

## The Money Market

This model, which is called **Liquidity Preference Theory** (Keynes), illustrates interest rate determination related to macroeconomic activity. It is based on two assets, money (M), which does not pay interest, and bonds (B) which pay interest.

Total Wealth (W) is the total amount of money and bonds in the economy

$$W = \text{bond supply } (B^S) + \text{money supply } (M^S)$$

In equilibrium, the supply and demand for each of these components of wealth must be equal:

$$B^D + M^D = W = B^S + M^S$$

Collecting like terms, this becomes:

$$(M^D - M^S) = (B^S - B^D)$$

This states that if there is an excess demand for money (so  $(M^D - M^S) > 0$ ), there will simultaneously be an excess supply of bonds ( $(B^S - B^D) > 0$ ).

- If the money market is in equilibrium,  $M^D = M^S$ , so:  $(M^D - M^S) = 0$ , then to satisfy the above equation,  $(B^S - B^D) = 0$ , which means that the bond market must also be in equilibrium,  $B^S = B^D$

The advantage of this framework is that it is fairly easy to analyze the effects of changes in the state of the economy (economic growth), the money supply (monetary policy), and the price level (inflation)

### Money Demand

In this model, money pays no interest, but bonds pay interest  $\Rightarrow$  interest rate is the *opportunity cost of holding money* (in non-interest bearing uses of money)

ex: if  $\uparrow r$ , the opportunity cost of holding money rises, so the expected return to holding money declines, causing a smaller amount of money demanded

Income, the state of the economy, also affects  $M^D$ , based on “motives” for holding money.

**Transactions Motive**: money must be held to bridge the gap between when paid and when transactions occur

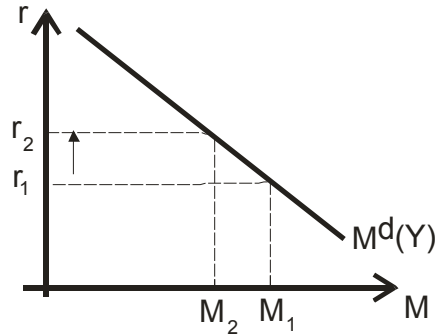
**Precautionary Motive**: some money must be held to deal with unexpected events (ex: flat tire, auto breakdown)

**Income and  $M^D$  change in the same direction** (as income rises, more money demanded for each motive)

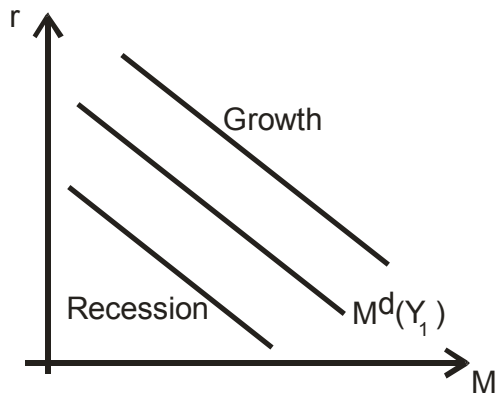
**$M^D$  is pro-cyclical**

$\Rightarrow$  **As the economy improves,  $M^D$  automatically rises, and during recessions,  $M^D$  automatically falls**

To graph this relationship, the price of money (the interest rate) is on the vertical axis and income locates the curve and causes it to shift



As  $r \uparrow$ , the opportunity cost of holding money rises, so people hold less money (they move some money into bonds which pay interest, since then bond prices are falling when  $r \uparrow$ )



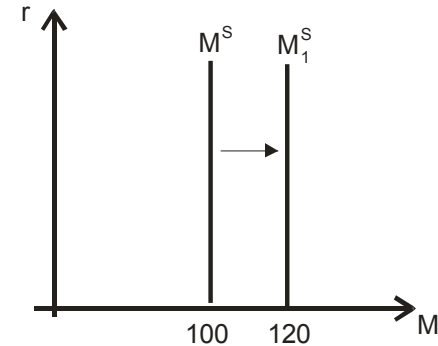
$M^D$  also shifts for changes in the price level: as  $P \uparrow$ , *real* money holdings decrease, so need more money to finance transactions  $\Rightarrow \uparrow M^D$

### Money Supply

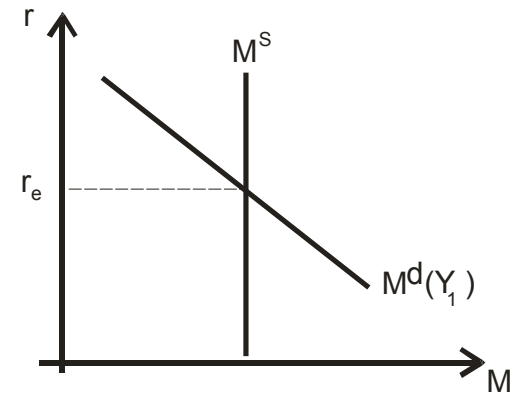
- taken as given, its value is determined by the Federal Reserve and monetary policy

$$\Rightarrow M^S \neq f(r)$$

- the money supply curve is vertical (relative to  $r$ ) but shifts when the Fed changes the  $M^S$



**Money Market Equilibrium:  $M^D = M^S$**



In this model,  $r_e$  is determined by the locations (the “other things”) of both  $M^D$  and  $M^S$ :

$$r_e = f(P, Y, M^S)$$

Rewriting this, expressing the variables in a more practical and useful way:

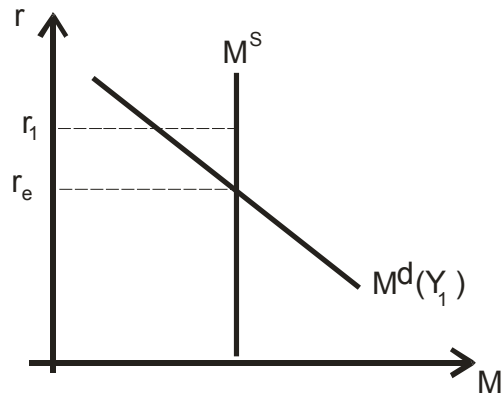
$$r_e = f(\text{expected inflation, economic growth, monetary policy})$$

If the interest rate is not at  $r_e$ , it must ultimately return to its equilibrium level. How does this occur?

In this model, with two asset markets, money and bonds, recall that the equilibrium condition is:

$$(M^D - M^S) = (B^S - B^D)$$

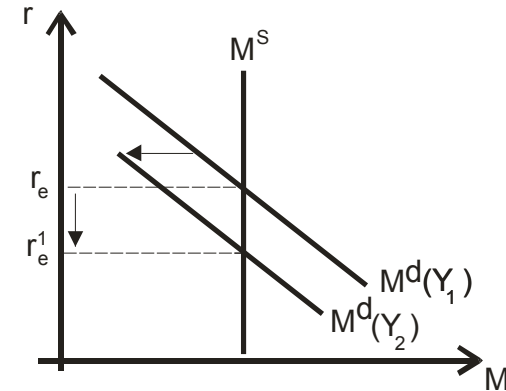
Let's assume that  $r > r_e$ , as shown in the graph:



If  $r > r_e$ ,  $M^S > M^D$ , there is an excess supply of money, so the left term above is negative. For equilibrium, the right term concerning bonds must also be negative, so  $B^D > B^S$ , there is an excess demand for bonds. This raises  $P_d$ , causing  $r$  to fall back to  $r_e$

### Effect of Recession

As  $Y \downarrow \Rightarrow M^D \downarrow$  (note: recessions also tend to lower inflationary expectations unless **STAGFLATION**, the combination of stagnation ( $Y \downarrow$ ) and inflation, occurs)



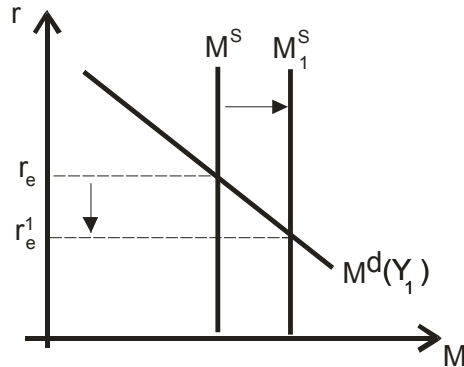
Given  $M^S$ , the equilibrium rate of interest falls.

- This provides an explanation of why interest rates tend to be pro-cyclical

What happens next? As  $r$  falls in a recession, this will begin to stimulate the demand for durable goods, housing, equipment and software purchases, and business construction – *as soon as negative expectations related to the recession disappear* (in reality  $Y = f(r)$  also)

## Does a higher money supply lower interest rates?

An increase in  $M^S$  shifts the money supply curve right without changing  $M^D$  initially.

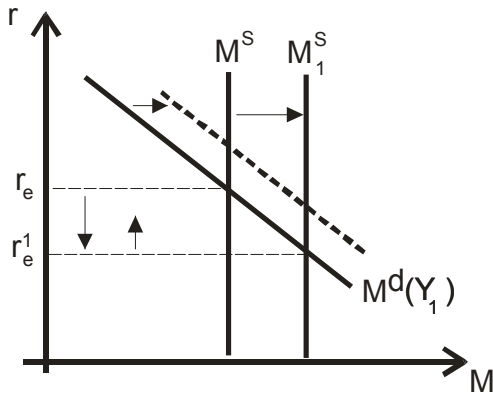


$\uparrow M^S \rightarrow \downarrow r_e$ , which is called the **Liquidity Effect**. Note that the Fed controls short-term rates directly.

But, as  $M^S \uparrow$ , demand is stimulated and the economy will expand (with a lag), so that:

**$\uparrow$  income and  $\uparrow$  price level (and expected inflation)**

- Both of these will begin to raise money demand.



The Liquidity Effect occurs immediately. The altering of income and expected inflation on  $M^D$  can take time, so this adjustment will occur through time (likely 6 - 12 months).  
- Increases in expected inflation can either occur immediately or take some time to emerge.

*It is possible that the Fed, while attempting to lower interest rates, is only able to do so in the very short-term. This depends largely on the behavior of expected inflation.*

When the money supply rises, this ultimately fuels demand. If the rise in  $M^S$  instantaneously ignites inflation fears,  $M^D$  will increase immediately, negating the Liquidity Effect almost simultaneously.

- If the Fed tries to sustain its interest rate target in this type of environment, they will need to continually raise the money supply, continually fueling inflation fears. Long-term interest rates in the bond market would rise sharply to reflect this concern.