

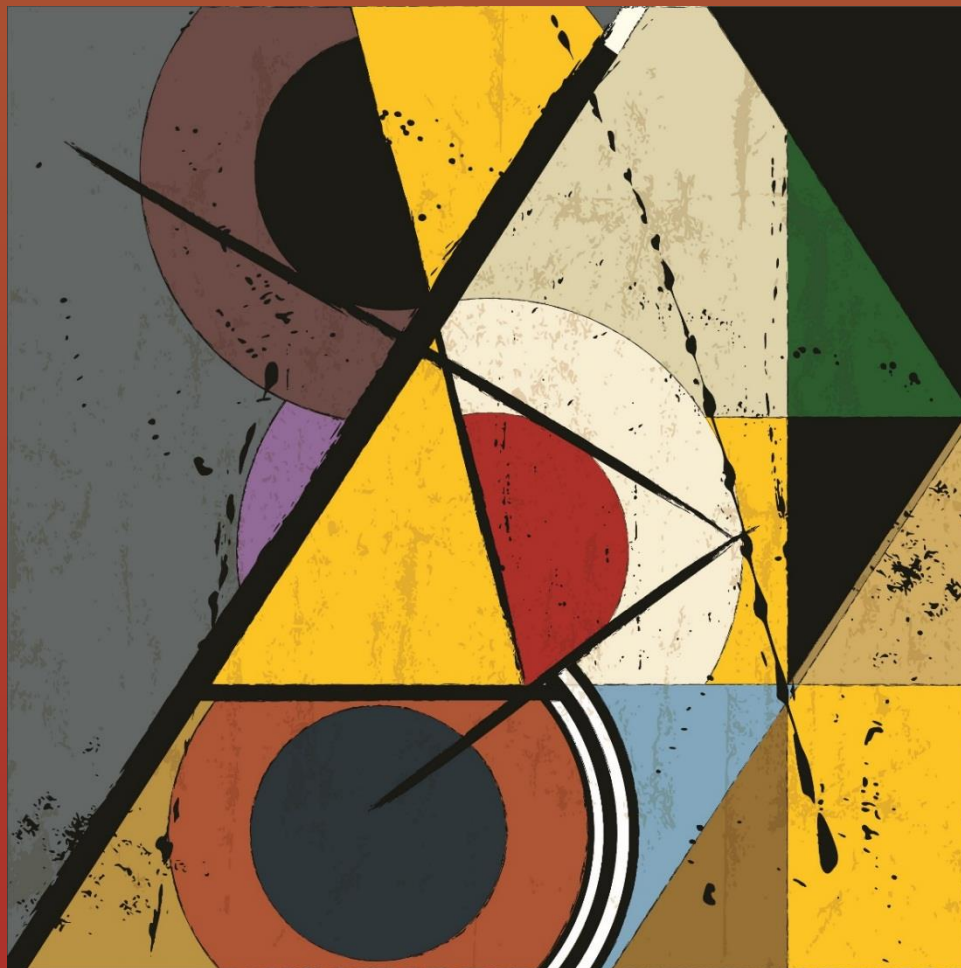
# CHAPTER 12

## Aggregate Demand II: Applying the *IS- LM* Model

Presentation Slides

# Macroeconomics

*N. Gregory Mankiw*



# IN THIS CHAPTER, YOU WILL LEARN: PART 1

A graphic for Chapter 12. The word 'CHAPTER' is in white capital letters on a dark blue background. Below it, the number '12' is in white. The '1' is on a yellow background, and the '2' is on a dark blue background. The entire graphic has a textured, slightly distressed appearance.

## CHAPTER 12

Chapter 10 introduced the model of aggregate demand and supply.

Chapter 11 developed the *IS–LM* model, the basis of the aggregate demand curve.

# IN THIS CHAPTER, YOU WILL LEARN: PART 2

A graphic for Chapter 12. The word 'CHAPTER' is in white capital letters on a dark blue background. Below it, the number '12' is displayed in large white font. The '1' is on a yellow background, and the '2' is on a dark blue background. The entire graphic has a textured, slightly distressed appearance.

## CHAPTER 12

How to use the *IS–LM* model to analyze the effects of shocks, fiscal policy, and monetary policy

How to derive the aggregate demand curve from the *IS–LM* model

Several theories about what caused the Great Depression

## Equilibrium in the *IS-LM* model

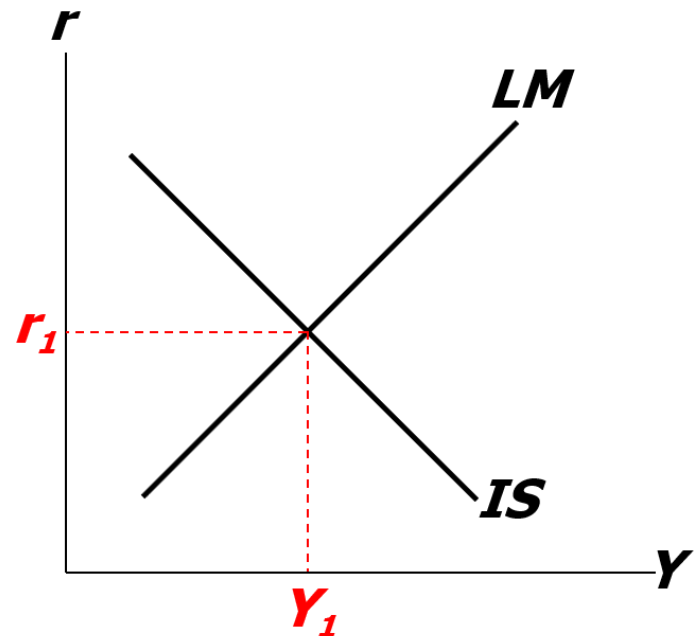
The *IS* curve represents equilibrium in the goods market.

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

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.



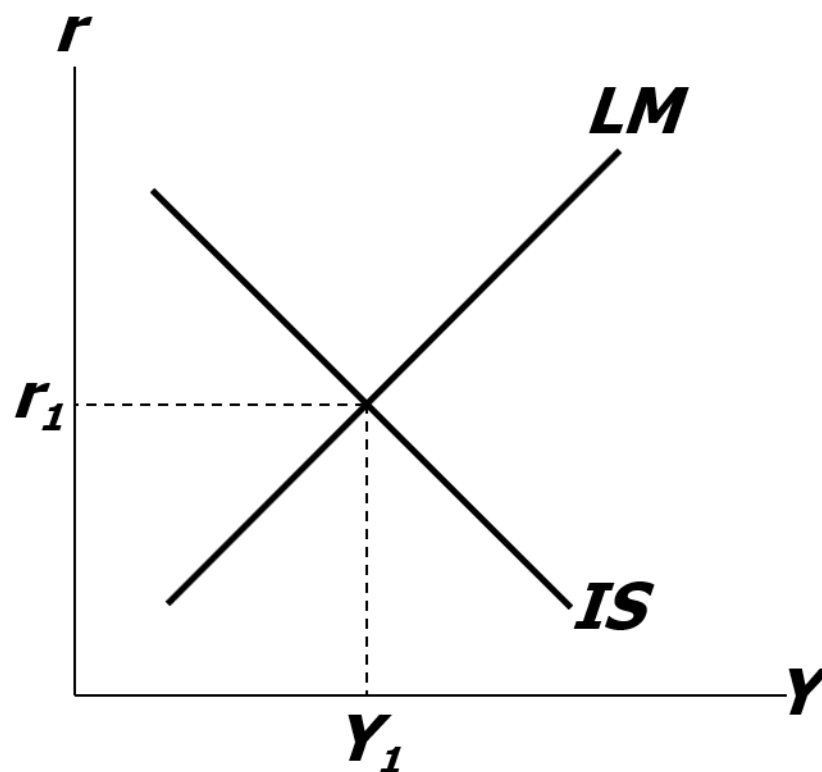
## Policy analysis with the *IS-LM* model

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

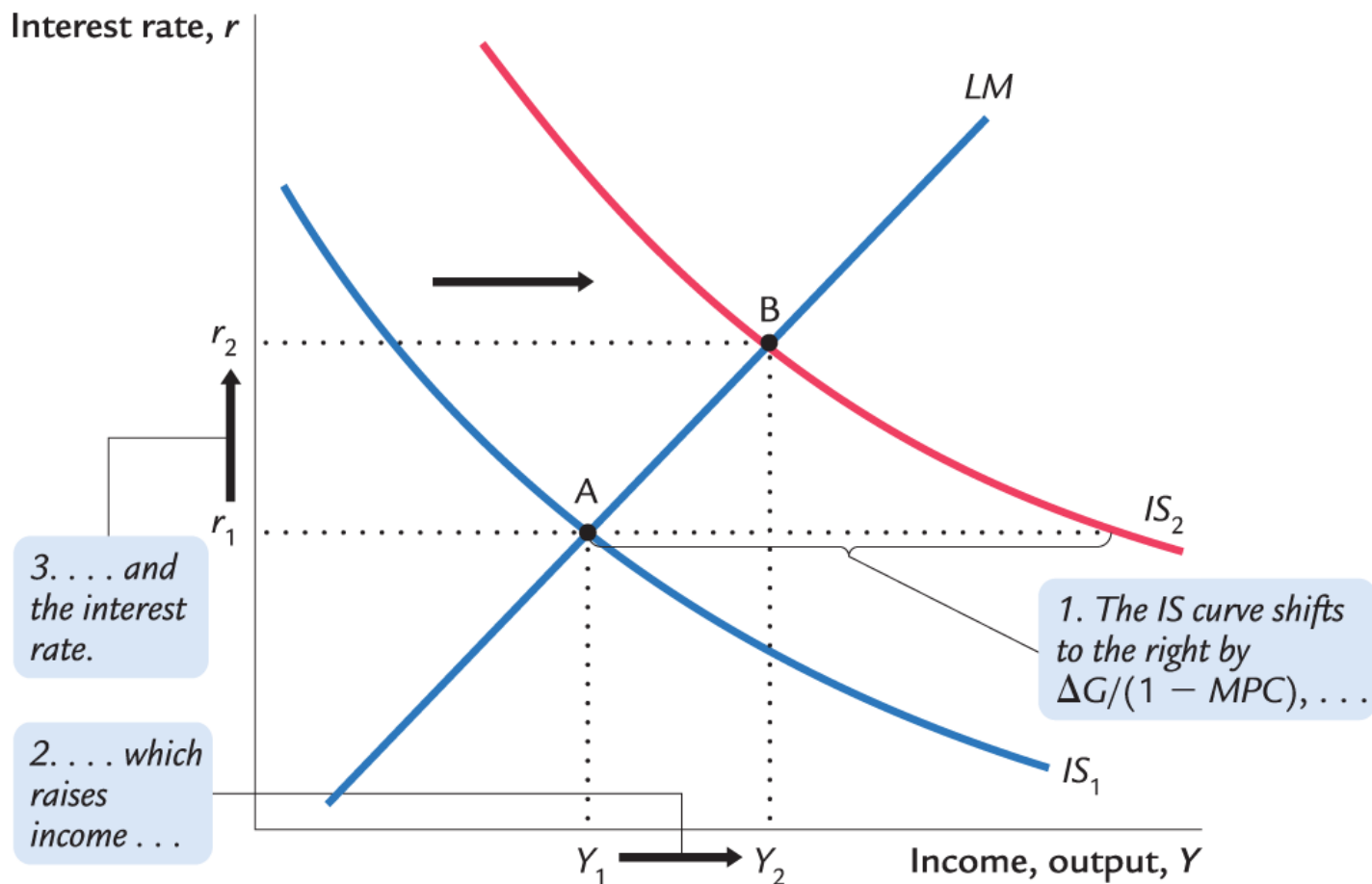
$$\bar{M}/\bar{P} = L(r, Y)$$

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

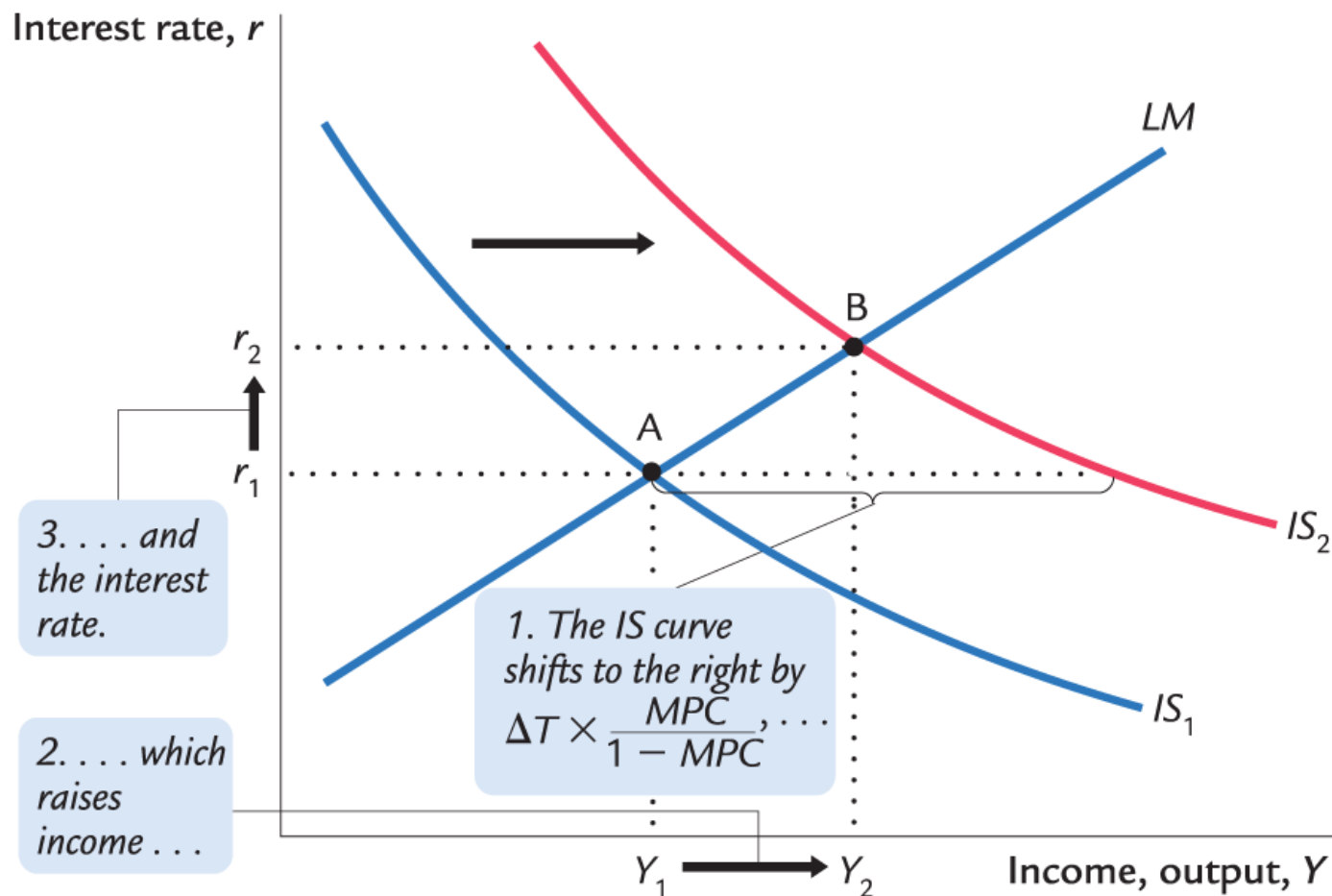
- fiscal policy: ***G*** and/or ***T***
- monetary policy: ***M***



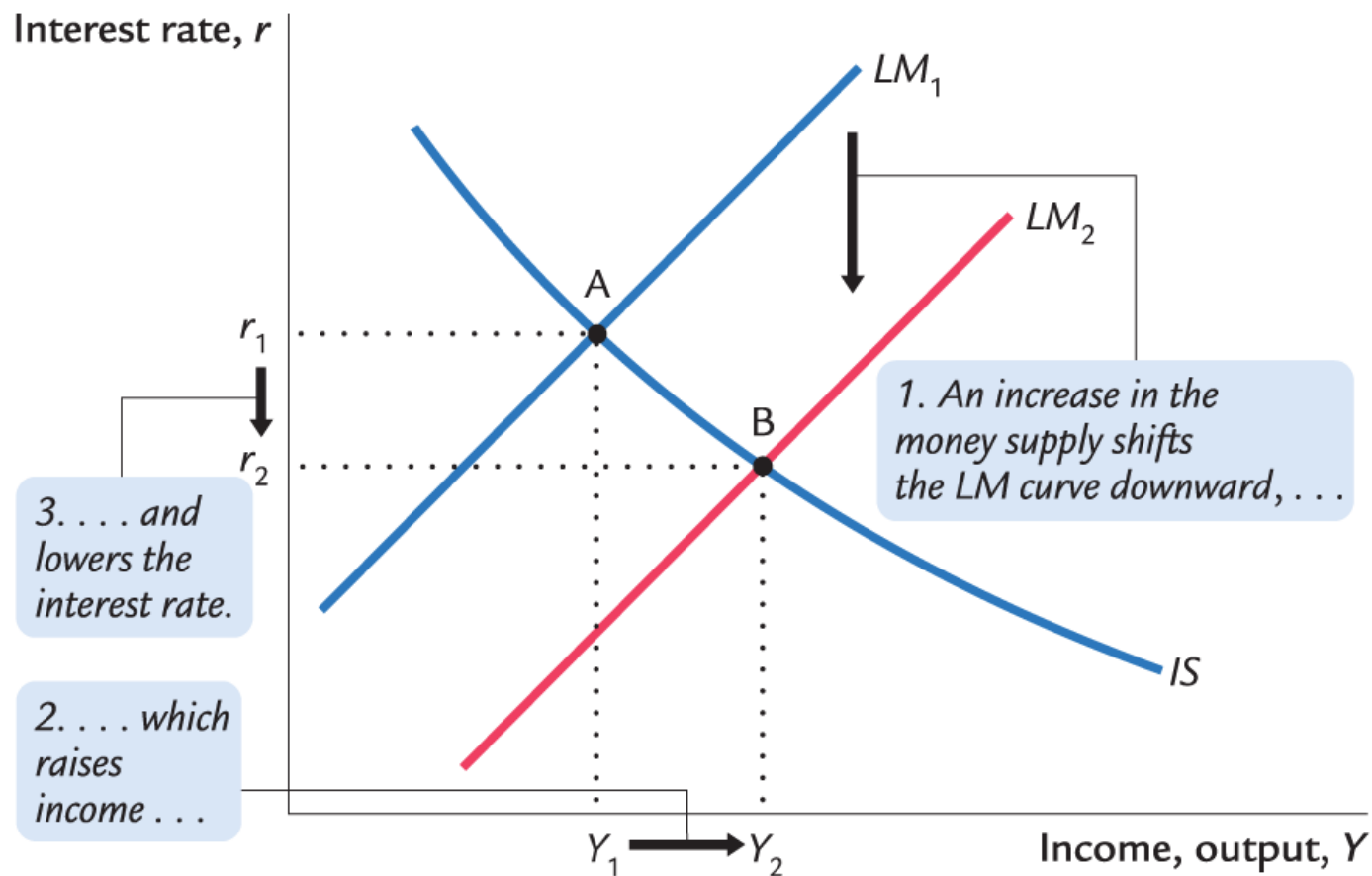
# An increase in government purchases



# A tax cut



# Monetary policy: An increase in $M$





# Interaction between monetary and fiscal policy

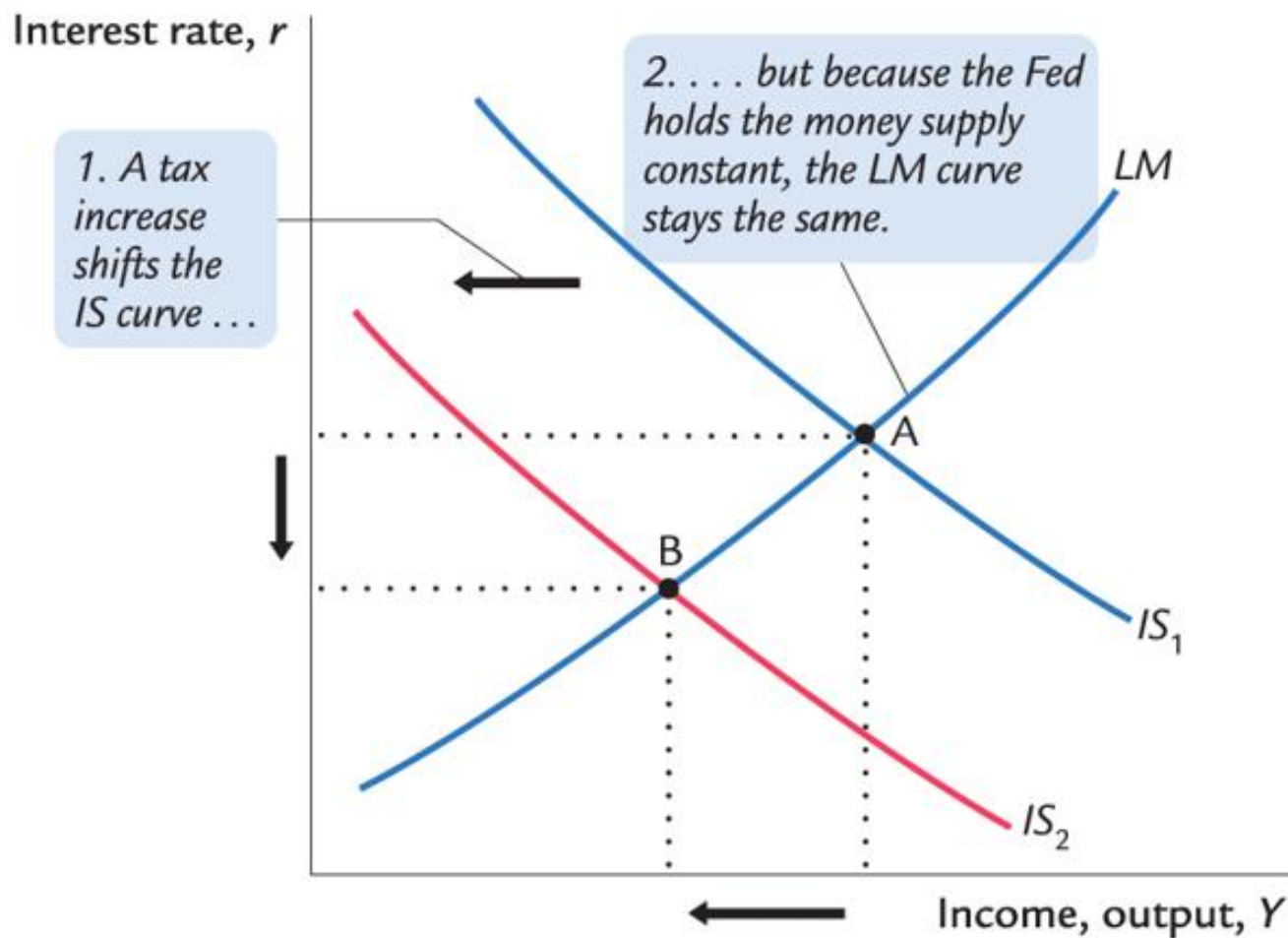
- Model:
  - Monetary and fiscal policy variables ( $M$ ,  $G$ , and  $T$ ) are exogenous.
- Real world:
  - Monetary policymakers may adjust  $M$  in response to changes in fiscal policy or vice versa.
  - Such interactions may alter the impact of the original policy change.

## The Fed's response to $\Delta T > 0$

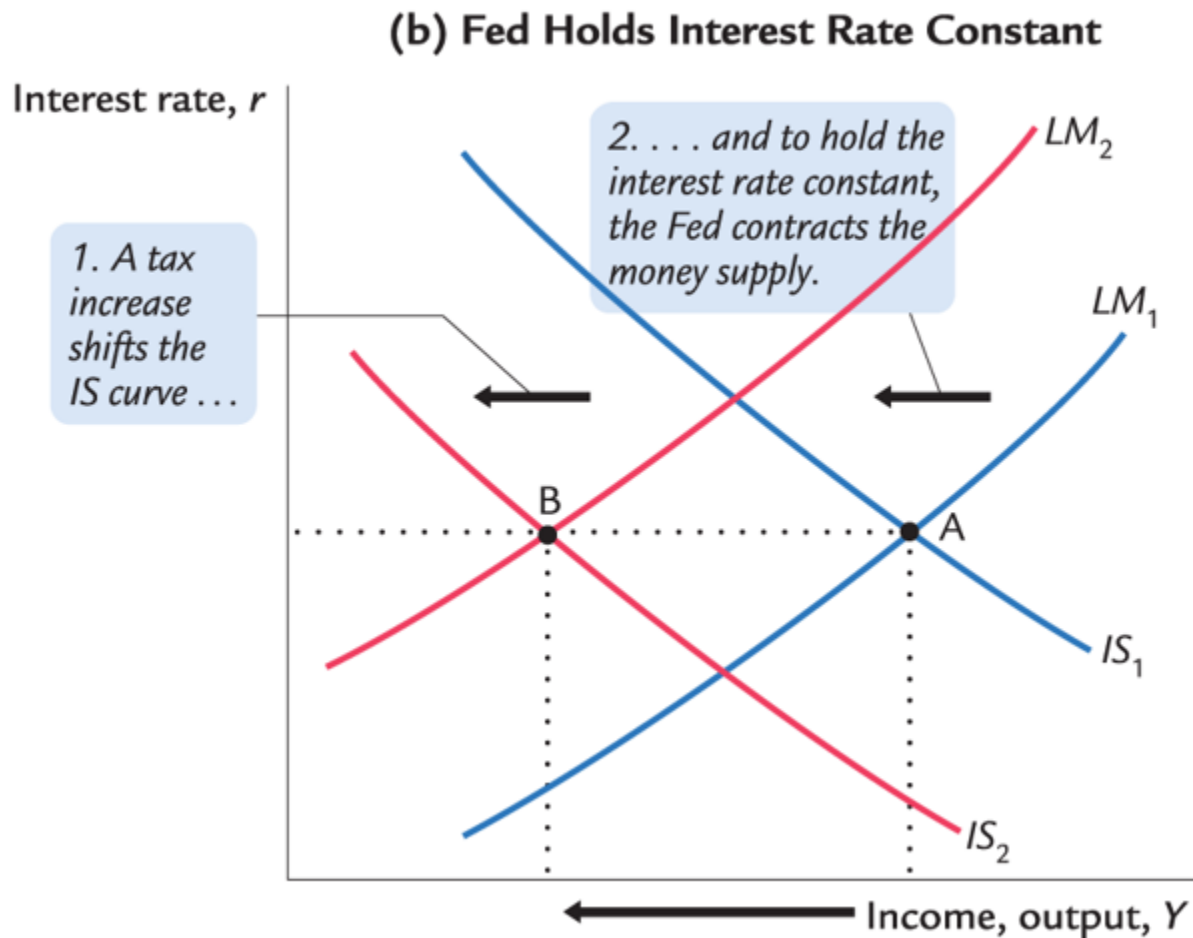
- Suppose Congress increases  **$G$** .
- Possible Fed responses:
  1. Hold  **$M$**  constant
  2. Hold  **$r$**  constant
  3. Hold  **$Y$**  constant
- In each case, the effects of  $\Delta T$  are different . . .

## Response 1: Hold $M$ constant

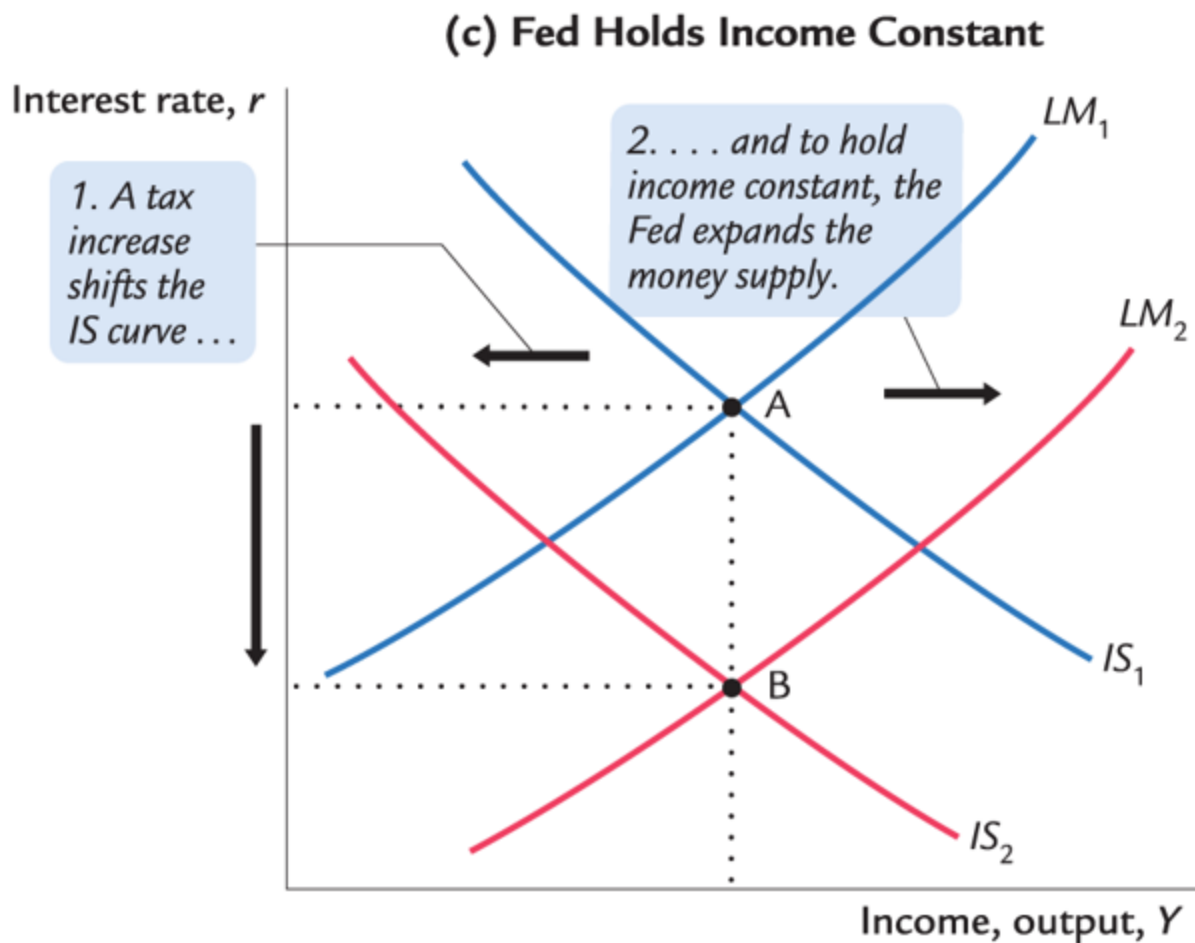
(a) Fed Holds Money Supply Constant



## Response 2: Hold $r$ constant



## Response 3: Hold $Y$ constant



## Shocks in the *IS-LM* model, part 1

***IS* shocks**: exogenous changes in the demand for goods and 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, part 2

***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.

## NOW YOU TRY

### Analyze shocks with the *IS-LM* model

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

1. a housing market crash that reduces consumers' wealth
2. consumers using cash in transactions more frequently in response to an increase in identity theft

For each shock,

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



## NOW YOU TRY

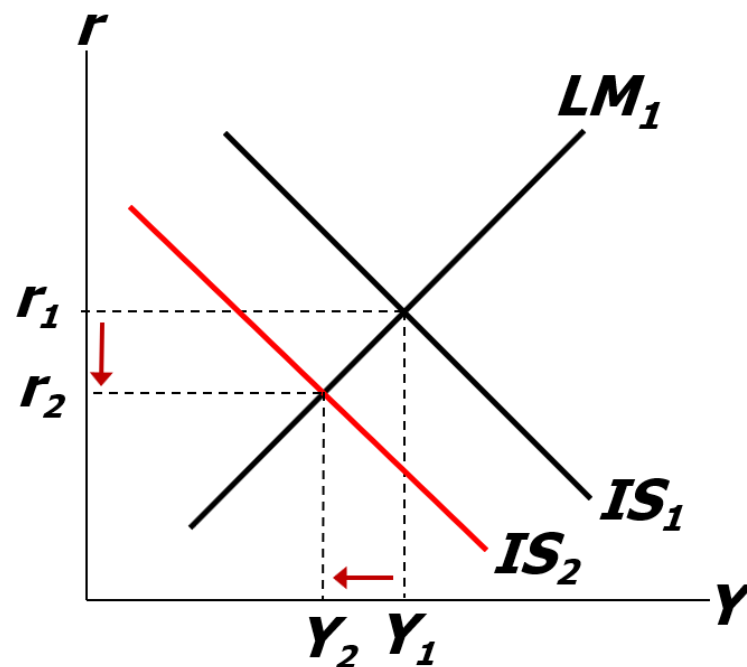
### Analyze shocks with the *IS-LM* model, answer, part 1

*IS* shifts left, causing  $r$  and  $Y$  to fall.

$C$  falls due to lower wealth and lower income,

$I$  rises because  $r$  is lower

$u$  rises because  $Y$  is lower (Okun's law)



## NOW YOU TRY

### Analyze shocks with the *IS-LM* model, answer, part 2

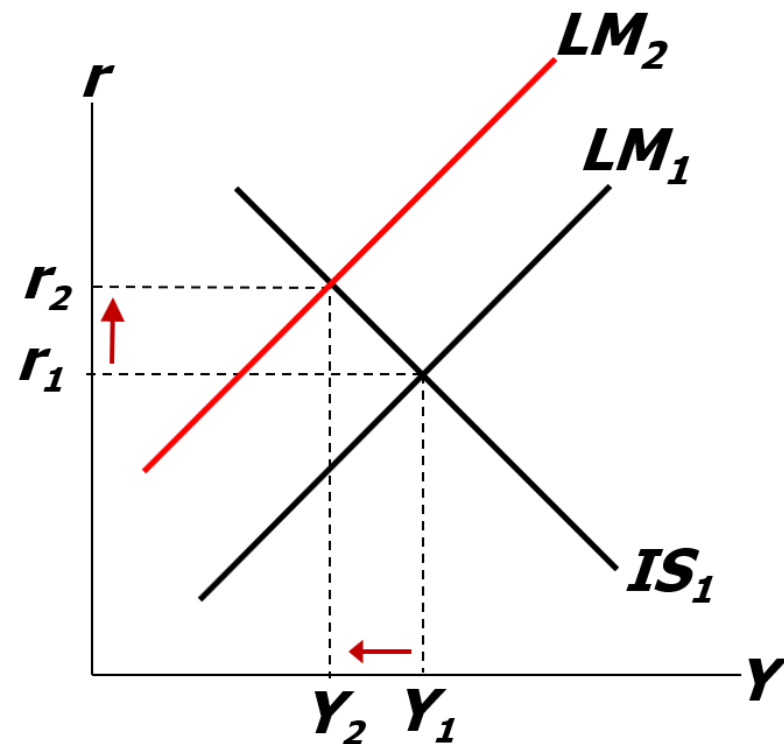
*LM* shifts left, causing  $r$  to rise and  $Y$  to fall.

$C$  falls due to lower income.

$I$  falls because  $r$  is higher.

$u$  rises because  $Y$  is lower.

(Okun's law)

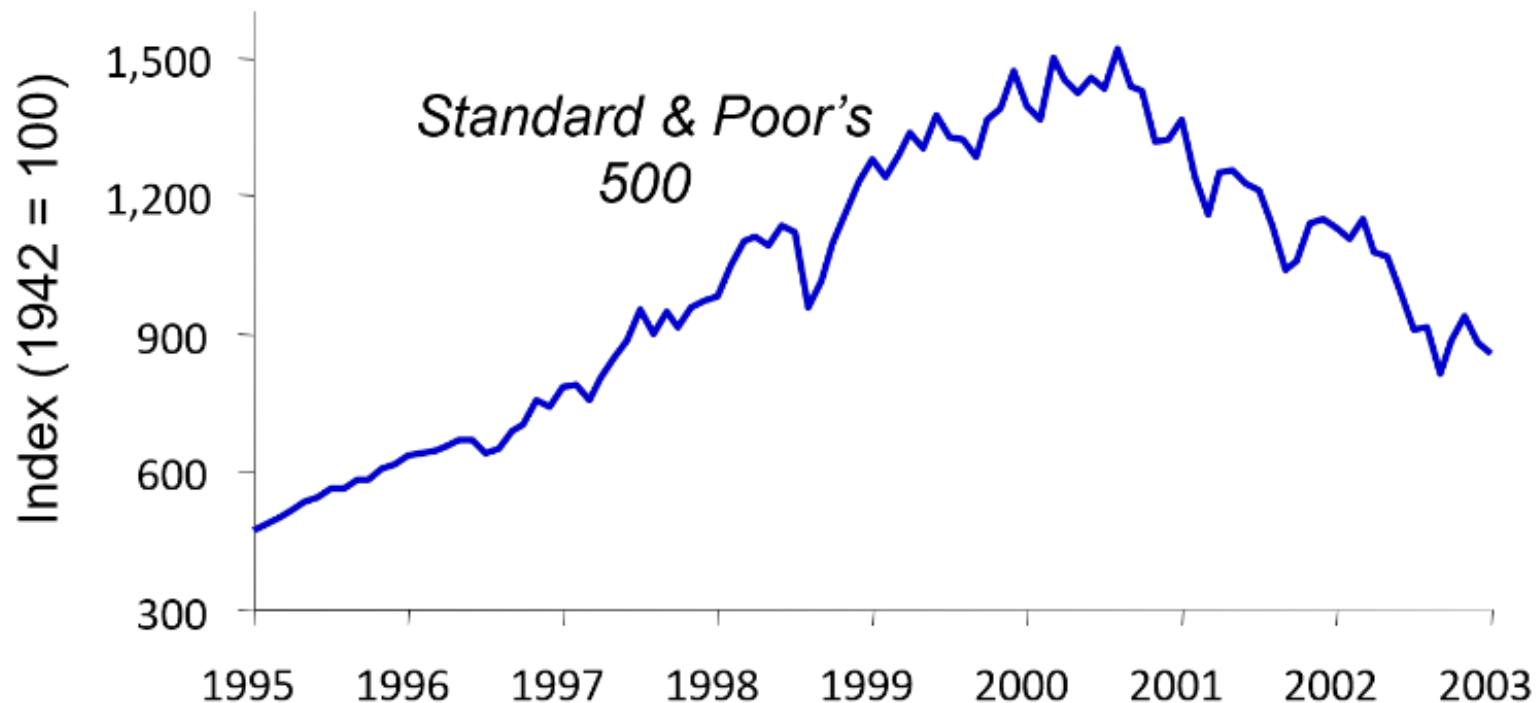


## CASE STUDY: The U.S. recession of 2001, part 1

- During 2001:
  - 2.1 million jobs lost, 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, part 2

Causes: 1) Stock market decline  $\rightarrow \downarrow \mathbf{C}$



## CASE STUDY: The U.S. recession of 2001, part 3

Causes: 2) 9/11

- increased uncertainty
- fall in consumer and business confidence
- result: lower spending,  $IS$  curve shifted left

Causes: 3) Corporate accounting scandals

- Enron, WorldCom, etc.
- reduced stock prices, discouraged investment

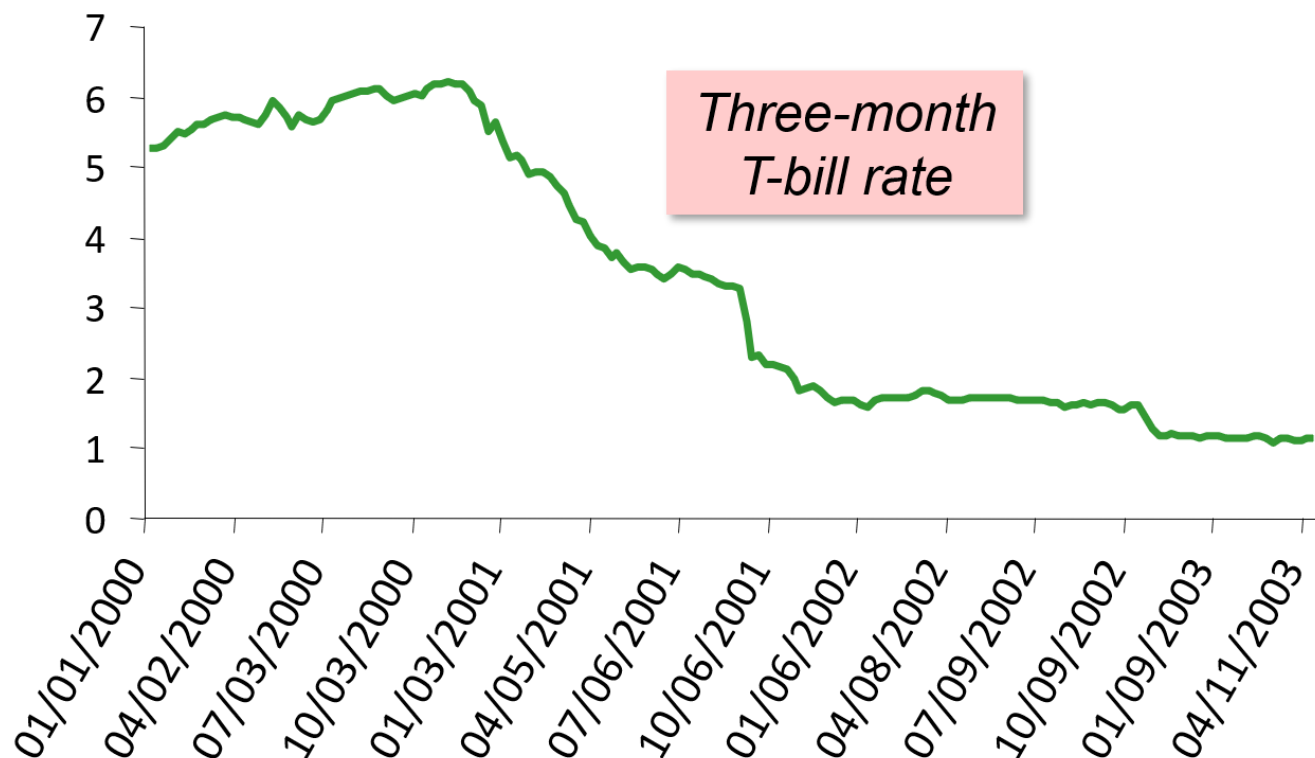
## CASE STUDY: The U.S. recession of 2001, part 4

Fiscal policy response: shifted  $IS$  curve right

- tax cuts in 2001 and 2003
- spending increases
  - airline industry bailout
  - NYC reconstruction
  - Afghanistan war

## CASE STUDY: The U.S. recession of 2001, part 5

Monetary policy response: shifted  $LM$  curve right



## What is the Fed's policy instrument? Part 1

- 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.



## What is the Fed's policy instrument? Part 2

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

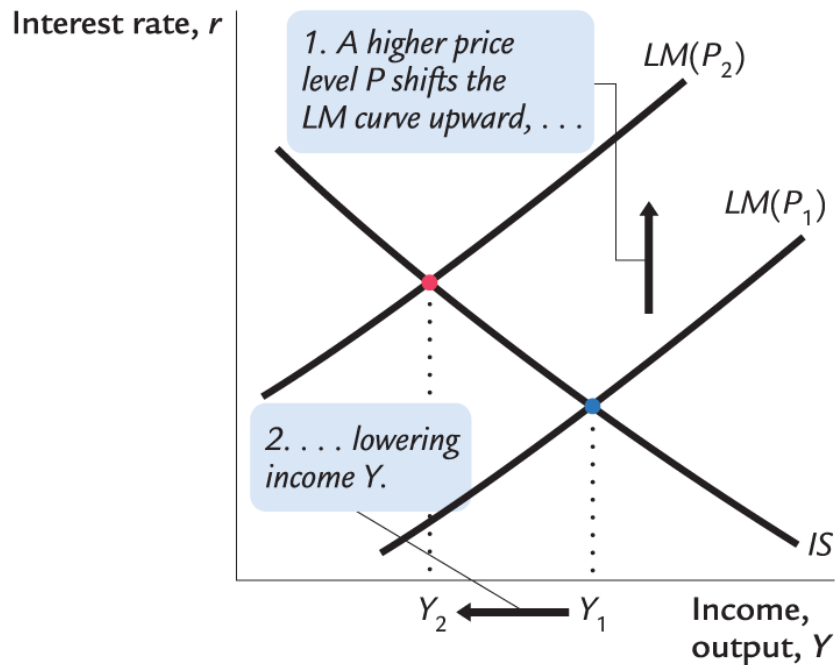
1. They are easier to measure than the money supply.
2. The Fed might believe that  $LM$  shocks are more widespread than  $IS$  shocks. If so, targeting the interest rate stabilizes income better than targeting the money supply.

## **IS-LM and aggregate demand**

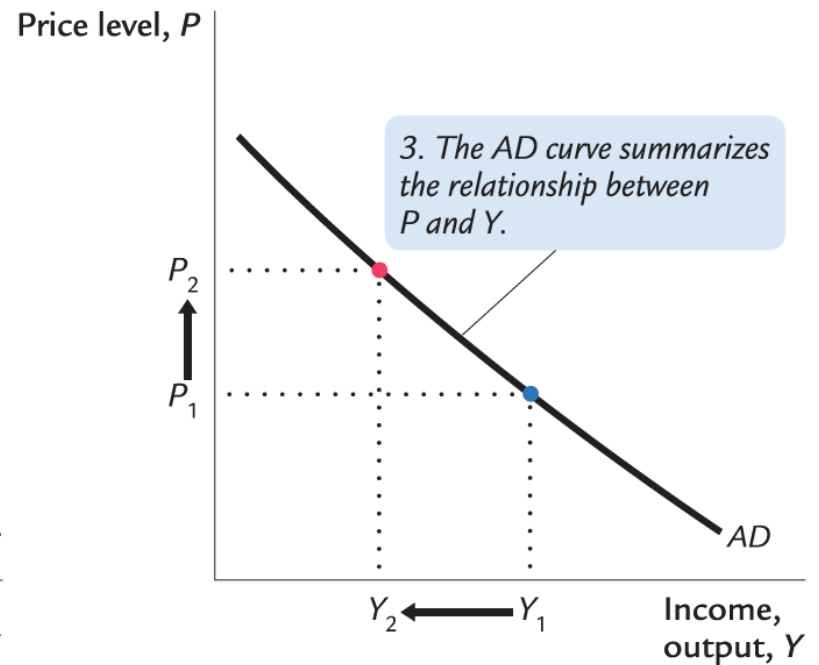
- So far, we've been using the *IS–LM* model to analyze the short run, when the price level is assumed to be fixed.
- However, a change in ***P*** would shift *LM* and would therefore affect ***Y***.
- The **aggregate demand curve** (*introduced in Chapter 10*) captures this relationship between ***P*** and ***Y***.

# Deriving the AD curve

(a) The IS–LM Model



(b) The Aggregate Demand Curve



# Monetary policy and the *AD* curve

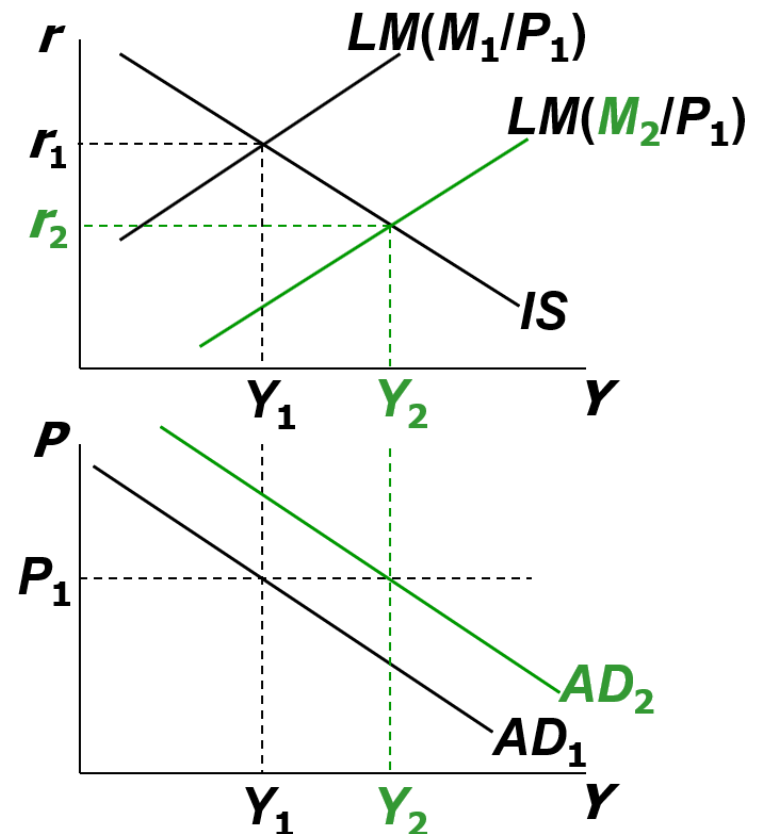
The Fed can increase aggregate demand:

$\uparrow M \rightarrow LM$  shifts right

$\rightarrow \downarrow r$

$\rightarrow \uparrow I$

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



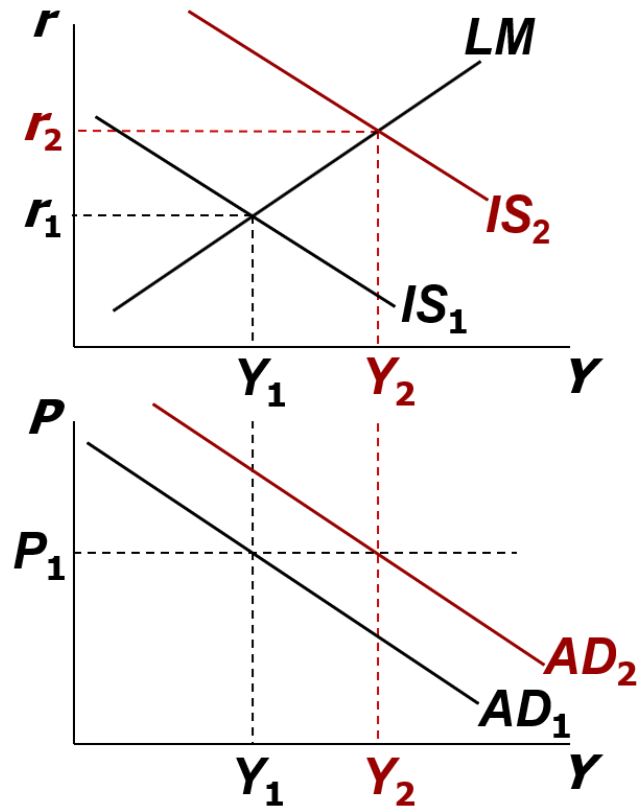
## Fiscal policy and the *AD* curve

Expansionary fiscal policy ( $\uparrow \mathbf{G}$   
and/or  $\downarrow \mathbf{T}$ ) increases agg.  
demand:

$\downarrow \mathbf{T} \rightarrow \uparrow \mathbf{C}$

$\rightarrow$  *IS* shifts right

$\rightarrow \uparrow \mathbf{Y}$  at each value of  $\mathbf{P}$



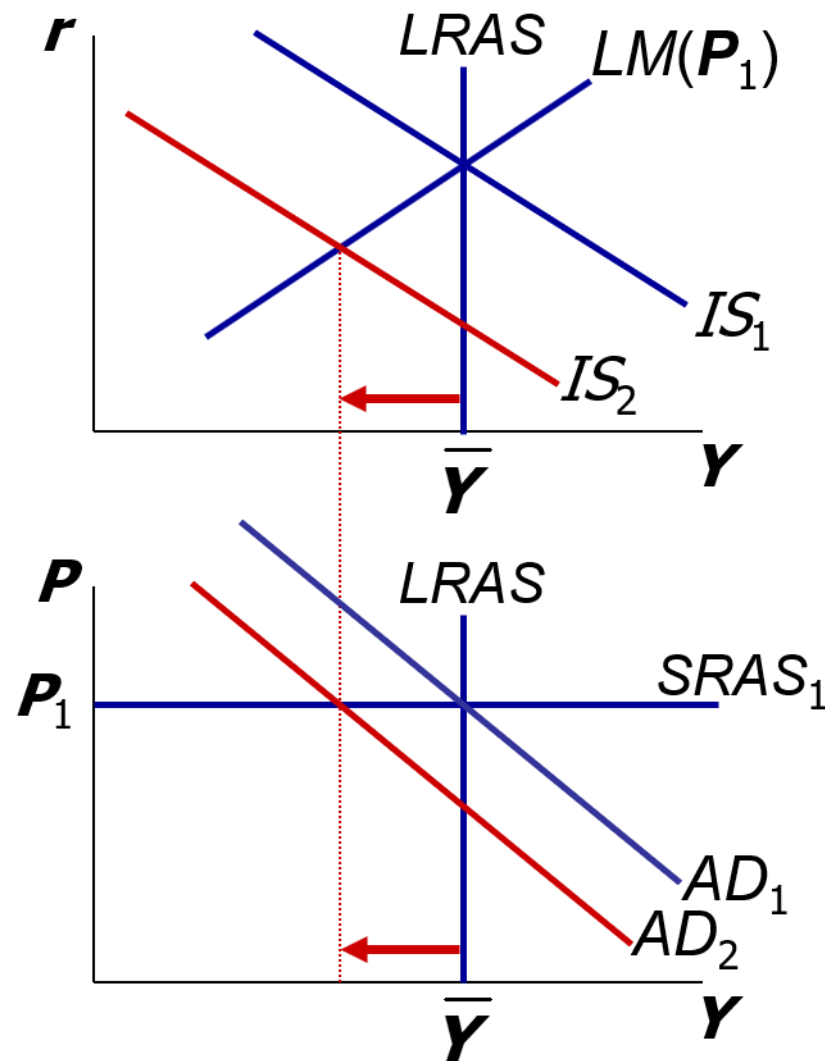
## *IS-LM and AD-AS in the short run and in the long run*

*Recall from Chapter 10:* 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

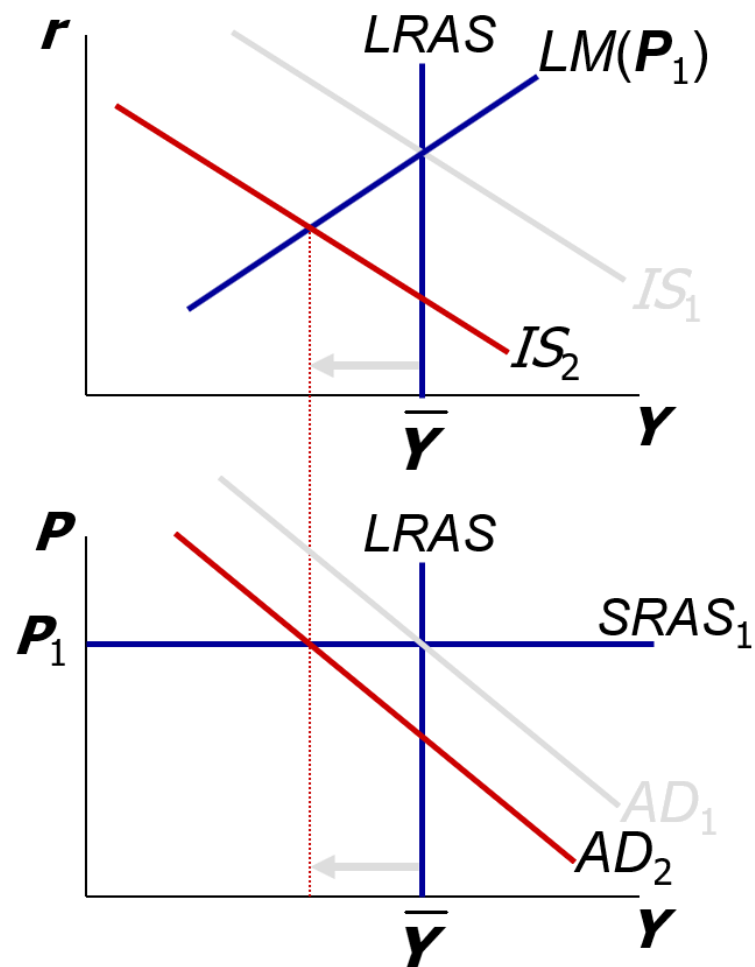
## The SR and LR effects of an *IS* shock, part 1

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



## The SR and LR effects of an *IS* shock, part 2

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



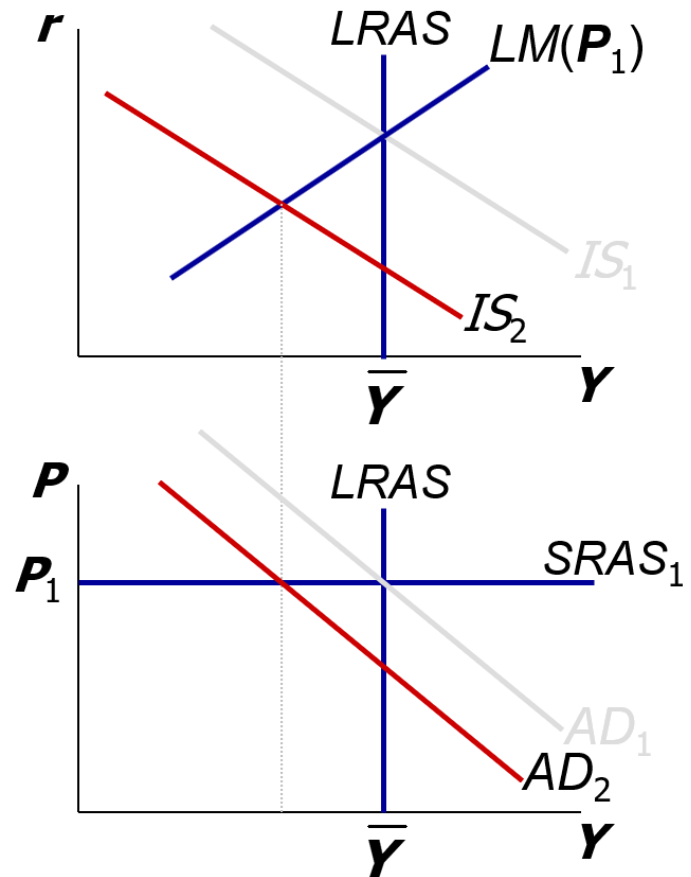


## The SR and LR effects of an $IS$ shock, part 3

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

Over time,  $P$  gradually falls, causing:

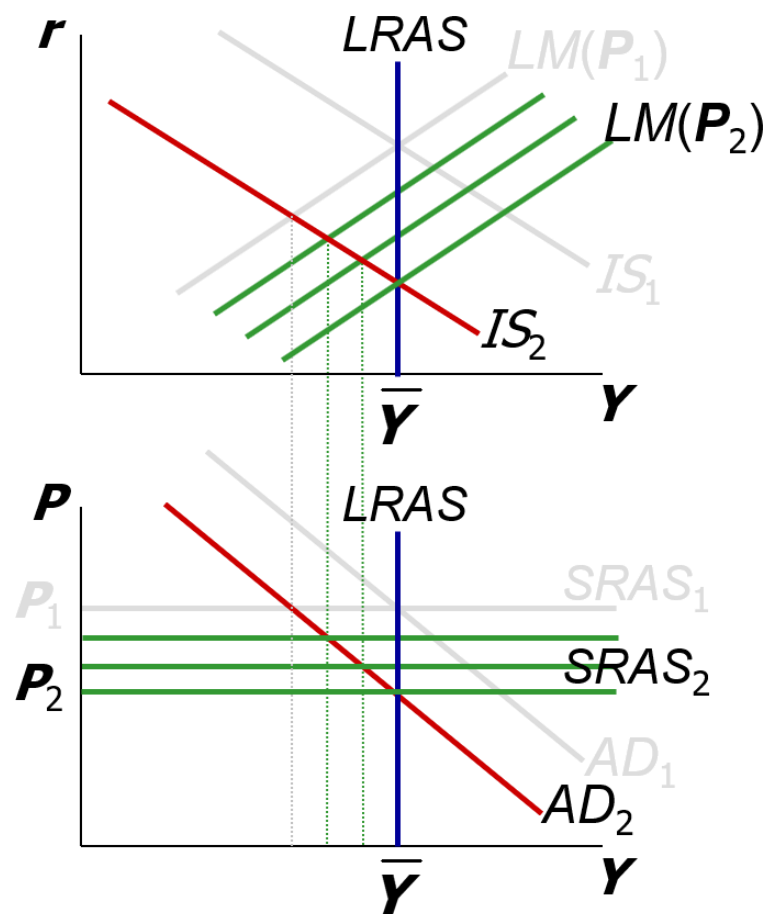
- $SRAS$  to move down
- $M/P$  to increase, which causes  $LM$  to move down



## The SR and LR effects of an $IS$ shock, part 4

Over time,  $P$  gradually falls, causing:

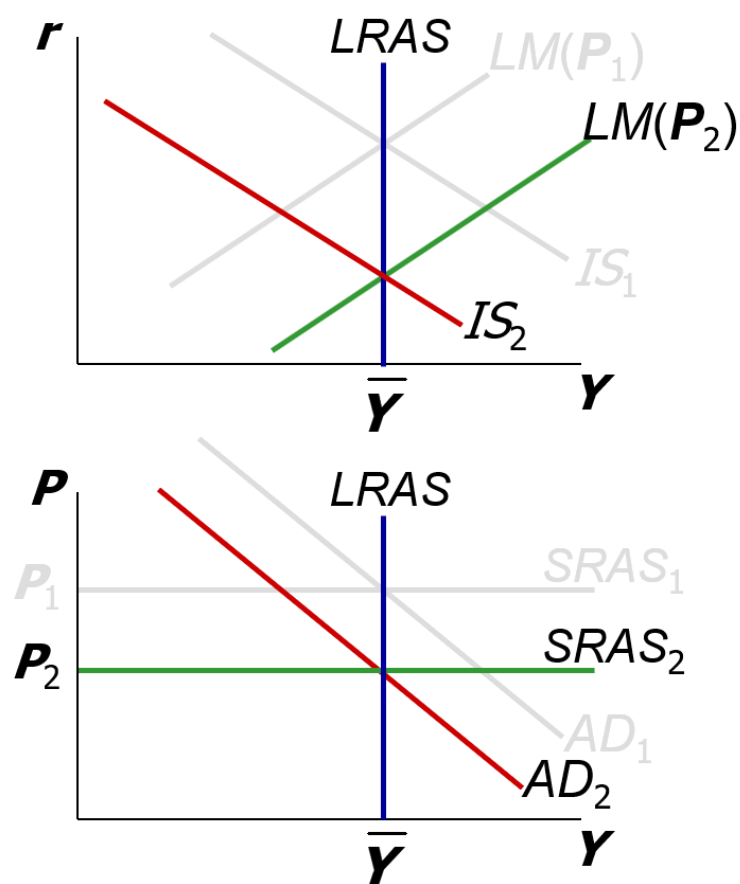
- $SRAS$  to move down
- $M/P$  to increase, which causes  $LM$  to move down



## The SR and LR effects of an *IS* shock, part 5

This process continues until the economy reaches a long-run equilibrium with

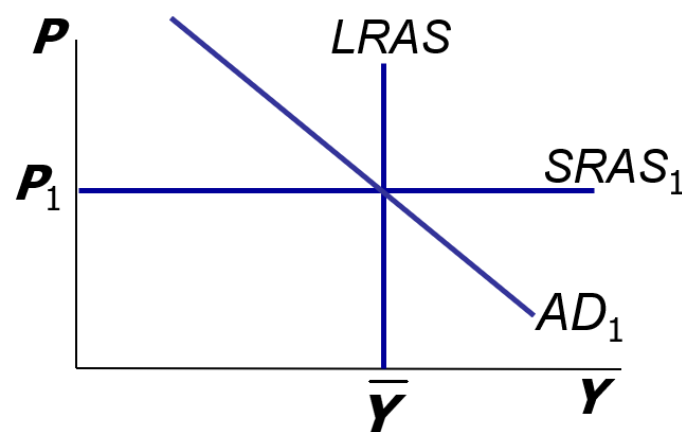
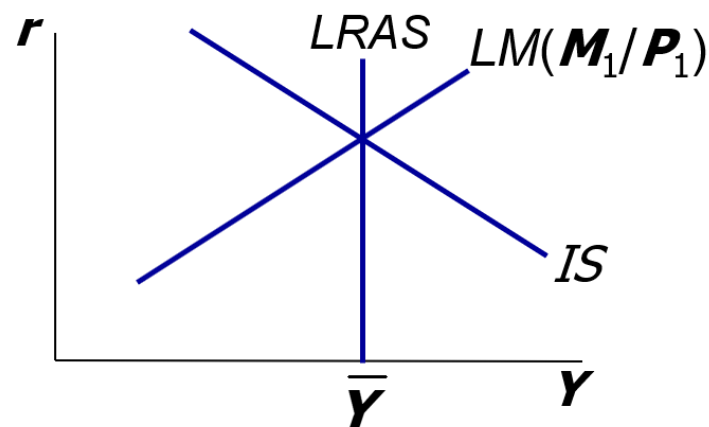
$$Y = \bar{Y}$$



## NOW YOU TRY

### Analyze SR and LR effects of $\Delta M$

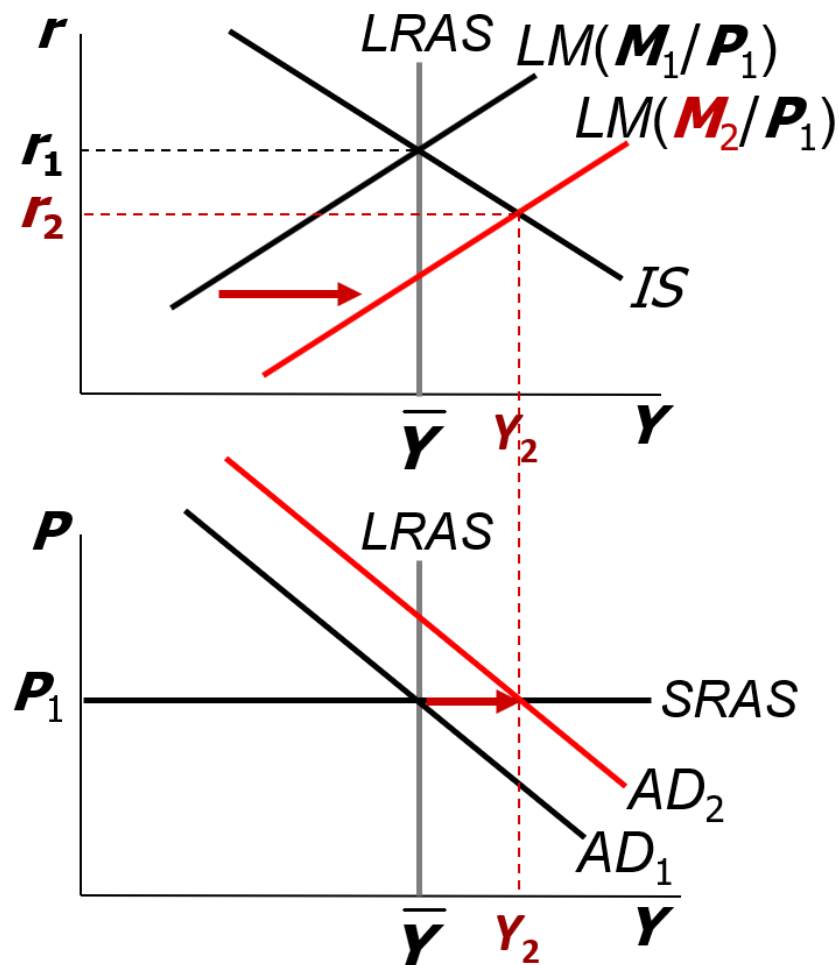
- Draw the  $IS-LM$  and  $AD-AS$  diagrams as shown here.
- Suppose the Fed increases  $M$ . Show the short-run effects on your graphs.
- Show what happens in the transition from the short run to the long run.
- How do the new long-run equilibrium values of the endogenous variables compare to their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



## NOW YOU TRY

Analyze SR and LR effects of  $\Delta M$ , answer, part 1

$LM$  and  $AD$  shift right.  
 $r$  falls,  $Y$  rises above  $\bar{Y}$



## NOW YOU TRY

### Analyze SR and LR effects of $\Delta M$ , answer, part 2

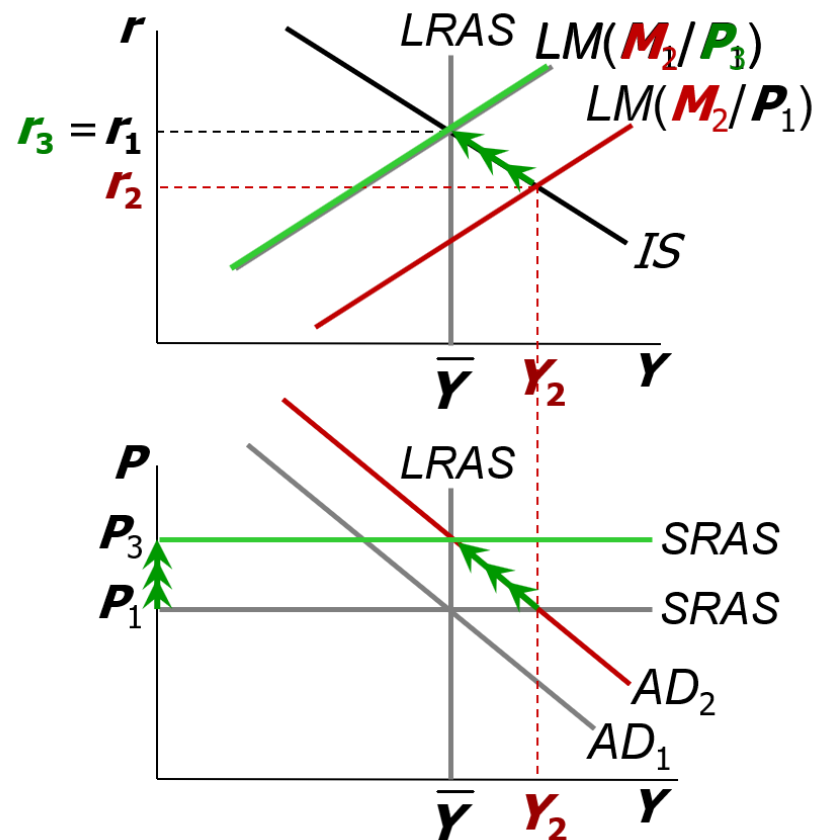
Over time,

- $P$  rises
- SRAS moves upward
- $M/P$  falls
- LM moves leftward

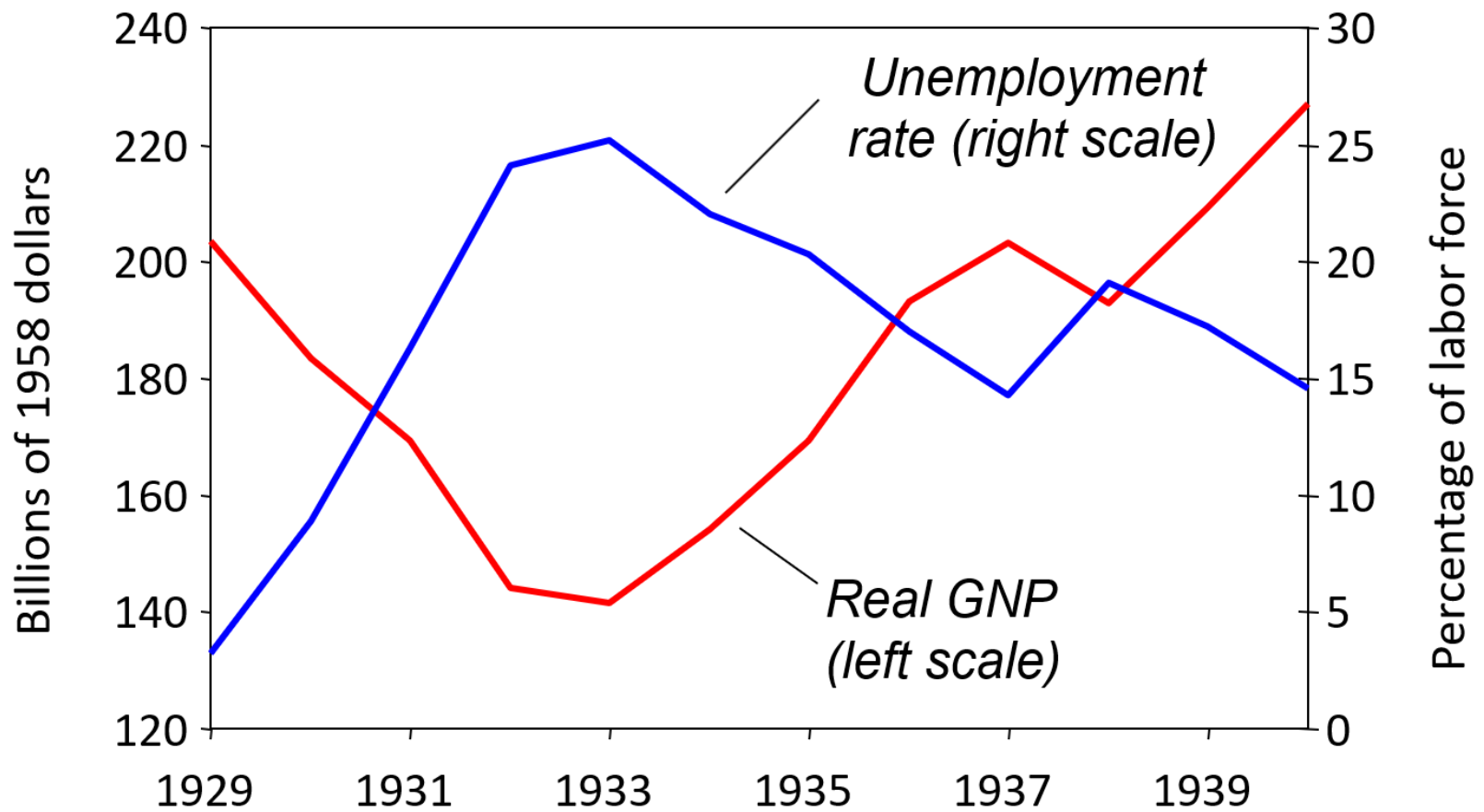
New long-run eq'm

- $P$  higher
- all *real* variables back at their initial values

***Money is neutral in the long run.***



# The Great Depression



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

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



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

- Stock market crash reduced consumption
  - Oct 1929–Dec 1929: S&P 500 fell 17%
  - Oct 1929–Dec 1933: S&P 500 fell 71%
- Drop in investment
  - Widespread bank failures made it harder to obtain financing for investment.
- Contractionary fiscal policy
  - Politicians raised tax rates and cut spending to combat increasing deficits.

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

- Asserts that the Depression was largely due to the huge fall in the money supply.
- Evidence: *M1* fell 25% during 1929–1933.
- But, two problems with this hypothesis:
  - *P* fell even more, so *M/P* actually rose slightly during 1929–1931.
  - Nominal interest rates fell, which is the opposite of what a leftward *LM* shift would cause.

## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices, part 1

- Asserts that the severity of the Depression was due to a huge deflation:  
 $P$  fell 25% during 1929–1933.
- 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?

## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices, part 2

- The stabilizing effects of deflation:
- $\downarrow P \rightarrow \uparrow (M/P) \rightarrow LM \text{ shifts right} \rightarrow \uparrow Y$
- **Pigou effect** (another channel through which falling prices expand income):
  - $\downarrow P \rightarrow \uparrow (M/P)$ 
    - $\rightarrow$  consumers' wealth  $\uparrow$
    - $\rightarrow \uparrow C$
    - $\rightarrow IS \text{ shifts right}$
    - $\rightarrow \uparrow Y$

## THE MONEY HYPOTHESIS AGAIN: The effects of falling prices, part 3

The destabilizing effects of unexpected deflation:

### **debt-deflation theory**

↓  **$P$**  (if unexpected)

- transfers purchasing power from borrowers to lenders
- borrowers spend less, lenders spend more
- if borrowers' propensity to spend is larger than lenders', then aggregate spending falls, the  $IS$  curve shifts left, and  $Y$  falls

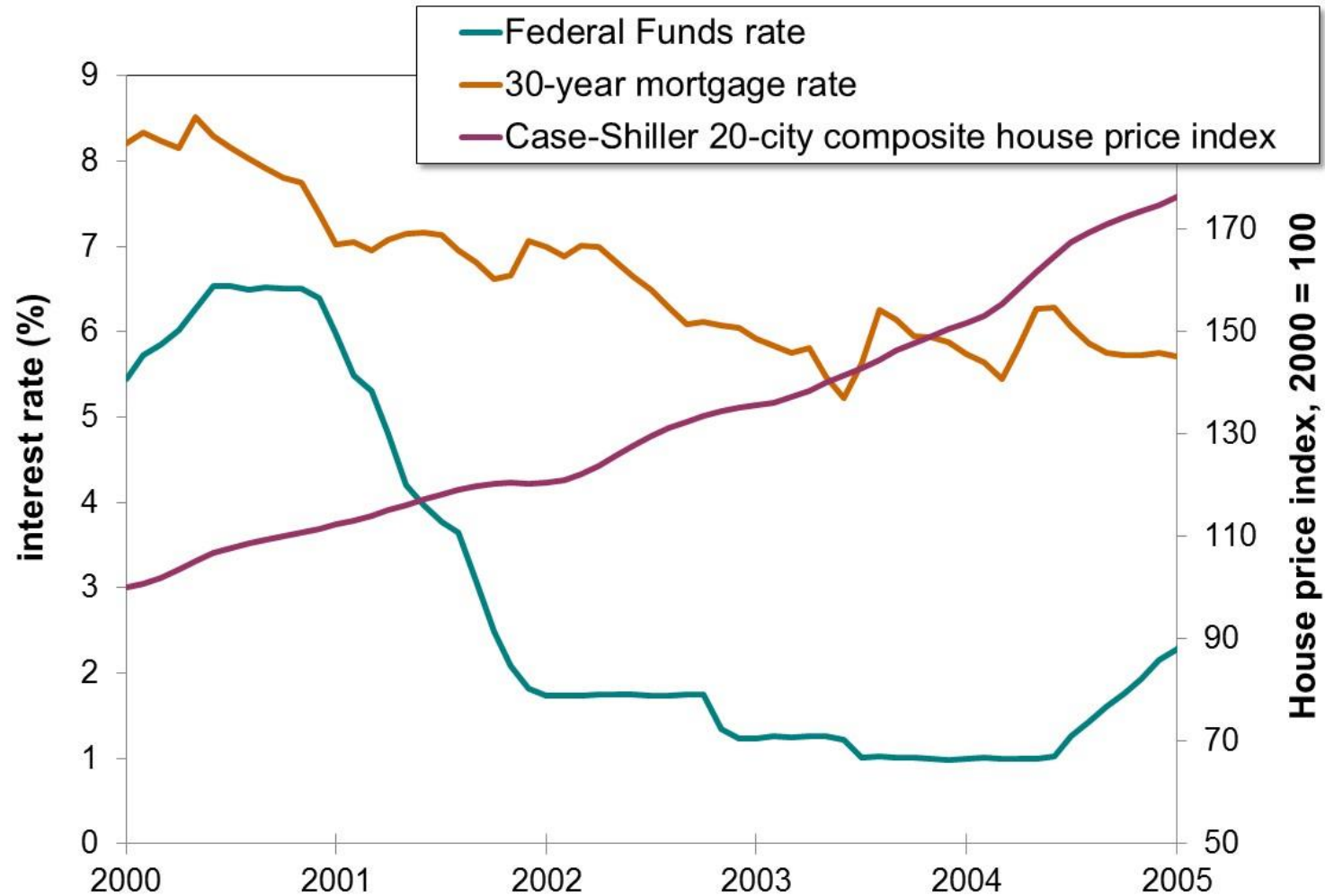
## Why another Depression is unlikely

- Policymakers (or their advisers) 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.

## CASE STUDY: The 2008-2009 financial crisis and recession

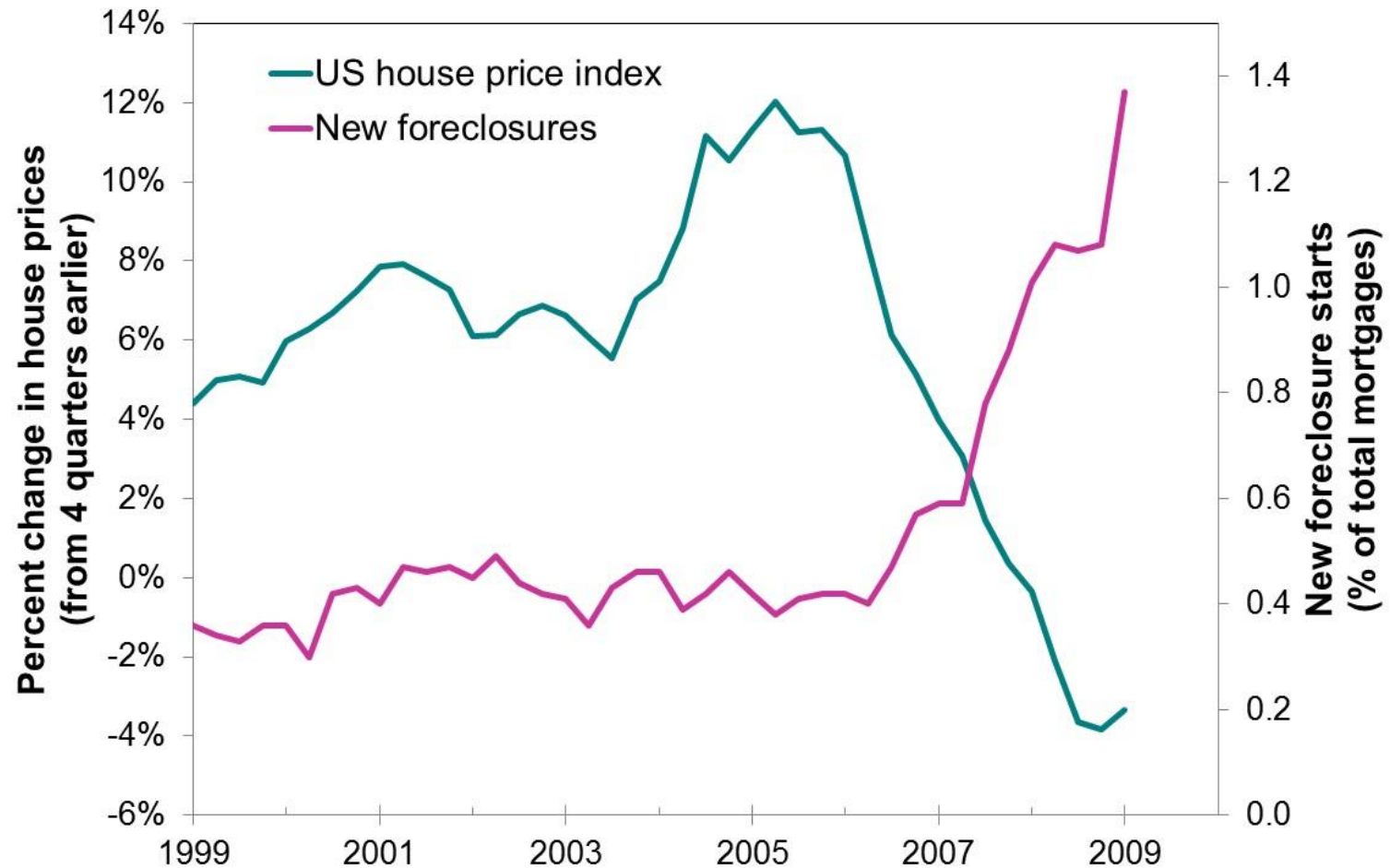
- 2009: Real GDP fell, u-rate approached 10%
- Important factors in the crisis:
  - early 2000s Federal Reserve interest rate policy
  - subprime mortgage crisis
  - bursting of house price bubble, rising foreclosure rates
  - falling stock prices
  - failing financial institutions
  - declining consumer confidence, drop in spending on consumer durables and investment goods

# Interest rates and house prices

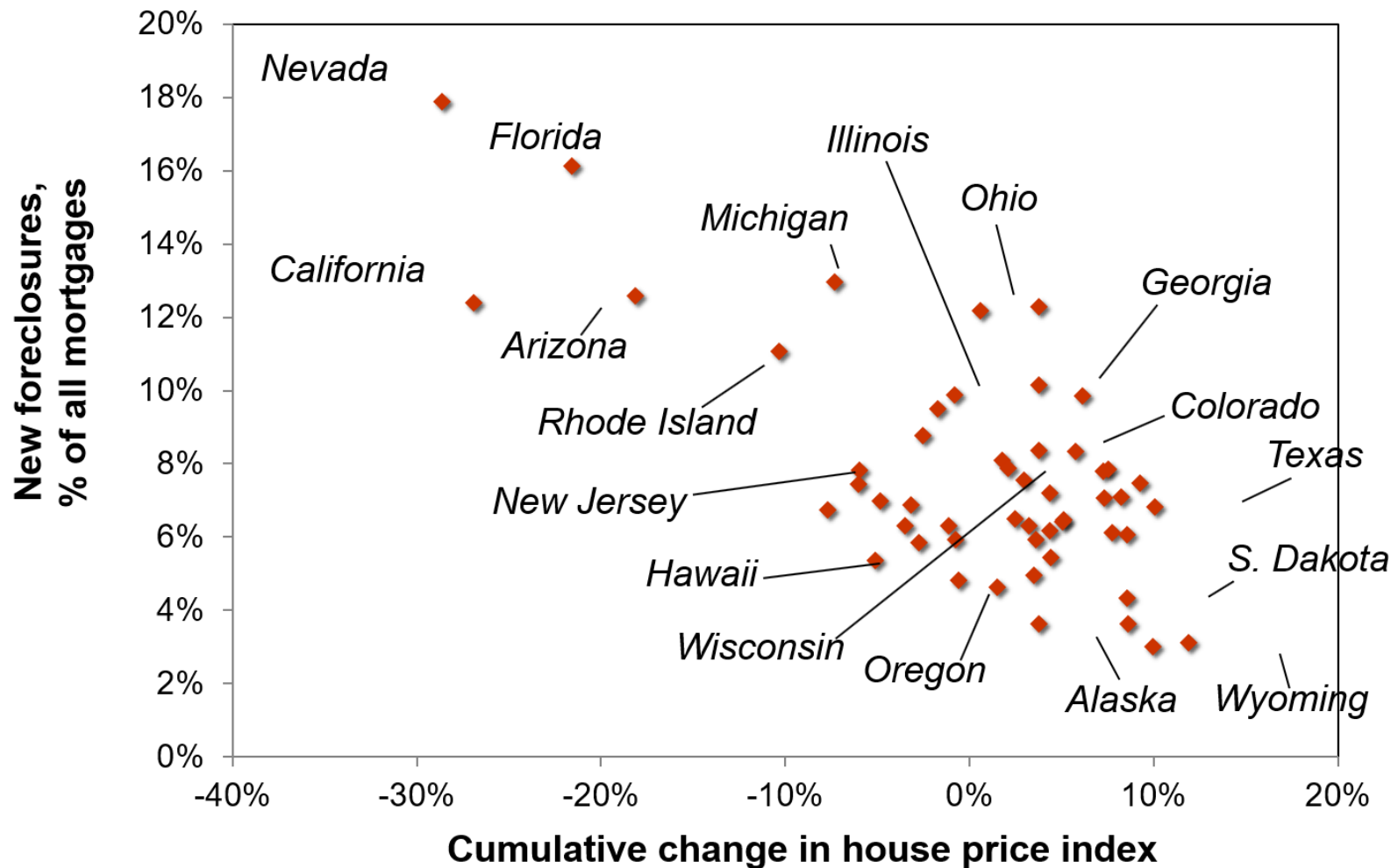




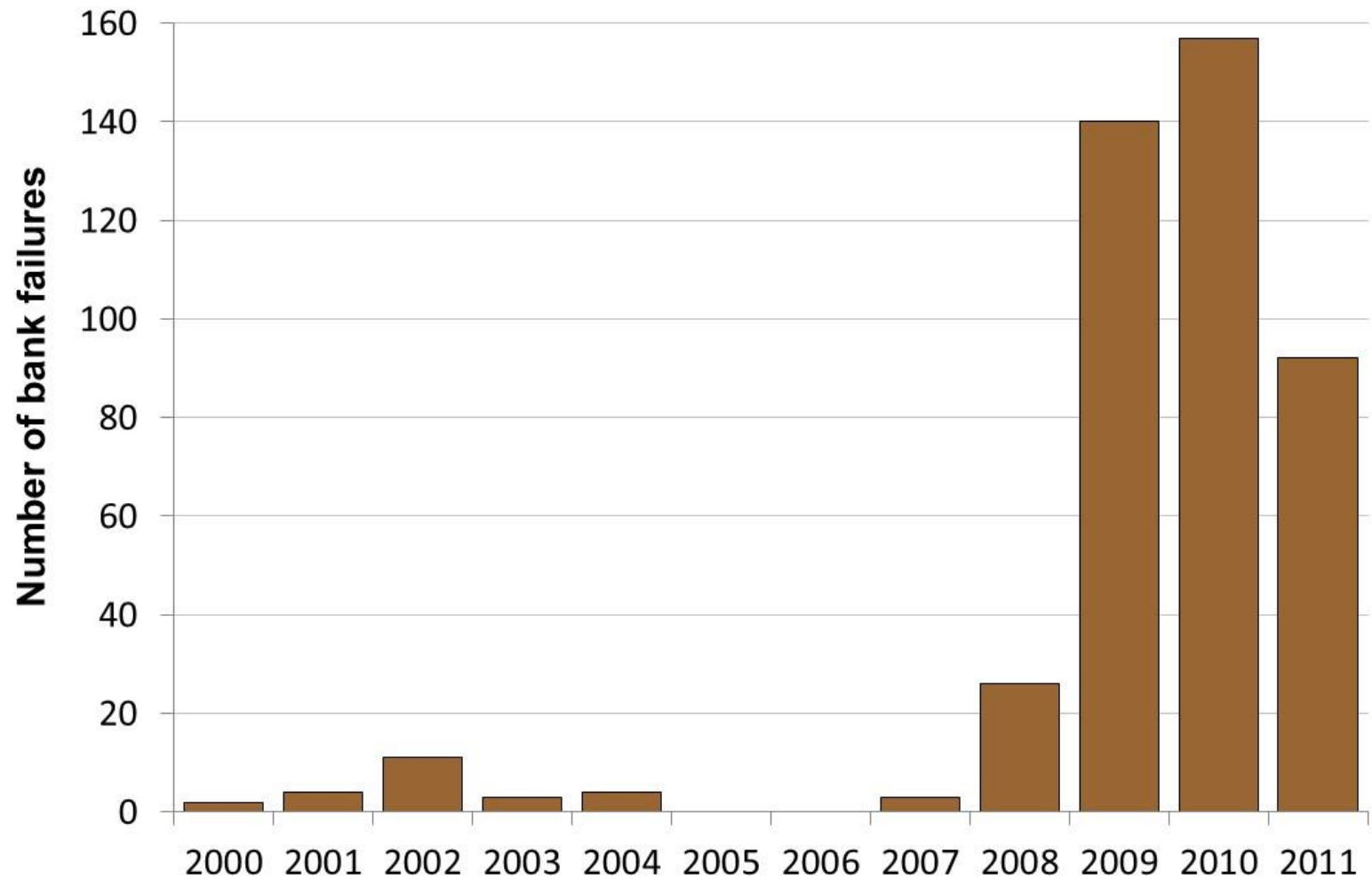
# Change in U.S. house price index and rate of new foreclosures, 1999–2009



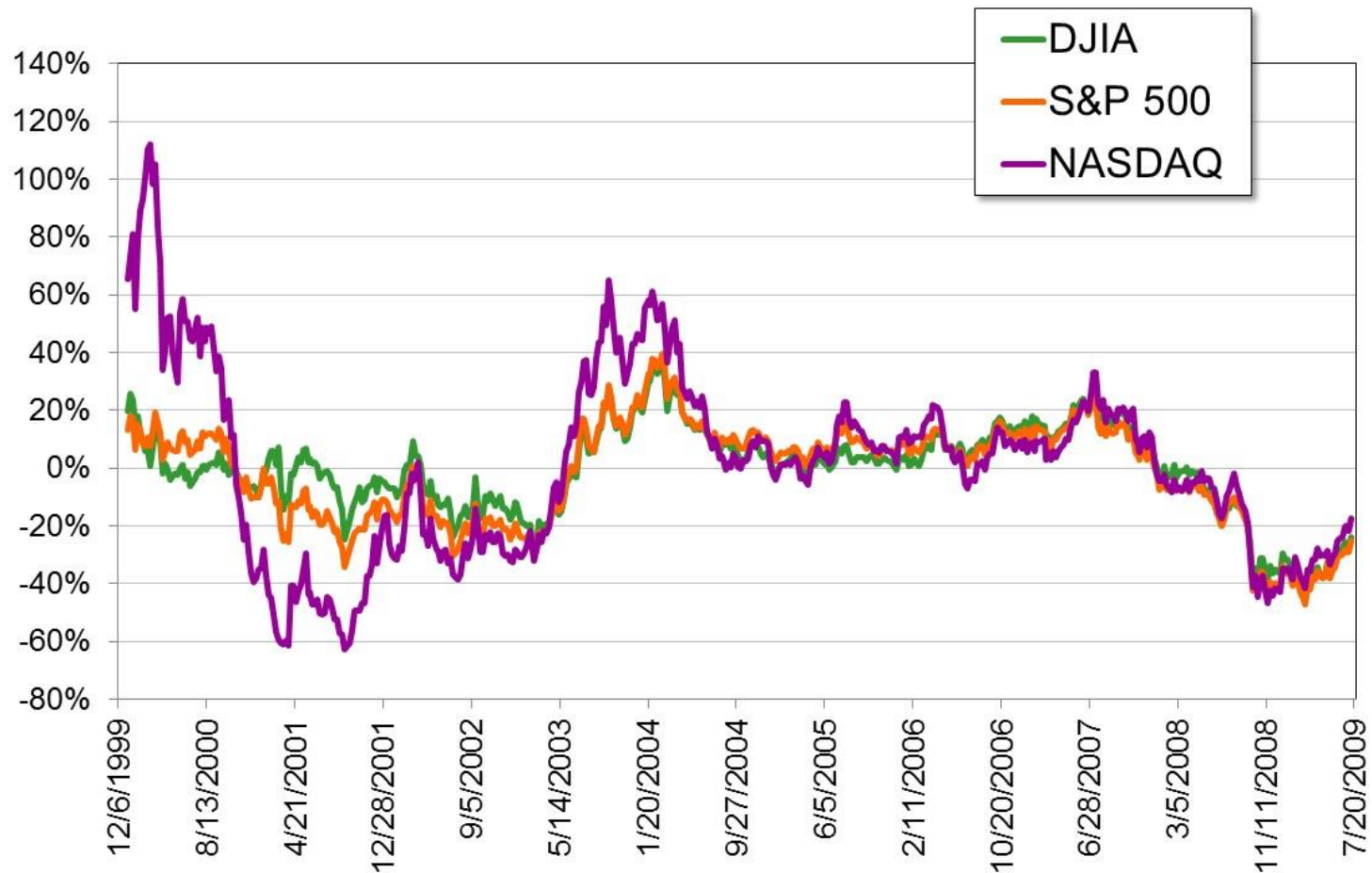
# House price change and new foreclosures, 2006:Q3–2009:Q1



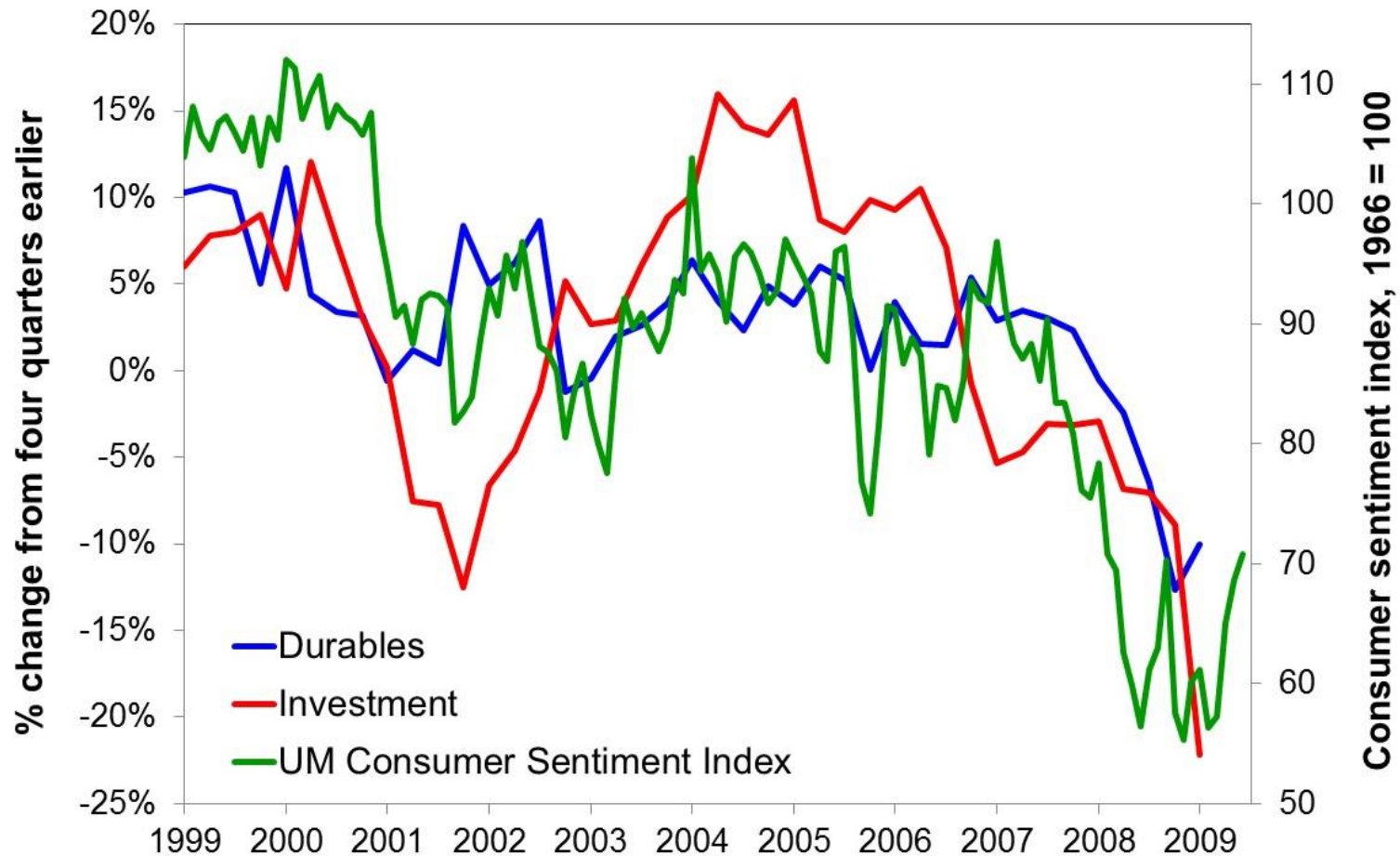
## U.S. bank failures by year, 2000–2011



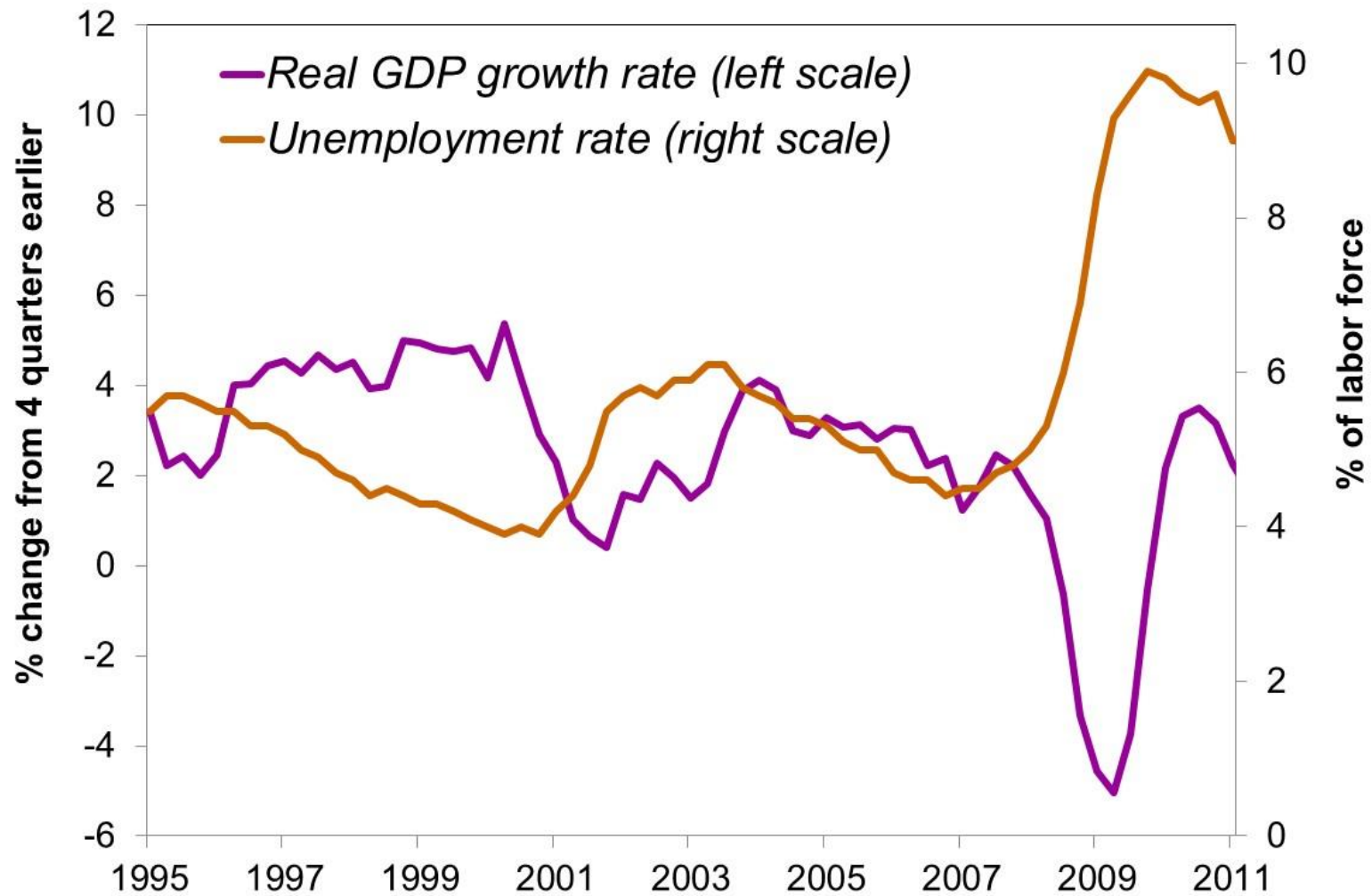
# Major U.S. stock indexes (% change from 52 weeks earlier)



# Consumer sentiment and growth in consumer durables and investment spending



# Real GDP growth and unemployment



# CHAPTER SUMMARY, PART 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

# CHAPTER SUMMARY, PART 2

## *AD* curve

- shows relationship between ***P*** and the *IS–LM* model's equilibrium ***Y***.
- negative slope because  
 $\uparrow \mathbf{P} \rightarrow \downarrow (\mathbf{M/P}) \rightarrow \uparrow \mathbf{r} \rightarrow \downarrow \mathbf{I} \rightarrow \downarrow \mathbf{Y}$
- 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.