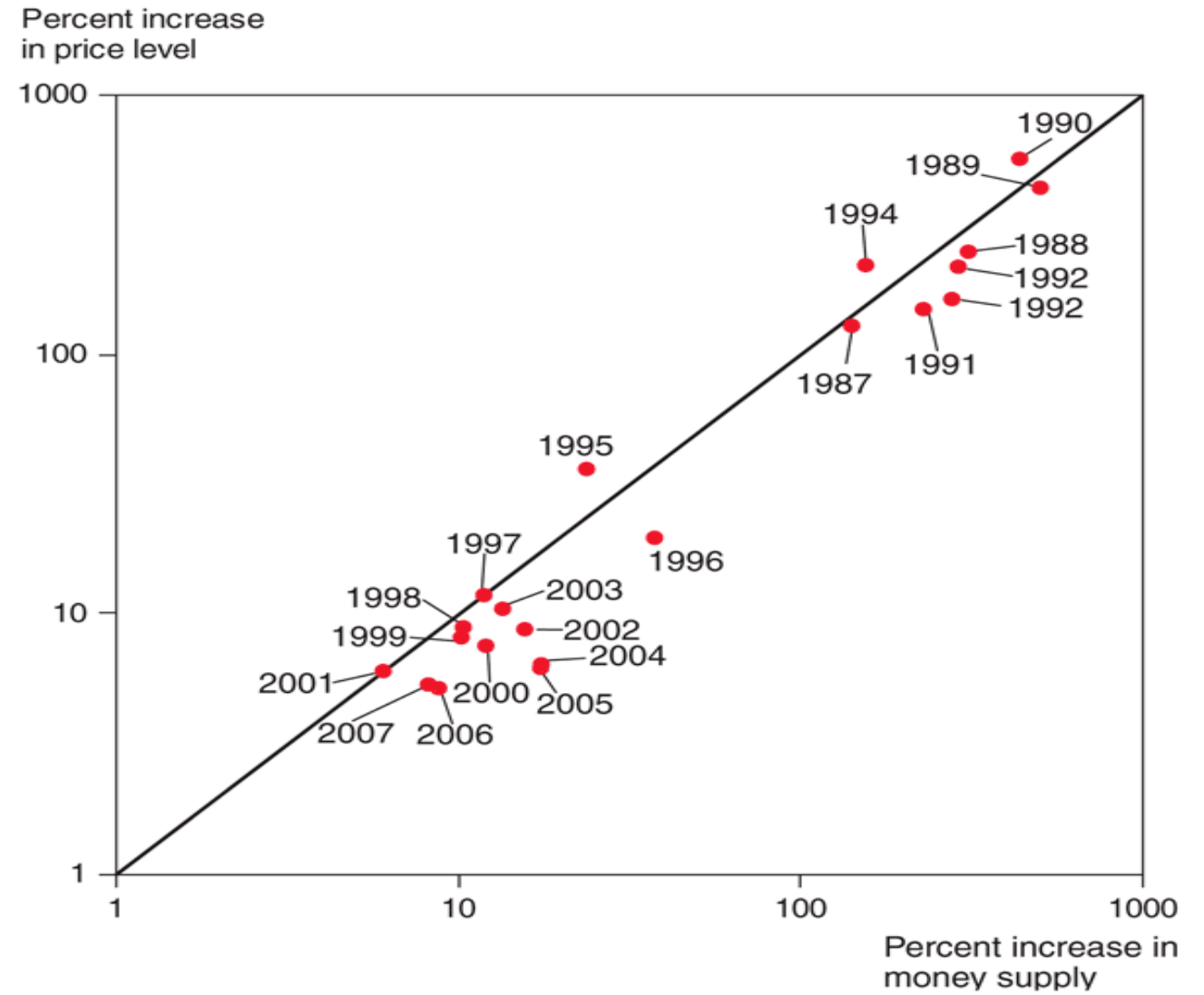
- In the long run, prices adjust to changing market conditions.
- In the long run, the economy is at full employment, so real output (Y) is exogenously determined.
- In the long-run, the real interest rate (the interest rate adjusted for inflation) is not influenced by the supply of money.
- It follows therefore that in the long run the demand for real balances— $L(R,Y)$ —is not affected by money supply.
- In the long run, there is a direct relationship between the inflation rate of changes in the money supply:

$$\begin{aligned}M^S &= P \times L(R, Y) \\P &= M^S / L(R, Y) \\\Delta P / P &= \Delta M^S / M^S - \Delta L / L\end{aligned}$$

The inflation rate equals the money growth rate minus the growth rate in money demand

Money Growth and Inflation

The empirical relationship between money growth rates and inflation in Western Hemisphere Developing Countries averaged over the period 1987-2007 is shown in the adjacent figure



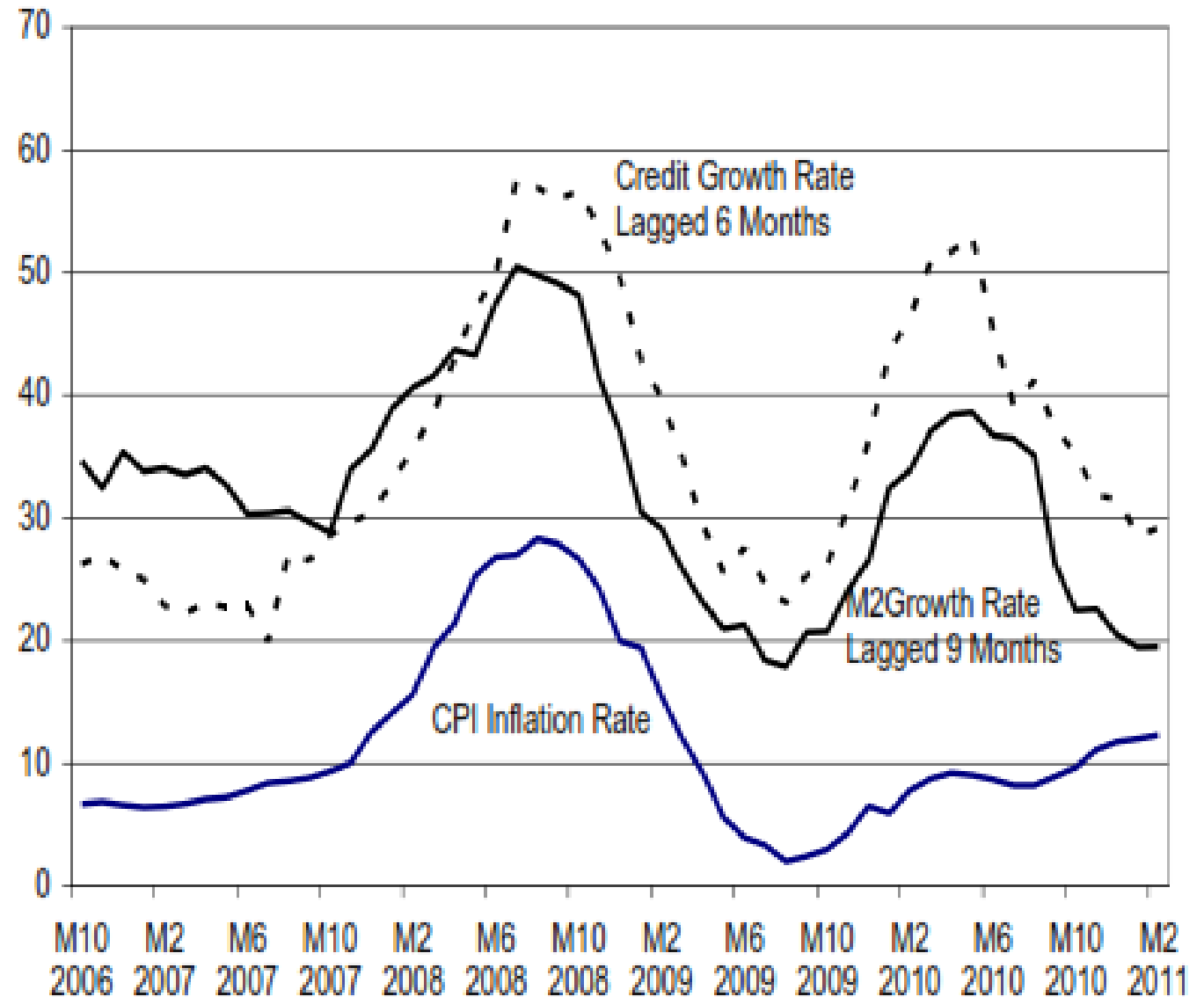
Source: IMF, *World Economic Outlook*, various issues. Regional aggregates are weighted by shares of dollar GDP in total regional dollar GDP.

Money Growth and Inflation in Vietnam

Growth rates of credit and money (M2) lagged to the adjust for the delay in the inflationary effect of money and credit growth.

Money growth and inflation parallel each other, but with about a 20 percentage point spread. What accounts for this spread?

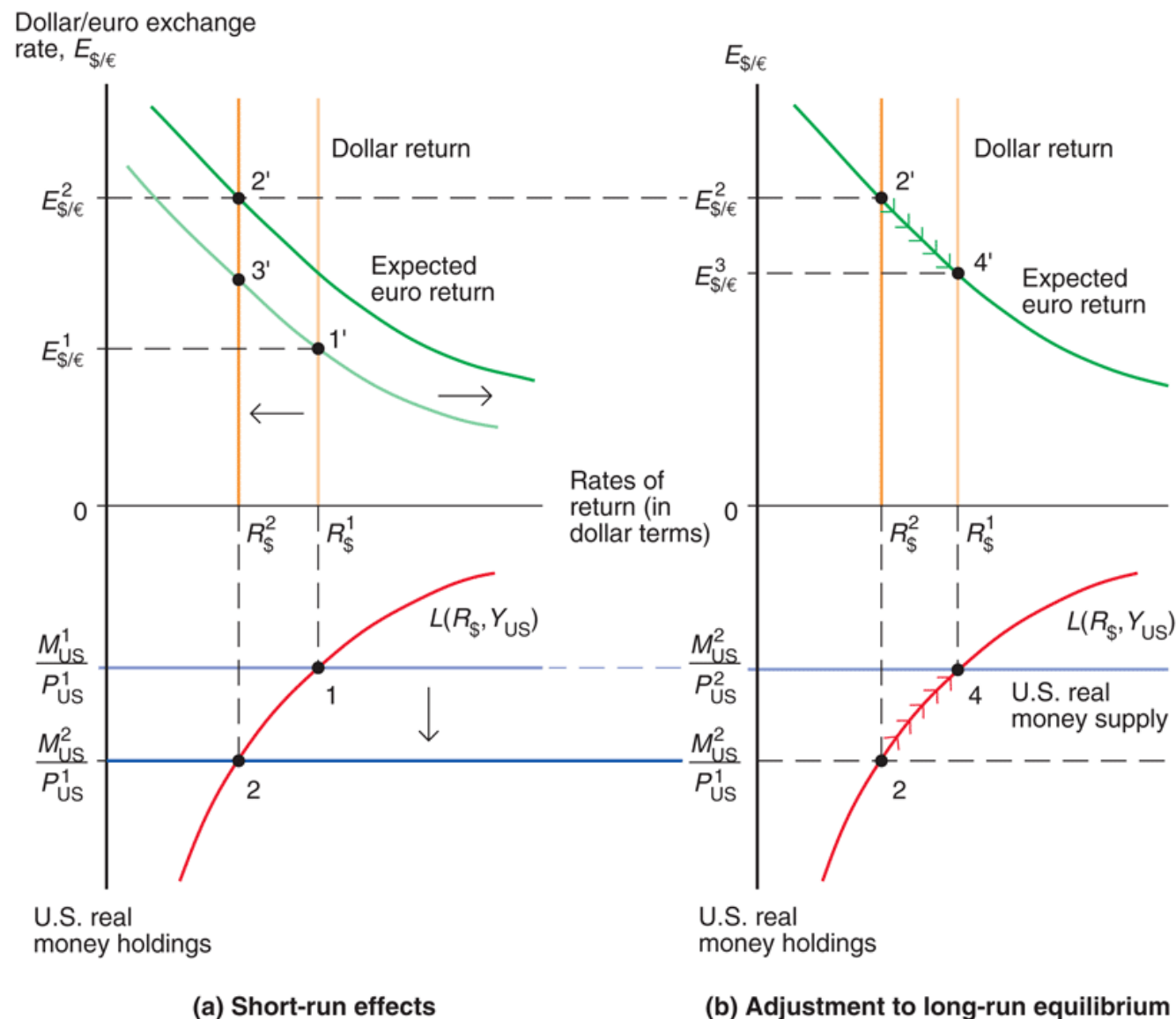
Source: Pham and Riedel, "On the conduct of monetary policy in Vietnam," *Asia Pacific Economic Literature*, 2012



Long Run versus Short Run Adjustment

A permanent increase in the money supply leads to a proportional rise in the price level and a proportional nominal depreciation in the long-run. (Note the real exchange rate is unchanged.)

The dynamics of the model predicts a large depreciation first, and then a smaller subsequent appreciation. This phenomenon is known as “exchange rate overshooting”.

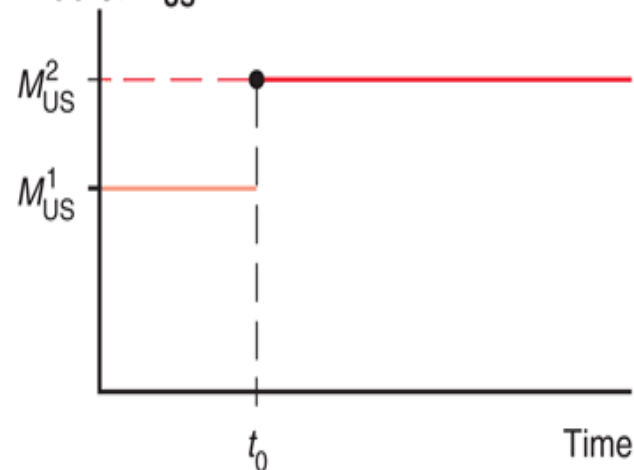


Long Run versus Short Run Adjustment

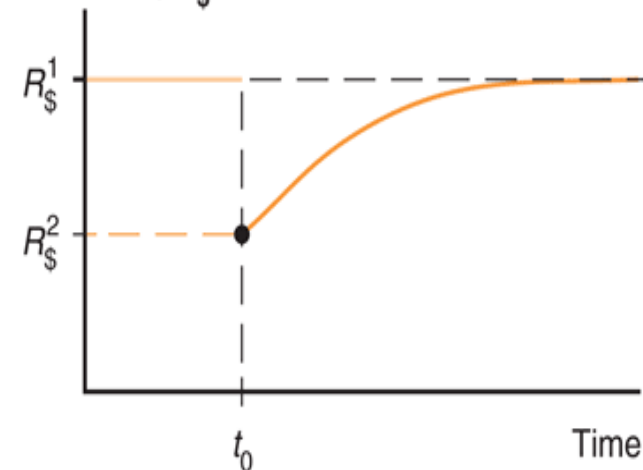
Here we see the dynamics of adjustment resulting from short-run price stickiness.

	SR	LR
M	Higher	Higher
M/P	Higher	No higher
P	No higher	Higher
E	Much Higher	Higher
R	Lower	No lower

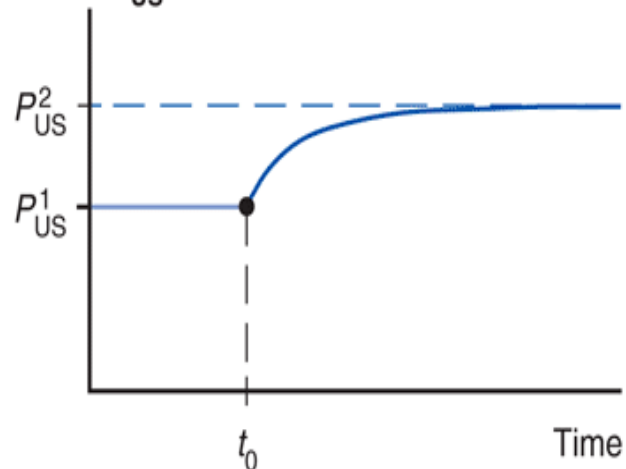
(a) U.S. money supply, M_{US}



(b) Dollar interest rate, $R_{\$}$



(c) U.S. price level, P_{US}



(d) Dollar/euro exchange rate, $E_{\$/\epsilon}$

