



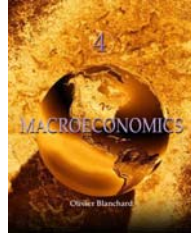
# Business Conditions Analysis

ECON 736

Professor Yamin Ahmad

Lecture 5:

- Effects of Policy Actions in IS-LM framework
- Fiscalism vs. Monetarism
- Short run to Long Run



## Equilibrium in the IS-LM model

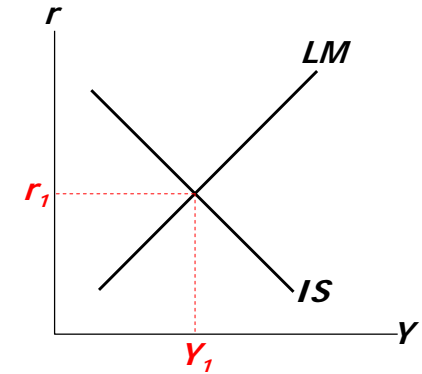
The IS curve represents equilibrium in the goods market.

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

The LM curve represents money market equilibrium.

$$\bar{M}/\bar{P} = L(r, Y)$$

The intersection determines the unique combination of  $Y$  and  $r$  that satisfies equilibrium in both markets.



Note: These lecture notes are incomplete without having attended lectures



## Equilibrium With Fixed Prices

### IS Curve

$$S(Y;G,T)=I(r) \left( \text{or } Y = \frac{c_0 + I_0 + G - c_1 T}{1 - c_1} - \frac{br}{1 - c_1} \right)$$

(+)(-)(+)

### LM Curve

$$\frac{M}{P} = L(r, Y) \quad (\text{or } \frac{M}{P} = m_0 + kY - hr)$$

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Solve for  $Y$  and  $r$  in terms of  $G, T, M$  and  $P$ .

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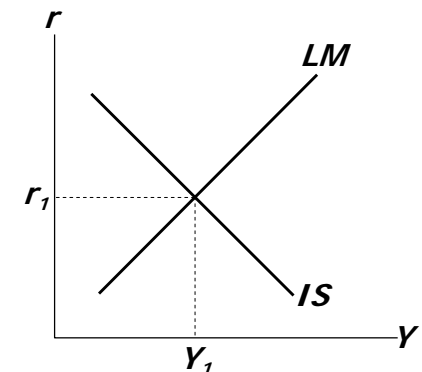
## Policy analysis with the IS-LM model

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

$$\bar{M}/\bar{P} = L(r, Y)$$

We can use the IS-LM model to analyze the effects of

- Fiscal policy:  $G$  and/or  $T$
- Monetary policy:  $M$

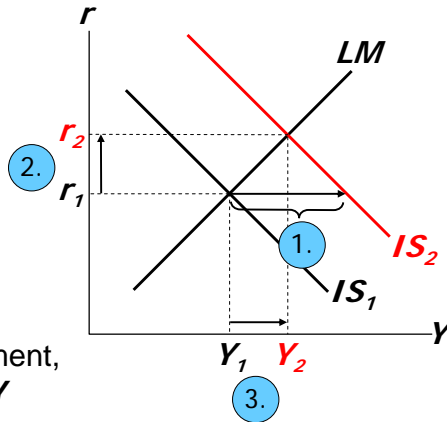


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## An increase in government purchases

1. IS curve shifts right  
by  $\frac{1}{1-MPC} \Delta G$   
causing output & income to rise.
2. This raises money demand, causing the interest rate to rise...
3. ...which reduces investment, so the final increase in  $Y$  is smaller than  $\frac{1}{1-MPC} \Delta G$



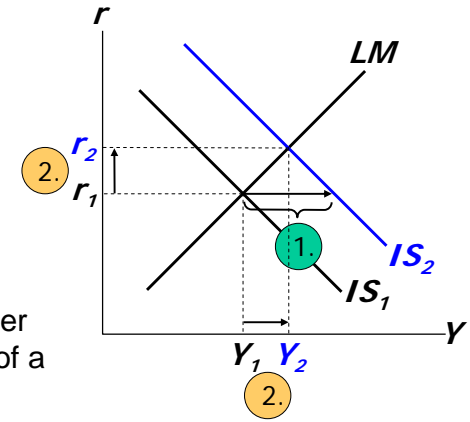
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## A tax cut

The IS curve shifts by

1.  $\frac{-MPC}{1-MPC} \Delta T$
2. ... $r$  rises so the final increase in  $Y$  is smaller than the direct effect of a tax cut.

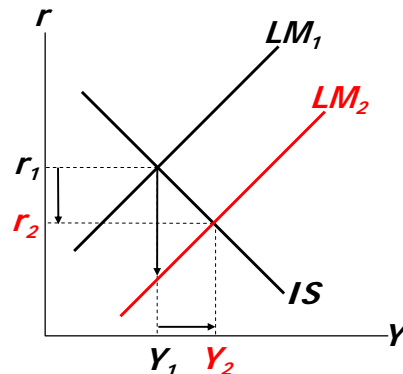


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## Monetary policy: An increase in $M$

1.  $\Delta M > 0$  shifts the LM curve down (or to the right)
2. ...causing the interest rate to fall
3. ...which increases investment, causing output & income to rise.



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## Using a Policy Mix

- The combination of monetary and fiscal policies is known as the **monetary-fiscal policy mix**, or simply, the **policy mix**.

The Effects of Fiscal and Monetary Policy.				
	Shift of IS	Shift of LM	Movement of Output	Movement in Interest Rate
Increase in taxes	left	none	down	down
Decrease in taxes	right	none	up	up
Increase in spending	right	none	up	up
Decrease in spending	left	none	down	down
Increase in money	none	down	up	down
Decrease in money	none	up	down	up

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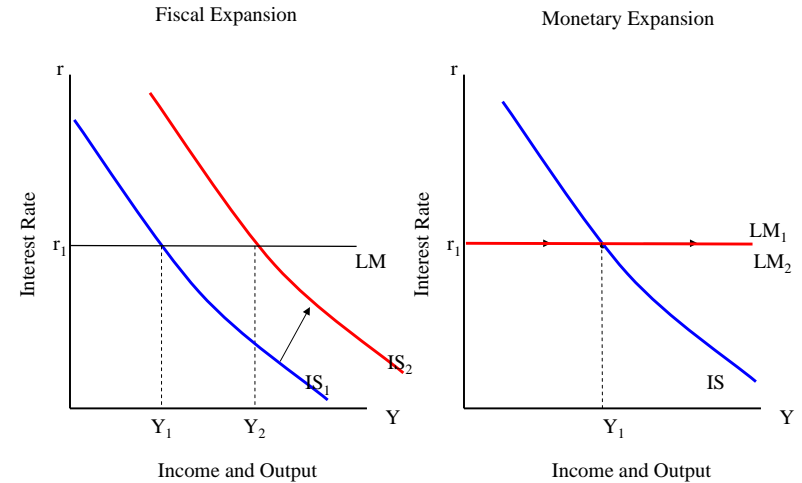


## Fiscalism vs. Monetarism

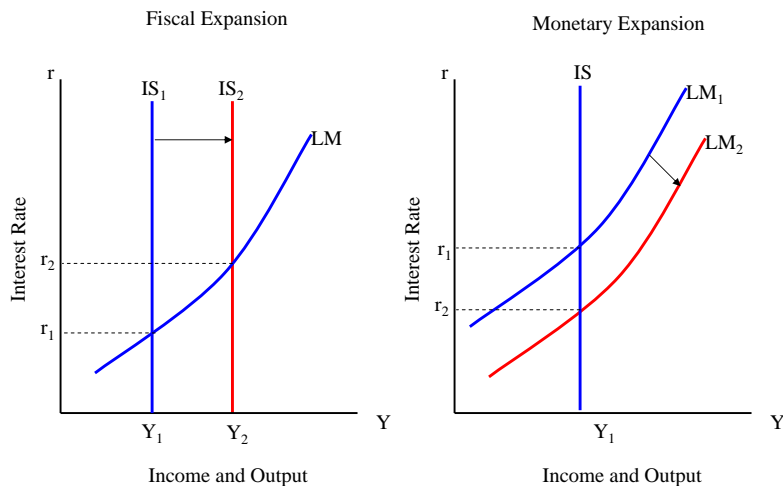
- In the *General Theory*, Keynes argued that:
  - The main source of fluctuations in demand was  $I_0$  due to changes in “animal spirits”;
  - The demand for money was highly interest elastic ( $h \rightarrow \infty$ ; the “liquidity trap”);
  - Hence neither expansionary monetary policy, (nor a fall in prices) could maintain demand;
  - Instead fiscal policy should be used.
- Post war Keynesians also argued that investment was insensitive to  $r$  ( $b \rightarrow 0$ ).



## Liquidity Trap ( $h = \infty$ )



## Investment Interest-Insensitive ( $b = 0$ )



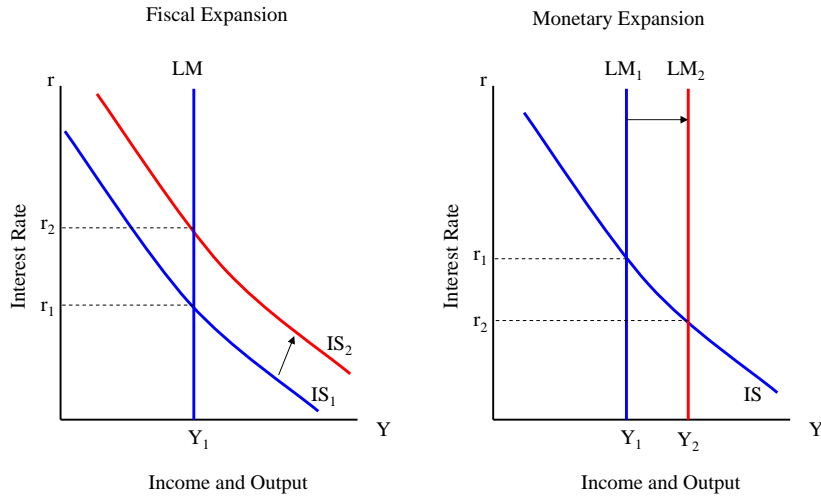
## Monetarism

Monetarists (led by Friedman) argued that:

- the main source of fluctuations in demand was changes in  $M$  due to misguided policy making
- the demand for money was not excessively interest elastic ( $h \rightarrow 0$ );
- demand was sensitive to interest rates ( $b \neq 0$ );
- hence Fiscal policy was not very effective;
- whilst monetary policy was potent, the aim should be to avoid destabilizing the economy by keeping  $M$  growing at a steady rate.



## Quantity Theory ( $h=0$ )



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	Fiscal Policy	Monetary Policy
Liquidity Trap ( $h=\infty$ ) (Keynesian Case I)	Yes	No
Autonomous Investment ( $b=0$ ) (Keynesian Case II)	Yes	No
Quantity Theory ( $h=0$ ) (Monetarist Case)	No	Yes

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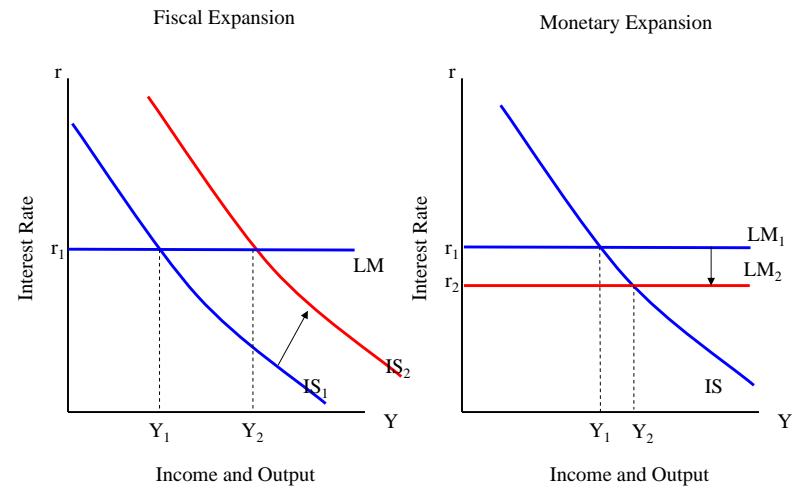
## The Monetarists Strike Back!

- Friedman also argued that the demand for money depends on “permanent” income, not just current income (i.e.  $M/P=L(i, Y)$ , or  $k=0$ ).
- LM is flat, but monetary policy still works.

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## “Friedman” Case ( $k=0$ )



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## Return of the ...

- Note:  $c_1, k$  do not affect the relative efficacy of fiscal vs. monetary policy which depends only on  $b, h$ :

$$\frac{\Delta Y / \Delta G}{\Delta Y / (\Delta M / P)} = \frac{h}{b}$$

- Today the big difference between economists is in explanations of supply rather than demand:
  - New Keynesian Theories
  - New Neoclassical Theories



## Interaction between Monetary & Fiscal policy

- Model:**  
Monetary & fiscal policy variables ( $M, G,$  and  $T$ ) are exogenous.
- Real world:**  
Monetary policymakers may adjust  $M$  in response to changes in fiscal policy, or vice versa.
- Such interaction may alter the impact of the original policy change.



## The Fed's response to $\Delta G > 0$

- Suppose Congress increases  $G$ .
- Possible Fed responses:
  - hold  $M$  constant
  - hold  $r$  constant
  - hold  $Y$  constant
- In each case, the effects of the  $\Delta G$  are different:



## Response 1: Hold $M$ constant

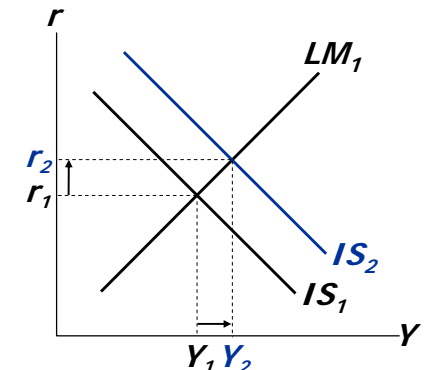
If Congress raises  $G$ , the  $IS$  curve shifts right.

If Fed holds  $M$  constant, then  $LM$  curve doesn't shift.

Results:

$$\Delta Y = Y_2 - Y_1$$

$$\Delta r = r_2 - r_1$$





### Response 2: Hold $r$ constant

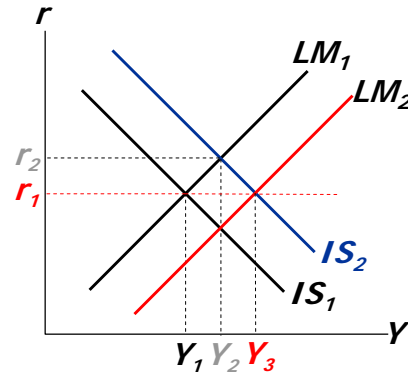
If Congress raises  $G$ , the  $IS$  curve shifts right.

To keep  $r$  constant, Fed increases  $M$  to shift  $LM$  curve right.

Results:

$$\Delta Y = Y_3 - Y_1$$

$$\Delta r = 0$$



### Response 3: Hold $Y$ constant

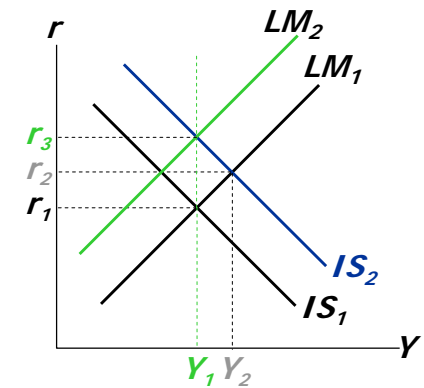
If Congress raises  $G$ , the  $IS$  curve shifts right.

To keep  $Y$  constant, Fed reduces  $M$  to shift  $LM$  curve left.

Results:

$$\Delta Y = 0$$

$$\Delta r = r_3 - r_1$$



### Balanced Budget Combination Policy

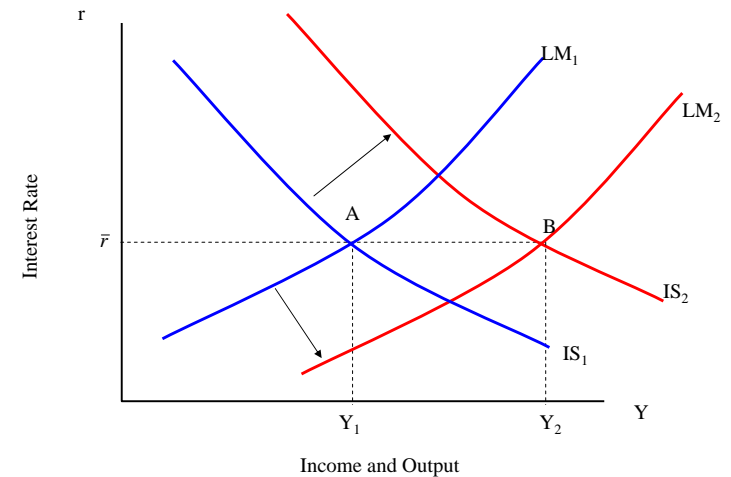
- Balanced budget fiscal expansion + monetary expansion to keep  $r$  fixed ( $r = \bar{r}$ ):

$$\bullet \text{ IS: } Y = \frac{C_0 + I_0 + G - c_1 T - b\bar{r}}{1 - c_1} \Rightarrow \Delta Y = \frac{\Delta G - c_1 \Delta T}{1 - c_1} = \Delta G$$

$$\bullet \text{ LM: } \frac{M}{P} = m_0 + kY - h\bar{r} \Rightarrow \frac{\Delta M}{P} = k\Delta Y = k\Delta G$$



### Balanced Budget Combination Policy



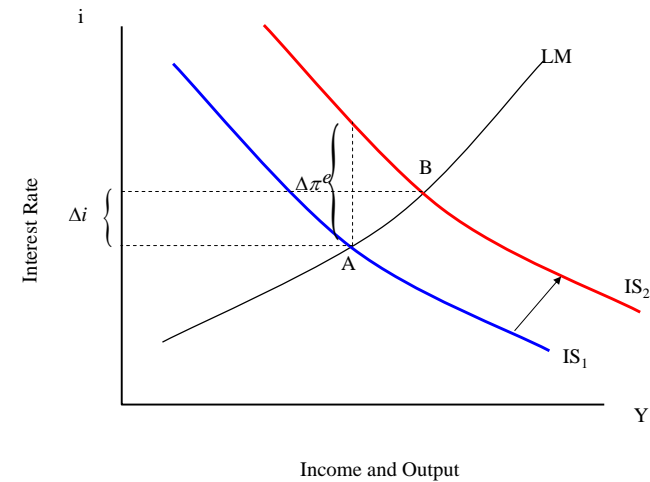


### Inflationary Expectations ( $\pi^e \neq 0$ )

- LM:  $\frac{M}{P} = L(i, Y)$  (or  $\frac{M}{P} = m_0 + kY - hi$ )
- IS:  $S(Y; G, T) = I(i - \pi^e)$  (or  $Y = \frac{C_0 + I_0 + G - c_1 T - b(i - \pi^e)}{1 - c_1}$ )
- In  $(Y, i)$  space with  $Y$  fixed, the vertical shift in IS is  $\Delta i = \Delta \pi^e$
- Hence  $Y$  changes unless LM is vertical ( $h=0$ ). This is known as the **Mundell-Tobin** effect.



### Mundell-Tobin Effect



### Shocks in the IS-LM model

**IS shocks:** exogenous changes in the demand for goods & services.

Examples:

- stock market boom or crash
  - ⇒ change in households' wealth
  - ⇒  $\Delta C$
- change in business or consumer confidence or expectations
  - ⇒  $\Delta I$  and/or  $\Delta C$



### Shocks in the IS-LM model

**LM shocks:** exogenous changes in the demand for money.

Examples:

- a wave of credit card fraud increases demand for money.
- more ATMs or the Internet reduce money demand.

## EXERCISE:

*Analyze shocks with the IS-LM model*

Use the *IS-LM* model to analyze the effects of

1. a boom in the stock market that makes consumers wealthier.
2. after a wave of credit card fraud, consumers using cash more frequently in transactions.

For each shock,

- a. use the *IS-LM* diagram to show the effects of the shock on  $Y$  and  $r$ .
- b. determine what happens to  $C$ ,  $I$ , and the unemployment rate.

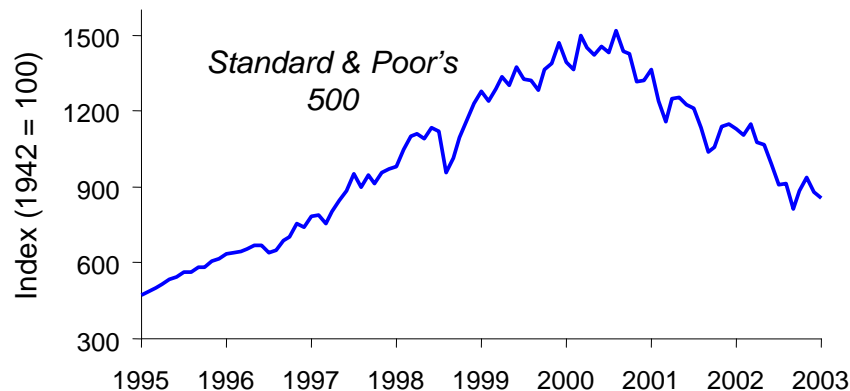
## CASE STUDY:

## The U.S. recession of 2001

- During 2001:
  - 2.1 million people lost their jobs, as unemployment rose from 3.9% to 5.8%.
  - GDP growth slowed to 0.8% (compared to 3.9% average annual growth during 1994-2000).

CASE STUDY:  
The U.S. recession of 2001

- Causes: 1) Stock market decline  $\Rightarrow \downarrow C$



CASE STUDY:  
The U.S. recession of 2001

- Causes: 2) 9/11
  - increased uncertainty
  - fall in consumer & business confidence
  - result: lower spending, *IS* curve shifted left
- Causes: 3) Corporate accounting scandals
  - Enron, WorldCom, etc.
  - reduced stock prices, discouraged investment



## CASE STUDY: The U.S. recession of 2001

- Fiscal policy response: shifted *IS* curve right
  - tax cuts in 2001 and 2003
  - spending increases
    - airline industry bailout
    - NYC reconstruction
    - Afghanistan war

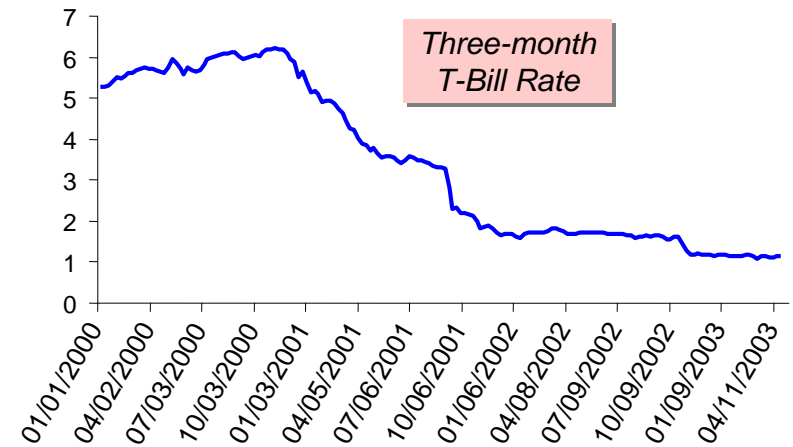
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## CASE STUDY: The U.S. recession of 2001

- Monetary policy response: shifted *LM* curve right



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## What is the Fed's policy instrument?

- The news media commonly report the Fed's policy changes as interest rate changes, as if the Fed has direct control over market interest rates.
- In fact, the Fed **targets** the *federal funds rate* – the interest rate banks charge one another on overnight loans.
- The Fed changes the money supply and shifts the *LM* curve to achieve its target.
- Other short-term rates typically move with the federal funds rate.

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## What is the Fed's policy instrument?

Why does the Fed target interest rates instead of the money supply?

- 1) They are easier to measure than the money supply.
- 2) The Fed might believe that *LM* shocks are more prevalent than *IS* shocks. If so, then targeting the interest rate stabilizes income better than targeting the money supply.

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## IS-LM and Aggregate Demand

- So far, we've been using the *IS-LM* model to analyze the short run, when the price level is assumed fixed.
- However, a change in **P** would shift *LM* and therefore affect **Y**.
- The **Aggregate Demand curve** (introduced in Lecture 3) captures this relationship between **P** and **Y**.



## Aggregate Demand

- Recall from before, by plugging interest rates from the *LM* relation into the *IS* relation, we obtain:

$$Y = \frac{C_0 + I_0 + G - c_1 T_1}{1 - c_1} - \frac{b}{1 - c_1} \left( \frac{m_0 + kY - M/P}{h} \right)$$

$$= \frac{C_0 + I_0 + G - c_1 T_1 - b m_0 / h + b M / h P}{1 - c_1 + b k / h}$$

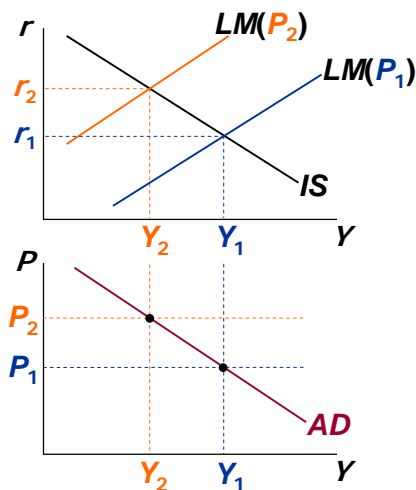
- Thus demand is decreasing in **P** (unless  $b/h=0$ )
- Why?  $P \uparrow \Rightarrow M/P \downarrow \Rightarrow LM \uparrow \Rightarrow r \uparrow \Rightarrow I \downarrow \Rightarrow Y \downarrow$  (Keynes Effect)
- Horizontal Shifts in *AD* from *IS/LM* analysis.



## Deriving the AD curve

Intuition for slope of *AD* curve:

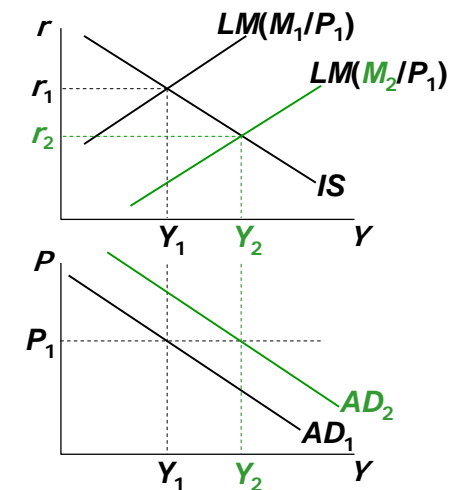
- $\uparrow P \Rightarrow \downarrow (M/P)$
- $\Rightarrow LM$  shifts left
- $\Rightarrow \uparrow r$
- $\Rightarrow \downarrow I$
- $\Rightarrow \downarrow Y$



## Monetary policy and the AD curve

The Fed can increase aggregate demand:

- $\uparrow M \Rightarrow LM$  shifts right
- $\Rightarrow \downarrow r$
- $\Rightarrow \uparrow I$
- $\Rightarrow \uparrow Y$  at each value of **P**





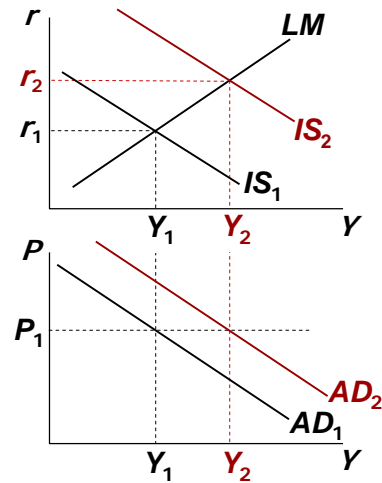
### Fiscal policy and the AD curve

Expansionary fiscal policy ( $\uparrow G$  and/or  $\downarrow T$ ) increases Agg. demand:

$\downarrow T \Rightarrow \uparrow C$

$\Rightarrow IS$  shifts right

$\Rightarrow \uparrow Y$  at each value of  $P$



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### IS-LM and AD-AS in the short run & long run

Recall from Lecture 3: The force that moves the economy from the short run to the long run is the gradual adjustment of prices.

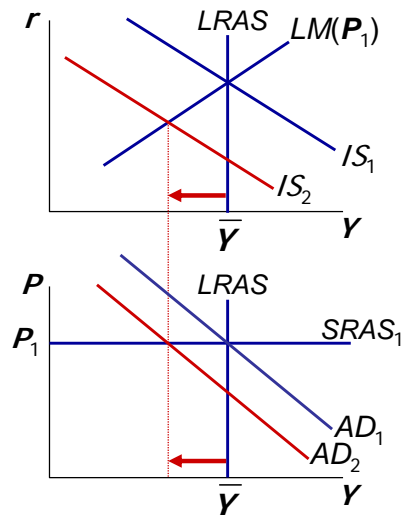
In the short-run equilibrium, if	then over time, the price level will
$Y > \bar{Y}$	rise
$Y < \bar{Y}$	fall
$Y = \bar{Y}$	remain constant

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### The SR and LR effects of an IS shock

A negative IS shock shifts IS and AD left, causing  $Y$  to fall.

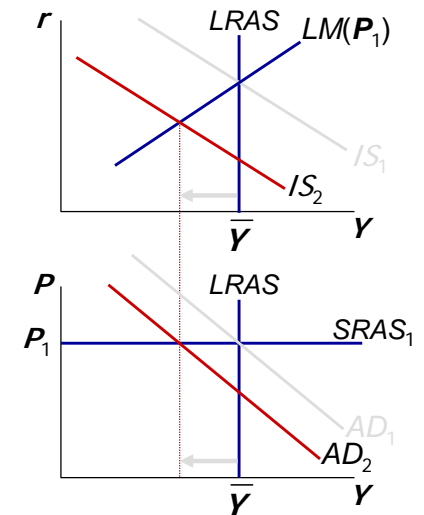


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### The SR and LR effects of an IS shock

In the new short-run equilibrium,  $Y < \bar{Y}$



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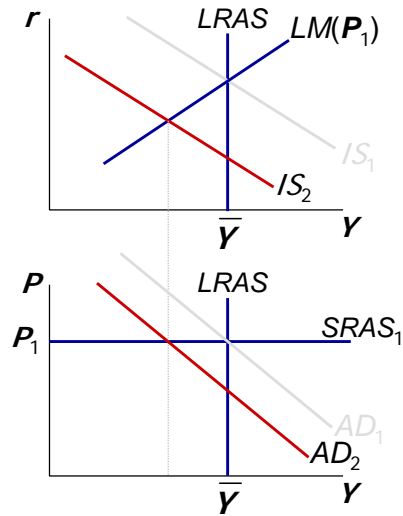


### The SR and LR effects of an IS shock

In the new short-run equilibrium,  $Y < \bar{Y}$

Over time,  $P$  gradually falls, which causes

- $SRAS$  to move down.
- $M/P$  to increase, which causes  $LM$  to move down.



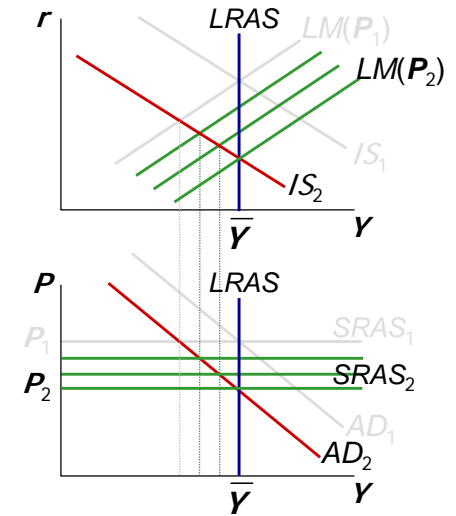
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### The SR and LR effects of an IS shock

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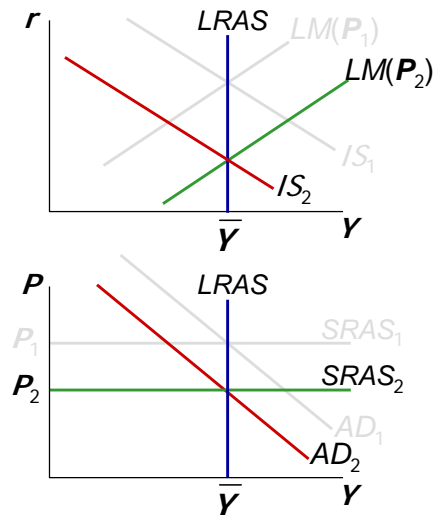


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### The SR and LR effects of an IS shock

This process continues until economy reaches a long-run equilibrium with  $Y = \bar{Y}$

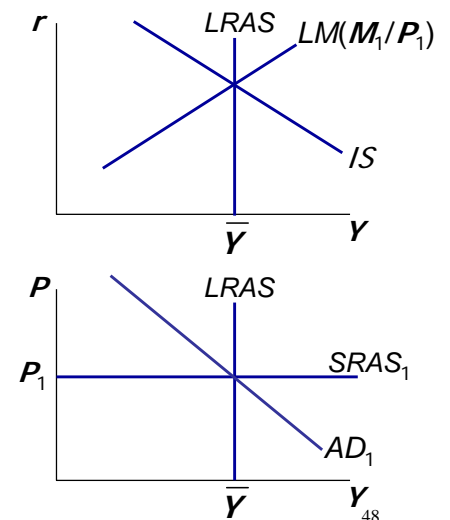


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### EXERCISE: Analyze SR & LR effects of $\Delta M$

- Draw the  $IS-LM$  and  $AD-AS$  diagrams as shown here.
- Suppose Fed increases  $M$ . Show the short-run effects on your graphs.
- Show what happens in the transition from the short run to the long run.
- How do the new long-run equilibrium values of the endogenous variables compare to their initial values?



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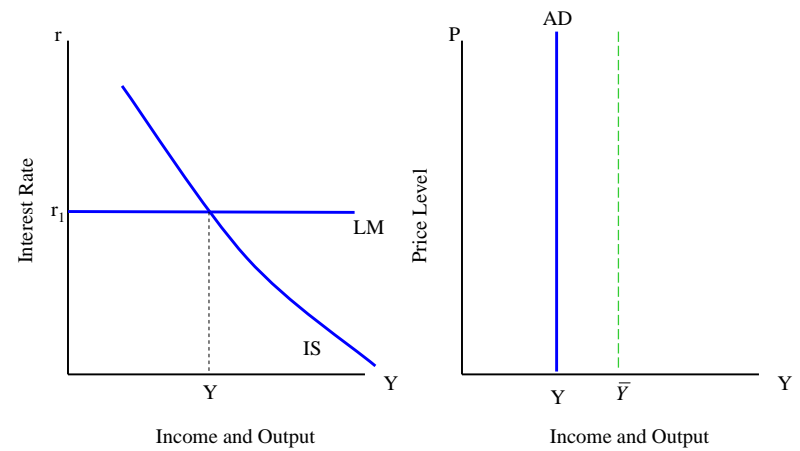


### Question for you...

Keynes argued that there was a liquidity trap ( $h=\infty$ ) so that  $b/h=0$ . In that case is there any  $P$  that will give full employment?



### Liquidity Trap

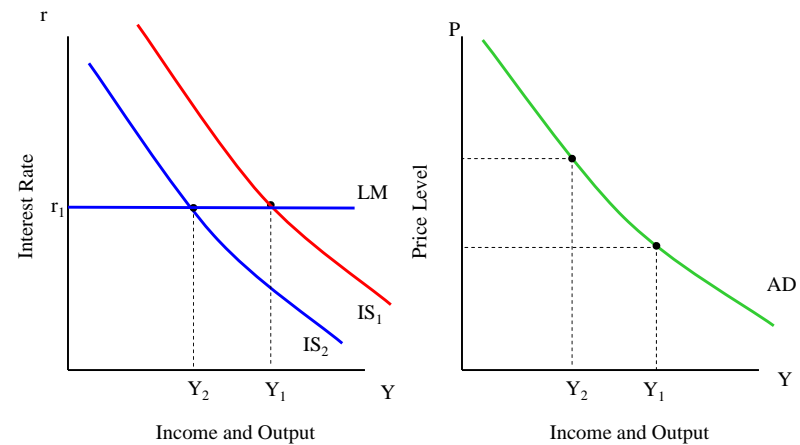


### Real Balance Effect

- Pigou argued that Consumption depends on wealth (as well as disposable income)
- i.e.  $C=C[Y-T, (M/P)+B]$   
 (+)            (+)
- Now a fall in prices shifts IS as well as LM.
- As  $P \rightarrow 0$ ,  $M/P \rightarrow \infty \Rightarrow C \rightarrow \infty$ . Hence there is a  $P$  such that:  
 $\bar{Y} = \bar{Y} = F(\bar{K}, \bar{L})$



### Real Balance Effect



## Case Study: The Great Depression

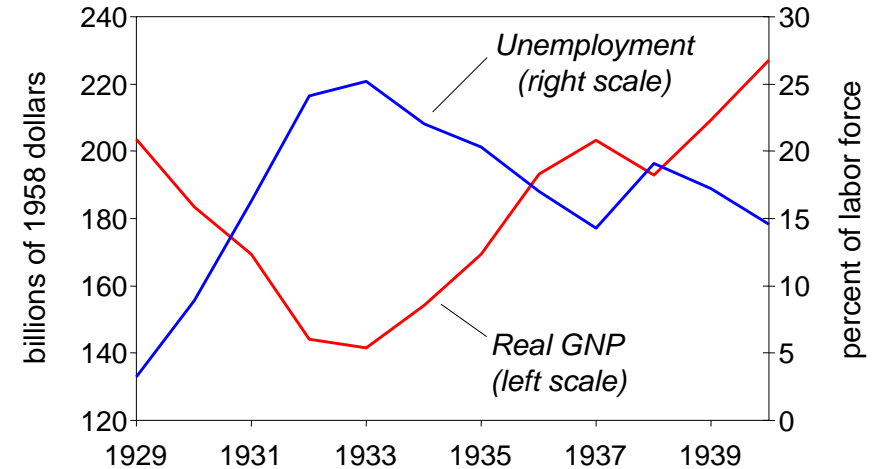
### Competing Hypotheses:

1. Spending Hypothesis
2. Money Hypothesis
3. Credit Crunch
4. Expected Inflation/Deflation Effects ( - really “Money Hypothesis” revisited!)

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## The Great Depression



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## THE SPENDING HYPOTHESIS: Shocks to the *IS* curve

- **Asserts** that the Depression was largely due to an exogenous fall in the demand for goods & services – a leftward shift of the *IS* curve.
- **Evidence:** output and interest rates both fell, which is what a leftward *IS* shift would cause.

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## THE SPENDING HYPOTHESIS: Reasons for the *IS* shift

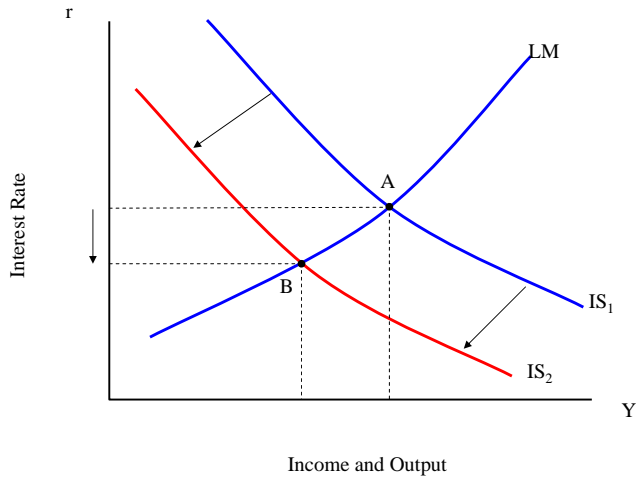
- **Stock market crash**  $\Rightarrow$  exogenous  $\downarrow C$ 
  - Oct-Dec 1929: S&P 500 fell 17%
  - Oct 1929-Dec 1933: S&P 500 fell 71%
- **Drop in investment**
  - “correction” after overbuilding in the 1920s
  - widespread bank failures made it harder to obtain financing for investment (- **Credit Crunch**)
- **Contractionary fiscal policy**
  - Politicians raised tax rates and cut spending to combat increasing deficits.

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## The Spending Hypothesis



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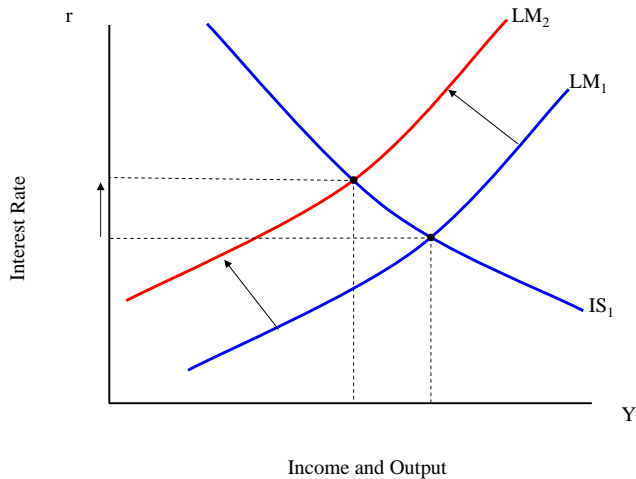
## THE MONEY HYPOTHESIS: A shock to the LM curve

- Asserts that the Depression was largely due to huge fall in the money supply.
- Evidence:  
M1 fell 25% during 1929-33.
- But, two problems with this hypothesis:
  - $P$  fell even more, so  $M/P$  actually rose slightly during 1929-31.
  - nominal interest rates fell, which is the opposite of what a leftward  $LM$  shift would cause.

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## The Money Hypothesis



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## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- Asserts that the severity of the Depression was due to a huge deflation:  
 $P$  fell 25% during 1929-33.
- This deflation was probably caused by the fall in  $M$ , so perhaps money played an important role after all.
- In what ways does a deflation affect the economy?

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## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The stabilizing effects of deflation:
- $\downarrow P \Rightarrow \uparrow (M/P) \Rightarrow LM$  shifts right  $\Rightarrow \uparrow Y$
- **Real Balance (Pigou) effect:**
  - $\downarrow P \Rightarrow \uparrow (M/P)$
  - $\Rightarrow$  consumers' wealth  $\uparrow$
  - $\Rightarrow \uparrow C$
  - $\Rightarrow IS$  shifts right
  - $\Rightarrow \uparrow Y$

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## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The destabilizing effects of expected deflation:

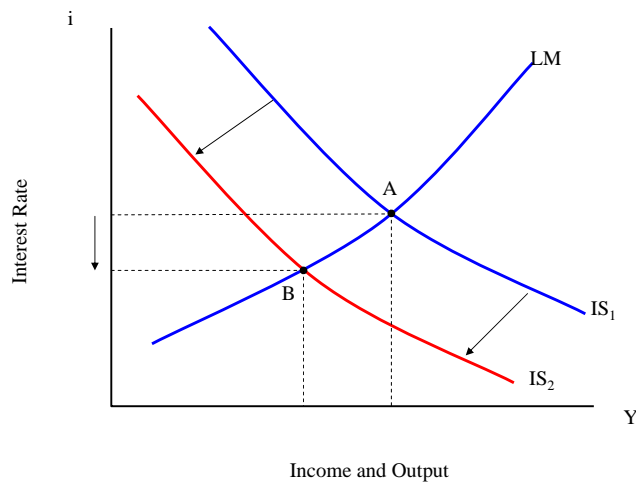
$\downarrow \pi^e$   
 $\Rightarrow r \uparrow$  for each value of  $i$   
 $\Rightarrow I \downarrow$  because  $I = I(r)$   
 $\Rightarrow IS$  shifts to the left  
 $\Rightarrow$  planned expenditure & agg. demand  $\downarrow$   
 $\Rightarrow$  income & output  $\downarrow$

Note: These lecture notes are incomplete without having attended lectures

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## Expected Deflation Effect



Note: These lecture notes are incomplete without having attended lectures

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## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices

- The destabilizing effects of unexpected deflation:  
**debt-deflation theory**

$\downarrow P$  (if unexpected)  
 $\Rightarrow$  transfers purchasing power from borrowers to lenders  
 $\Rightarrow$  borrowers spend less, lenders spend more  
 $\Rightarrow$  if borrowers' propensity to spend is larger than lenders', then aggregate spending falls, the  $IS$  curve shifts left, and  $Y$  falls

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## Summary of Hypotheses:

### Competing Hypotheses:

1. Spending Hypothesis:  $C_0 \downarrow$  (stock market crash),  $I_0 \downarrow \Rightarrow IS \downarrow$
2. Money Hypothesis:  $M \downarrow \Rightarrow LM \downarrow$ . But  $P \downarrow$  so  $M/P$  unchanged,  $i \downarrow$ .
3. Credit Crunch  $\Rightarrow C_0, I_0 \downarrow$  and  $IS \downarrow$ .
4. Expected Deflation Effects:  $\pi^e \downarrow \Rightarrow AD \downarrow$  by Mundell-Tobin effect. Also, redistributive effects (debt-deflation)

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## Why another Depression is unlikely

- Policymakers (or their advisors) now know much more about macroeconomics:
  - The Fed knows better than to let  $M$  fall so much, especially during a contraction.
  - Fiscal policymakers know better than to raise taxes or cut spending during a contraction.
- Federal deposit insurance makes widespread bank failures very unlikely.
- Automatic stabilizers make fiscal policy expansionary during an economic downturn.

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## Summary

### 1. IS-LM model

- a theory of aggregate demand
- exogenous:  $M, G, T$ ,  
 $P$  exogenous in short run,  $Y$  in long run
- endogenous:  $r$ ,  
 $Y$  endogenous in short run,  $P$  in long run
- IS curve: goods market equilibrium
- LM curve: money market equilibrium

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## Summary

### 2. AD curve

- shows relation between  $P$  and the IS-LM model's equilibrium  $Y$ .
- negative slope because  
 $\uparrow P \Rightarrow \downarrow (M/P) \Rightarrow \uparrow r \Rightarrow \downarrow I \Rightarrow \downarrow Y$
- expansionary fiscal policy shifts IS curve right, raises income, and shifts AD curve right.
- expansionary monetary policy shifts LM curve right, raises income, and shifts AD curve right.
- IS or LM shocks shift the AD curve.

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