

IS relation	LM relation	IS-LM combined	Change in equilibrium
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SHIFTS OF THE IS CURVE

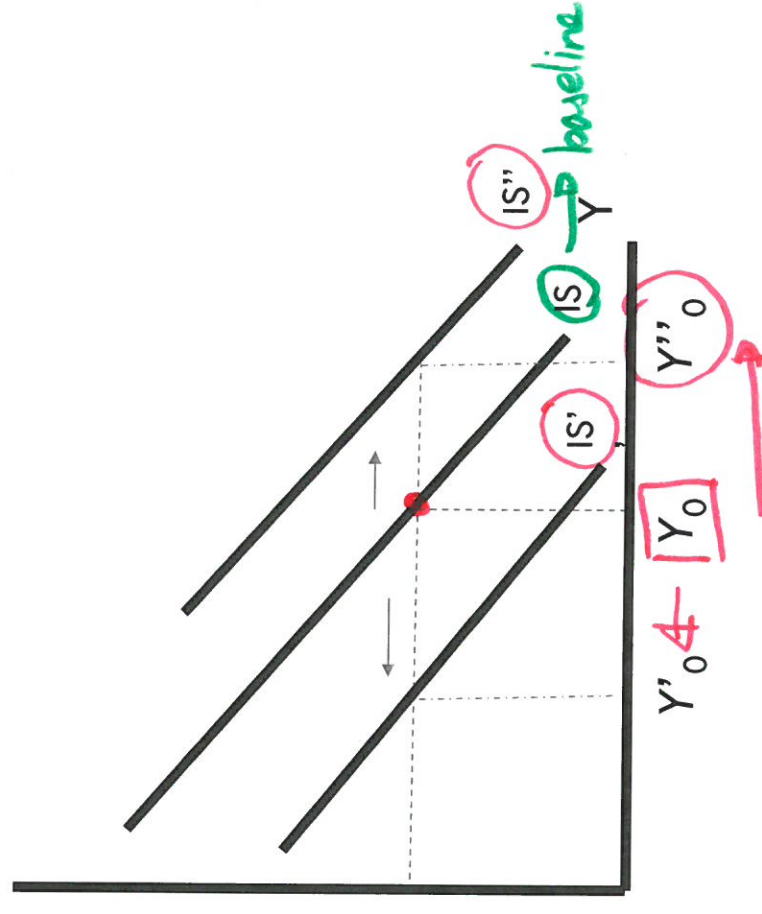
Change in the IS equilibrium

- IS curve shifts left: $IS \rightarrow IS'$
 - Income decreases at every level of interest rate
- IS curve shifts right: $IS \rightarrow IS''$
 - Income increases at every level of interest rate

Could occur because the
Change in factors affecting $\overline{AE}$

- Shifts of the IS curve

r



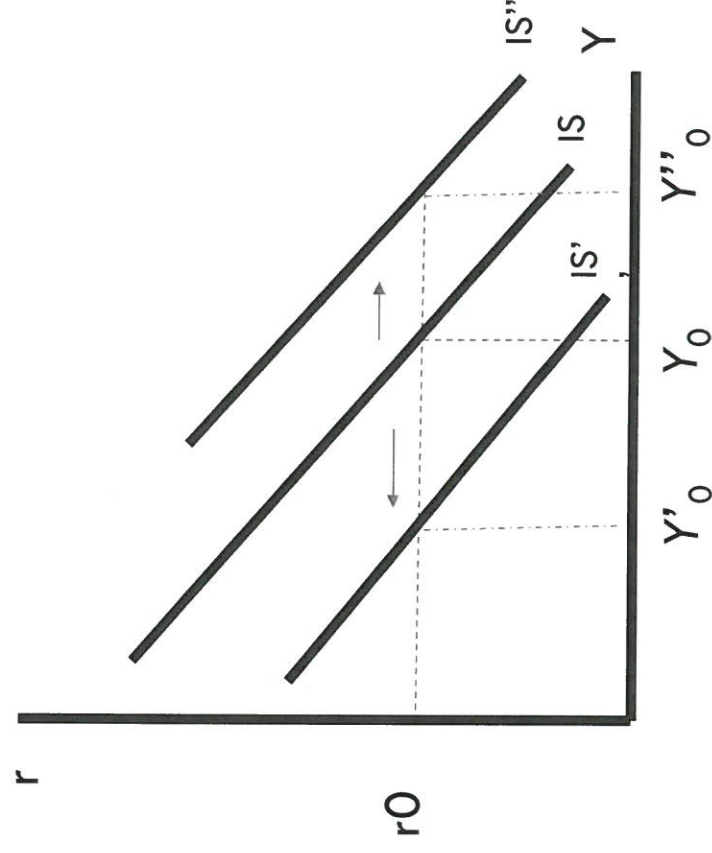
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SHIFTS OF THE IS CURVE

- The shift of IS curve occurs because of the change in autonomous expenditure that is not due to the interest rate
- What are those factors affecting autonomous expenditure

Other factors affecting $\overline{AE}$, that we kept them fixed.

- Shifts of the IS curve



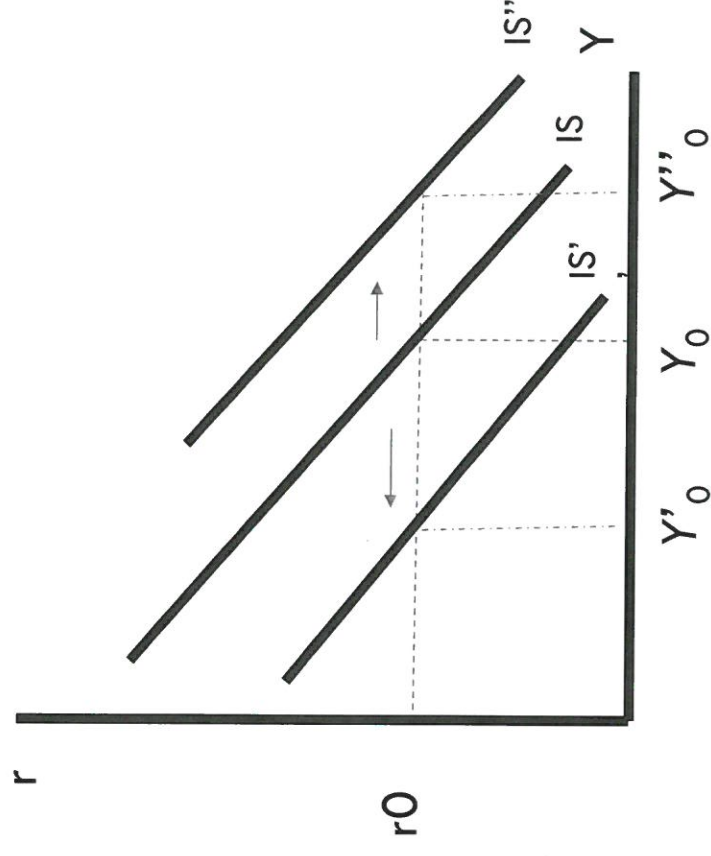
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SHIFTS OF THE IS CURVE

" $\overline{DI}$ " can be driven by many factors

- Autonomous consumption
 - Consumer confidence
- Autonomous investment
 - Business sentiments
- Autonomous government spending
- Autonomous tax
- Autonomous net exports
 - Exchange rate / Trade barriers

- Shifts of the IS curve

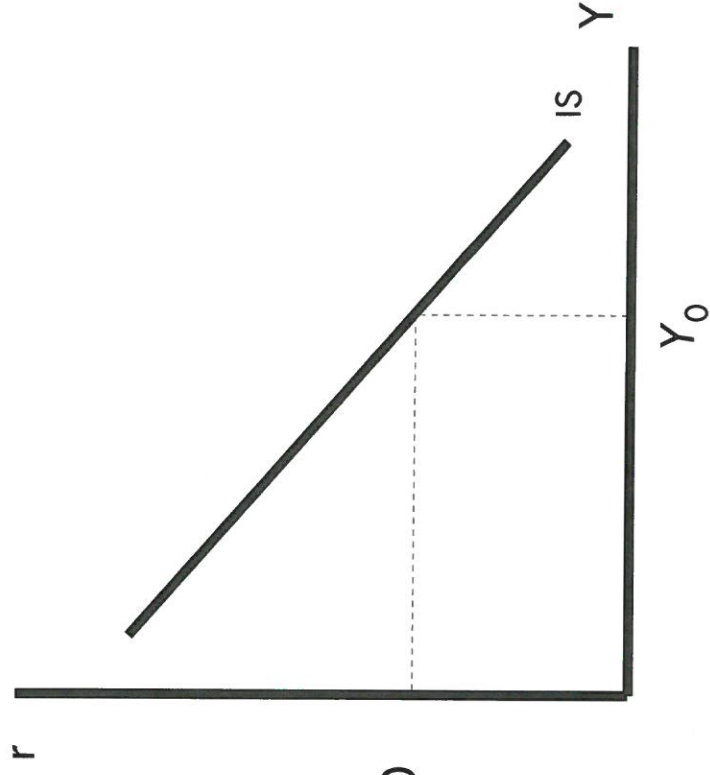


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SHIFTS OF THE IS CURVE

- Examples *IS shifting left*
 - A drop in business sentiments
 - An increase in government spending *IS shifts right*
 - An decrease in net-exports due to an appreciation in Thai baht
 - A tax cut by government *shifting right*
 - A negative outlook by households *"shifting to the left"*

- Shifts of the IS curve



shifts left

IS: $r \uparrow \rightarrow y \downarrow$

AGENDA

- IS relation
 - Derivation of IS curve
 - Slope of IS curve
 - Shifts of IS curve

LM relation

- Derivation of LM curve
- Slope of LM curve
- Shifts of LM curve

- IS-LM combined

- Changes in Equilibrium under IS-LM

change in the interest rate
can be happening independently.

interest rate is going to be determined
by various factors; income/output

" Liquidity Preference
Model "

Real money demand U.S. Real money supply

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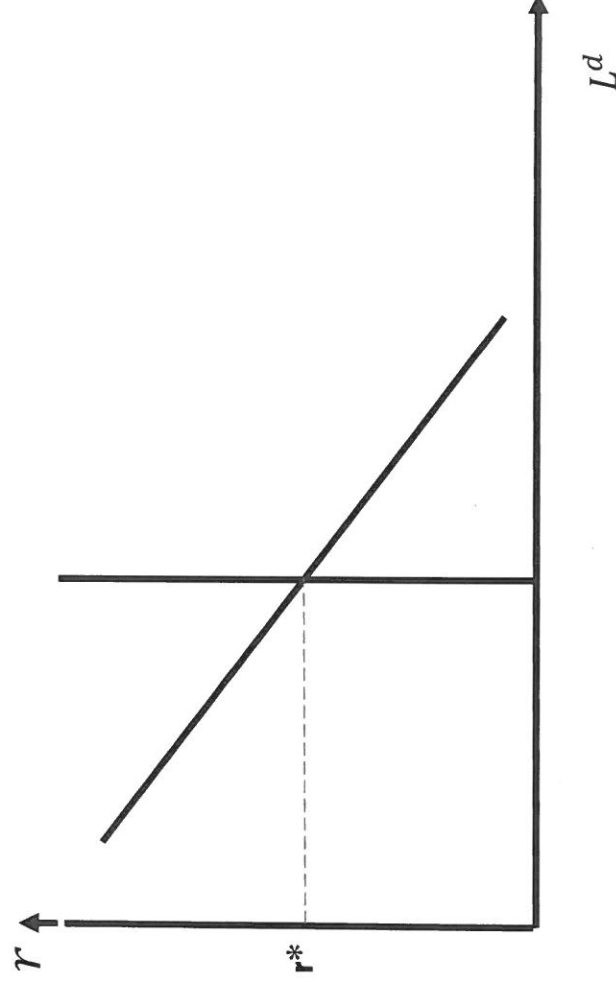
MONEY MARKET AND LM RELATION

- We have seen that interest rate relates to income in the product market
 - Higher interest rate → Lower income
- How is the interest rate determined?
 - Based on the liquidity preference model, we have seen that interest rate is determined by the demand and supply for real money balance, i.e. equilibrium in the money market

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MONEY MARKET AND LM RELATION

- From the analysis, it turns out that **income is one of the factors that determines the interest rate**
- For a given level of income, transaction and precautionary demand is determined, and hence the money demand curve
- For a fixed level of real money supply, the equilibrium interest rate is determined



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MONEY MARKET AND LM RELATION

- Similar to the IS relation, economists consider the relation between “ r ” and “ y ” that put the money market in equilibrium as the LM relation
- The LM relation represents the positive relation between “ r ” and “ y ” (Why is it so?)

$$y \uparrow \rightarrow r \uparrow$$

$$y \downarrow \rightarrow r \downarrow$$

IS relation	LM relation	IS-LM combined	Change in equilibrium
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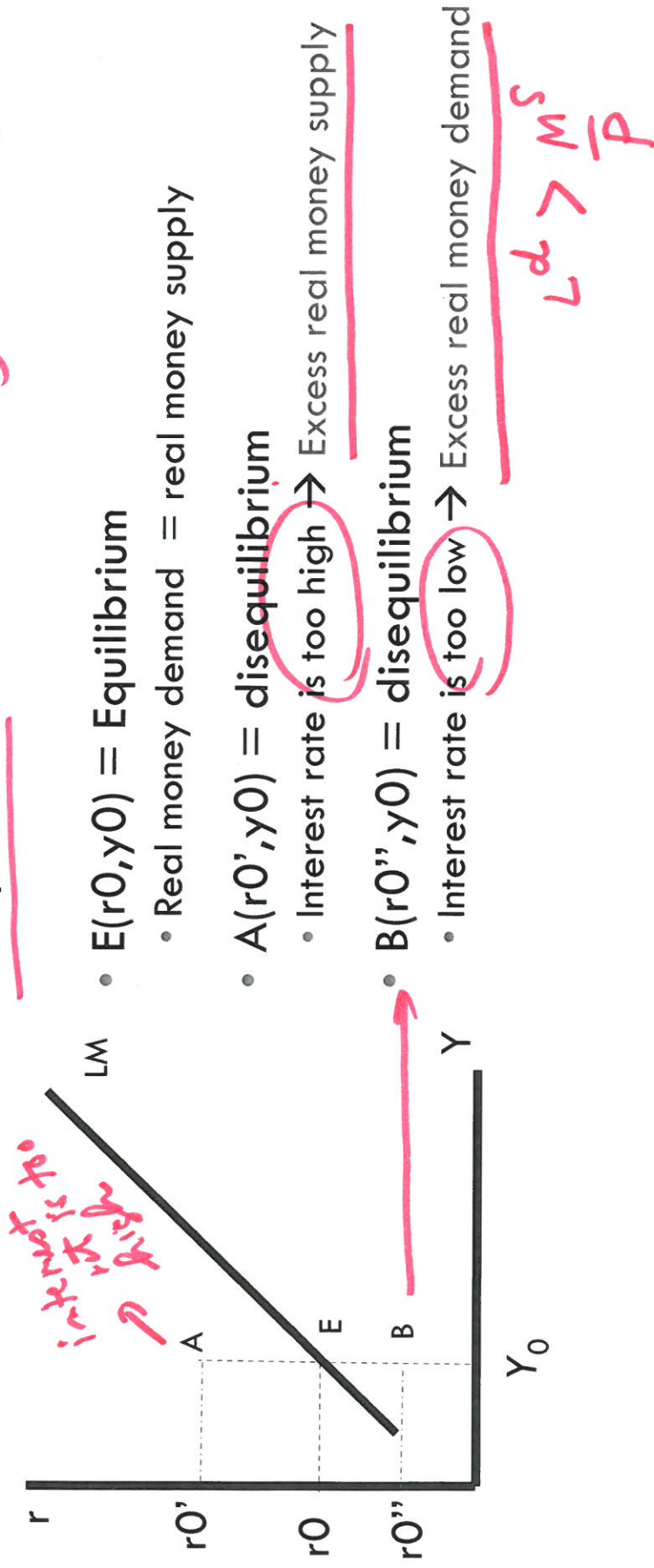
MONEY MARKET AND LM RELATION: LINKAGE

- Why positive relation? 
- Suppose we start from y_0 ,  the level of transaction and precautionary demand for money is determined.
- Given the two, the level of money demand can be determined, and hence the equilibrium interest rate, i.e. r_0
- An increase in the income from $y_0 \rightarrow y_1$ will increase the level transaction and precautionary demand for money
- Given the change, the new level of money demand is higher than before, for every level of interest rate
- In the equilibrium, interest rate will rise from r_0 to r_1 

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LM CURVE AND DISEQUILIBRIUM

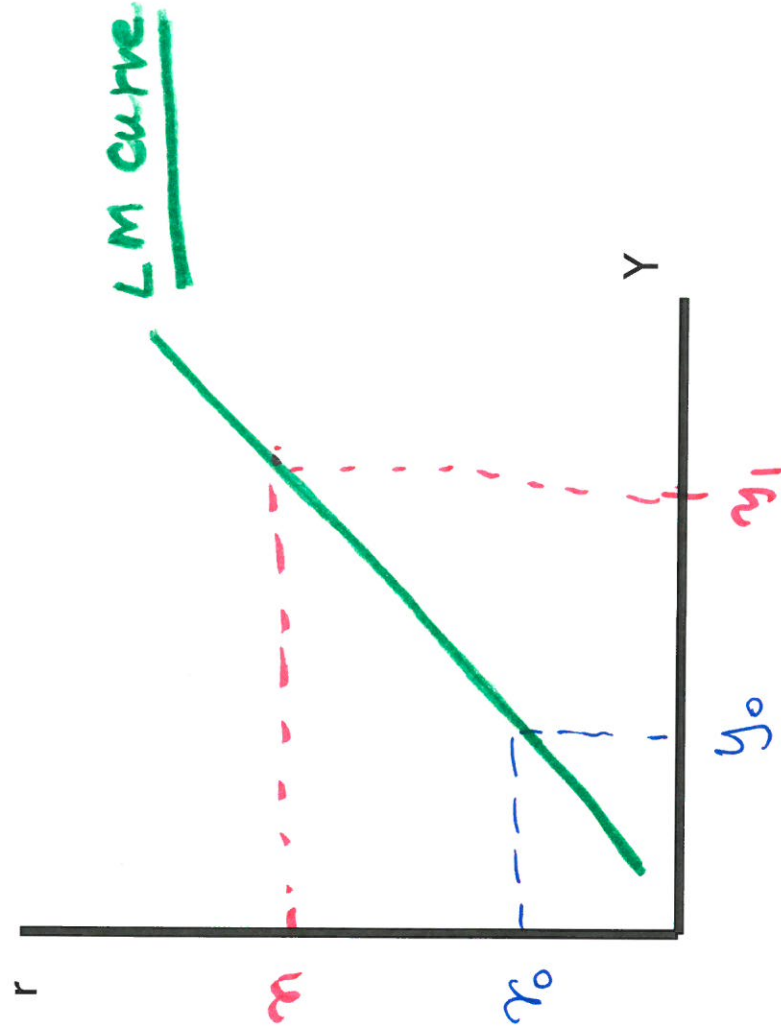
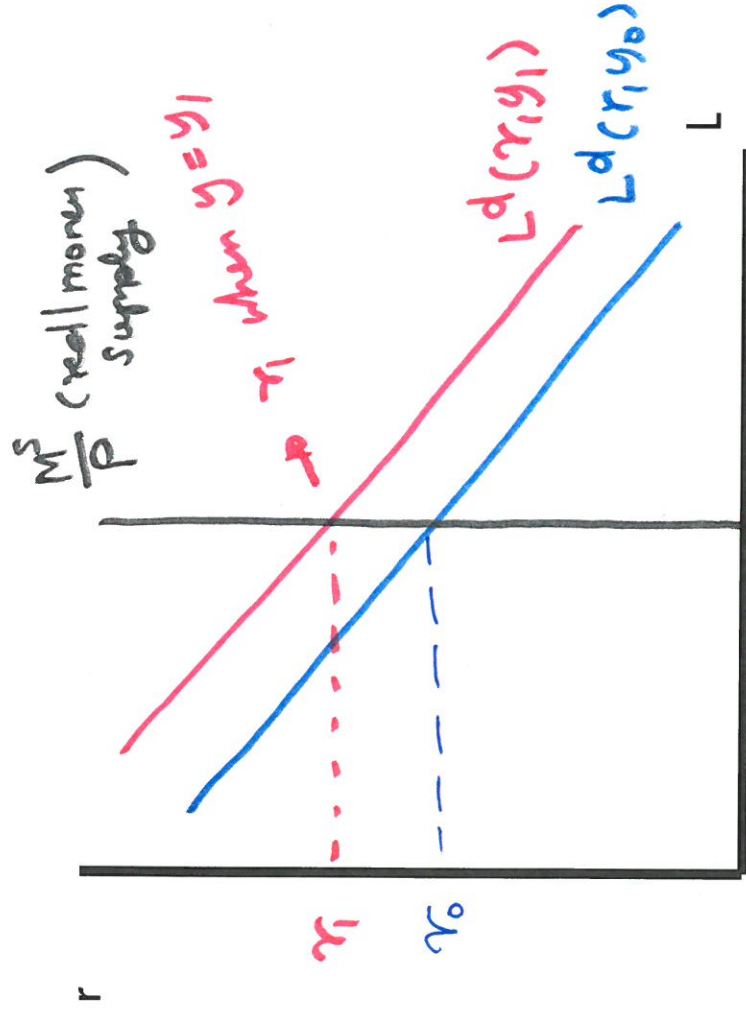
- Combination of “ r ” and “ y ” on the LM curve represents the equilibrium situation in money market
- Off the LM curve $\rightarrow$ disequilibrium in the money market.



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GRAPHICAL APPROACH TO THE DERIVATION OF

LM CURVE suppose $y_0 \rightarrow L^d(r, y_0)$; $y_1 > y_0 \rightarrow L^d(r, y_1)$



given $y_0 \rightarrow$ interest rate in Equilibrium
for money market is r_0
what if $y_0 \rightarrow y_1$?

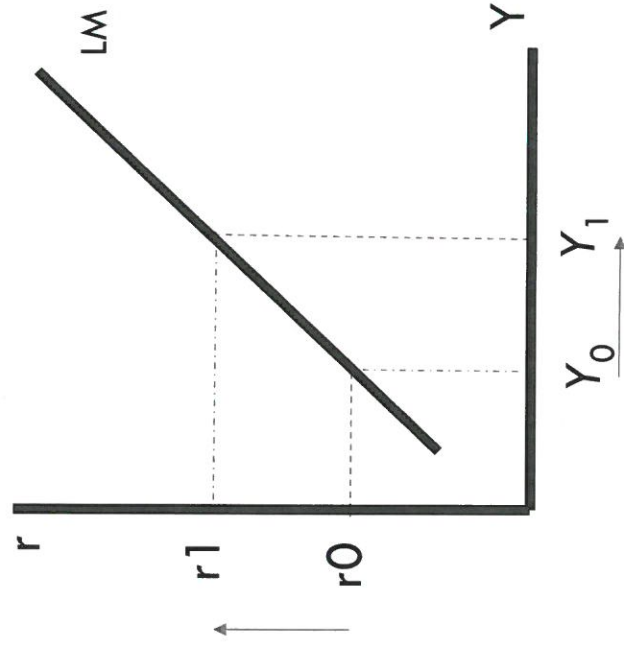
Investment
Saving

liquidity - money

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GRAPHICAL ILLUSTRATION OF LM RELATION: THE LM CURVE

- LM curve is the graphical version of LM relation
- Plotting "r" on vertical and "y" on the horizontal



- An increase in the income from $y_0 (=100)$ to $y_1 (=200)$ increases the level of money demand, and thus increase the equilibrium interest rate from r_0 to r_1 .

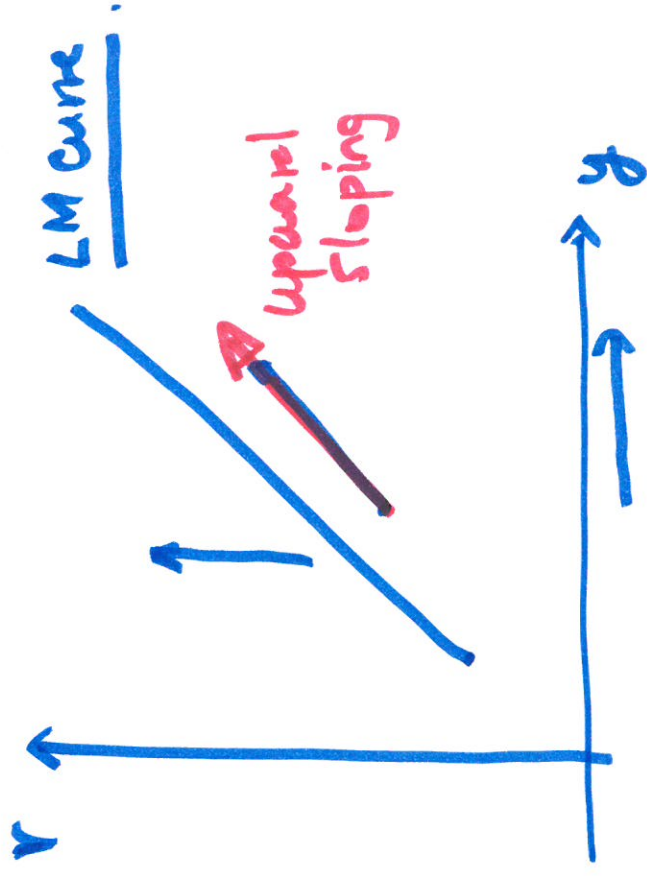
LM Curve:

- Equilibrium relation in money market

- how does "y" affect "r"?

- $y \uparrow \rightarrow$ higher money demand $\rightarrow$ higher "r"

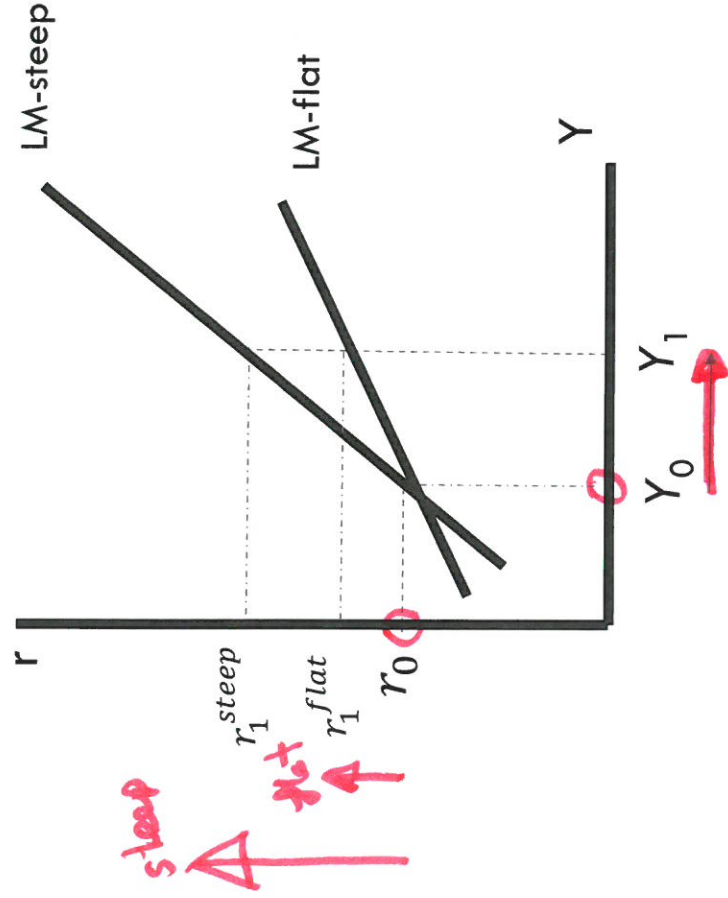
(positive relation;
upward sloping curve)



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slope LM

FACTORS DETERMINES OF ~~IS~~ CURVE



Steep LM curve:

- Interest rate changes a lot for a unit change in income
- Interest rate sensitively responds to income *highly sensitive to income*

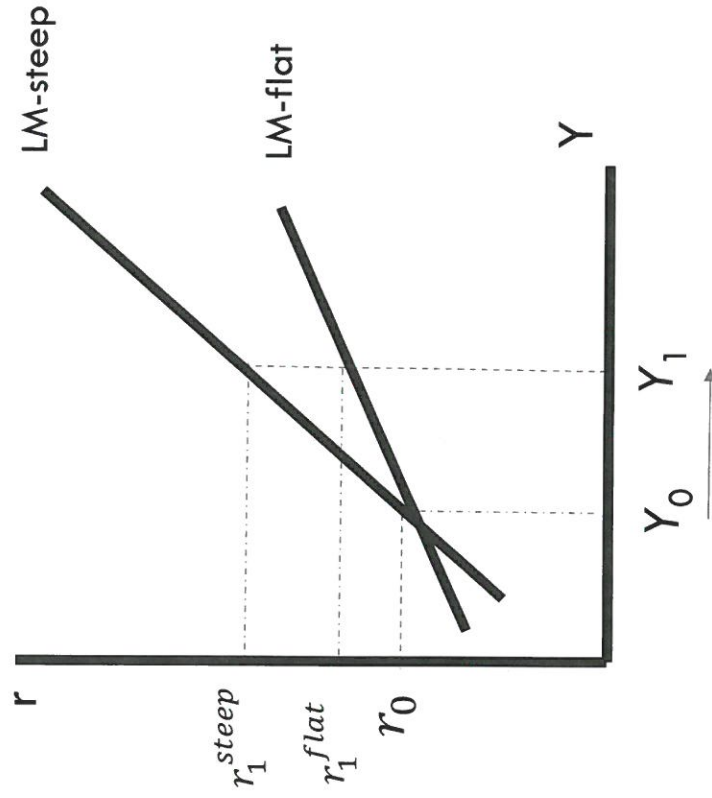
Flat LM curve:

- Interest rate changes a lot for a unit change in income
- Interest rate has limited response to income *"insensitive"*

IS relation	LM relation	IS-LM combined	Change in equilibrium
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FACTORS DETERMINES ~~OF IS~~ CURVE

slope of LM



- Recall the mechanism

$$y \uparrow \rightarrow L^d \uparrow \rightarrow r \uparrow$$

A big change in “r” can occur because of two possibilities

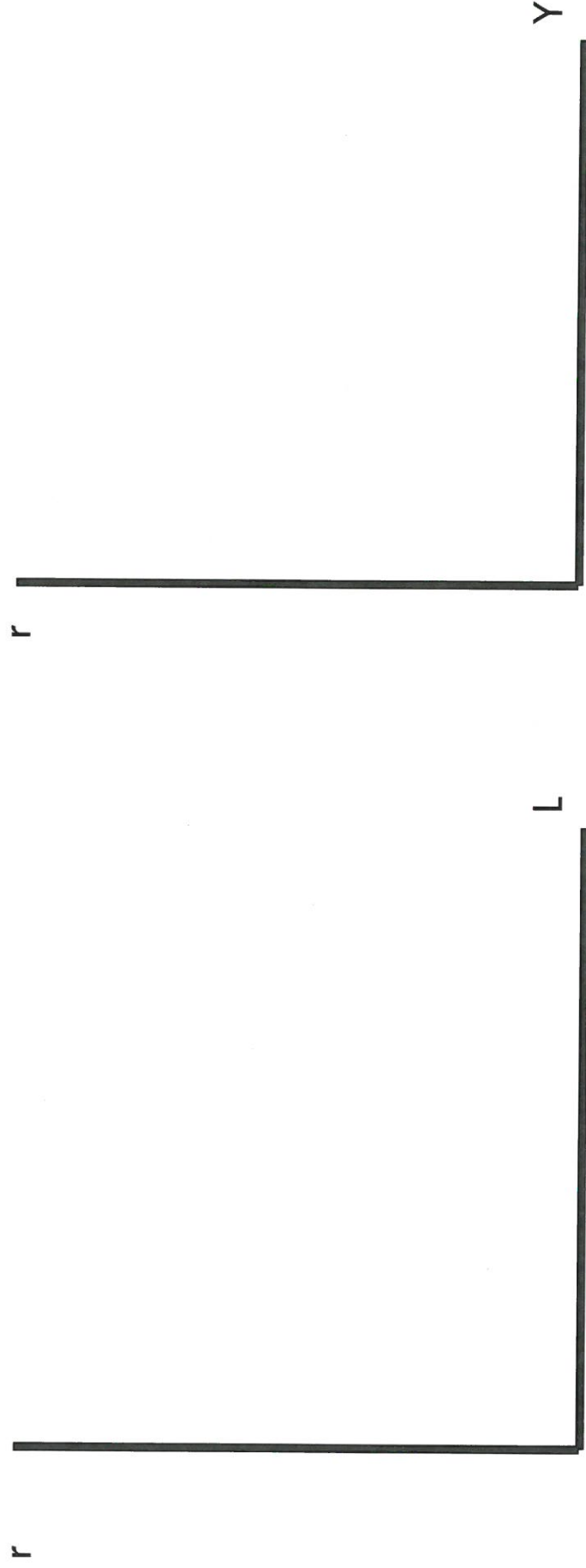
1. Demand for money is sensitive to income change *y ↑ → L^d ↑ a lot*
2. Demand for money is insensitive to interest rate

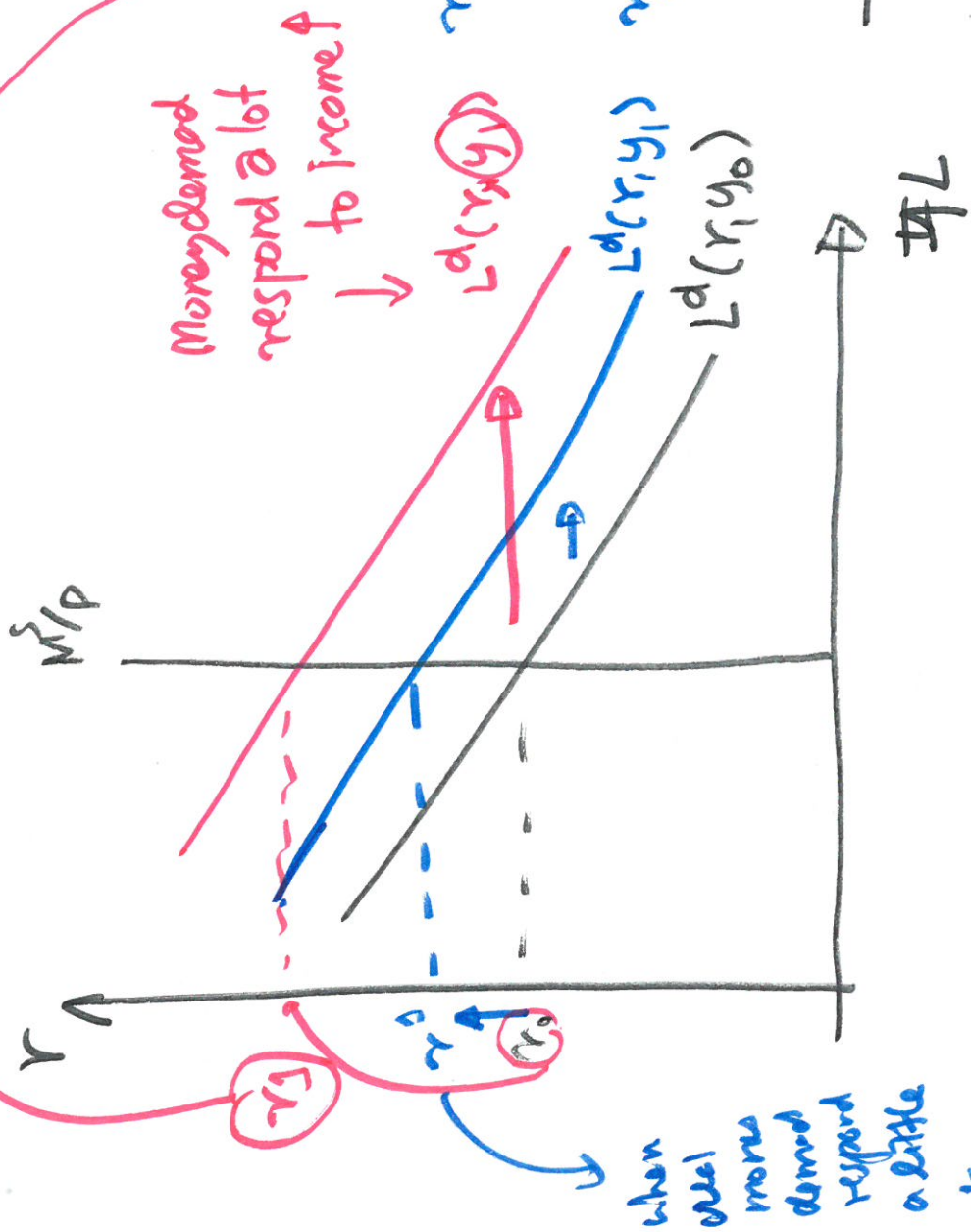
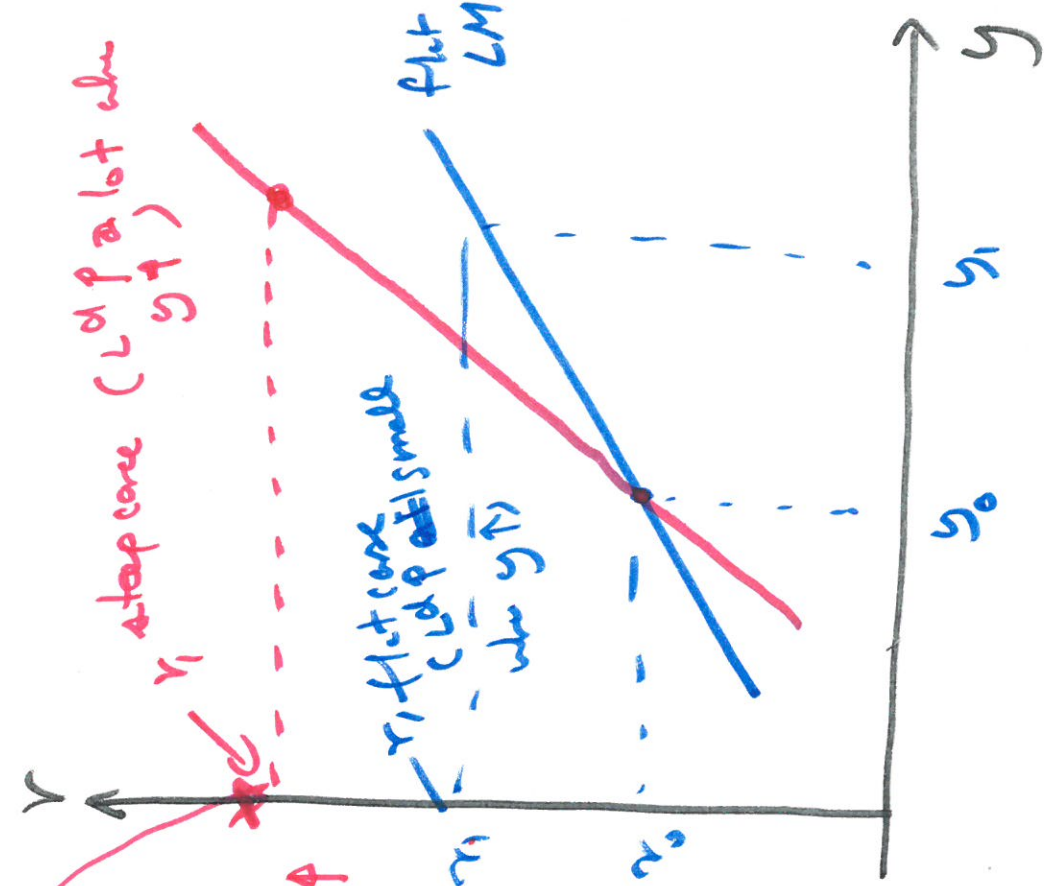
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FACTORS DETERMINES OF ~~IS~~ CURVE

slope of LM curve

Sensitivity of money demand to income $y \uparrow \rightarrow L^d \uparrow \rightarrow r \uparrow$

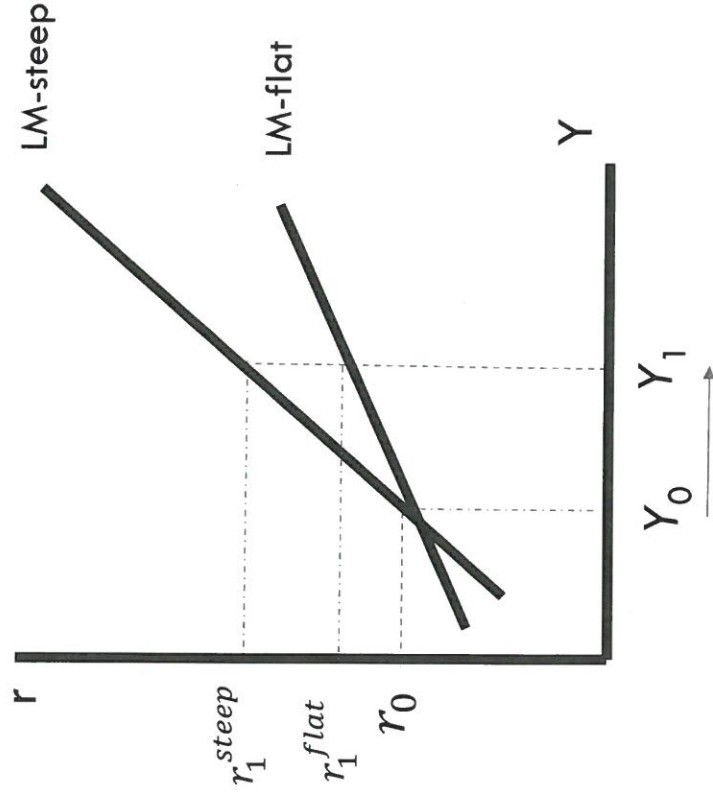




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FACTORS DETERMINES OF IS CURVE

slope of LM curve



- Recall the mechanism

$$y \uparrow \rightarrow L^d \uparrow \rightarrow r \uparrow$$

A big change in “r” can occur because of two possibilities

1. Demand for money is sensitive to income change
2. Demand for money is insensitive to interest rate

how does money holding change when interest rate changes.

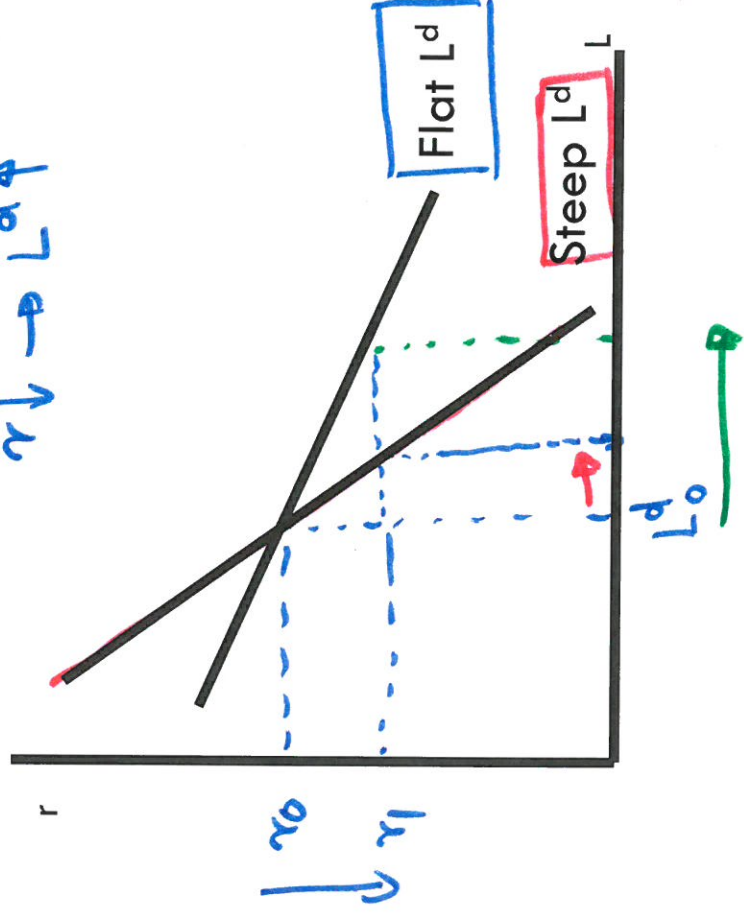
slope of IM curve

FACTORS DETERMINES OF IS CURVE

ppl responds differently to the change in the interest rate.

Sensitivity of money demand to interest rate

$r \downarrow \rightarrow L^d \uparrow$



- How does money holding respond to the interest rate?

High sensitivity money demand is lushly sensitive to the interest rate.

Low sensitivity money demand

Money demand curve is steep

is ~~that~~ limitedly

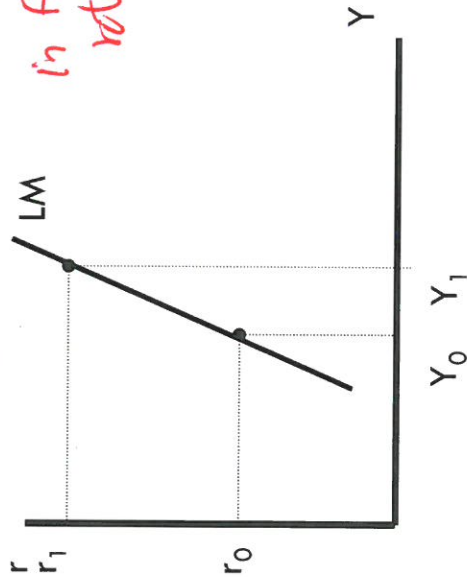
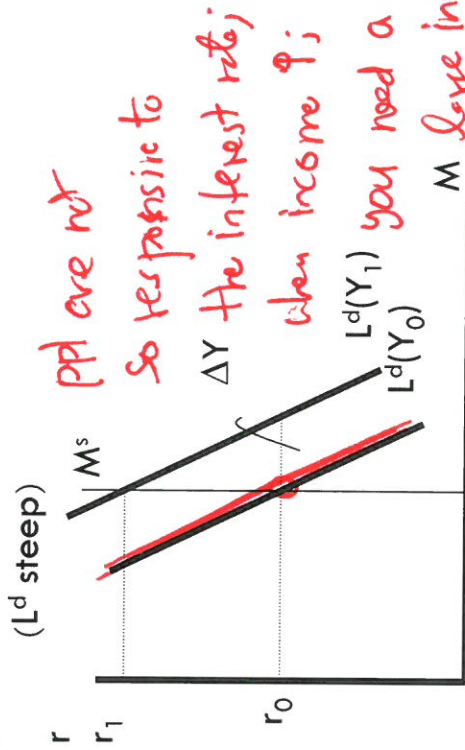
responding to

the interest rate.

money demand is insensitive to the interest rate

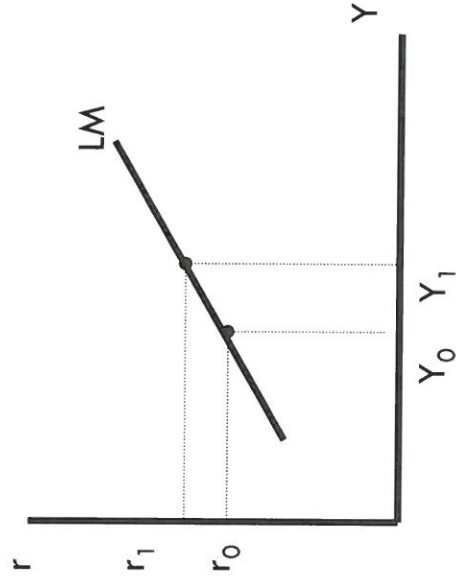
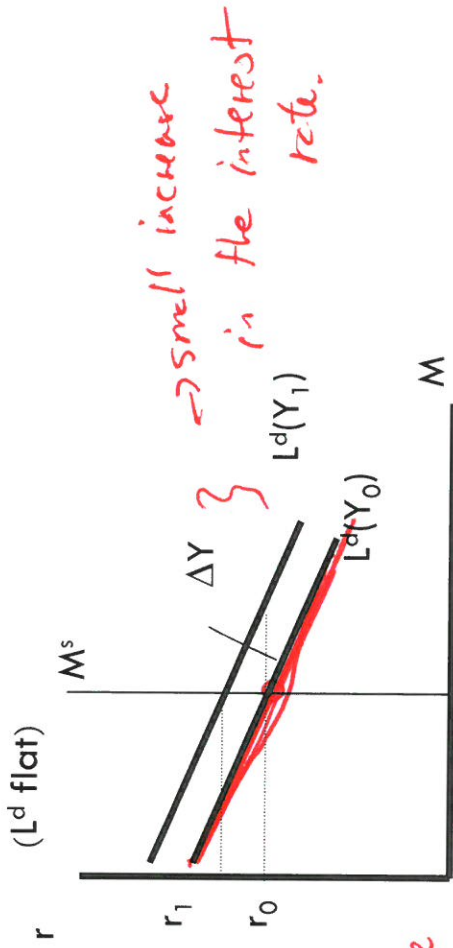
not highly sensitive

Money demand is insensitive to interest rate



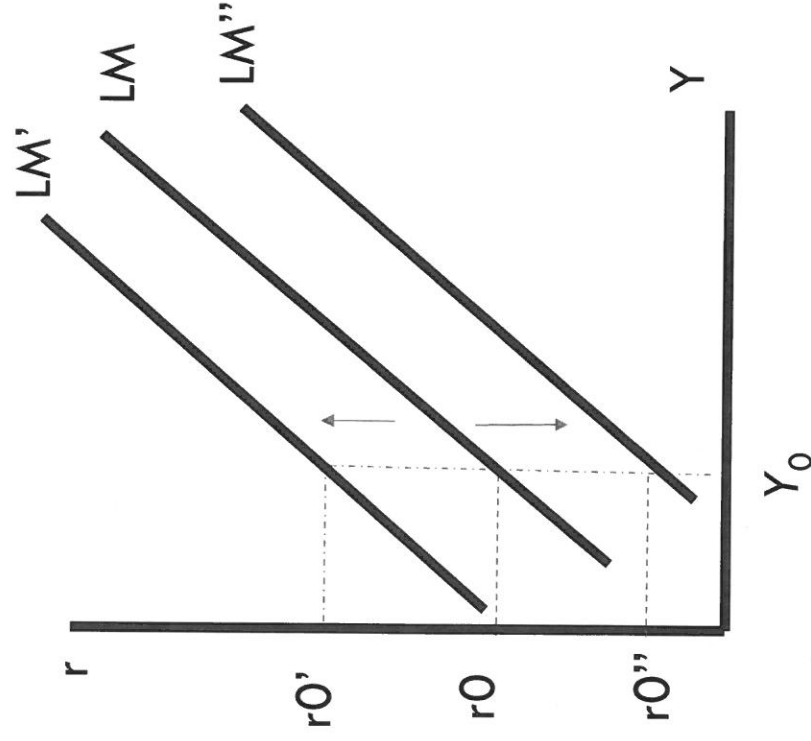
highly sensitive.

Money demand is sensitive to interest rate



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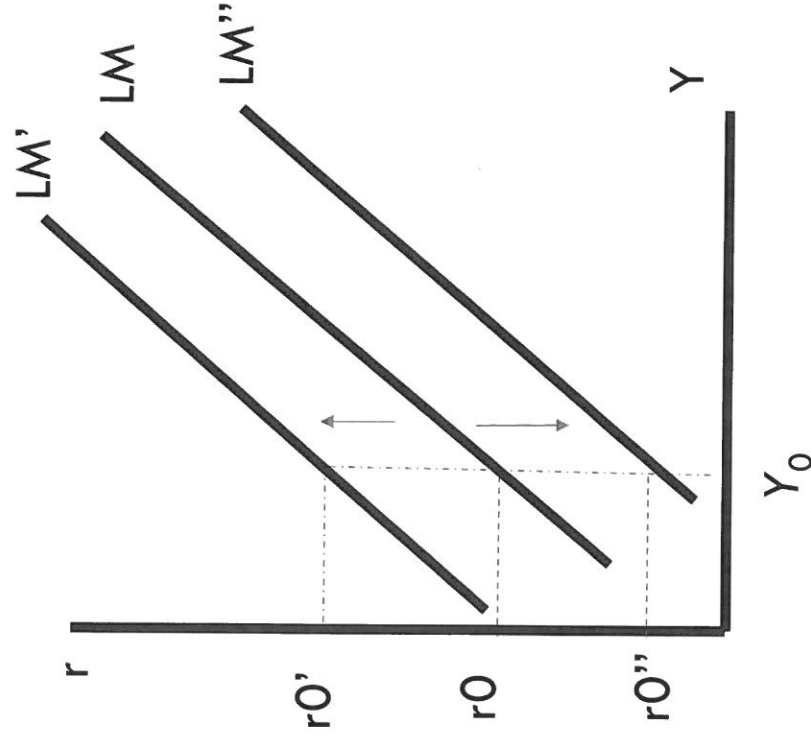
SHIFTS IN LM CURVE



- LM curve shifts up: $LM \rightarrow LM'$
 - Interest rate increases at every level of income
- LM curve shifts down: $LM \rightarrow LM''$
 - Interest rate falls at every level of income

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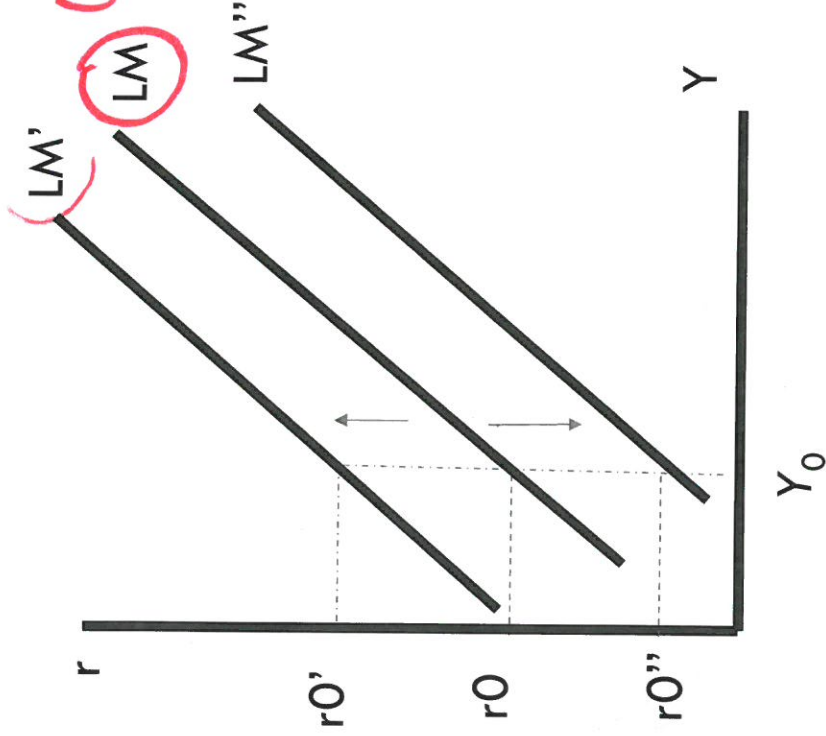
SHIFTS IN LM CURVE



- The shift in LM occurs because of the **non-income factors** that affect the money market, and hence equilibrium interest rate
- What are they?

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SHIFTS IN LM CURVE

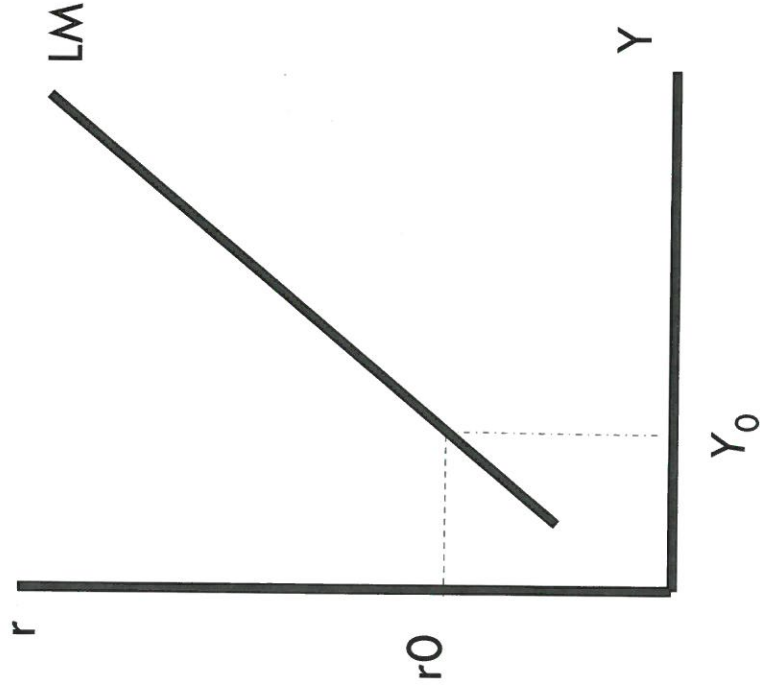


(level of Transaction technology is given)

- Non-income factors that affect money demand curve
 - Transaction technology
 - **• riskiness of alternative investment.**
- Factors affecting real money supply
 - The level of nominal money supply
 - Price level

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SHIFTS IN LM CURVE



• Example

- Better transaction technology $(r \downarrow)$ LM shift down
- Lower risk of other assets $\rightarrow r \downarrow$ LM shift down
- ~~Decrease~~ Increase in nominal money supply $\rightarrow r \uparrow$; LM shift up
- Increase in the price

$$P \uparrow \rightarrow \overline{M_s} \downarrow \rightarrow r \uparrow \text{ for every level } \rightarrow LM \text{ shift up.}$$

As income shift up.