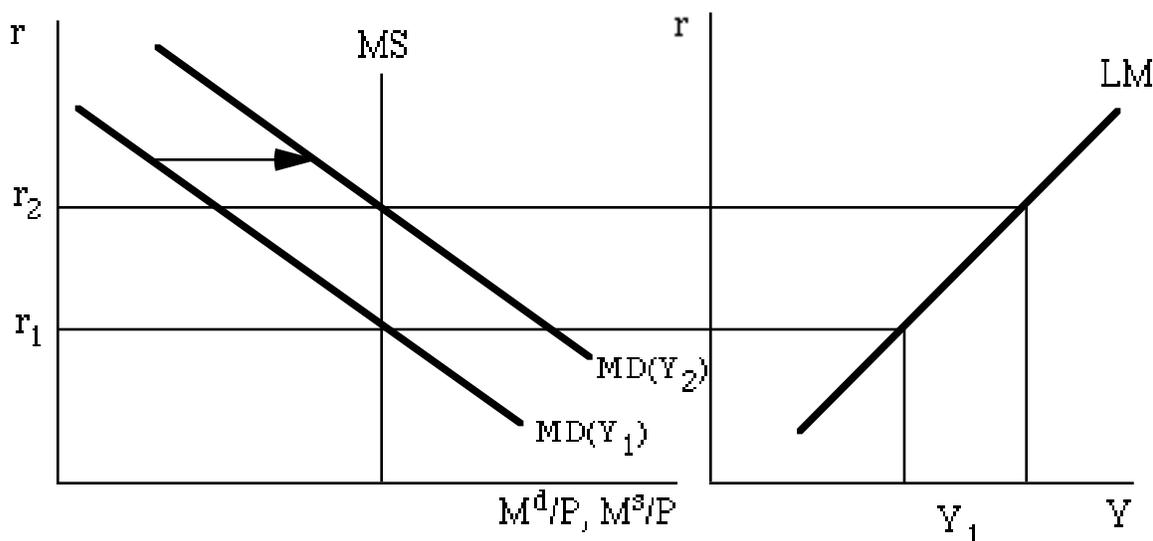


## The LM Curve

Recall what characterized movements along the IS curve: When  $Y$  changed saving would shift along a stable investment schedule, tracing out all of the pairs of  $r$  and  $Y$  that yield equilibrium in the goods market.

Now we shall do the very same thing with the asset market. When  $Y$  changes, the demand for money shifts along a stable money supply schedule tracing out all of the  $r$  and  $Y$  pairs that give equilibrium in the market for money. This schedule which is traced out in the  $r, Y$  plane is called the LM curve, denoting money demand money supply equilibrium.



Why are money demand curves downward sloping? At higher levels of interest wealth holders will choose to hold more nonmonetary assets relative to money, so the quantity of money demanded decreases as the interest rate rises. This is a movement along the money demand schedule.

When output rises agents engage in more transactions. This shifts the real money demand schedule for every interest rate. At the old interest rate,  $r_1$ , the quantity of money demanded exceeds the real supply of money. Recall that the price of nonmonetary assets and their real returns are negatively related. As people demand more money at the initial interest rate the price of nonmonetary assets is bid down. Wealth holders selling their nonmonetary assets will drive the price down. As the price falls the real interest rate on these assets rises. As the interest rate begins to rise ( a movement along the new money demand schedule) the quantity of money demanded by the public falls. This process continues until  $M^s = M^d$ .

**Factors that Shift the LM Curve:** All of these, except the first, will be very familiar! They are the same ones that we discussed when we talked about the factors that affected money demand. Beware though when we consider a rise in the price level. An increase in the price level with respect to a fixed level of money supply will cause the real money supply to fall. But, this does not affect the real money demand (as we discussed in Chapter 7), it does affect nominal money demand, though.

1. Nominal money supply increases:

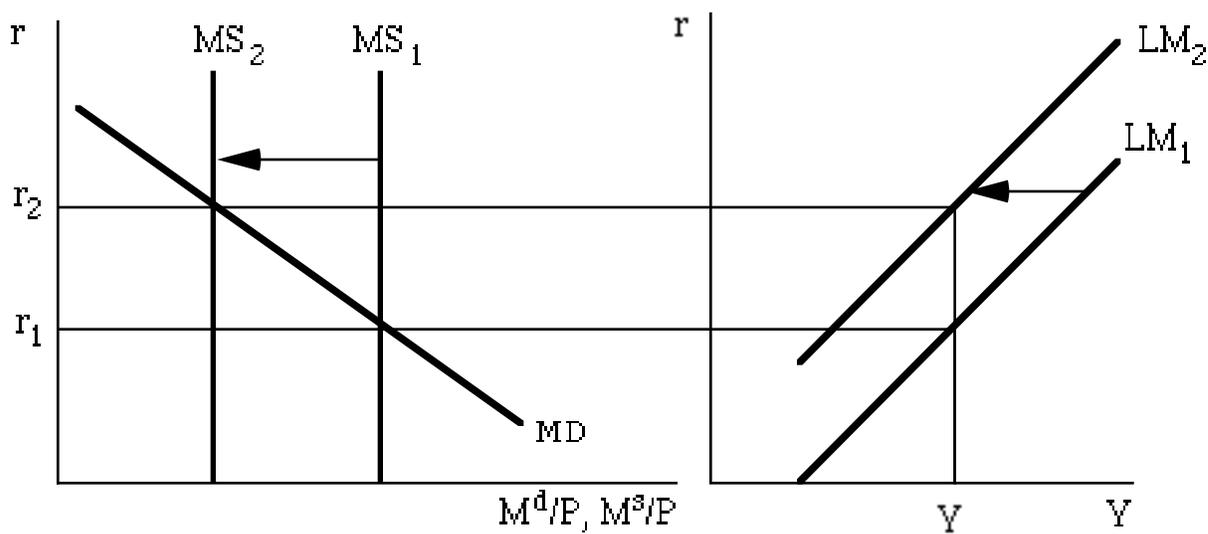
$$\Rightarrow \uparrow \left( \frac{\uparrow M^s}{P} \right) = \uparrow L(Y, \downarrow r + \pi^e)$$

$\Rightarrow$  real money supply shifts to the right & the LM curve shifts down & to the right.

2. Price level rises:

$$\Rightarrow \downarrow \left( \frac{M^s}{\uparrow P} \right) = \downarrow L(Y, \uparrow r + \pi^e)$$

$\Rightarrow$  real money supply shifts to the left along a stable money demand function



### 3. Expected inflation rises: Recall our answer which we gave in Chapter 7

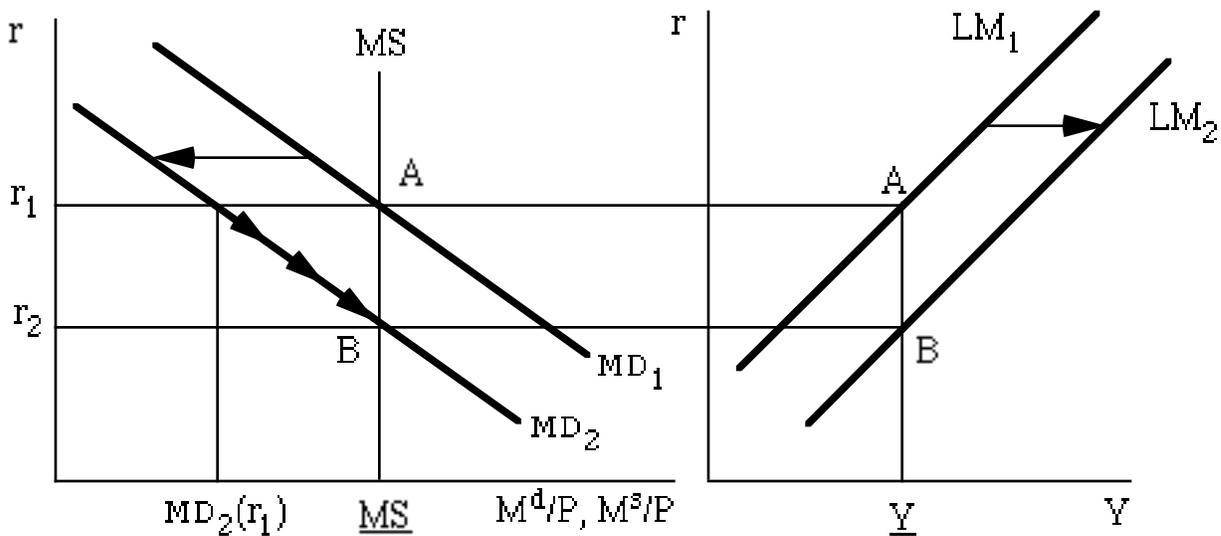
Higher return on nonmonetary assets relative to money. People choose to hold fewer dollars than they did before.

$$\uparrow \pi^e \Rightarrow \downarrow M^d = P \downarrow L(Y, r + \uparrow \pi^e)$$

$$\Rightarrow \downarrow \left( \frac{\downarrow M^d}{P} \right) = \downarrow L(Y, r + \uparrow \pi^e)$$

$\Rightarrow$  real money demand shifts down

$\Rightarrow$  for any level of output the decrease in real money demand decreases the real interest rate that clears the asset market.



Let's describe the adjustment story: After the initial decrease in money demand, the real quantity of money demanded at  $r_1$ ,  $MD_2(r_1)$ , exceeds the available supply denoted by  $MS$ . Thus,  $r_1$  is no longer the market clearing rate of interest. How does the interest rate adjust? Wealth holders want less money in their portfolios, therefore they will proceed to exchange money for nonmonetary assets. As wealth holders enter the market for nonmonetary assets, gobbling up bonds, land etc. they will drive the price of these nonmonetary assets up! Now, what is the relationship between the price of an asset and its real interest rate? As the price of the asset rises, its yield or rate of return will fall. The rate of return is the real interest rate. As the real interest rate falls, nonmonetary assets become less and less desirable. Finally, wealth holders are satisfied with their portfolios when the interest rate reaches  $r_2$ . Note that our story of wealth holders swapping nonmonetary assets for money occurs as movements along  $MD_2$ .

Note what happens to the LM curve when money demand falls. The initial curve passes through point A, where the output is  $\underline{Y}$  and the rate of interest is  $r_1$ . After the fall in money demand, with output fixed at  $\underline{Y}$ , the market clearing rate of interest falls to  $r_2$ . Thus the new LM curve passes through point B which corresponds to B in the money demand money supply graph. The new LM curve is lower because the real rate of interest that clears the asset market is lower for every level of output.

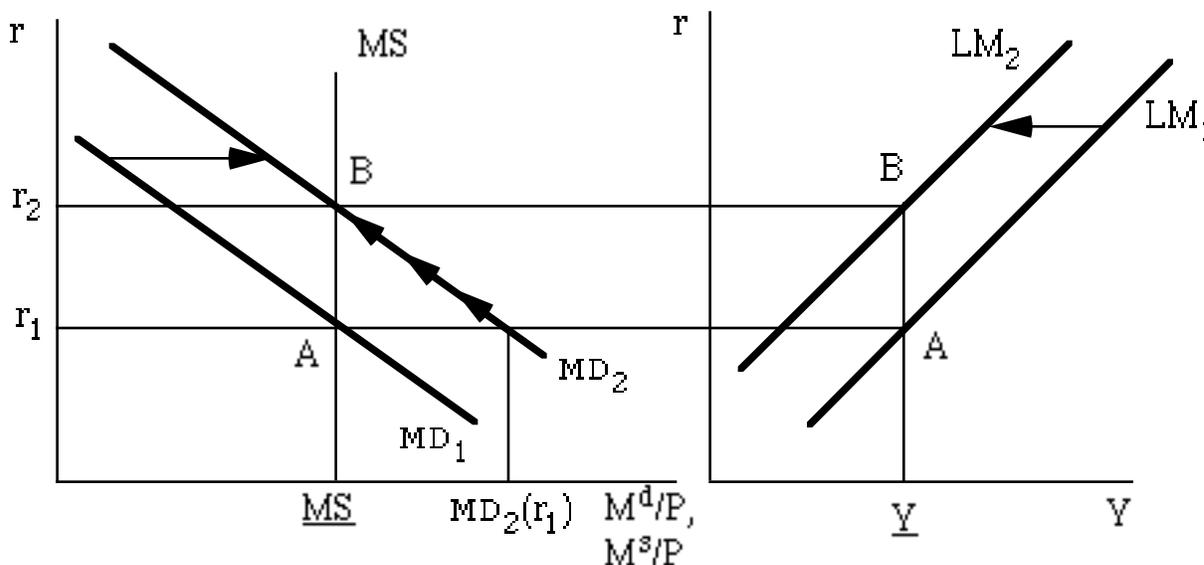
#### 4. Nominal interest rate on money rises: Recall Chapter 7

A higher return to holding money will mean, ceteris paribus, people will choose to hold more money in their portfolios.

$$\uparrow i^m \Rightarrow \uparrow M^d = P \uparrow L(Y, r + \pi^e, \uparrow i^m)$$

$$\Rightarrow \uparrow \left( \frac{\uparrow M^d}{P} \right) = \uparrow L(Y, r + \pi^e, \uparrow i^m)$$

$\Rightarrow$  real money demand shifts upward



We can follow the discussion in the book on p. 317.

The increase in the nominal return to money means that people will choose to hold more money in their portfolios at the same level of output and the same real interest rate. At the initial interest rate  $r_1$  the real quantity of money demanded,  $MD_2(r_1)$ , exceeds the available supply,  $MS$ , So  $r_1$  no longer clears the asset market.

What is the process by which the asset market clears? The interest rate will be bid up. Now that agents wish to hold more money in their portfolios than they did before the change in the exogenous fact, agent will sell nonmonetary assets. This will drive down the price of the nonmonetary assets. This will increase the real interest rate that these assets pay. As the real interest rate rises (this is now a movement along the new money demand function  $MD_2$ ) the attractiveness of holding money falls. This process continues until wealth holders' desired level of money demanded equals the available supply. This whole process represents a movement from  $A$  to  $B$ .

The increase in money demand with output at  $Y$ , the market clearing level of interest rises to  $r_2$ . The new LM curve must pass through point  $B$  because this represents equilibrium in the asset market. The new LM curve is higher because the market clearing real rate of interest is higher for ever level of output.

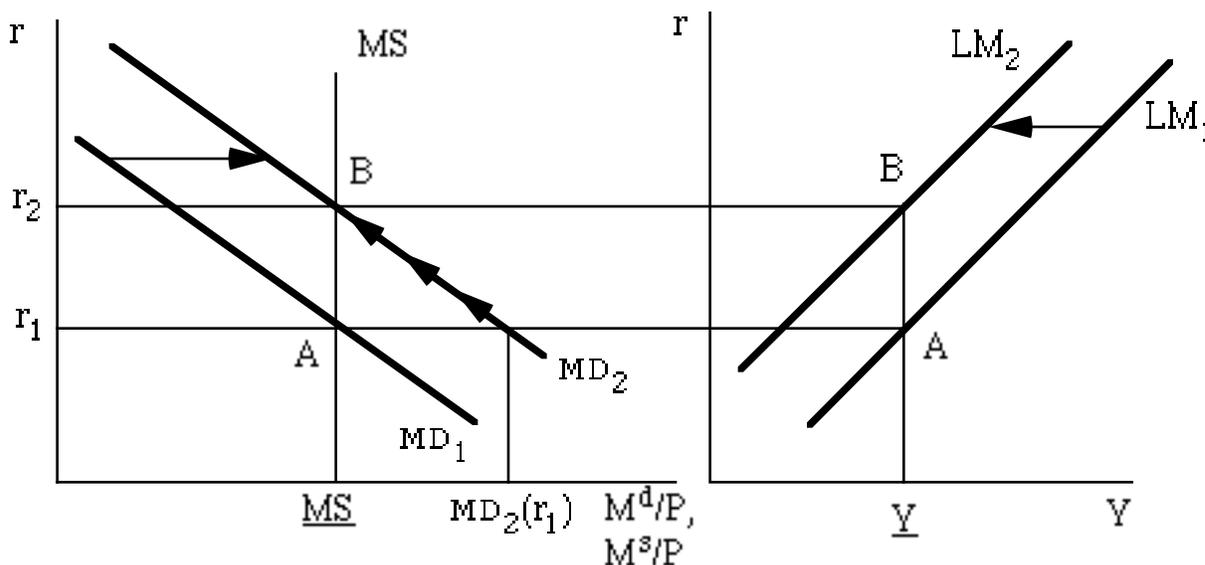
## 5. Wealth increases: Recall chapter 7

An increase in wealth means that part of this increase will be held in the form of money

$$\uparrow \text{wealth} \Rightarrow \uparrow M^d = P \uparrow L(Y, r + \pi^e, \uparrow \text{wealth})$$

$$\Rightarrow \uparrow \left( \frac{\uparrow M^d}{P} \right) = \uparrow L(Y, r + \pi^e, \uparrow \text{wealth})$$

$\Rightarrow$  real money demand shifts upward

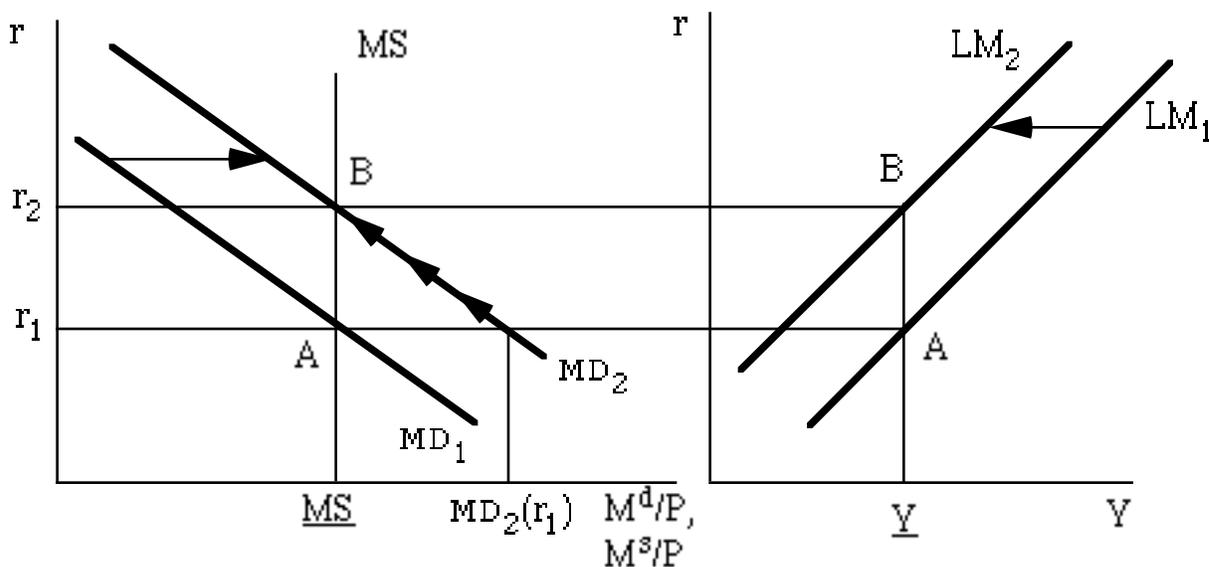


6. Risk of nonmonetary assets increases: People will choose to hold more money than they did before in their portfolios.

$$\uparrow \text{risk} \Rightarrow \uparrow M^d = P \uparrow L(Y, r + \pi^e, \uparrow \text{risk of alternative assets})$$

$$\Rightarrow \uparrow \left( \frac{\uparrow M^d}{P} \right) = \uparrow L(Y, r + \pi^e, \uparrow \text{risk of alternative assets})$$

$\Rightarrow$  real money demand shifts upward

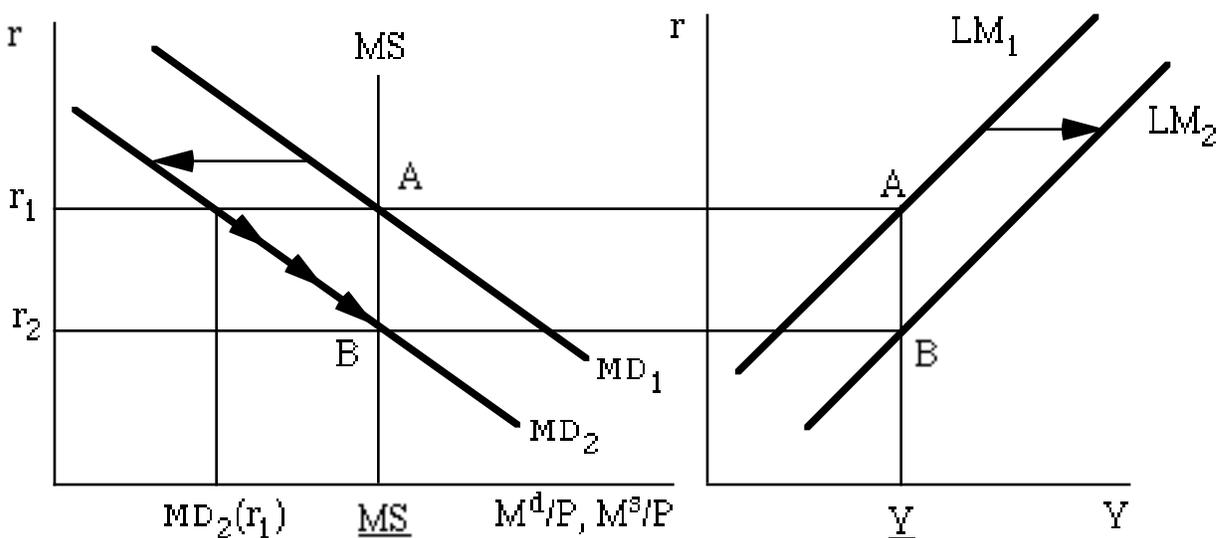


7. Risk of money increases: People will choose to hold fewer dollars in their portfolios than they did before.

$$\uparrow \text{risk} \Rightarrow \downarrow M^d = P \downarrow L(Y, r + \pi^e, \uparrow \text{risk of money})$$

$$\Rightarrow \downarrow \left( \frac{\downarrow M^d}{P} \right) = \downarrow L(Y, r + \pi^e, \uparrow \text{risk of money})$$

$\Rightarrow$  real money demand shifts down

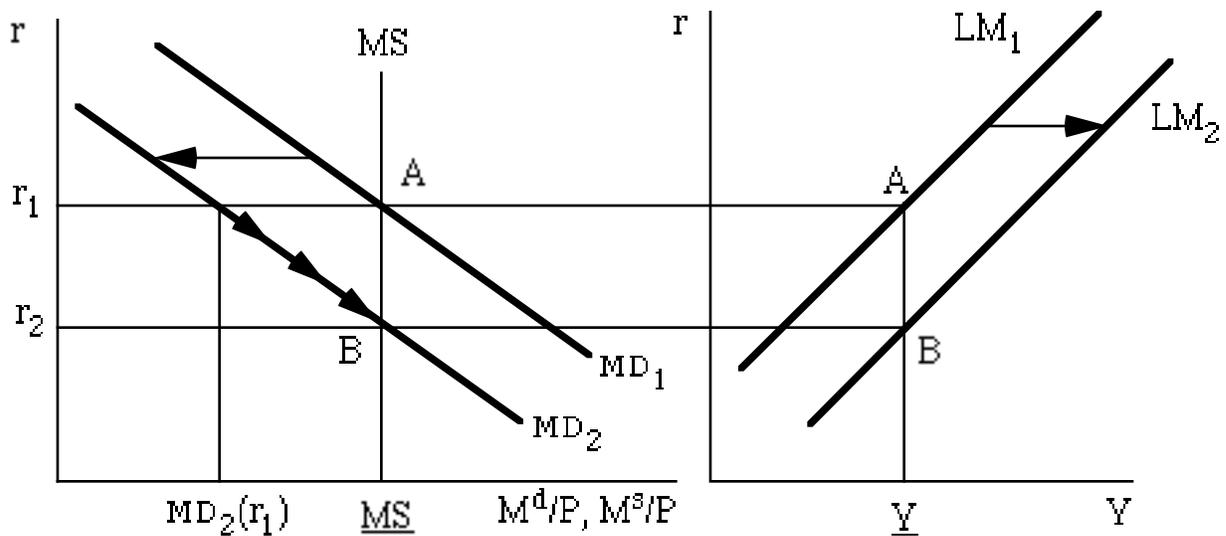


8. Payments technology increases: People need not hold as much money as they did before. Money demand will fall.

↑efficiency of payments technologies

$$\Rightarrow M^d = P \downarrow L(Y, r + \pi^e, \uparrow \text{efficiency of payments technologies})$$

⇒ real money demand shifts down

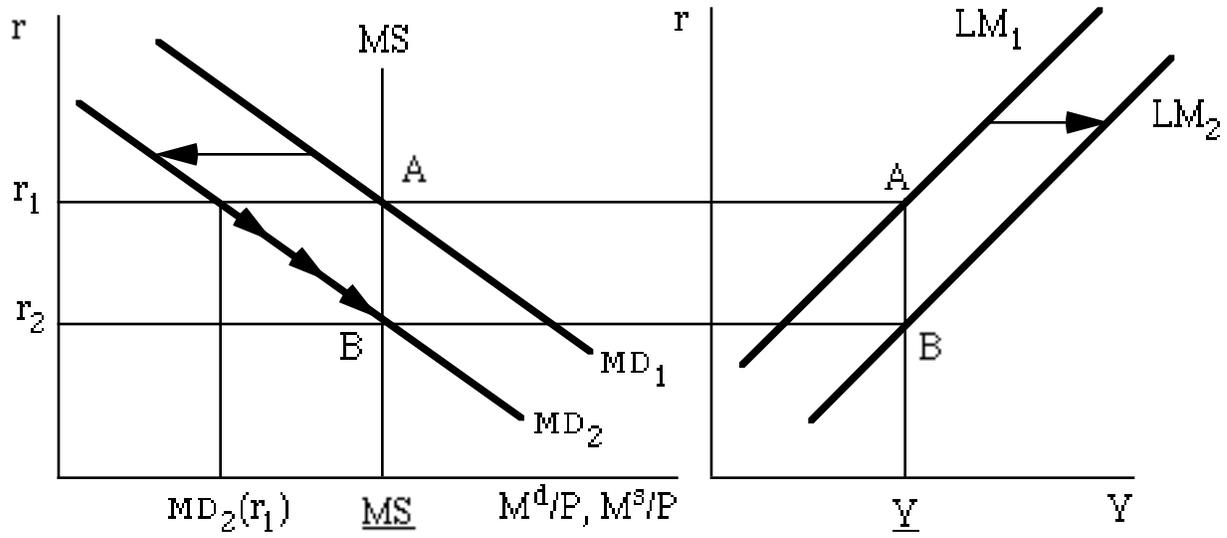


9. Nonmonetary asset liquidity rises: The degree to which one can exchange nonmonetary assets for goods, services and other assets, has risen therefore, people will choose to hold less currency and more nonmonetary assets.

↑liquidity of alternative assets

$$\Rightarrow \downarrow M^d = P \downarrow L(Y, r + \pi^e, \uparrow \text{liquidity of alternative assets})$$

⇒ real money demand shifts down



A good exercise for you would be to compare the numerous variables that affect the demand for money (which are detailed in the handout titled Chapter 7 Addendum) with the factors that shift the LM curve.