

## CHAPTER 33

# Aggregate Demand and Aggregate Supply

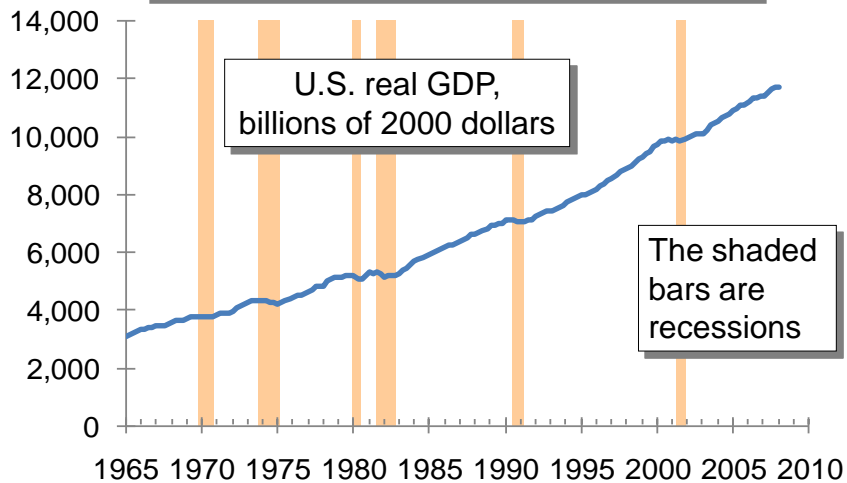
PRINCIPLES OF  
**Economics**  
N. Gregory Mankiw

## Introduction

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

## Three Facts About Economic Fluctuations

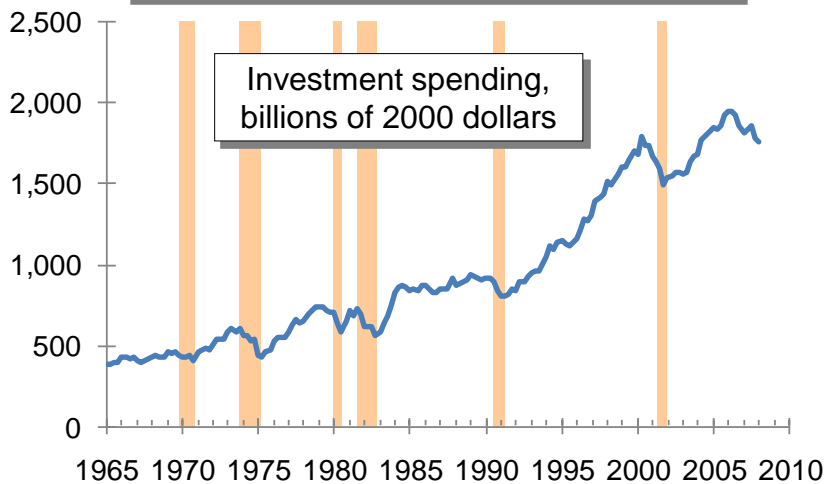
**FACT 1:** Economic fluctuations are irregular and unpredictable.



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## Three Facts About Economic Fluctuations

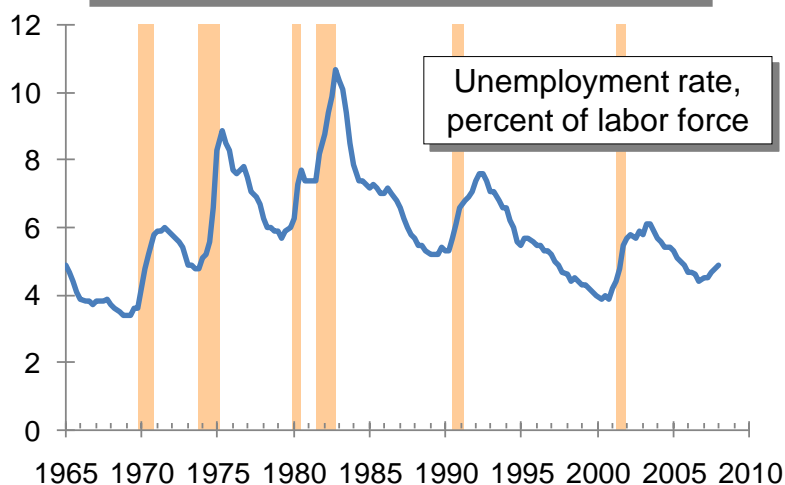
**FACT 2:** Most macroeconomic quantities fluctuate together.



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## Three Facts About Economic Fluctuations

**FACT 3:** As output falls, unemployment rises.



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### 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 ( ) **Dichotomy**, the separation of variables into two groups:
  - Real – quantities, relative prices
  - Nominal – measured in terms of money
- The ( ) **of money**:  
Changes in the money supply affect nominal but not real variables.

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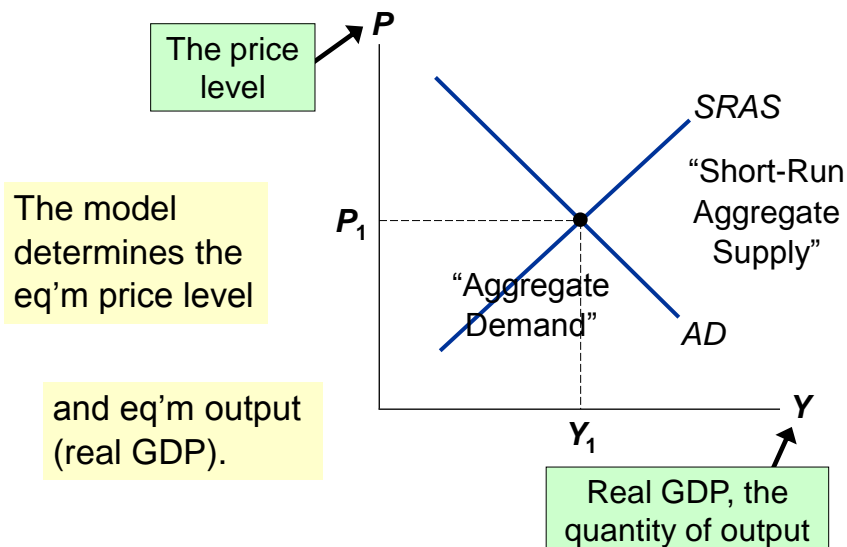
## Classical Economics – A Recap

- 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.

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## The Model of Aggregate Demand and Aggregate Supply

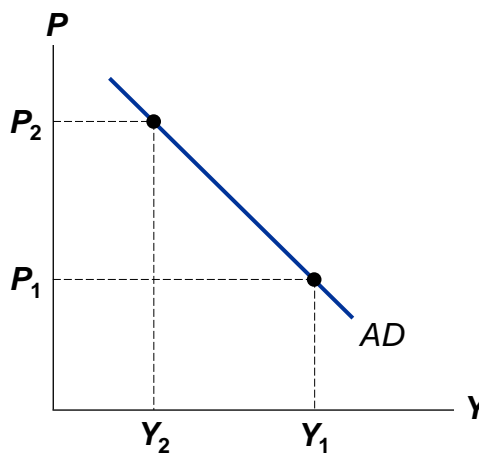


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## The Aggregate-Demand (AD) Curve

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



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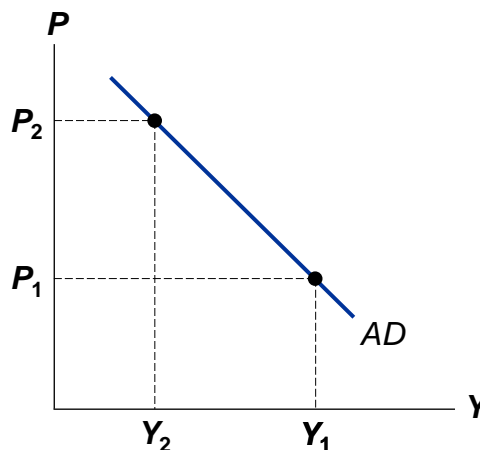
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## Why the $AD$ Curve Slopes Downward

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

Assume  $G$  fixed  
by govt policy.

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



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## 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.

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## 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.)

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## 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.

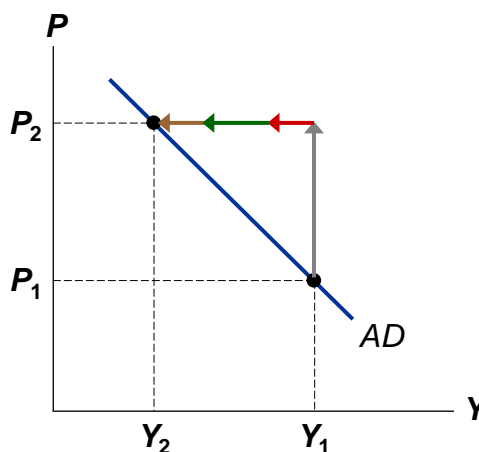
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## The Slope of the AD Curve: Summary

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)



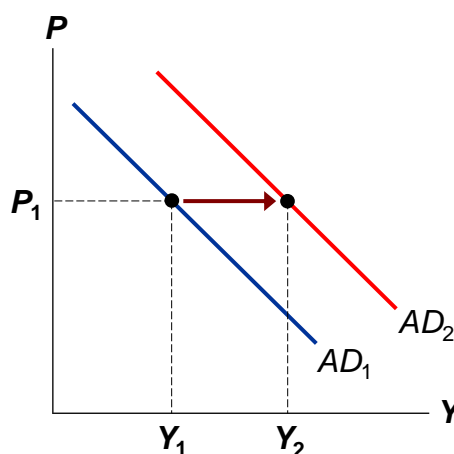
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## Why the AD Curve Might Shift

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.



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## 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

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## 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

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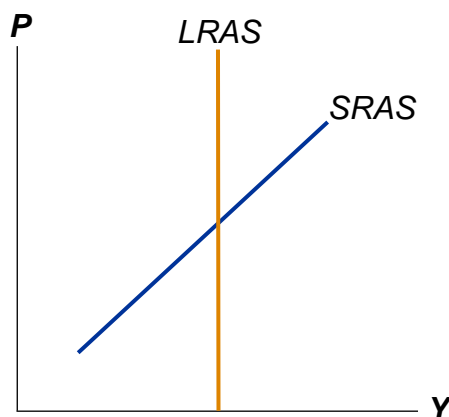
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## The Aggregate-Supply (AS) Curves

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



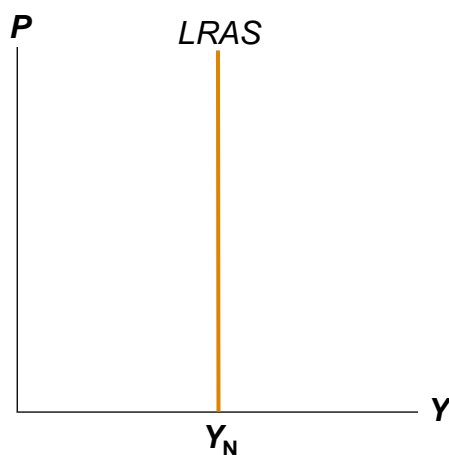
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## The Long-Run Aggregate-Supply Curve (LRAS)

The ( ) **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**.



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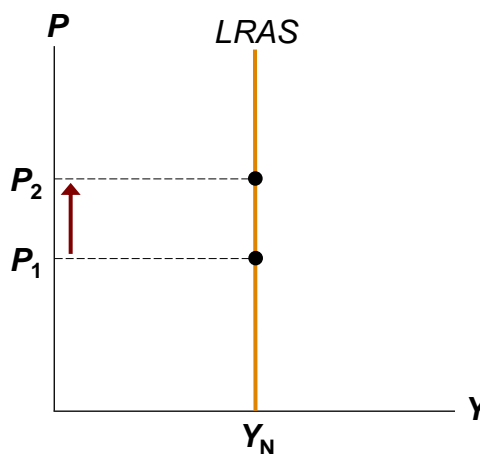
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## Why $LRAS$ Is Vertical

$Y_N$  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)*



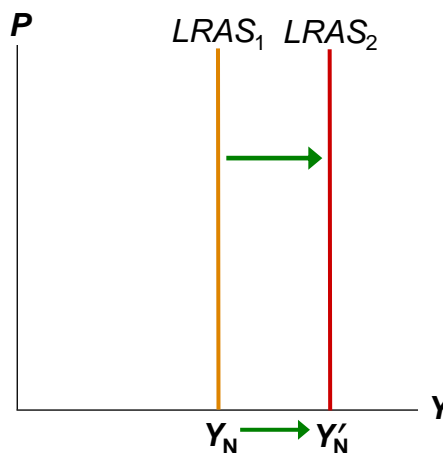
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## Why the $LRAS$ Curve Might Shift

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

Example:  
Immigration increases  $L$ , causing  $Y_N$  to rise.



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## Why the *LRAS* Curve Might Shift

- Changes in ( ) 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

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## 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

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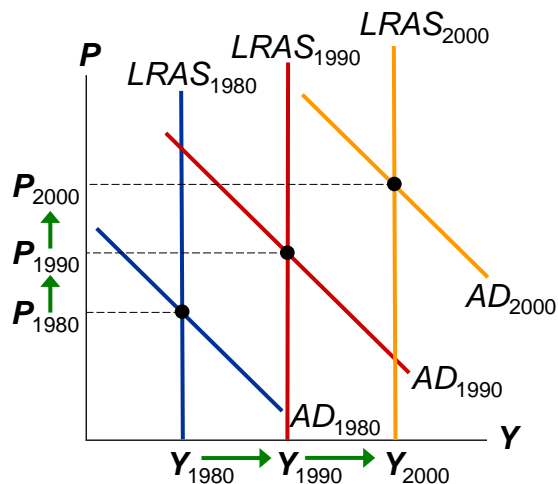
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## Using *AD & AS* to Depict *LR* Growth and Inflation

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.



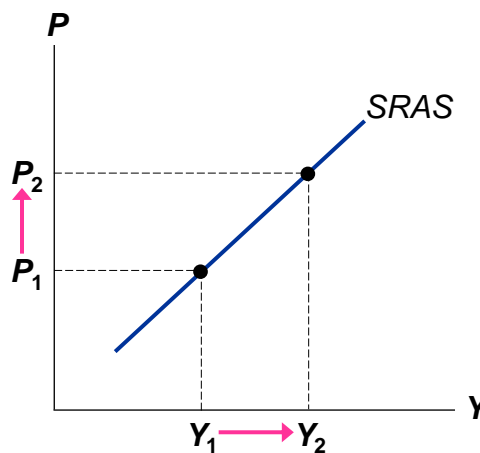
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## Short Run Aggregate Supply (*SRAS*)

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.



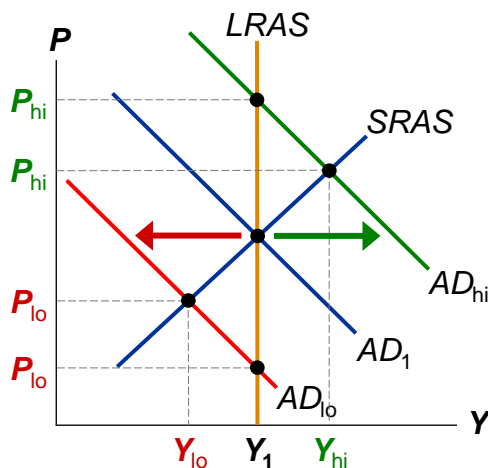
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## Why the Slope of SRAS Matters

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.



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## 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.***

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## 1. The Sticky-Wage Theory

- ( ):  
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.

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## 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**.

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## 2. The Sticky-Price Theory

- Imperfection:
  - Many prices are sticky in the short run.
    - Due to (                    ), 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  $P_E$ .

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## 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. Meantime, 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**.

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### 3. The Misperceptions Theory

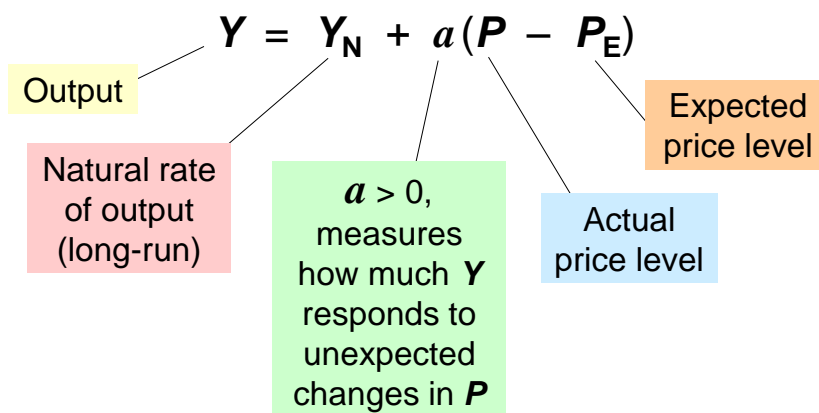
- ( ): Firms may confuse changes in  $P$  with changes in the relative price of the products they sell.
- If  $P$  rises above  $P_E$ , a firm sees its price rise before realizing all prices are rising. The firm may believe its *relative* price is rising, and may increase output and employment.
- So,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

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### What the 3 Theories Have in Common:

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

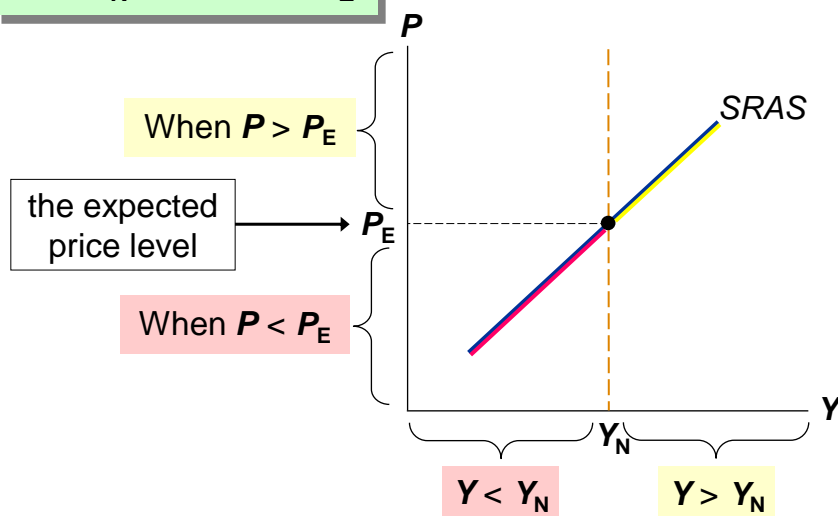


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## What the 3 Theories Have in Common:

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



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## 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

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## SRAS and LRAS

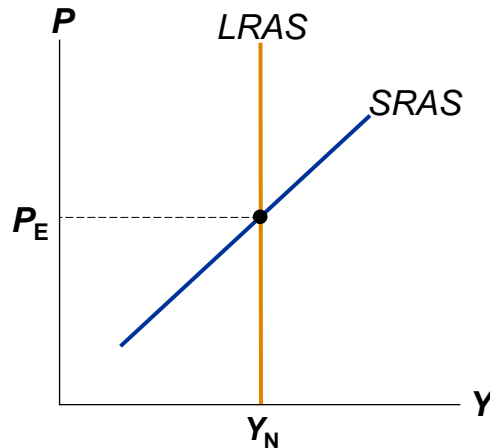
$$Y = Y_N + a(P - P_E)$$

In the long run,

$$P_E = P$$

and

$$Y = Y_N.$$



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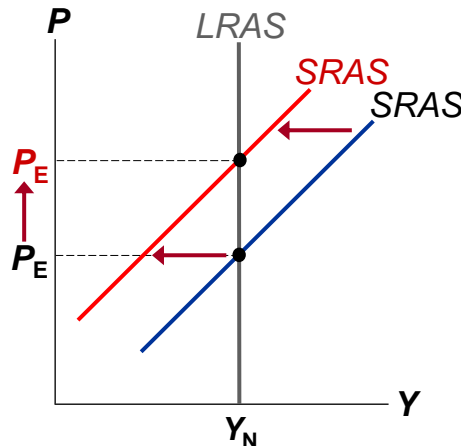
## Why the SRAS Curve Might Shift

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.



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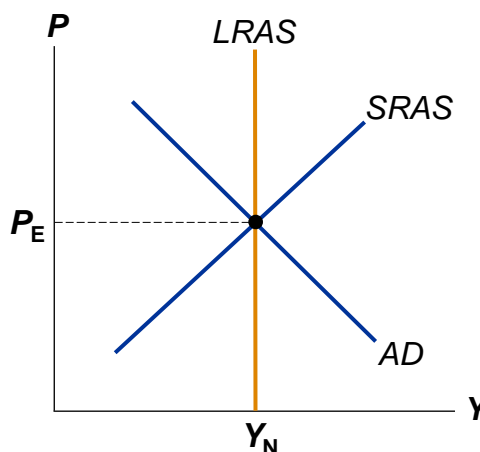
## The Long-Run Equilibrium

In the long-run equilibrium,

$$P_E = P,$$

$$Y = Y_N,$$

and unemployment is at its natural rate.



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## 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.

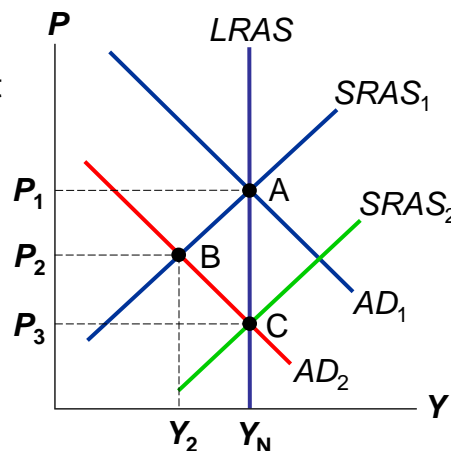
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## The Effects of a Shift in AD

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.



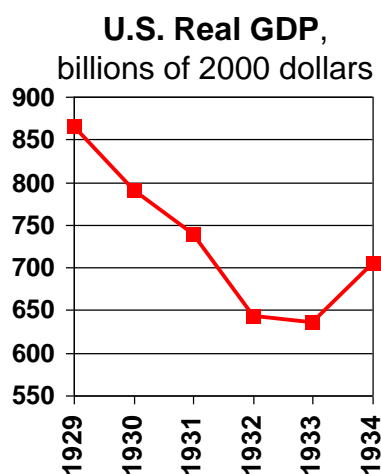
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## Two Big AD Shifts: 1. The Great Depression

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%



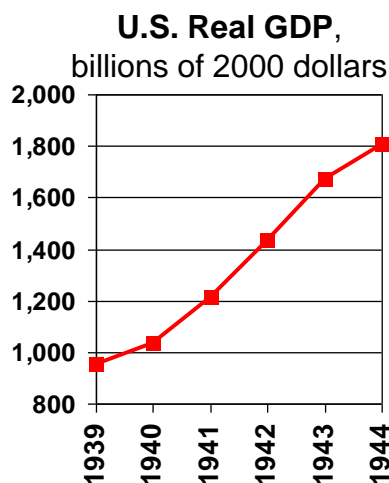
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## Two Big AD Shifts: 2. The World War II Boom

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%



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### 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.

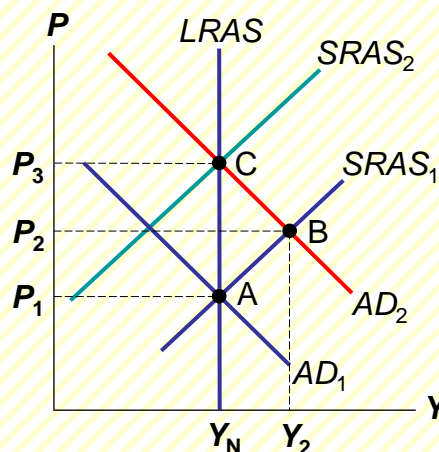
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## ACTIVE LEARNING 2

### 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.

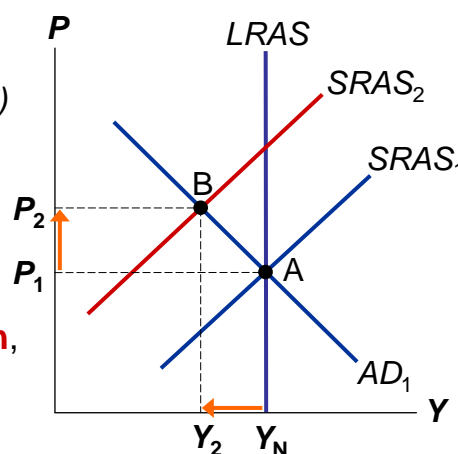


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## The Effects of a Shift in **$SRAS$**

#### 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.



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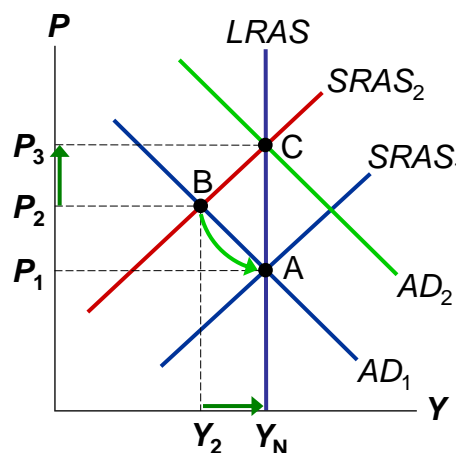
## Accommodating an Adverse Shift in SRAS

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.



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## 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

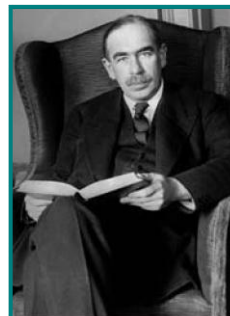
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## John Maynard Keynes, 1883-1946

- *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.*



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## 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.

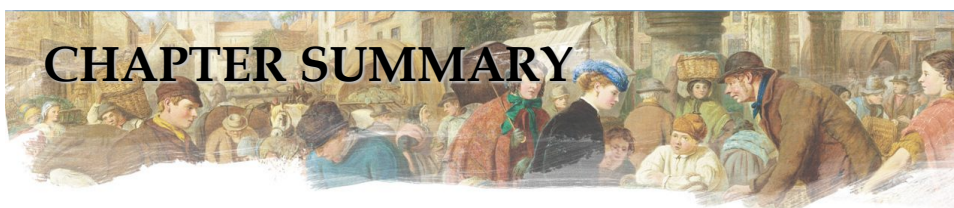
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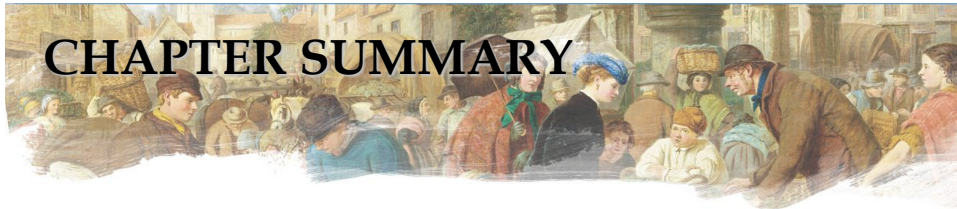
- Short-run fluctuations in GDP and other macroeconomic quantities are irregular and unpredictable. Recessions are periods of falling real GDP and rising unemployment.
- Economists analyze fluctuations using the model of aggregate demand and aggregate supply.
- The aggregate demand curve slopes downward 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.

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- 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.

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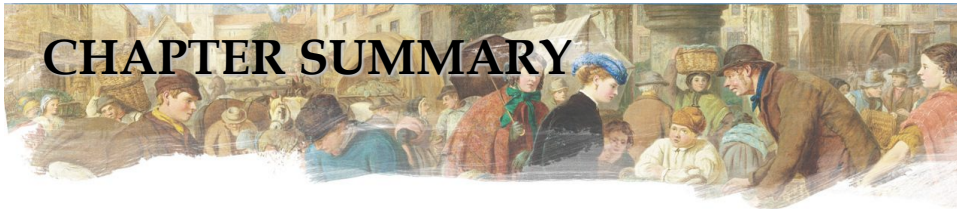
- In the short run, output deviates from its natural rate when the price level is different than expected, leading to an upward-sloping short-run aggregate supply curve. The three theories proposed to explain this upward slope are the sticky wage theory, the sticky price theory, and the misperceptions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

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- 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.

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