

# Keynesian IS-LM

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The Keynesian System (II):  
Money, Interest, and Income

# Problems with the Income-Expenditure Model

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- **What about prices?**
  - Don't they change when AS and AD conditions change?
  - Don't they have an influence?
- **Are firms really indifferent to changes in the real wage rate?**
- **These issues remain to be addressed...**

# Money in the Keynesian Model

- **Recall the classical model:**
  - **Transactions motive:** people hold money only to make transactions
  - **Rejects the store of value theory** of the mercantilists, arguing that:
    - Money bears no interest, and
    - A rational person would not forego a positive return by holding money unless he/she planned to make a transaction.
  - **People do not hoard money.**

# Liquidity Preference Theory

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- **Money is:**
  1. **A Medium of Exchange**
  2. **A Store of Value**
  3. **A Unit of Account**
- **The first two create *demands* for money.**

# Liquidity Preference Theory

- **Transactions Motive**—yields **transactions demand** for money
- **Store of Value**—yields:
  - **Precautionary Motive**—yielding **precautionary demand for money**
  - **Speculative Motive**—yielding the **speculative demand for money**
- *There are reasons why someone might rationally hoard money!*

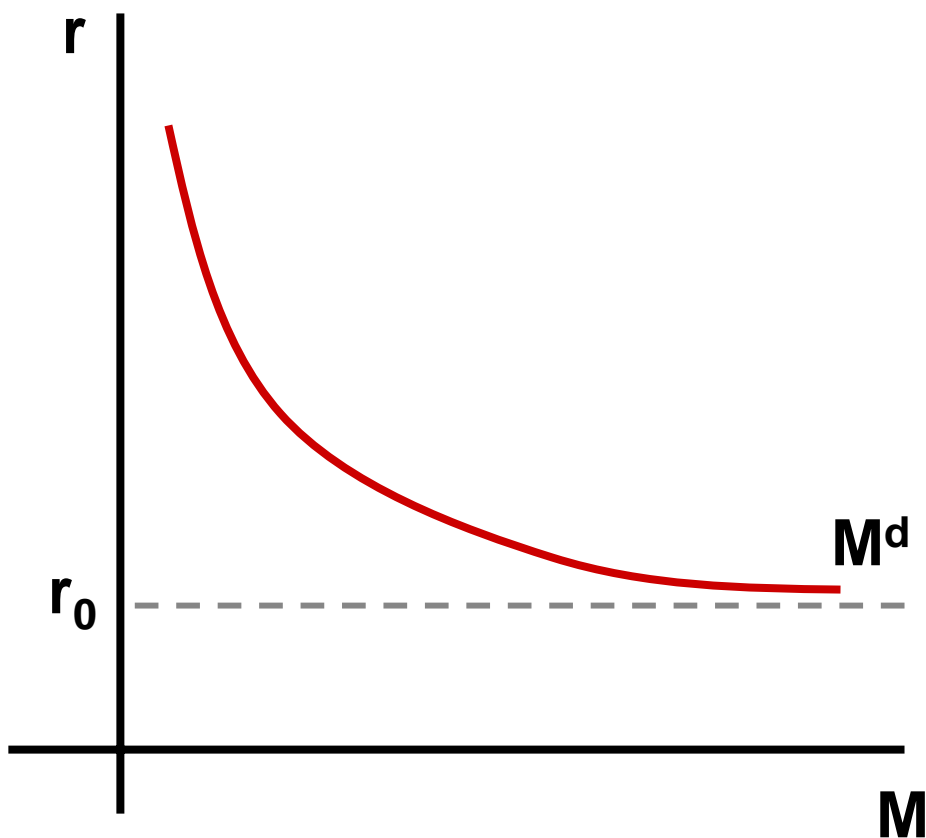
# Speculative Demand (1)

- **Keynes considers a portfolio of financial assets.**
- **All financial assets can be considered as money or bonds:**
  - **Money (M): yields no return**
  - **Bonds (B): yield a return**
- **$W_h = M + B$**

# Speculative Demand (2)

- **Example—Perpetuity (a bond that never matures):**
  - Bond is issued at \$1000
  - Coupon rate is \$50 →  $50/1000=5\%$
  - Later, market interest double to 10%
  - How much can you sell the bond for?
  - Ans: \$500 because  $50/500=10\%$
- **When interest rates rise, bond prices fall  
→ capital losses!**

# Speculative Demand (3)



People decide to hold money instead of bonds when interest rates get so low that they cannot possibly go lower. The move to money to avoid capital losses.

**There is a rational motive for hoarding money!!!**

$$L_p = L_p(r)_{(-)}$$

As interest rates fall,  
 $B^d \rightarrow 0$  and  $M^d \rightarrow \infty$ .

# Precautionary Demand

- People hold money (“precautionary balances”) for unforeseeable expenses.
- These holdings (“balances”) tend to:
  - Rise with income, and
  - Fall with interest rates.
- $L_p = L_p(Y, r)$   
(+) (-)

# Ambiguity in the Money Market

- **In the classical model:**
  - $M^s = M_0$  (exogenous)
  - $M^d = M^d(Y)$
  - We used these relationships to create the AD curve.
- **In Keynes' model:**
  - $M^s = M_0$  (exogenous)
  - $M^d = L(Y,r)$
  - $M^s = M^d$
  - $M_0 = L(Y,r)$  is the money market outcome.

# Sidenote: Hicks' Little Apparatus

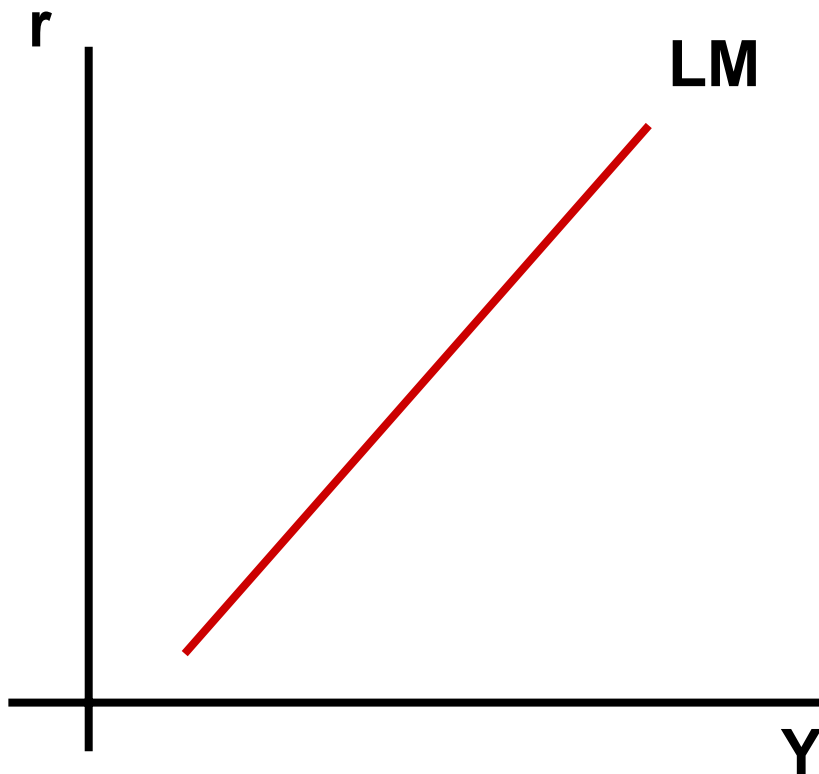
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- Sir John Hicks, 1939, “Mr Keynes and the Classics, a Suggested Interpretation”
- Introduces the **IS-LM Model** as a way of making sense of Keynes' *General Theory*.

# Keynesian “Money Market”

- $M_0 = L(Y,r)$  is the equilibrium in the money market.
- There is not one single variable that can change to clear the market. There are two!
- The “money market” cannot tell us alone what the supply and demand for money will be.
- **Money is not dichotomous.**

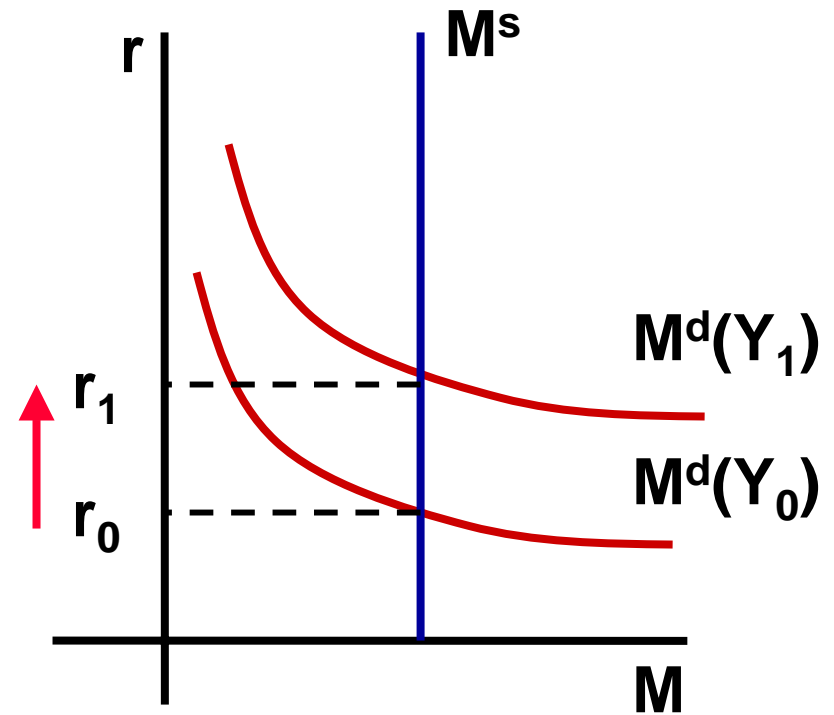
# Hicks' Interpretation: LM Curve



**LM Curve ( $L=M$ ):** all those combinations of real interest rates and income which bring the money supply equal to money demand.

# LM Curve Slopes Upward Because...

- Assumes  $M^s = M_0$  (exogenous)
- If  $Y$  increases, transactions and precautionary demand increase.
  - There will be excess demand in the money markets
  - Interest rates will be driven upward
- So  $Y \uparrow \rightarrow r \uparrow$ , and the LM Curve slopes upward.



# LM Curve Slopes Upward Because...

Liquidity Preference is:

$$L = L(Y, r)$$

Money Supply is:

$$M^s = M_0 = M$$

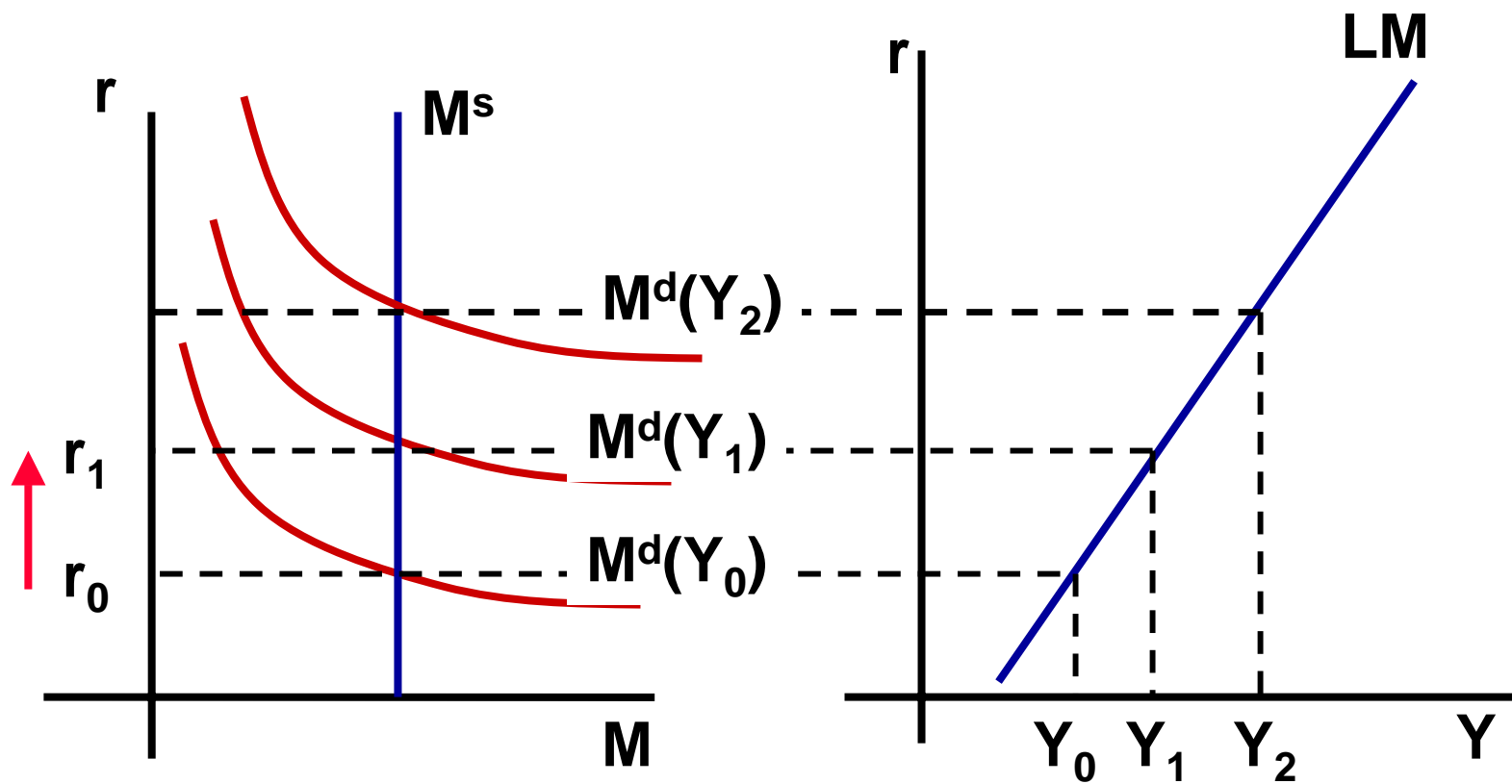
$M^s = M^d$  implies

$$M = L(Y, r) \rightarrow \text{LM Curve}$$

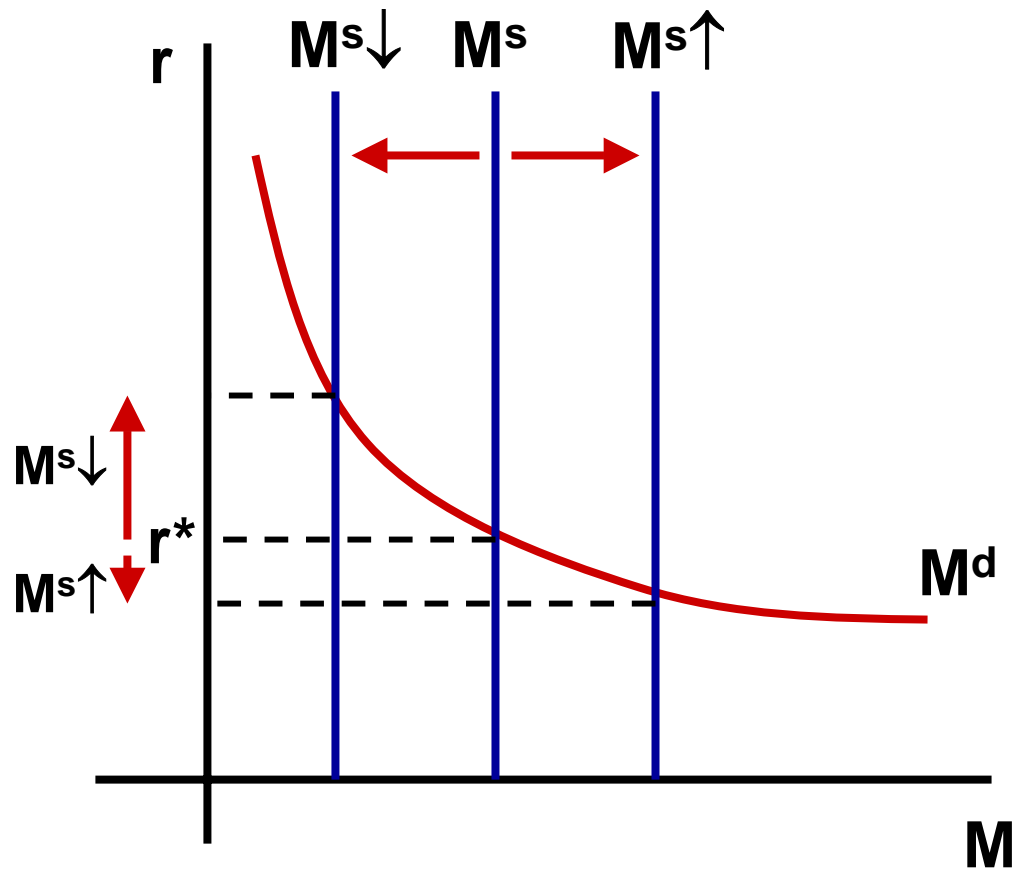
Differentiating:

$$\frac{dr}{dY} = \frac{-\partial L / \partial Y}{\partial L / \partial r} = \frac{-(+)}{(-)} > 0$$

# LM and the Money Market



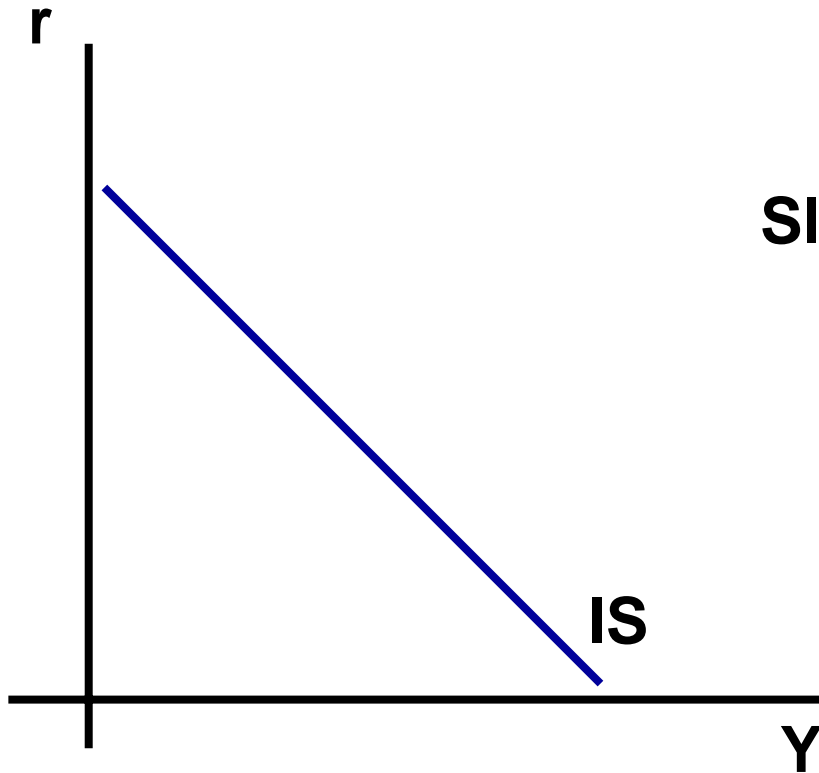
# Changes in Money Supply



# Capital Market

- Investment  $I = I(r, E) = I(r)$
- But Saving  $S = S(Y)$  or  $S(Y_d)$
- So there is not a single “price variable” to clear the capital market!
- $I(r) = S(Y) \rightarrow$  IS Curve:  $IS = IS(Y, r)$
- IS: all those combinations of  $Y$  and  $r$  which make the “capital market” clear.
- Equivalently, IS is all those combinations of  $Y$  and  $r$  for which supply = demand in the loanable funds market.
- Thus the real sector cannot be resolved without considering money market outcomes.
  - Money is NOT dichotomous.

# IS Curve



**Slopes downward because**

$$r \uparrow \rightarrow I \downarrow \rightarrow Y \downarrow$$

# IS Curve Slopes Downward Because...

Recall that:

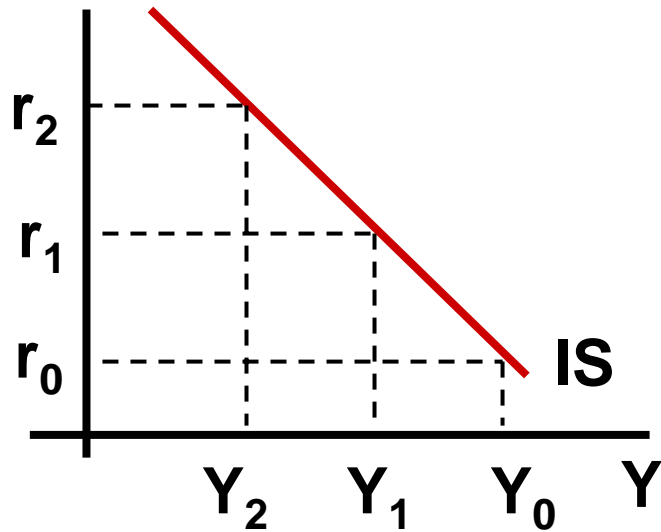
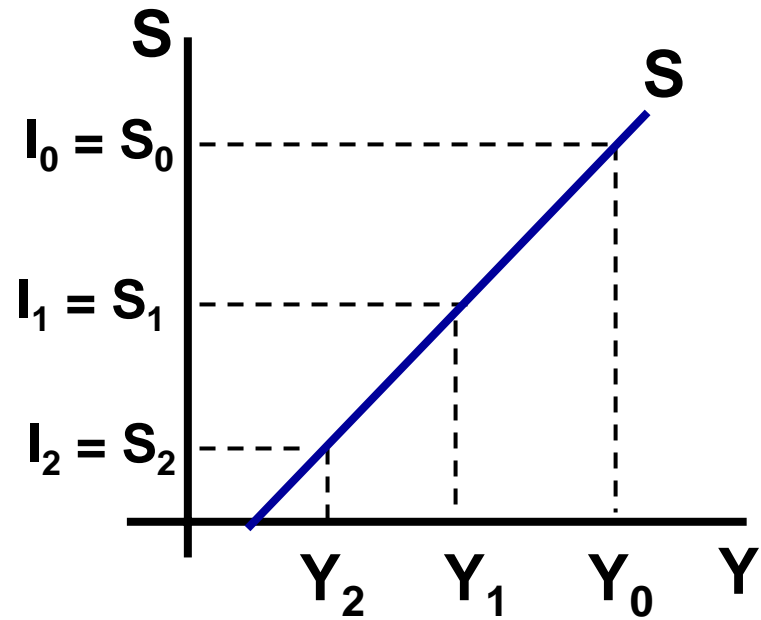
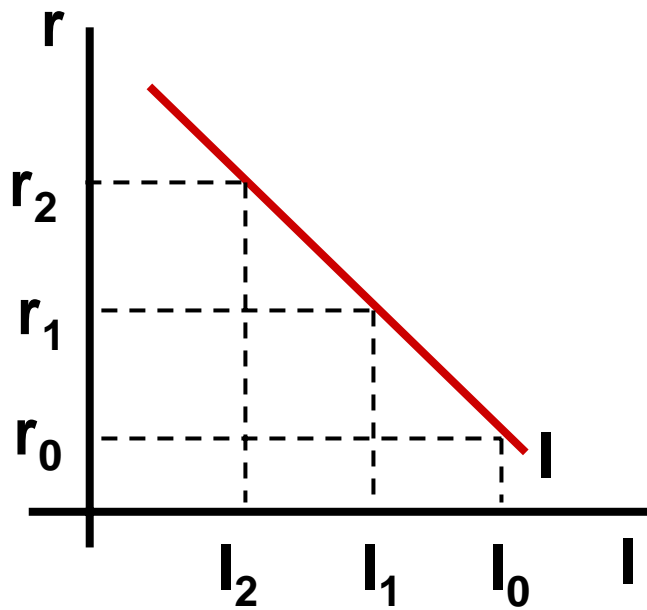
$$I + T = S + G$$

or

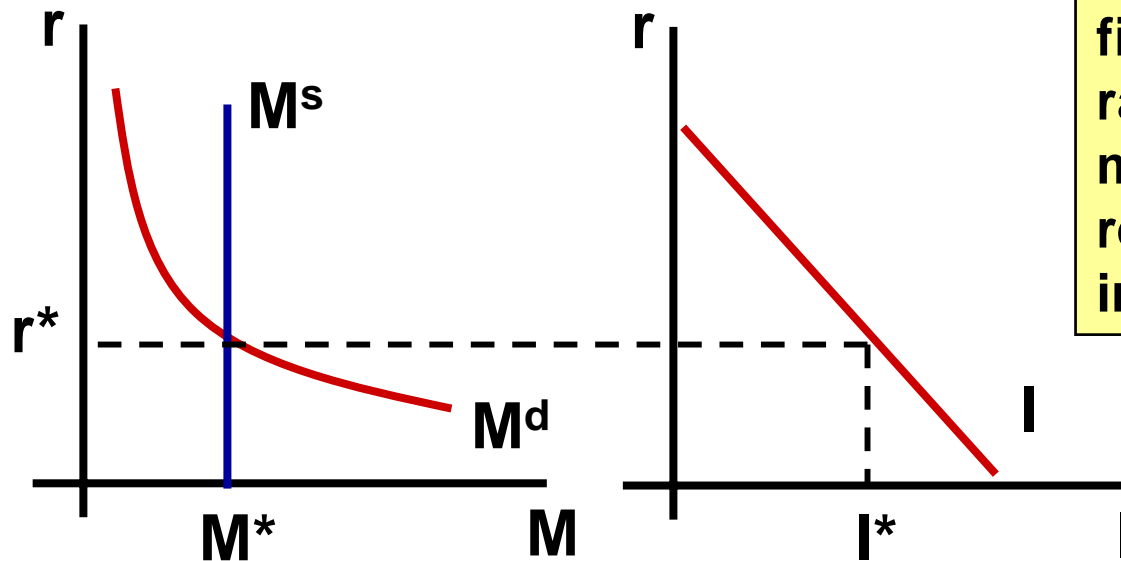
$$I(r) + T_0 = S(Y) + G_0$$

Differentiate implicitly with respect to  $Y$  and  $r$ .

$$\frac{dr}{dY} = \frac{\frac{ds}{dY}}{\frac{dl}{dr}} = \frac{(+)}{(-)} < 0$$



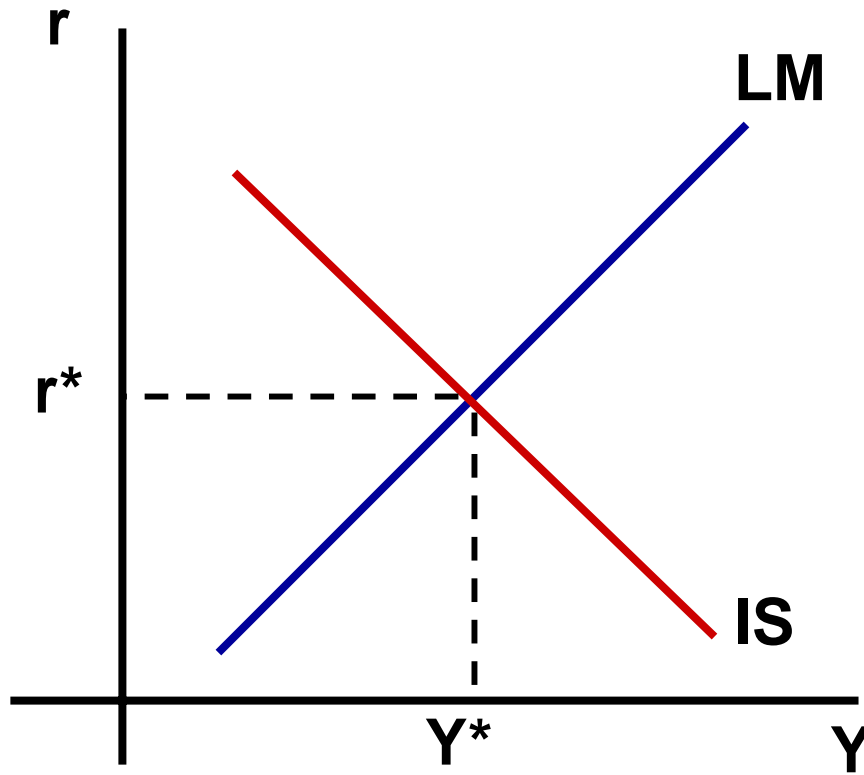
# Money and Investment



The interest rate is determined in the money market. Decision makers in firms compare this rate to the MEC and make the decision regarding investment.

The real and monetary sectors are linked. Money matters!

# IS-LM



- Note that the real and monetary sectors of the economy are resolved together.
- Money matters to real sector outcomes.
- There is no dichotomy.

# Money-Income Transmission

The Keynes Effect (Money Income Transmission Mechanism):

$$M^s \uparrow \rightarrow B^d \uparrow \rightarrow P_B \uparrow \rightarrow r \downarrow \rightarrow \left\{ \begin{array}{l} I \uparrow \\ C_{durables} \uparrow \end{array} \right\} \rightarrow AD \uparrow \rightarrow P \uparrow$$

- Money is not neutral (in the short run), and there is no dichotomy.
- Some modern Keynesians argue for long-run neutrality, but short-run nonneutrality.
- Changes in the money supply affect the real sector through the interest rate channel.

# Notes on IS-LM

- **LM is a stock equilibrium (beginning of period. IS is a flow equilibrium (end of period).**
- **The equilibrium is an equilibrium of flows constrained by stocks. It is a cash-flow equilibrium.**
- **The time frame is long enough for full adjustment of real income and interest, short enough so stocks do not change.**
- **IS-LM equilibrium is not permanent.  $S > 0$  implies that wealth (allocations) are increasing over time. Therefore LM is shifting due to the stock of bonds. If net investment is positive, then the capital stock grows.**

# Linearized IS-LM

$$LM: \frac{M}{P} = kY - \beta r$$

$$-\beta r = \frac{M}{P} - kY$$

$$r = \frac{-M}{P\beta} + \frac{k}{\beta} Y$$

$$IS: I + G = S + T$$

$$I = I_0 - \alpha r$$

$$S = S_0 + (1 - c)(Y - T)$$

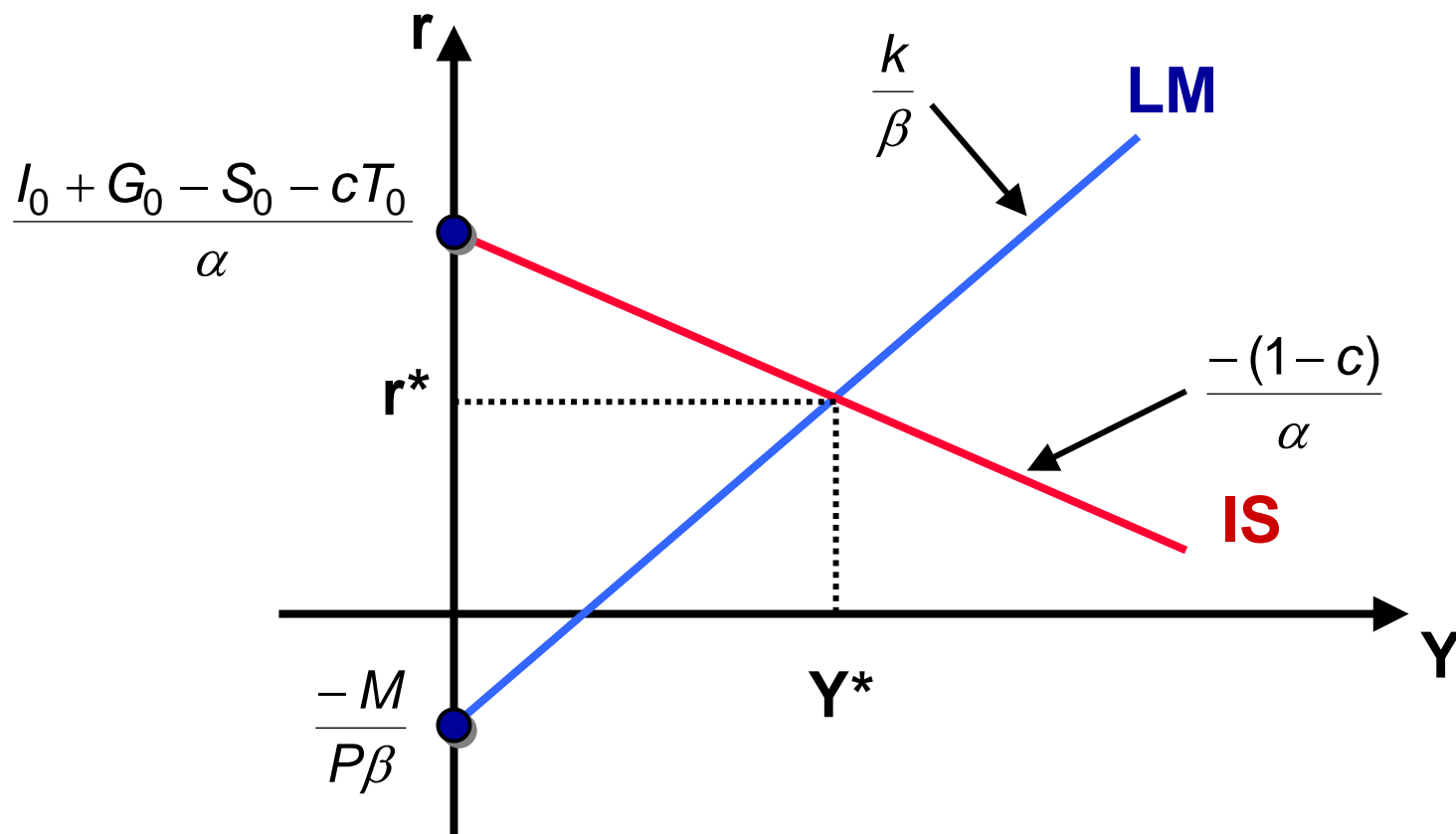
$$I_0 - \alpha r + G_0 = S_0 + (1 - c)(Y - T) + T$$

$$-\alpha r = (S_0 - I_0 - G_0) + (1 - c)Y - T + cT + T$$

$$-\alpha r = (S_0 - I_0 - G_0 + cT) + (1 - c)Y$$

$$r = \frac{(I_0 + G_0 - S_0 + cT)}{\alpha} - \frac{1 - c}{\alpha} Y$$

# Linearized IS-LM



# Classical Model? ( $\beta=0$ )

