

Macroeconomics, Masaryk University Spring 2017

Lecture 10: AD and AS

Nikoloz Kudashvili

Seventh Edition

Principles of Macroeconomics

N. Gregory Mankiw



Wojciech Gerson (1831-1901)

CHAPTER 20 Aggregate Demand and Aggregate Supply

In this chapter, look for the answers to these questions

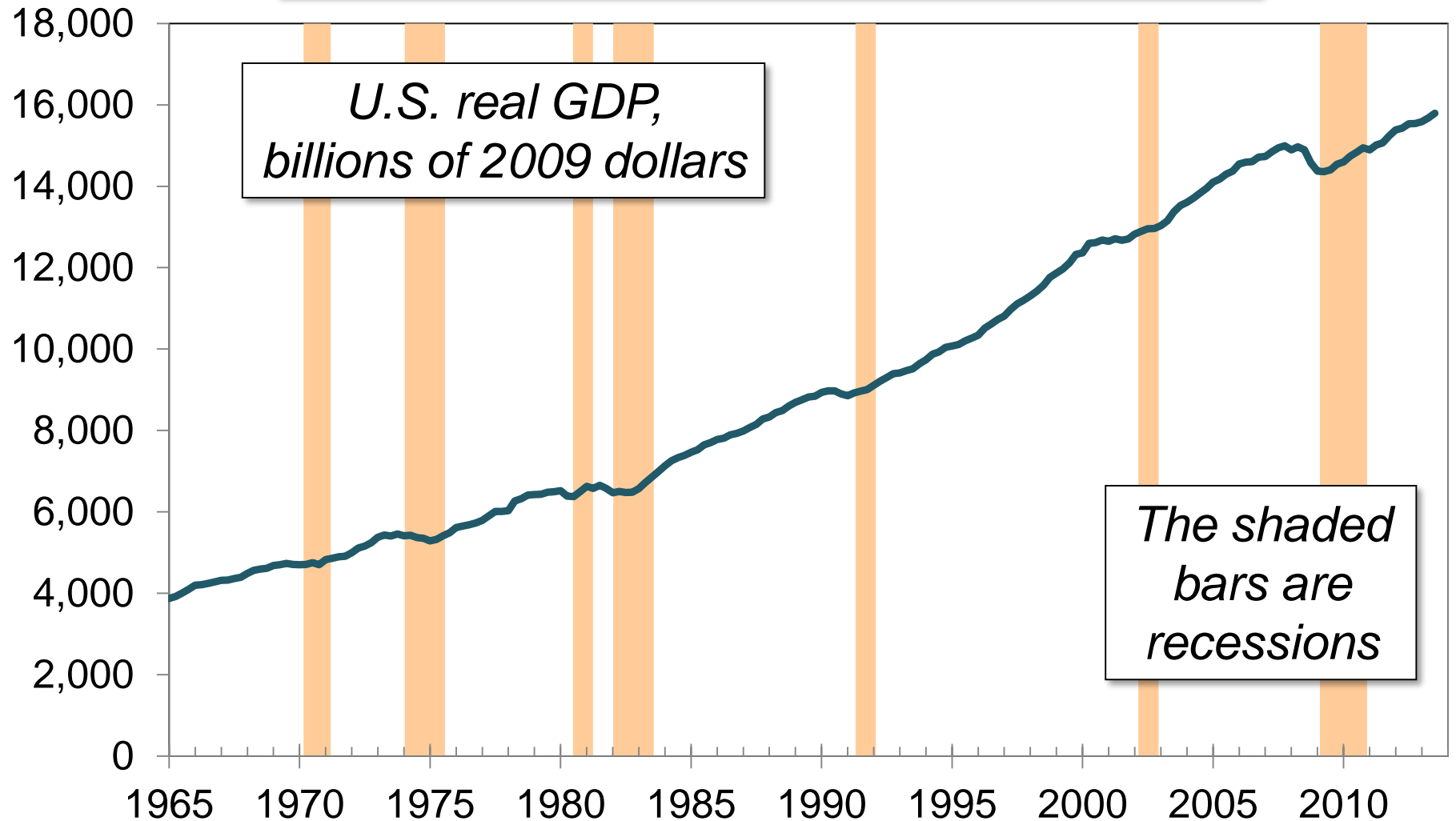
- What are economic fluctuations? What are their characteristics?
- How does the model of aggregate demand and aggregate supply explain economic fluctuations?
- Why does the Aggregate-Demand curve slope downward? What shifts the *AD* curve?
- What is the slope of the Aggregate-Supply curve in the short run? In the long run? What shifts the *AS* curve(s)?

Introduction

- Over the long run, real GDP grows about 3% per year on average.
- In the short run, GDP fluctuates around its trend.
 - **Recessions**: periods of falling real incomes and rising unemployment
 - **Depressions**: severe recessions (very rare)
- Short-run economic fluctuations are often called **business cycles**.

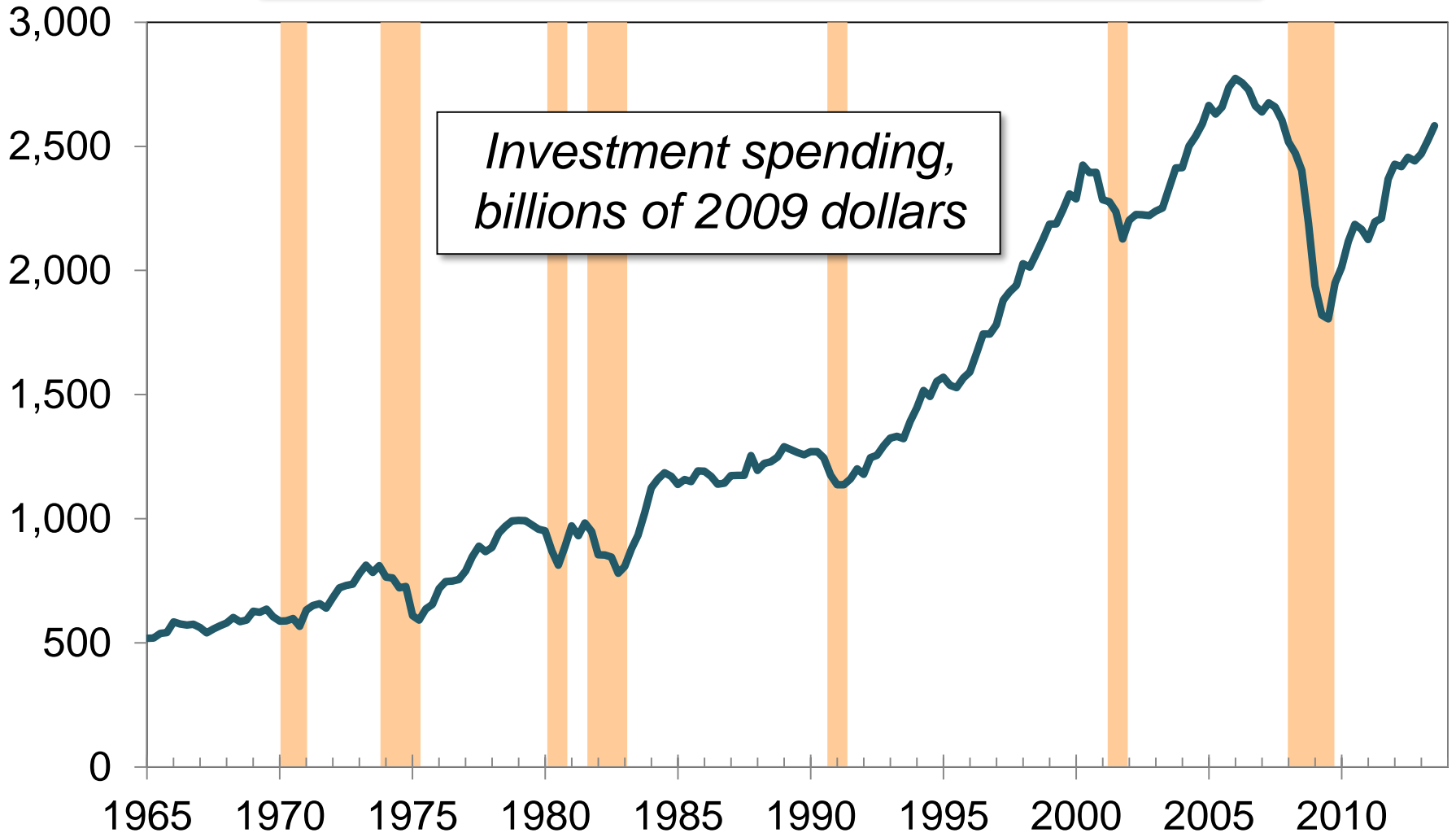
Three Facts About Economic Fluctuations

FACT 1: Economic fluctuations are irregular and unpredictable.



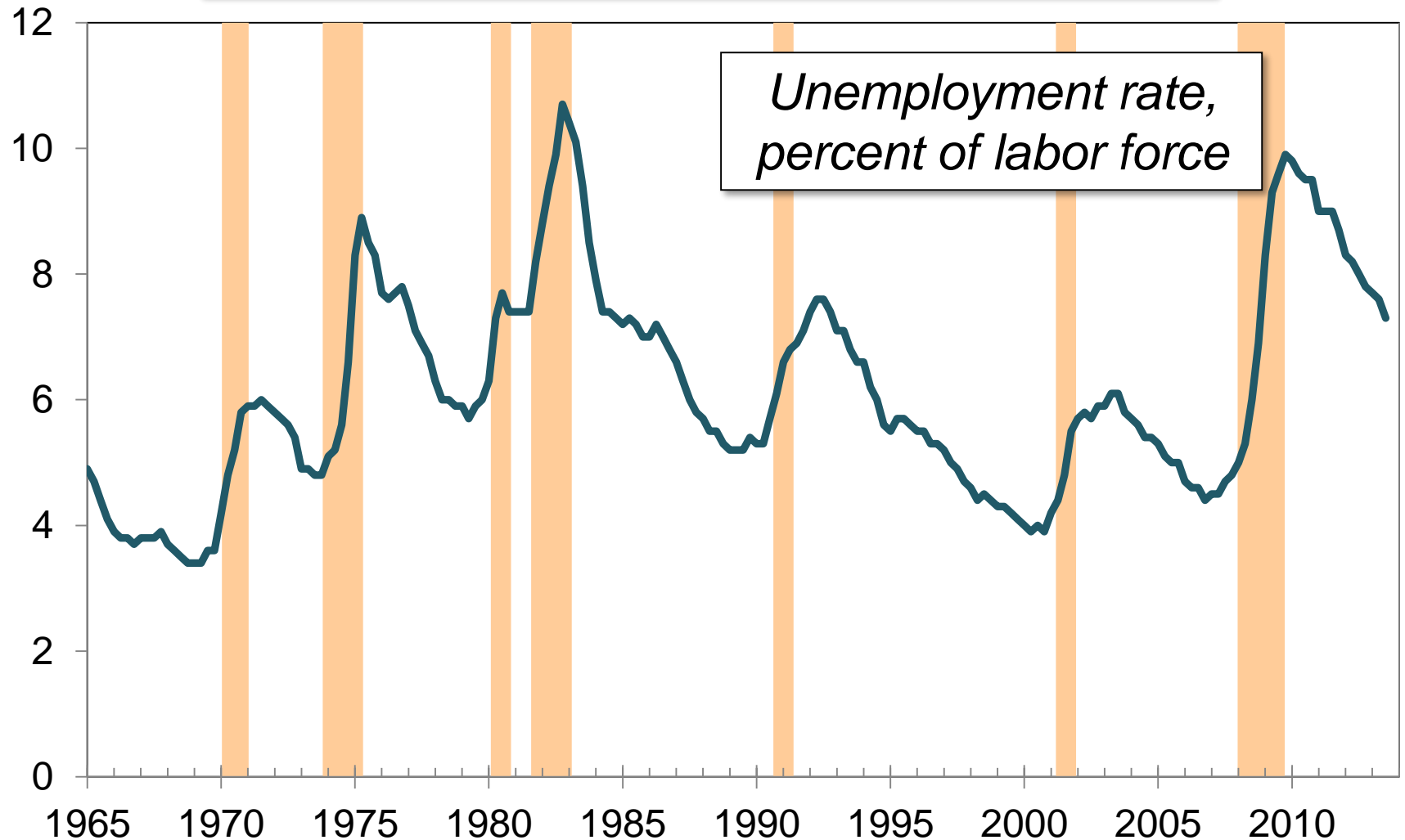
Three Facts About Economic Fluctuations

FACT 2: Most macroeconomic quantities fluctuate together.



Three Facts About Economic Fluctuations

FACT 3: As output falls, unemployment rises.



Introduction, *continued*

- Explaining these fluctuations is difficult, and the theory of economic fluctuations is controversial.
- Most economists use the **model of aggregate demand and aggregate supply** to study fluctuations.
- This model differs from the classical economic theories economists use to explain the long run.

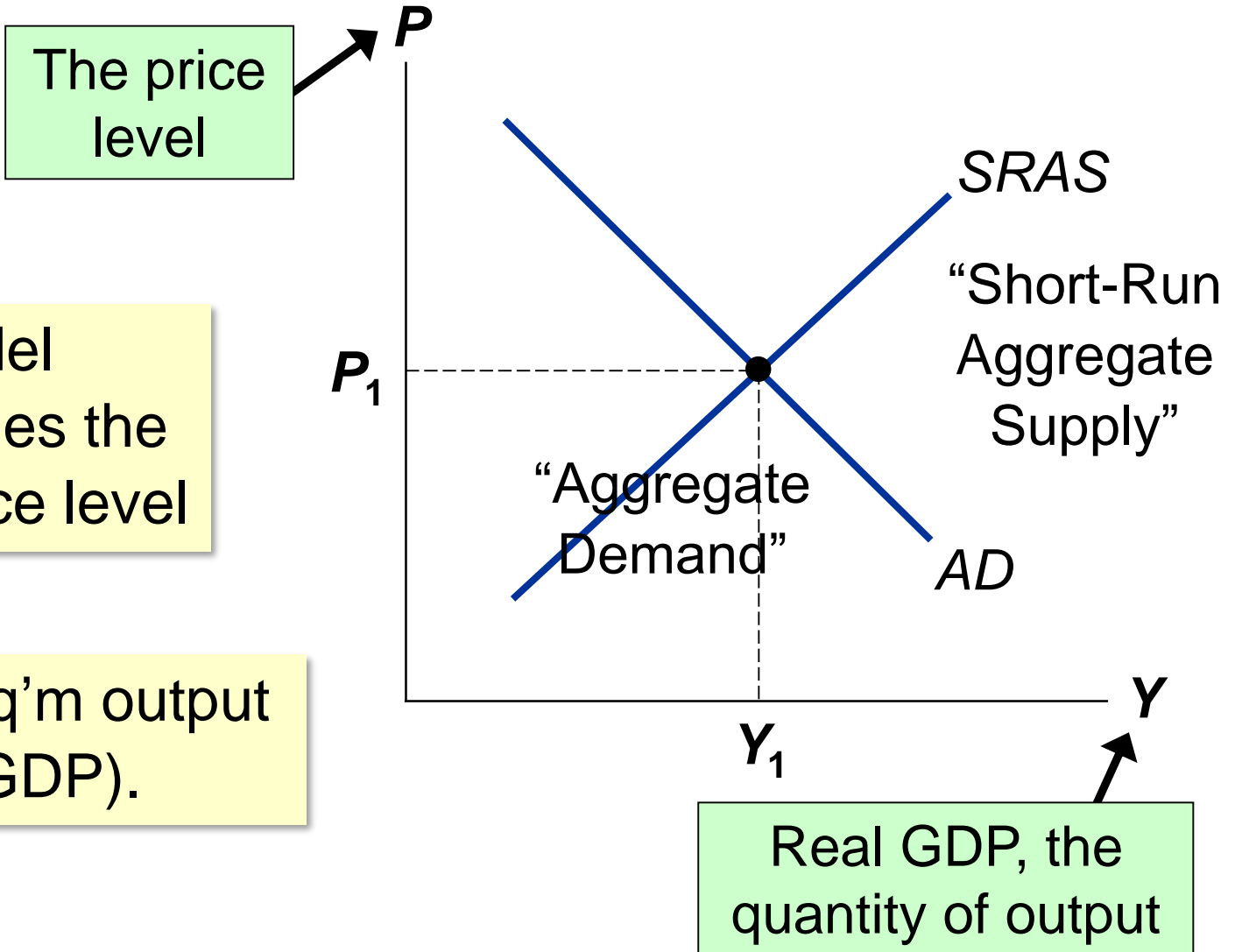
Classical Economics—A Recap

- The previous chapters are based on the ideas of classical economics, especially:
- The **Classical Dichotomy**, the separation of variables into two groups:
 - Real – quantities, relative prices
 - Nominal – measured in terms of money
- The **neutrality of money**:
Changes in the money supply affect nominal but not real variables.

Classical Economics—A Recap

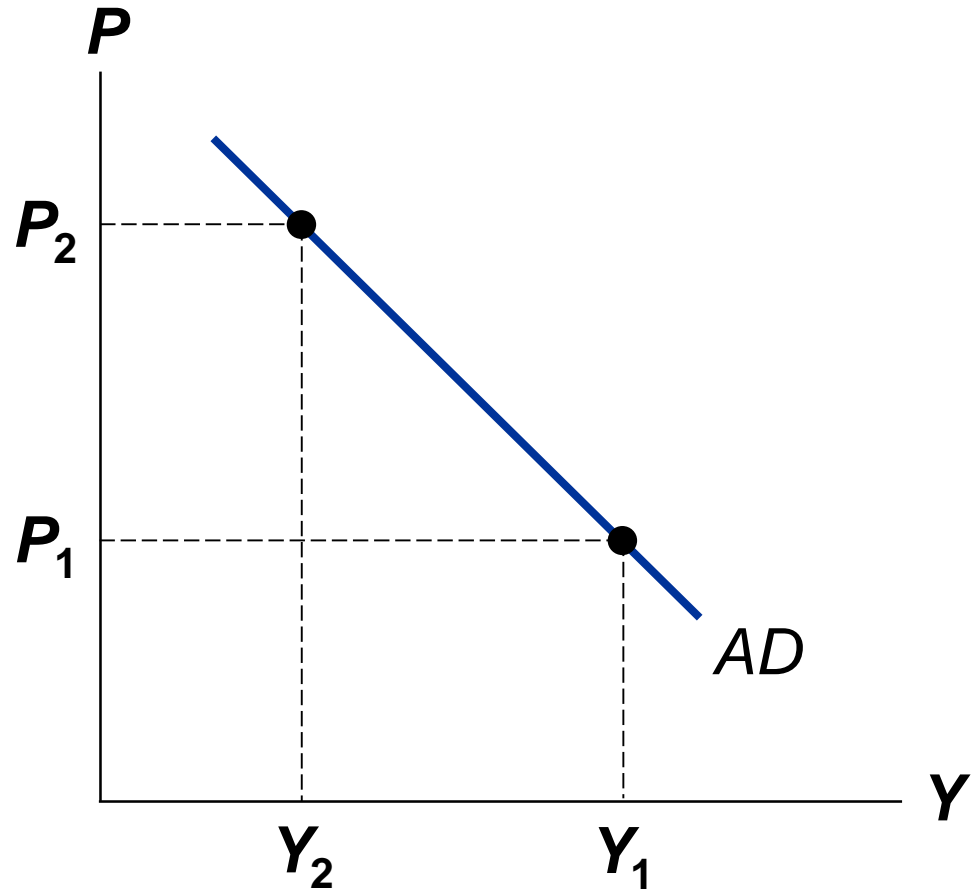
- Most economists believe classical theory describes the world in the long run, but not the short run.
- In the short run, changes in nominal variables (like the money supply or P) can affect real variables (like Y or the u-rate).
- To study the short run, we use a new model.

The Model of Aggregate Demand and Aggregate Supply



The Aggregate-Demand (*AD*) Curve

The ***AD*** curve shows the quantity of all g&s demanded in the economy at any given price level.

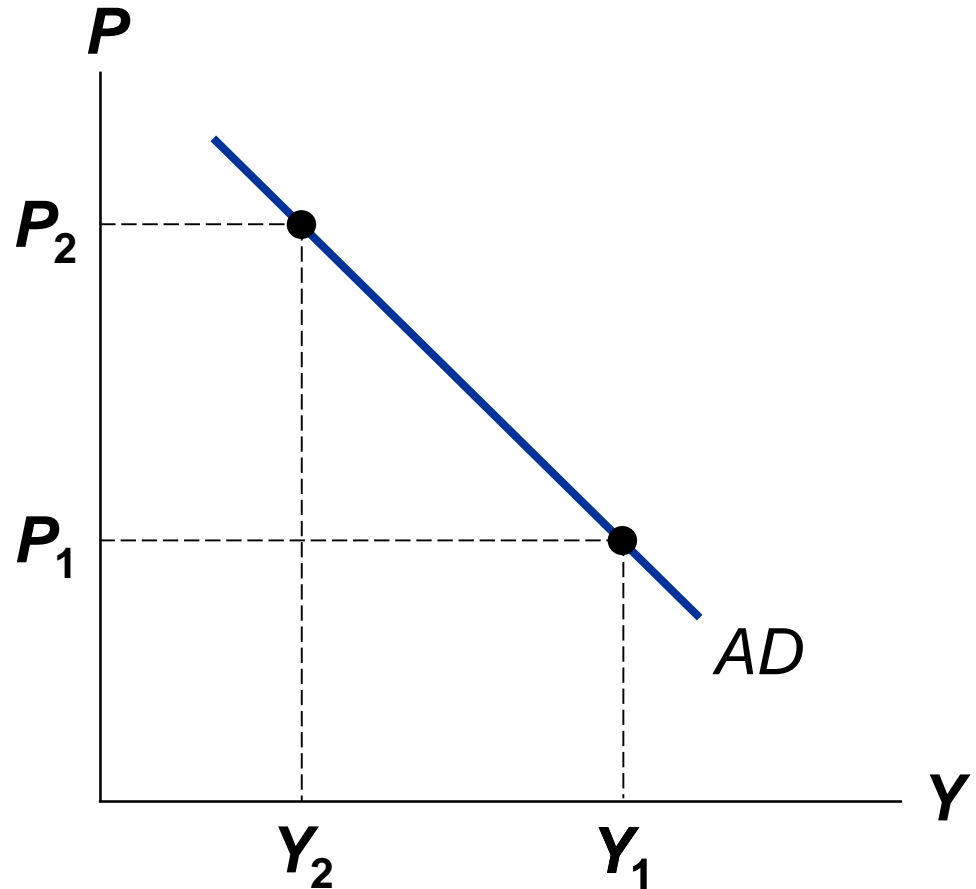


Why the *AD* Curve Slopes Downward

$$Y = C + I + G + NX$$

Assume **G** is fixed by govt policy.

To understand the slope of *AD*, must determine how a change in **P** affects **C**, **I**, and **NX**.



The Wealth Effect (P and C)

Suppose P rises.

- The dollars people hold buy fewer g&s, so real wealth is lower.
- People feel poorer.

Result: C falls.

The Interest-Rate Effect (P and I)

Suppose P rises.

- Buying g&s requires more dollars.
- To get these dollars, people sell bonds or other assets.
- This drives up interest rates.

Result: I falls.

(Recall, I depends negatively on interest rates.)

The Exchange-Rate Effect (P and NX)

Suppose P rises.

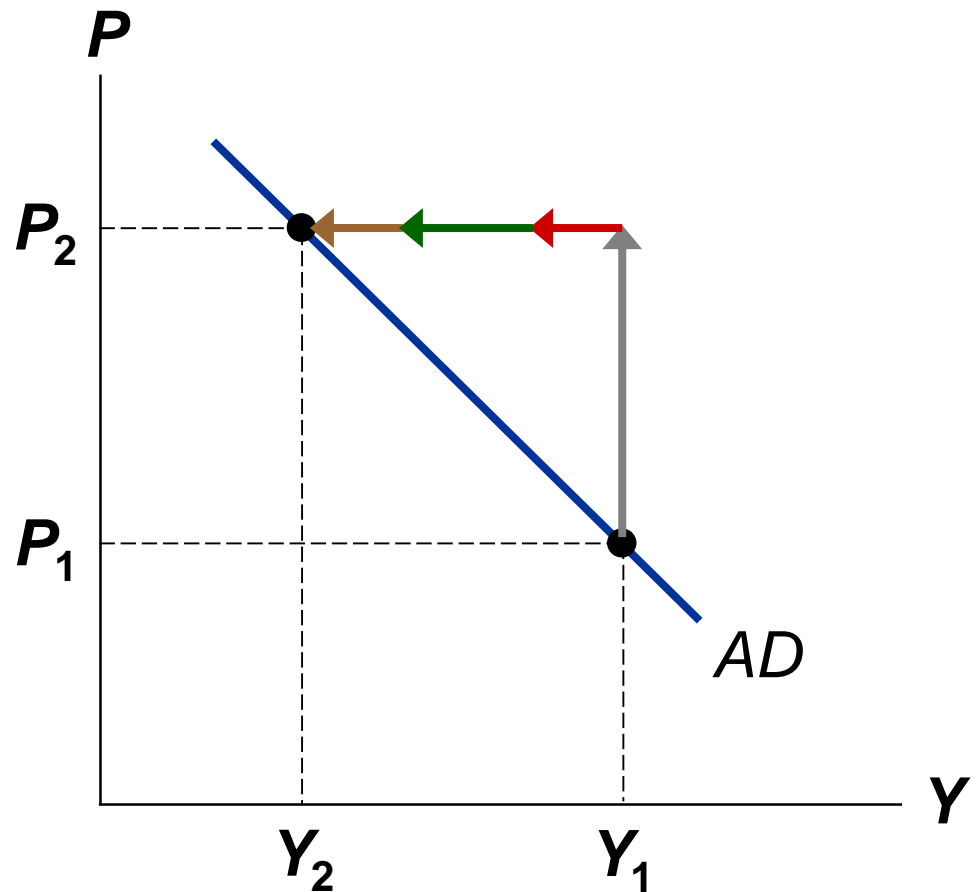
- U.S. interest rates rise (the interest-rate effect).
- Foreign investors desire more U.S. bonds.
- Higher demand for \$ in foreign exchange market.
- U.S. exchange rate appreciates.
- U.S. exports more expensive to people abroad, imports cheaper to U.S. residents.

Result: NX falls.

The Slope of the *AD* Curve: Summary

An increase in P reduces the quantity of g&s demanded because:

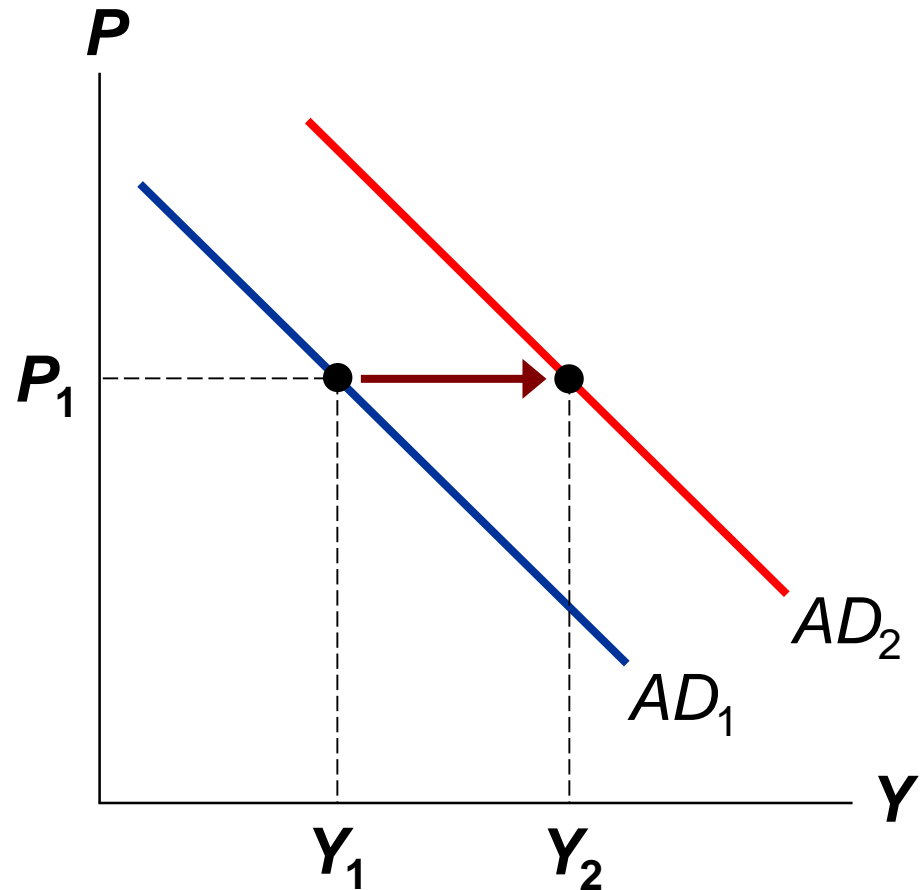
- the wealth effect (C falls)
- the interest-rate effect (I falls)
- the exchange-rate effect (NX falls)



Why the AD Curve Might Shift

Any event that changes C , I , G , or NX —except a change in P —will shift the AD curve.

Example:
A stock market boom makes households feel wealthier, C rises, the AD curve shifts right.



Why the *AD* Curve Might Shift

- Changes in **C**
 - Stock market boom/crash
 - Preferences re: consumption/saving tradeoff
 - Tax hikes/cuts
- Changes in **I**
 - Firms buy new computers, equipment, factories
 - Expectations, optimism/pessimism
 - Interest rates, monetary policy
 - Investment Tax Credit or other tax incentives

Why the *AD* Curve Might Shift

- Changes in **G**
 - Federal spending, e.g., defense
 - State & local spending, e.g., roads, schools
- Changes in ***NX***
 - Booms/recessions in countries that buy our exports
 - Appreciation/depreciation resulting from international speculation in foreign exchange market

ACTIVE LEARNING 1

The Aggregate-Demand curve

What happens to the AD curve in each of the following scenarios?

- A.** A ten-year-old investment tax credit expires.
- B.** The U.S. exchange rate falls.
- C.** A fall in prices increases the real value of consumers' wealth.
- D.** State governments replace their sales taxes with new taxes on interest, dividends, and capital gains.

ACTIVE LEARNING 1

Answers

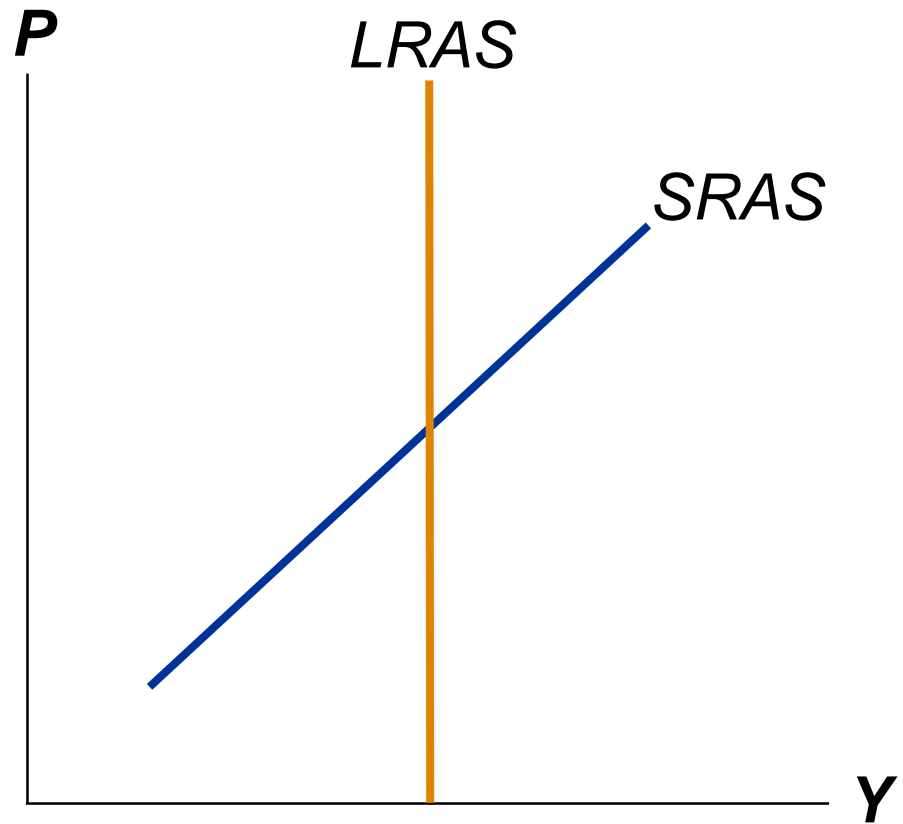
- A.** A ten-year-old investment tax credit expires.
I falls, *AD* curve shifts left.
- B.** The U.S. exchange rate falls.
NX rises, *AD* curve shifts right.
- C.** A fall in prices increases the real value of consumers' wealth.
Move down along *AD* curve (wealth-effect).
- D.** State governments replace sales taxes with new taxes on interest, dividends, and capital gains.
C rises, *AD* shifts right.

The Aggregate-Supply (AS) Curves

The **AS curve** shows the total quantity of g&s firms produce and sell at any given price level.

AS is:

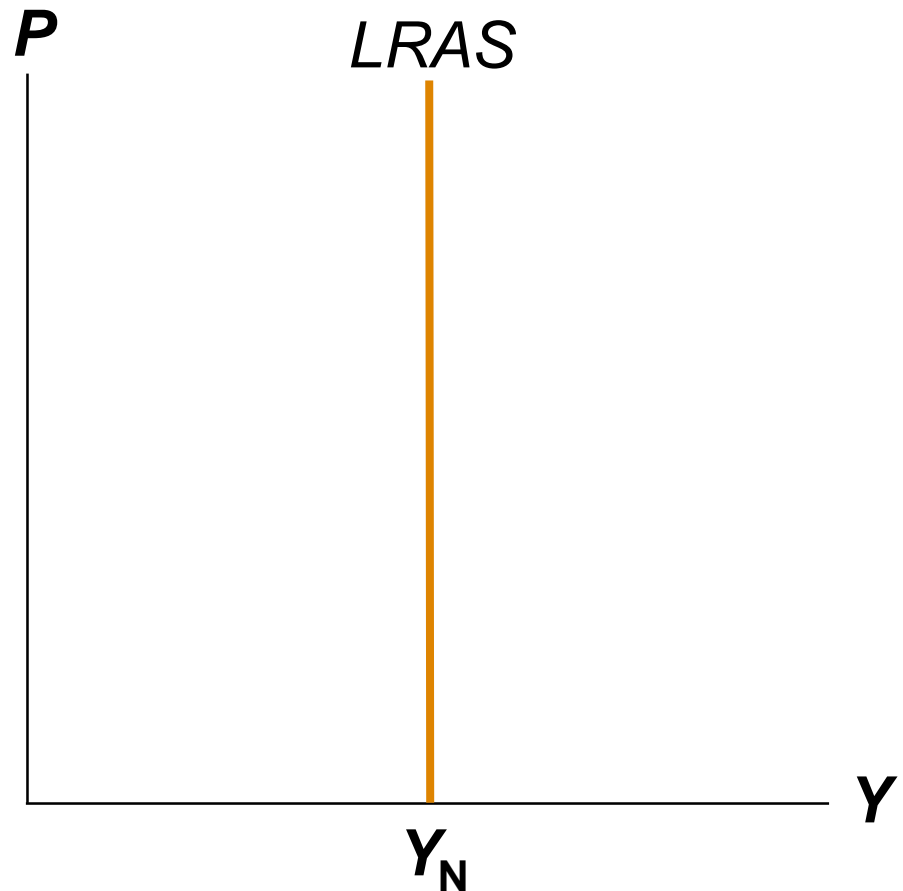
- upward-sloping in short run
- vertical in long run



The Long-Run Aggregate-Supply Curve (*LRAS*)

The **natural rate of output** (Y_N) is the amount of output the economy produces when unemployment is at its natural rate.

Y_N is also called **potential output** or **full-employment output**.

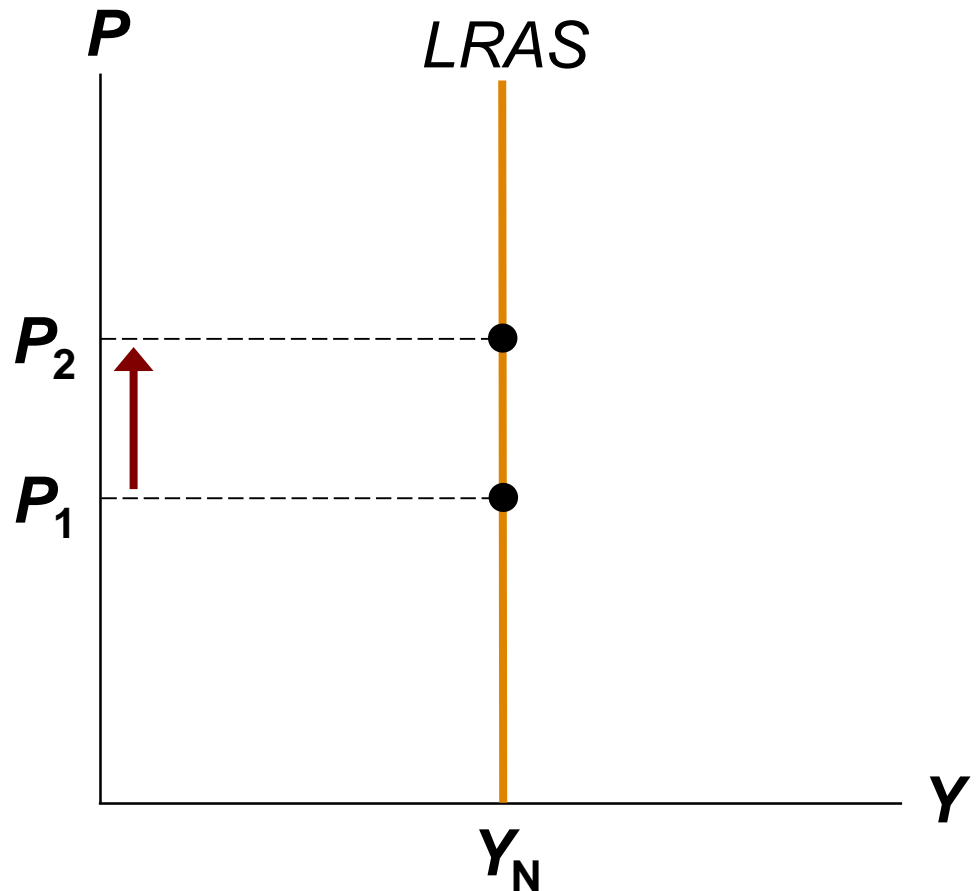


Why *LRAS* Is Vertical

Y_N determined by the economy's stocks of labor, capital, and natural resources, and on the level of technology.

An increase in P does not affect any of these, so it does not affect Y_N .

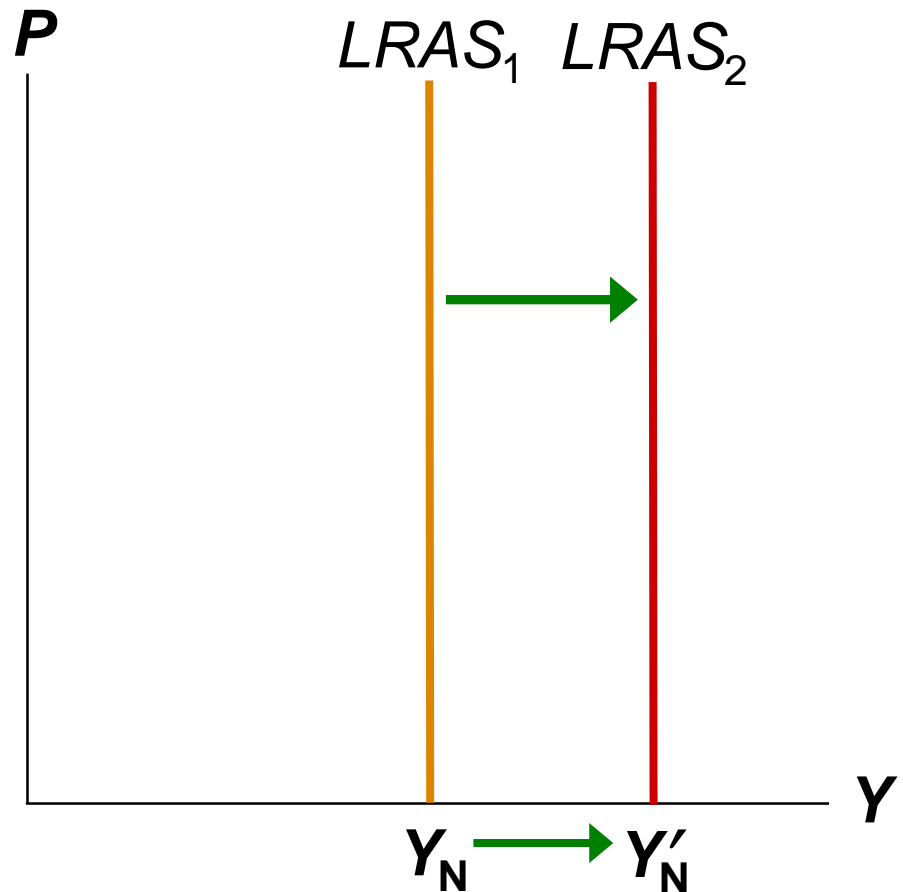
(Classical dichotomy)



Why the $LRAS$ Curve Might Shift

Any event that changes any of the determinants of Y_N will shift $LRAS$.

Example:
Immigration increases L , causing Y_N to rise.



Why the *LRAS* Curve Might Shift

- Changes in ***L*** or natural rate of unemployment
 - Immigration
 - Baby-boomers retire
 - Govt policies reduce natural u-rate
- Changes in ***K*** or ***H***
 - Investment in factories, equipment
 - More people get college degrees
 - Factories destroyed by a hurricane

Why the *LRAS* Curve Might Shift

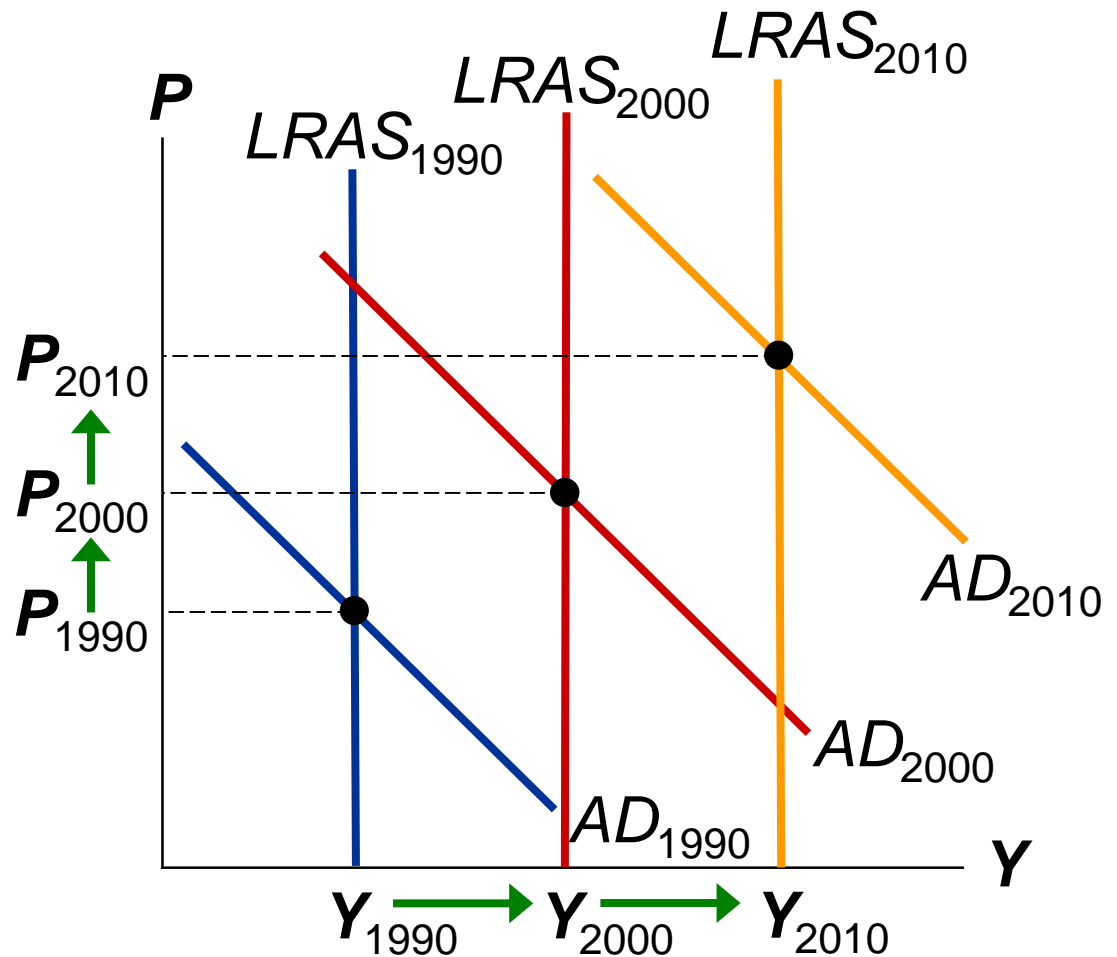
- Changes in natural resources
 - Discovery of new mineral deposits
 - Reduction in supply of imported oil
 - Changing weather patterns that affect agricultural production
- Changes in technology
 - Productivity improvements from technological progress

Using *AD* & *AS* to Depict Long-Run Growth and Inflation

Over the long run, tech. progress shifts *LRAS* to the right

and growth in the money supply shifts *AD* to the right.

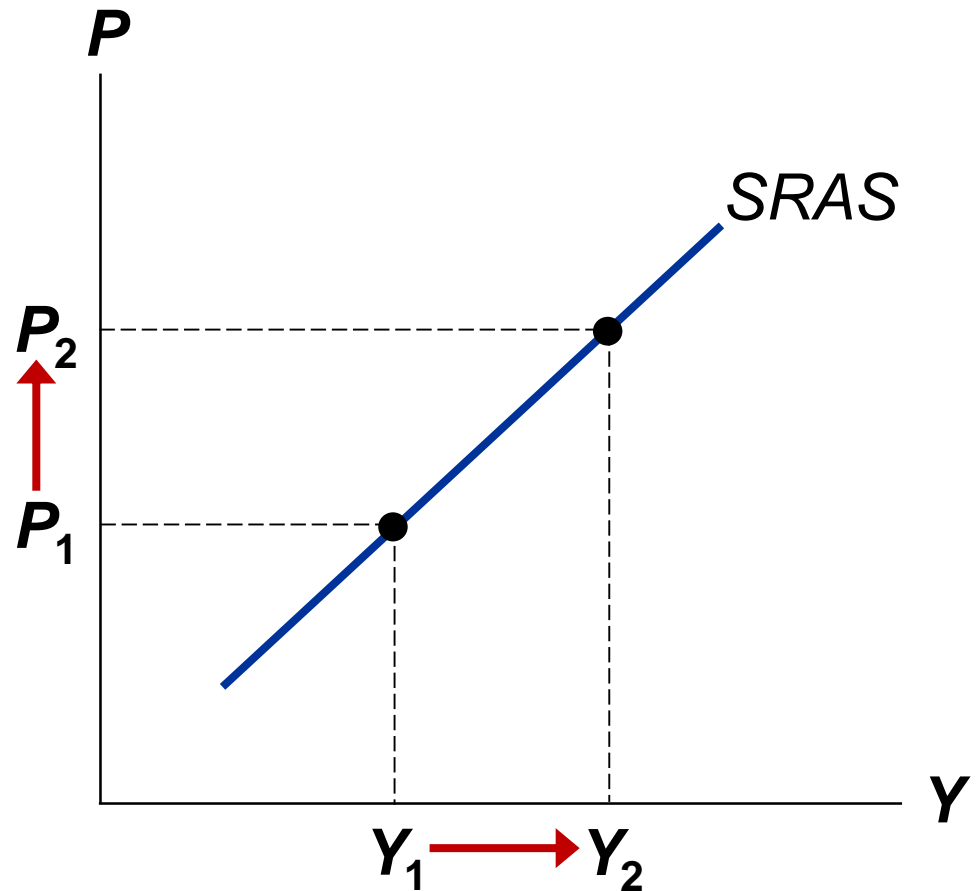
Result:
ongoing inflation
and growth in
output.



Short Run Aggregate Supply (SRAS)

The SRAS curve is upward sloping:

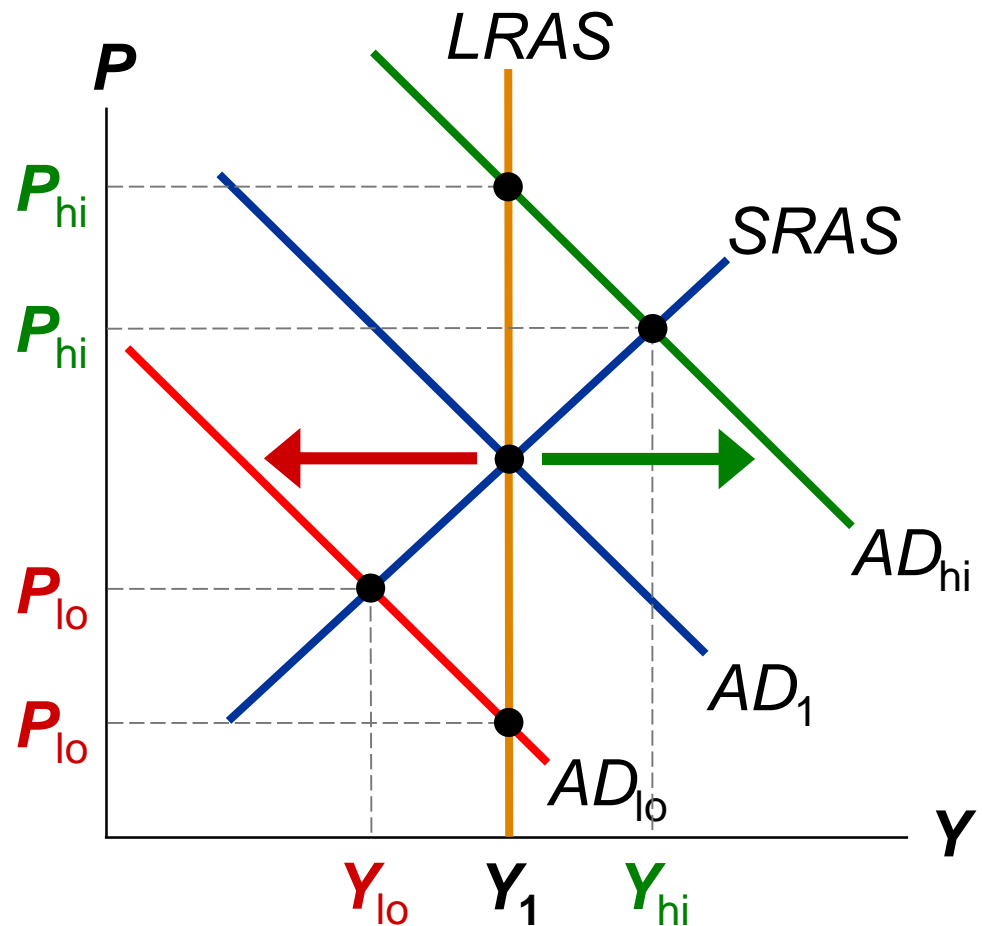
Over the period of 1–2 years, an increase in P causes an increase in the quantity of g & s supplied.



Why the Slope of SRAS Matters

If AS is vertical, fluctuations in AD do not cause fluctuations in output or employment.

If AS slopes up, then shifts in AD do affect output and employment.



Three Theories of *SRAS*

In each,

- some type of market imperfection
- result:

Output deviates from its natural rate when the actual price level deviates from the price level people expected.

1. The Sticky-Wage Theory

- Imperfection:
Nominal wages are **sticky** in the short run, they adjust sluggishly.
 - Due to labor contracts, social norms
- Firms and workers set the nominal wage in advance based on P_E , the price level they expect to prevail.

1. The Sticky-Wage Theory

- If $P > P_E$,
revenue is higher, but labor cost is not.
Production is more profitable,
so firms increase output and employment.
- Hence, higher P causes higher Y ,
so the ***SRAS curve slopes upward.***

2. The Sticky-Price Theory

- Imperfection:
Many prices are sticky in the short run.
 - Due to **menu costs**, the costs of adjusting prices.
 - Examples: cost of printing new menus, the time required to change price tags
- Firms set sticky prices in advance based on P_E .

2. The Sticky-Price Theory

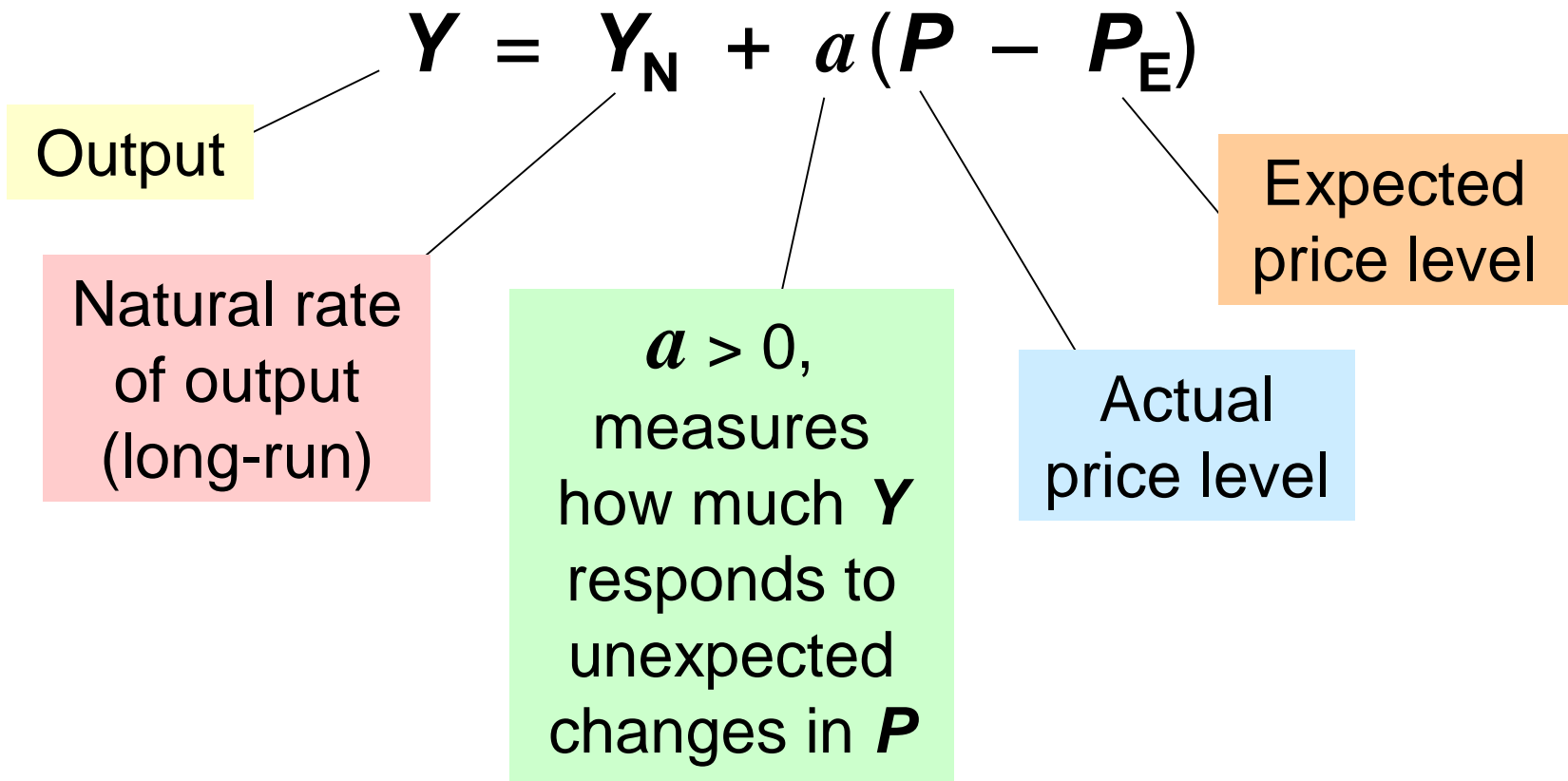
- Suppose the Fed increases the money supply unexpectedly. In the long run, P will rise.
- In the short run, firms without menu costs can raise their prices immediately.
- Firms with menu costs wait to raise prices. Meanwhile, their prices are relatively low, which increases demand for their products, so they increase output and employment.
- Hence, higher P is associated with higher Y , so the ***SRAS curve slopes upward.***

3. The Misperceptions Theory

- Imperfection:
Firms may confuse changes in P with changes in the relative price of the products they sell.
- If P rises above P_E , a firm sees its price rise before realizing all prices are rising.
The firm may believe its *relative* price is rising, and may increase output and employment.
- So, an increase in P can cause an increase in Y , making the ***SRAS curve upward-sloping.***

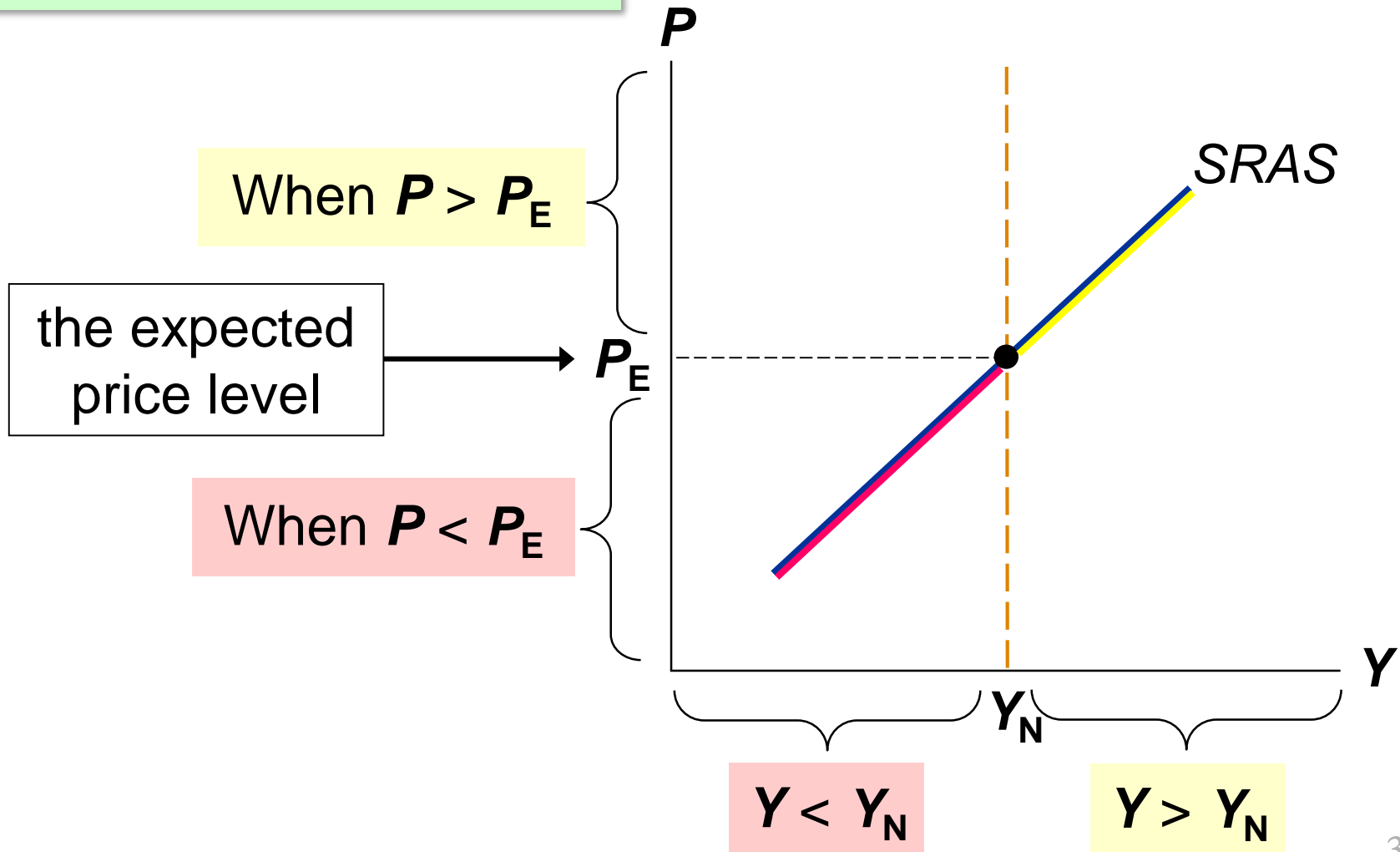
What the 3 Theories Have in Common:

In all 3 theories, Y deviates from Y_N when P deviates from P_E .



What the 3 Theories Have in Common:

$$Y = Y_N + a(P - P_E)$$



SRAS and LRAS

- The imperfections in these theories are temporary. Over time,
 - sticky wages and prices become flexible
 - misperceptions are corrected
- In the LR,
 - $P_E = P$
 - AS curve is vertical

SRAS and LRAS

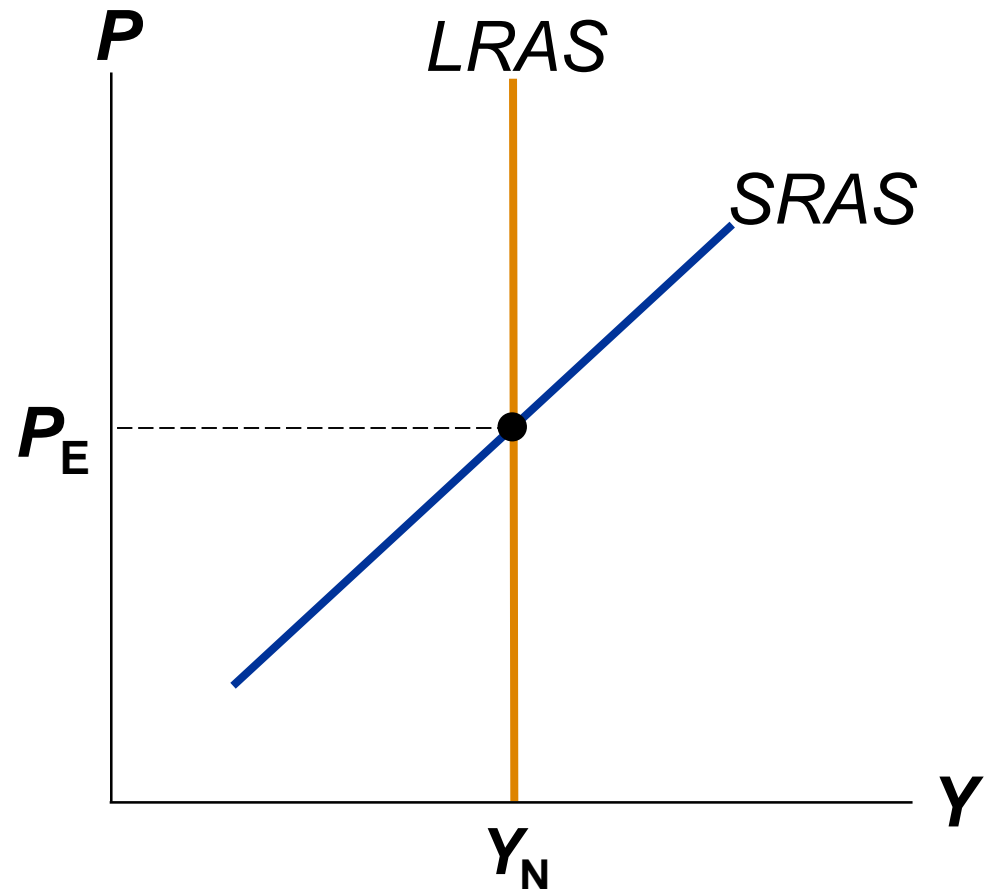
$$Y = Y_N + a(P - P_E)$$

In the long run,

$$P_E = P$$

and

$$Y = Y_N.$$



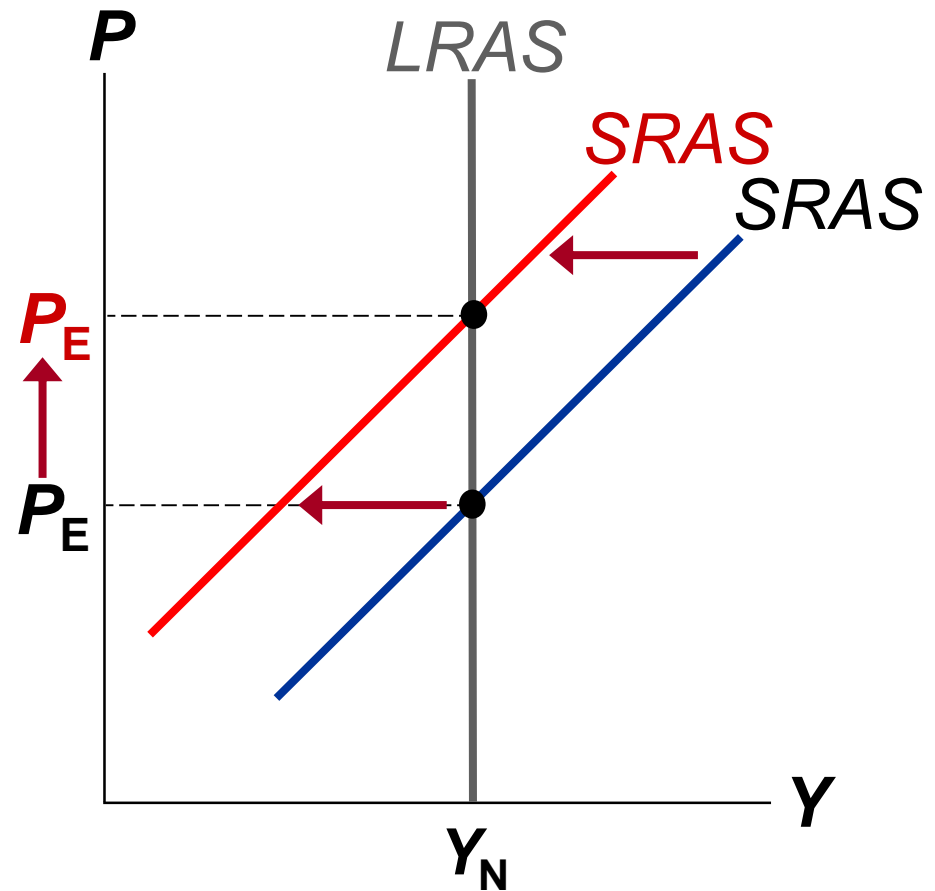
Why the *SRAS* Curve Might Shift

Everything that shifts *LRAS* shifts *SRAS*, too.

Also, P_E shifts *SRAS*:

If P_E rises,
workers & firms set
higher wages.

At each P ,
production is less
profitable, Y falls,
SRAS shifts left.



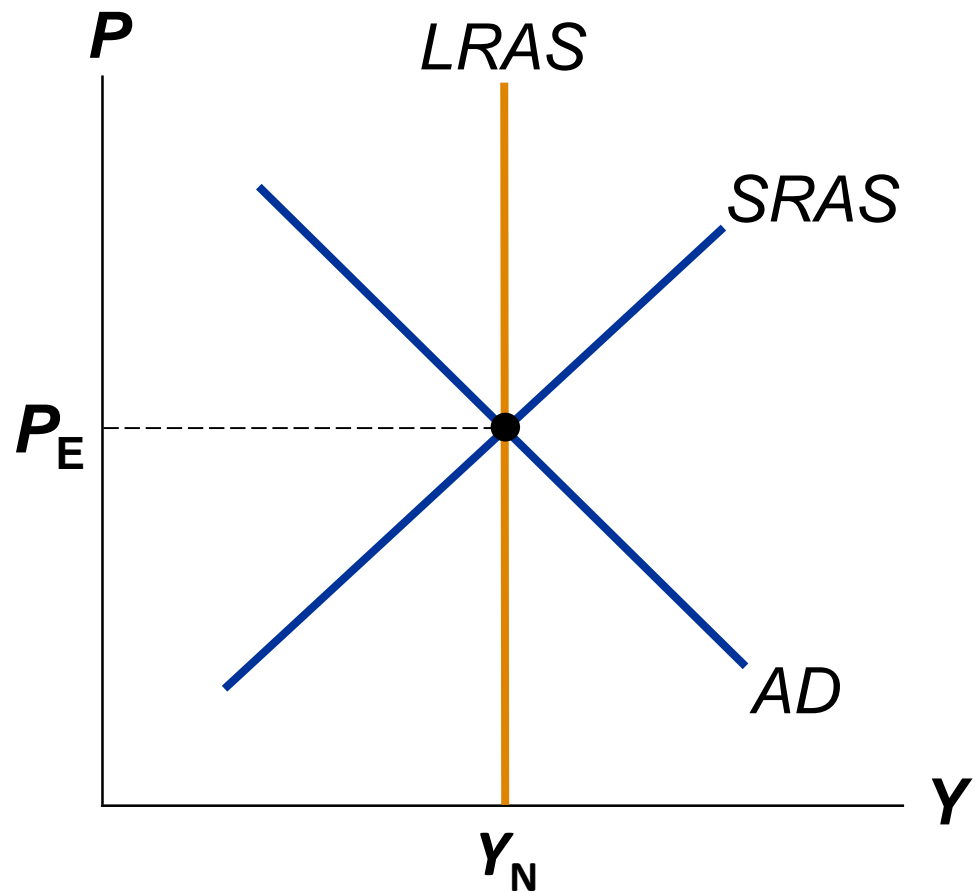
The Long-Run Equilibrium

In the long-run equilibrium,

$$P_E = P,$$

$$Y = Y_N,$$

and unemployment is at its natural rate.



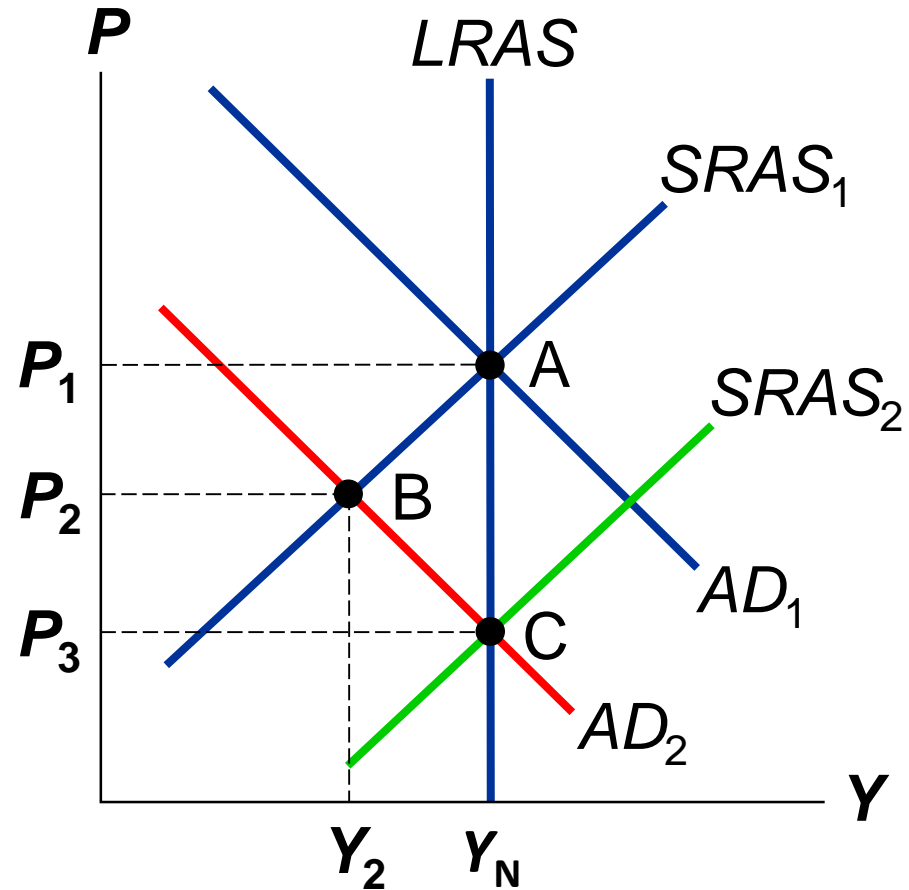
Economic Fluctuations

- Caused by events that shift the AD and/or AS curves.
- Four steps to analyzing economic fluctuations:
 1. Determine whether the event shifts AD or AS .
 2. Determine whether curve shifts left or right.
 3. Use $AD-AS$ diagram to see how the shift changes Y and P in the short run.
 4. Use $AD-AS$ diagram to see how economy moves from new SR eq'm to new LR eq'm.

The Effects of a Shift in AD

Event: Stock market crash

1. Affects C , AD curve
2. C falls, so AD shifts left
3. SR eq'm at B.
 P and Y lower,
unemp higher
4. Over time, P_E falls,
 $SRAS$ shifts right,
until LR eq'm at C.
 Y and unemp back
at initial levels.

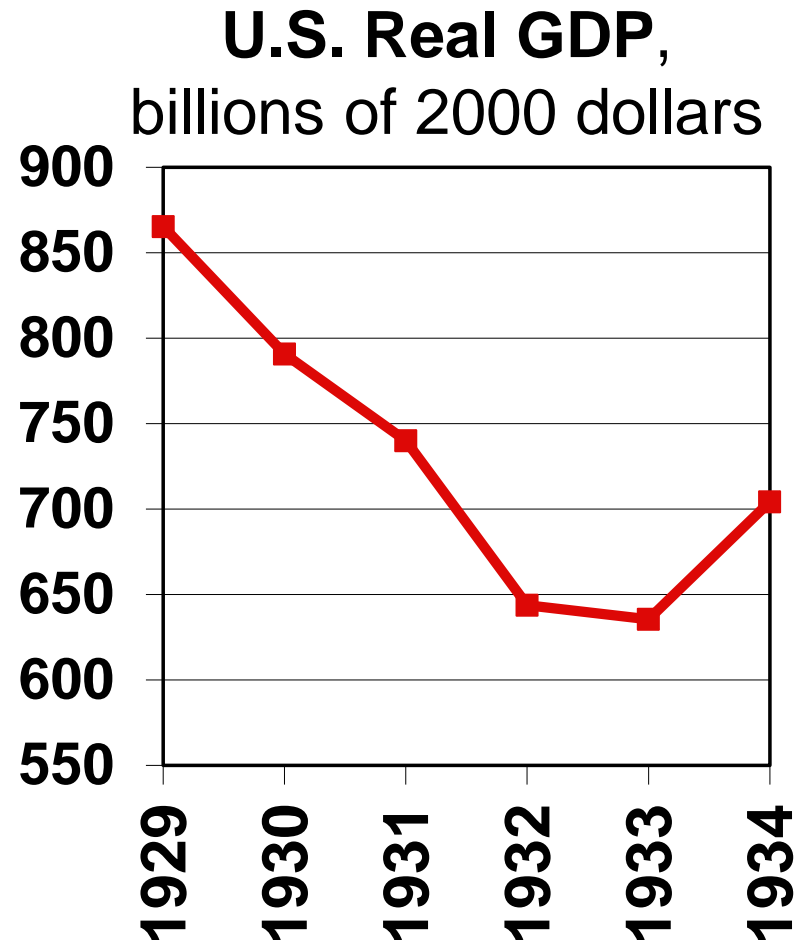


Two Big AD Shifts:

1. The Great Depression

From 1929–1933,

- money supply fell 28% due to problems in banking system
- stock prices fell 90%, reducing **C** and **I**
- **Y** fell 27%
- **P** fell 22%
- u-rate rose from 3% to 25%

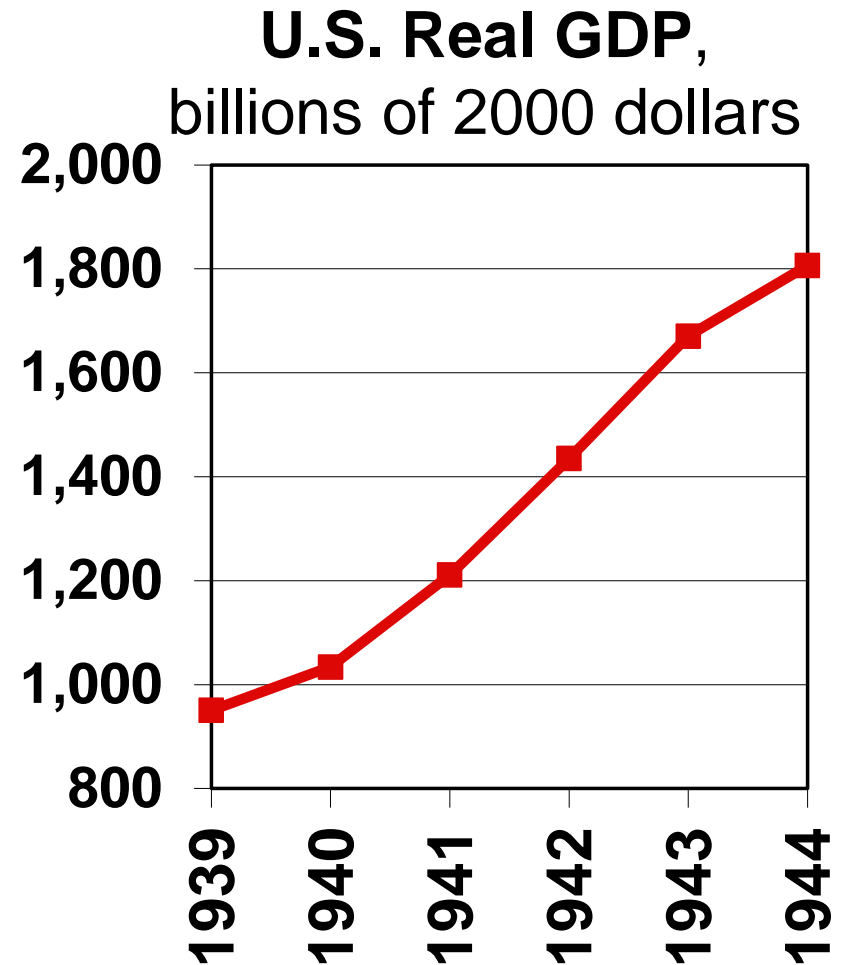


Two Big *AD* Shifts:

2. The World War II Boom

From 1939–1944,

- govt outlays rose from \$9.1 billion to \$91.3 billion
- Y rose 90%
- P rose 20%
- unemp fell from 17% to 1%



ACTIVE LEARNING 2

Working with the model

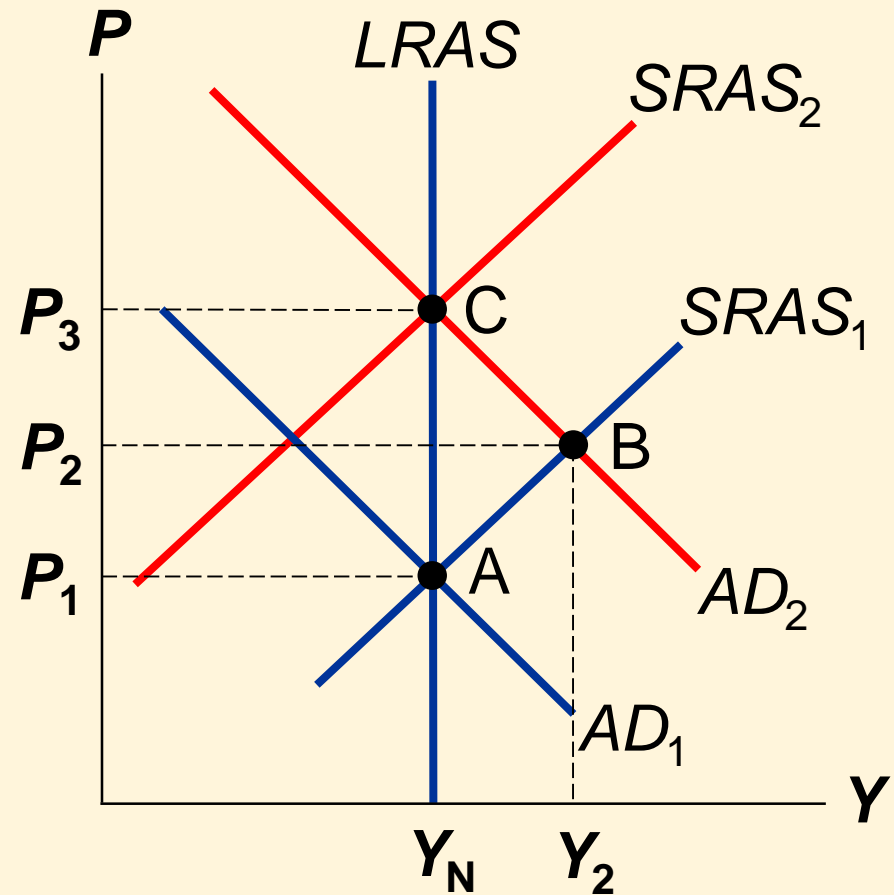
- Draw the *AD-SRAS-LRAS* diagram for the U.S. economy starting in a long-run equilibrium.
- A boom occurs in Canada. Use your diagram to determine the SR and LR effects on U.S. GDP, the price level, and unemployment.

ACTIVE LEARNING 2

Answers

Event: Boom in Canada

1. Affects ***NX***, *AD* curve
2. Shifts *AD* right
3. SR eq'm at point B.
P and *Y* higher,
unemp lower
4. Over time, P_E rises,
SRAS shifts left,
until LR eq'm at C.
Y and unemp back
at initial levels.



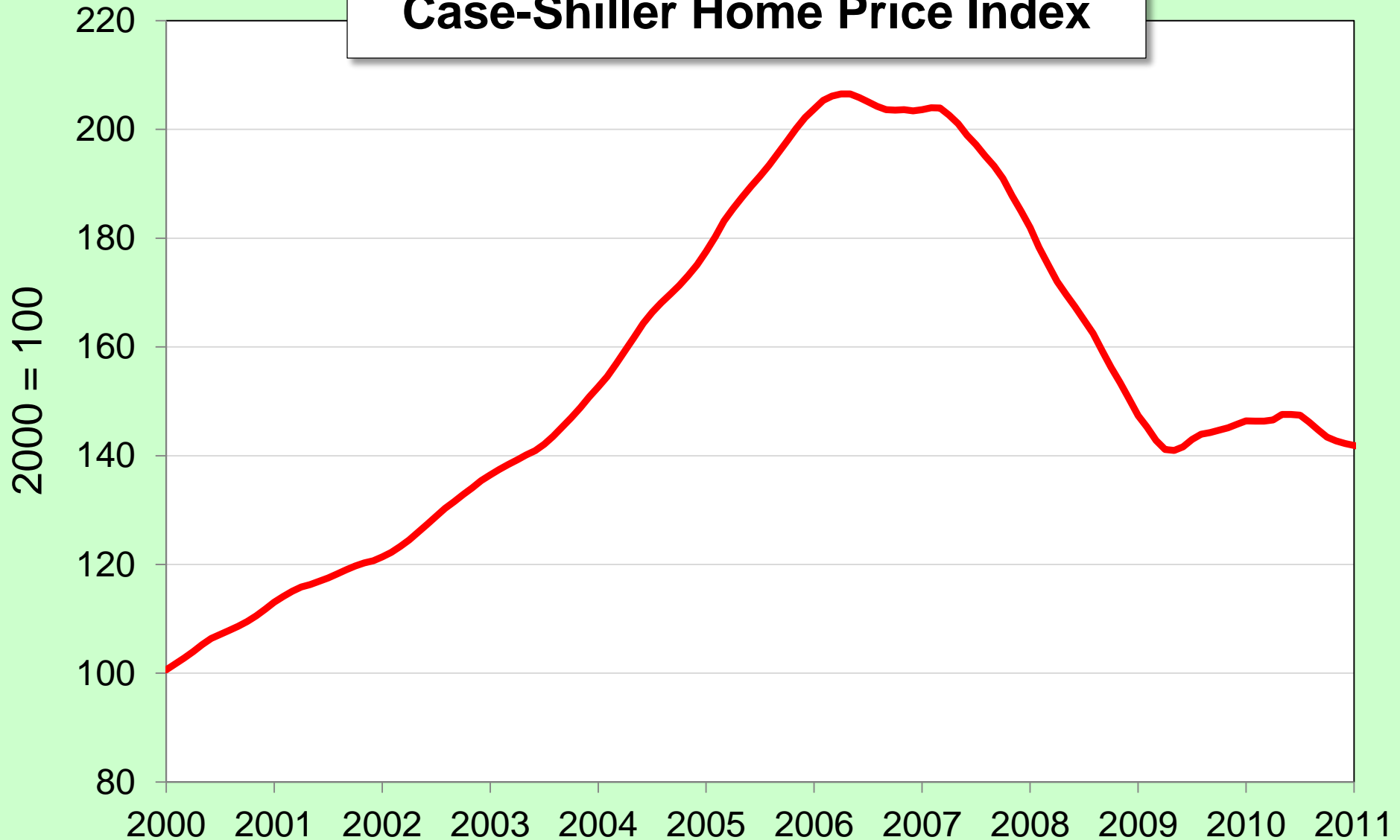
CASE STUDY:

The 2008–2009 Recession

- From 12/2007 to 6/2009, real GDP fell 4.7%
- Unemployment rose from 4.4% in 5/2007 to 10.0% in 10/2009
- The housing market played a central role in this recession...

CASE STUDY: The 2008–2009 Recession

Case-Shiller Home Price Index



CASE STUDY:

The 2008–2009 Recession

Rising house prices during 2002–2006 due to:

- low interest rates
- easier credit for “sub-prime” borrowers
- government policies to increase homeownership
- securitization of mortgages:
 - Investment banks purchased mortgages from lenders, created securities backed by these mortgages, sold the securities to banks, insurance companies, and other investors.
 - Mortgage-backed securities perceived as safe, since house prices “never fall.”

CASE STUDY:

The 2008–2009 Recession

Consequences of 2006–2009 housing market crash:

- Millions of homeowners “underwater”—owed more than house was worth.
- Millions of mortgage defaults and foreclosures.
- Banks selling foreclosed houses increased surplus and downward price pressures.
- Housing crash badly damaged construction industry: 2010 unemployment rate was 20.6% in construction vs. 9.6% overall.

CASE STUDY:

The 2008–2009 Recession

Consequences of 2006–2009 housing market crash:

- Mortgage-backed securities became “toxic,” heavy losses for institutions that purchased them, widespread failures of banks and other financial institutions.
- Sharply rising unemployment and falling GDP.

CASE STUDY:

The 2008–2009 Recession

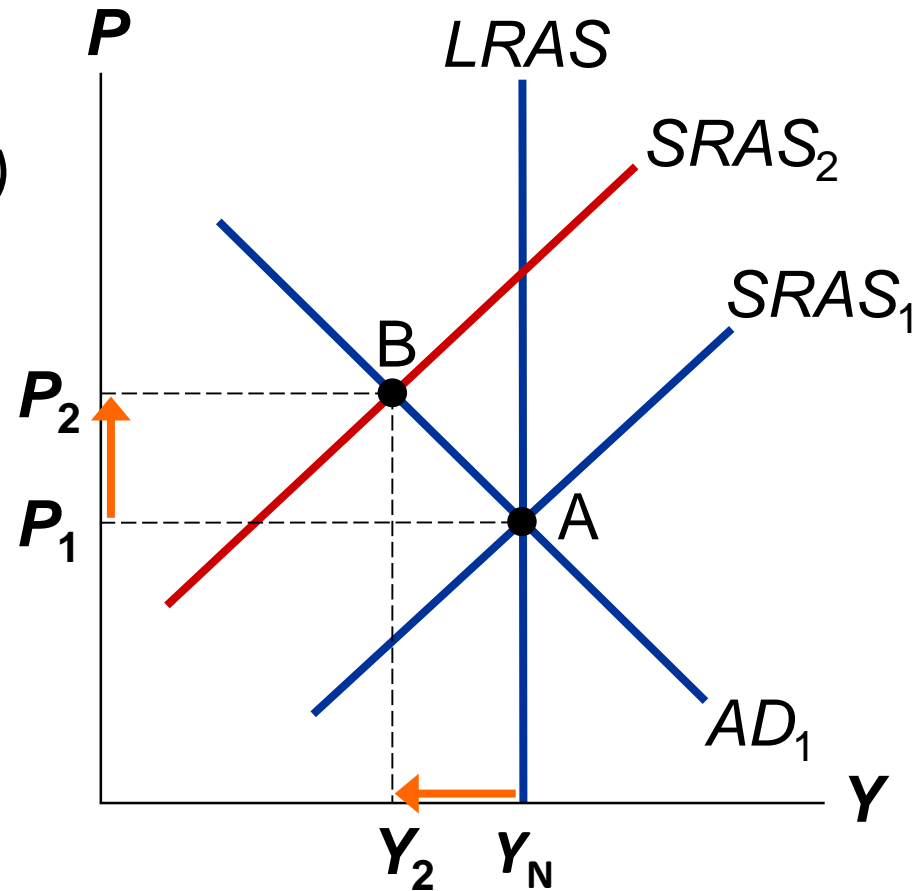
The policy response:

- Federal Reserve reduced Fed Funds rate target to near zero.
- Federal Reserve purchased mortgage-backed securities and other private loans.
- U.S. Treasury injected capital into the banking system to increase banks' liquidity and solvency in hopes of staving off a “credit crunch.”
- Fiscal policymakers increased government spending and reduced taxes by \$800 billion.

The Effects of a Shift in *SRAS*

Event: Oil prices rise

1. Increases costs, shifts *SRAS*
(assume *LRAS* constant)
2. *SRAS* shifts left
3. SR eq'm at point B.
P higher, *Y* lower,
unemp higher
From A to B,
stagflation,
a period of
falling output
and rising prices.



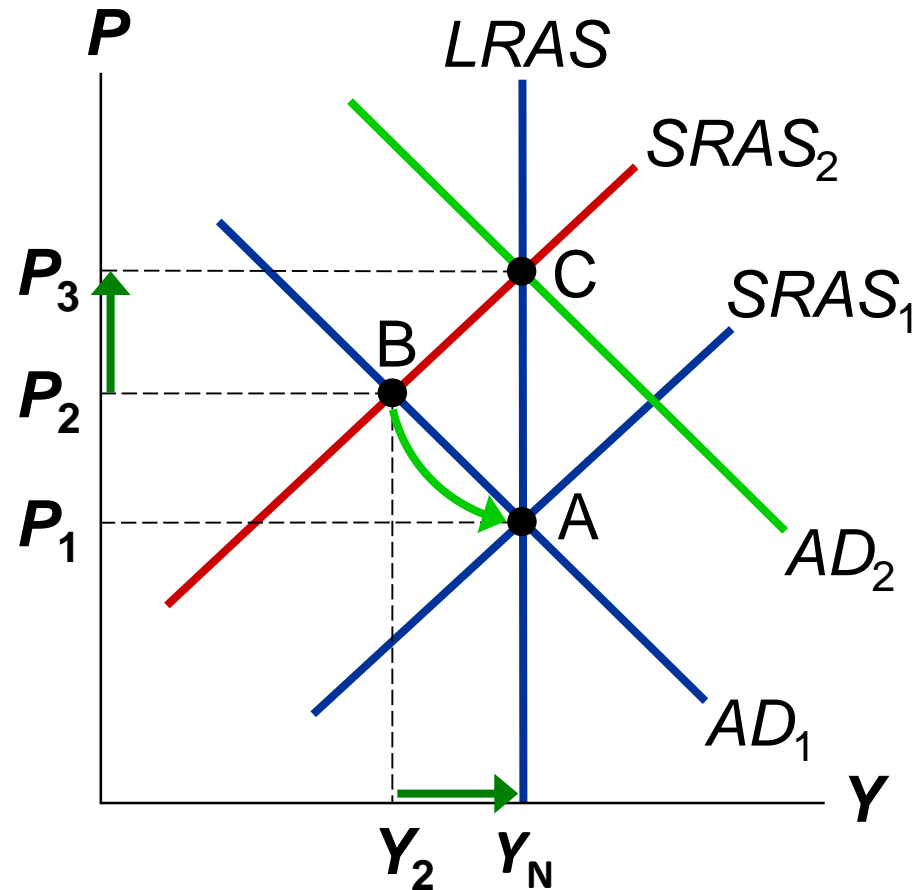
Accommodating an Adverse Shift in *SRAS*

If policymakers do nothing,

4. Low employment causes wages to fall, *SRAS* shifts right, until LR eq'm at A.

Or, policymakers could use fiscal or monetary policy to increase *AD* and accommodate the AS shift:

Y back to Y_N , but *P* permanently higher.

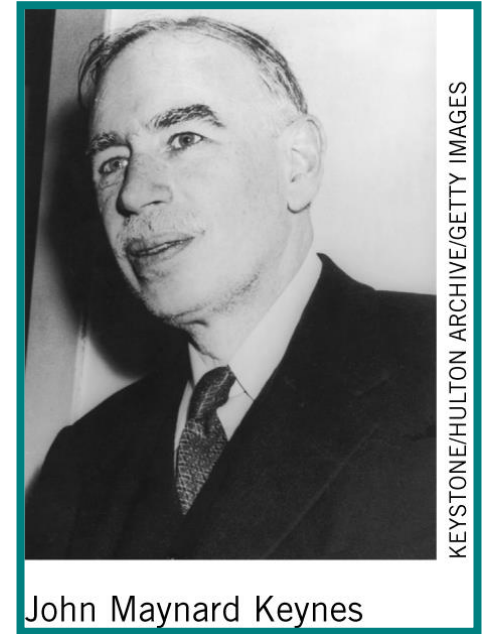


The 1970s Oil Shocks and Their Effects

	1973–75	1978–80
Real oil prices	+ 138%	+ 99%
CPI	+ 21%	+ 26%
Real GDP	– 0.7%	+ 2.9%
# of unemployed persons	+ 3.5 million	+ 1.4 million

John Maynard Keynes, 1883–1946

- *The General Theory of Employment, Interest, and Money*, 1936
- Argued recessions and depressions can result from inadequate demand; policymakers should shift *AD*.
- Famous critique of classical theory:
The long run is a misleading guide to current affairs. In the long run, we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us when the storm is long past, the ocean will be flat.



CONCLUSION

- This chapter has introduced the model of aggregate demand and aggregate supply, which helps explain economic fluctuations.
- Keep in mind: these fluctuations are deviations from the long-run trends explained by the models we learned in previous chapters.
- In the next chapter, we will learn how policymakers can affect aggregate demand with fiscal and monetary policy.

Summary

- Short-run fluctuations in GDP and other macroeconomic quantities are irregular and unpredictable. Recessions are periods of falling real GDP and rising unemployment.
- Economists analyze fluctuations using the model of aggregate demand and aggregate supply.
- The aggregate demand curve slopes downward because a change in the price level has a wealth effect on consumption, an interest-rate effect on investment, and an exchange-rate effect on net exports.

Summary

- Anything that changes **C**, **I**, **G**, or **NX**—except a change in the price level—will shift the aggregate demand curve.
- The long-run aggregate supply curve is vertical because changes in the price level do not affect output in the long run.
- In the long run, output is determined by labor, capital, natural resources, and technology; changes in any of these will shift the long-run aggregate supply curve.

Summary

- In the short run, output deviates from its natural rate when the price level is different than expected, leading to an upward-sloping short-run aggregate supply curve. The three theories proposed to explain this upward slope are the sticky wage theory, the sticky price theory, and the misperceptions theory.
- The short-run aggregate-supply curve shifts in response to changes in the expected price level and to anything that shifts the long-run aggregate supply curve.

Summary

- Economic fluctuations are caused by shifts in aggregate demand and aggregate supply.
- When aggregate demand falls, output and the price level fall in the short run. Over time, a change in expectations causes wages, prices, and perceptions to adjust, and the short-run aggregate supply curve shifts rightward. In the long run, the economy returns to the natural rates of output and unemployment, but with a lower price level.

Summary

- A fall in aggregate supply results in stagflation—falling output and rising prices.
Wages, prices, and perceptions adjust over time, and the economy recovers.