

# Chapter 11

## Aggregate Demand II

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### Learning Objectives

- Chapter 9 introduced the model of aggregate demand and supply.
- Chapter 10 developed the IS-LM model, the basis of the aggregate demand curve.
- In Chapter 11, we will use the IS-LM model to
  - see how **policies** and **shocks** affect income and the interest rate in the short run when prices are fixed
  - **derive** the **aggregate demand** curve
  - explore various explanations for the Great Depression (maybe)

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### 1. Recall: Equilibrium in the IS-LM Model

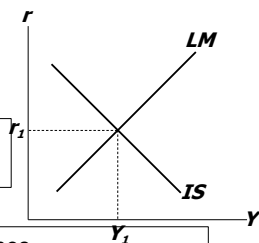
The *IS* curve represents equilibrium in the goods market.

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

The *LM* curve represents money market equilibrium.

$$M/P = L(r, Y)$$

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



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## 2.Explaining Fluctuations with IS-LM

### 2.1 Policy Changes

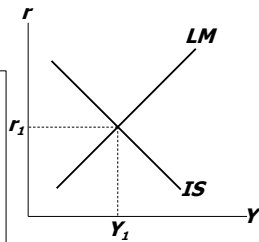
$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

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

Policymakers can affect macroeconomic variables with

- fiscal policy:  $G$  and/or  $T$
- monetary policy:  $M$

We can use the *IS-LM* model to analyze the effects of these policies.



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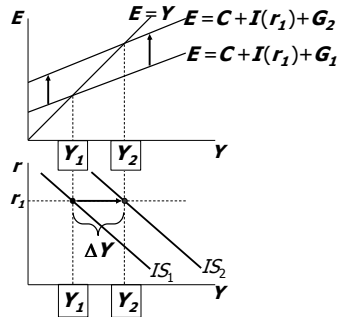
## 2.Explaining Fluctuations with IS-LM

### 2.1.1 Fiscal Policy Changes (an increase in G)

At any value of  $r$ ,  
 $\uparrow G \Rightarrow \uparrow E \Rightarrow \uparrow Y$   
 ...so the IS curve shifts to the right.

The horizontal distance of the IS shift equals

$$\Delta Y = \frac{1}{1-MPC} \Delta G$$



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## 2.Explaining Fluctuations with IS-LM

### 2.1.1 Fiscal Policy Changes (an increase in G)

1. IS curve shifts right

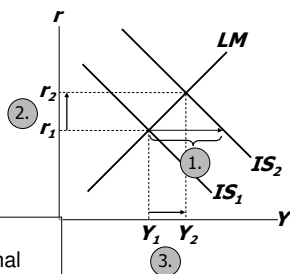
$$\text{by } \frac{1}{1-MPC} \Delta G$$

causing output & income to rise.

2. This raises money demand, causing the interest rate to

3. rise, which reduces investment, so the final increase in  $Y$

$$\text{is smaller than } \frac{1}{1-MPC} \Delta G$$



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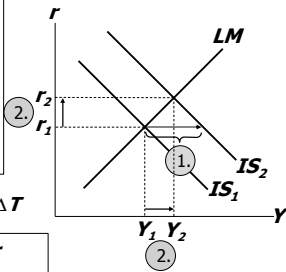
**2.Explaining Fluctuations with IS-LM**

**2.1.2 Fiscal Policy Changes (a decrease in T)**

Because consumers save  $(1-MPC)$  of the tax cut, the initial boost in spending is smaller for  $\Delta T$  than for an equal  $\Delta G$ ...

and the *IS* curve shifts by ①  $\frac{-MPC}{1-MPC} \Delta T$

② ...so the effects on  $r$  and  $Y$  are smaller for a  $\Delta T$  than for an equal  $\Delta G$ .



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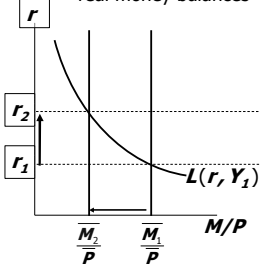
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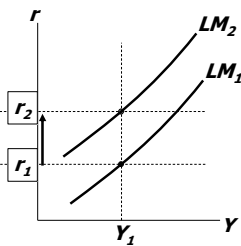
**2.Explaining Fluctuations with IS-LM**

**2.1.2 Monetary Policy Changes (a decrease in M)**

(a) The market for real money balances



(b) The LM curve



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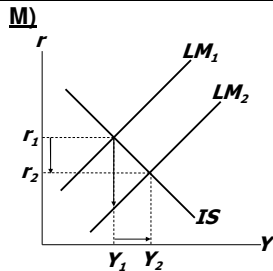
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**2.Explaining Fluctuations with IS-LM**

**2.1.2 Monetary Policy Changes (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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## 2.Explaining Fluctuations with IS-LM

### 2.1.3 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.

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## 2.Explaining Fluctuations with IS-LM

### 2.1.3 Interaction between monetary & fiscal policy

e.g. The Fed's response to  $\Delta G > 0$

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

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### Response 1: hold $M$ constant

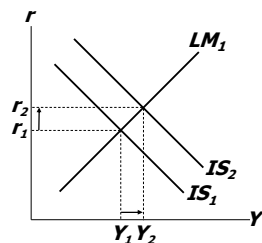
If Congress raises  $G$ , the  $IS$  curve shifts right

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

Results:

$$\Delta Y = Y_2 - Y_1$$

$$\Delta r = r_2 - r_1$$



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### Response 2: hold $r$ constant

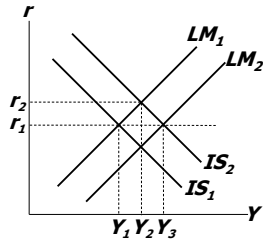
If Congress raises  $G$ , the  $IS$  curve shifts right

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

Results:

$$\Delta Y = Y_3 - Y_1$$

$$\Delta r = 0$$



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### Response 3: hold $Y$ constant

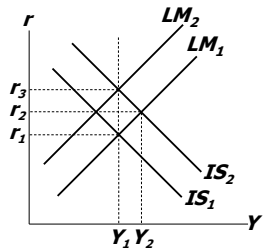
If Congress raises  $G$ , the  $IS$  curve shifts right

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

Results:

$$\Delta Y = 0$$

$$\Delta r = r_3 - r_1$$



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### Empirical estimates of fiscal policy multipliers

from the DRI macroeconomic model

Assumption about monetary policy	Estimated value of $\Delta Y/\Delta G$	Estimated value of $\Delta Y/\Delta T$
Fed holds money supply constant	0.60	-0.26
Fed holds nominal interest rate constant	1.93	-1.19

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## 2.Explaining Fluctuations with IS-LM

### 2.2 Shocks

**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  $\Delta C$

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## 2.Explaining Fluctuations with IS-LM

### 2.2 Shocks

**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

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### Homework:

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

1. A boom in the stock market makes consumers wealthier.
2. After a wave of credit card fraud, consumers use 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.

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e.g. The U.S. economic slowdown of 2001

*~What happened~*

1. Real GDP growth rate
  - 1994-2000: 3.9% (average annual)
  - 2001: 1.2%
2. Unemployment rate
  - Dec 2000: 4.0%
  - Dec 2001: 5.8%

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e.g. The U.S. economic slowdown of 2001

*~Shocks that contributed to the slowdown~*

1. Falling stock prices
  - From Aug 2000 to Aug 2001: -25%
  - Week after 9/11: -12%
2. The terrorist attacks on 9/11
  - increased uncertainty
  - fall in consumer & business confidence

*Both shocks reduced spending and shifted the IS curve left.*

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e.g. The U.S. economic slowdown of 2001

*~The policy response~*

1. Fiscal policy
  - large long-term tax cut, immediate \$300 rebate checks
  - spending increases: aid to New York City & the airline industry, war on terrorism
2. Monetary policy
  - Fed lowered its Fed Funds rate target 11 times during 2001, from 6.5% to 1.75%
  - Money growth increased, interest rates fell

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e.g. The U.S. economic slowdown of 2001

~What's happening now~

- In the first quarter of 2002, Real GDP grew at an annual rate of 6.1%, according to final figures released by the Bureau of Economic Analysis on June 27, 2002.
- However, in its news release of June 7, 2002, the NBER Business Cycle Dating Committee had not yet determined the date of the trough in economic activity, though it acknowledges that the economy seems to be picking up.

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## **2.Explaining Fluctuations with IS-LM**

### **2.3 What is the Fed's policy instrument?**

*What the newspaper says:*

“the Fed lowered interest rates by one-half point today”

*What actually happened:*

The Fed conducted expansionary monetary policy to shift the LM curve to the right until the interest rate fell 0.5 points.

*The Fed targets the Federal Funds rate:  
it announces a target value,  
and uses monetary policy to shift the LM curve  
as needed to attain its target rate.*

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## **2.Explaining Fluctuations with IS-LM**

### **2.3 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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### 3. 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 the *LM* curve and therefore affect  $Y$ .
- The **aggregate demand curve** (introduced in chap. 9) captures this relationship between  $P$  and  $Y$

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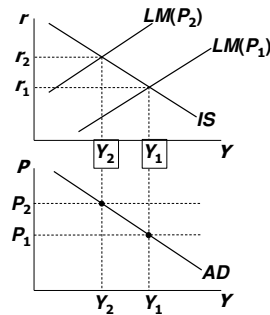
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### 3.1 Deriving the AD curve

Intuition for slope of *AD* curve:  
 $\uparrow P \Rightarrow \downarrow (M/P)$   
 $\Rightarrow LM$  shifts left  
 $\Rightarrow \uparrow r$   
 $\Rightarrow \downarrow I$   
 $\Rightarrow \downarrow Y$



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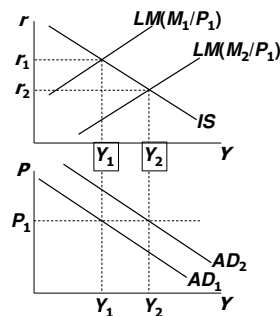
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### 3.2 Monetary policy and the AD curve

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  $P$



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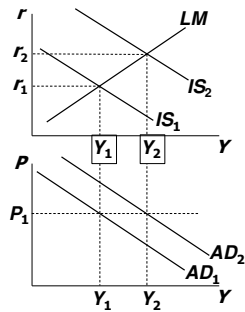
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### 3.3 Fiscal policy and the AD curve

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

*Recall from Chapter 9:* 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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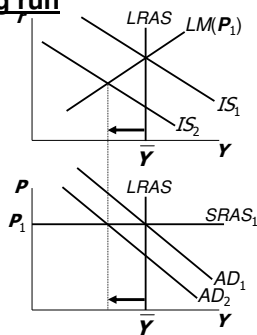
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### 4. IS-LM and AD-AS in the short run & long run

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



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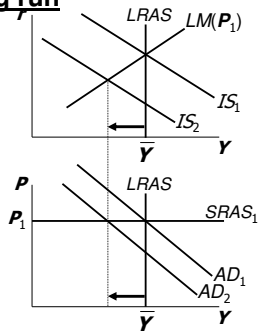
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**4. IS-LM and AD-AS in the short run & long run**

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



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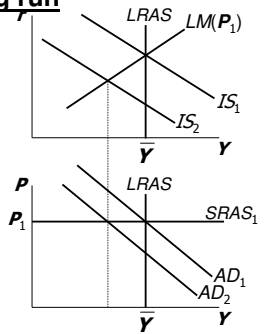
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**4. IS-LM and AD-AS in the short run & long run**

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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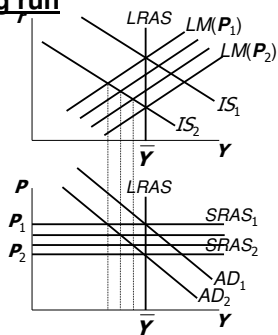
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**4. IS-LM and AD-AS in the short run & long run**

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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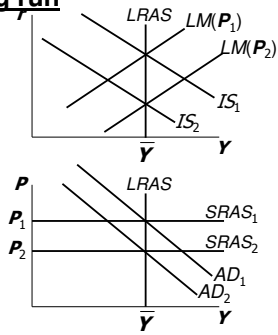
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**4. IS-LM and AD-AS in the short run & long run**

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



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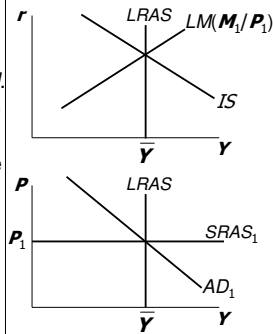
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**Homework: Analyze SR & LR effects of  $\Delta M$**

- 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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**Chapter summary**

- 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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## Chapter 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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