

Macroeconomics under Financial Crisis

Lecture 2

- a. Macroeconomics and measurement;
- b. Analytical frameworks in macroeconomics I:

The AD-AS model

June 28, 2016

Topics of today's lecture

- Macroeconomics and measurement: real and nominal variable
 - An introduction to aggregate demand and aggregate supply in the short run and long run
 - How the model of aggregate demand and aggregate supply can be used to analyze the short-run and long-run effects of “shocks”
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THE MEASUREMENT OF GROSS DOMESTIC PRODUCT

- *Gross domestic product (GDP)* is a measure of the income and expenditures of an economy.
 - It is the total market value of all final goods and services produced within a country in a given period of time.
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THE MEASUREMENT OF GROSS DOMESTIC PRODUCT

- “GDP is the Market Value”
 - Output is valued at market prices.
- “. . . Of All Final”
 - It records only the value of final goods, not intermediate goods (the value is counted only once).
- “. . . Goods and Services”
 - It includes both tangible goods (food, clothing, cars) and intangible services (haircuts, house cleaning, doctor visits).

THE MEASUREMENT OF GROSS DOMESTIC PRODUCT

- “. . . Produced . . .”
 - ❑ It includes goods and services produced in the period we’re considering, not transactions involving goods produced in the past.

 - “. . . Within a Country . . .”
 - ❑ It measures the value of production within the geographic confines of a country.

 - “. . . In a Given Period of Time.”
 - ❑ It measures the value of production that takes place within a specific interval of time, usually a year or a quarter (three months).
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THE COMPONENTS OF GDP

- GDP includes all items produced in the economy and sold *legally* in markets.
 - What Is Not Counted in GDP?
 - GDP excludes most items that are produced and consumed at home and that never enter the marketplace.
 - It excludes items produced and sold illicitly, such as illegal drugs.
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THE COMPONENTS OF GDP

- GDP (Y) is the sum of the following:
 - Consumption (C)
 - Investment (I)
 - Government Purchases (G)
 - Net Exports (NX)

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

THE COMPONENTS OF GDP

- *Consumption (C)*:

- The spending by households on goods and services

- *Investment (I)*:

- The spending on capital equipment, inventories, and structures.
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THE COMPONENTS OF GDP

■ *Government Purchases (G):*

- ❑ The spending on goods and services by local and central governments.
- ❑ Does *not* include transfer payments because they are not made in exchange for currently produced goods or services.

■ *Net Exports (NX):*

- ❑ Exports minus imports.
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Table 1 GDP and Its Components

This table shows total GDP for the UK economy in 2009 and the breakdown of GDP among its four components.

	Total (in billions of pounds)	Per person (in pounds)	Percent of total
Gross domestic product, Y	£1 267	£20 676	100%
Consumption, C	826	13 439	65
Investment, I	183	2 895	14
Government purchases, G	288	4 755	23
Net exports, NX	−30	−413	−2

Source: UK Office for National Statistics and HM Treasury. Parts may not sum to totals due to rounding.

Calculating Gross Domestic Product

GDP can be calculated three ways:

- a) Add up **the value added** of all producers
- b) Add up **all spending** on domestically produced final goods and services.

This results in the equation:

$$GDP = C + I + G + X - IM$$

- c) Add up **all income paid** to factors of production

REAL VERSUS NOMINAL GDP

- *Nominal GDP* values the production of goods and services at *current prices*.
 - *Real GDP* values the production of goods and services at *constant prices*.
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Table 2 Real and Nominal GDP (for students' practice)

Prices and quantities				
Year	Price of hot dogs	Quantity of hot dogs	Price of hamburgers	Quantity of hamburgers
2009	€1	100	€2	50
2010	2	150	3	100
2011	3	200	4	150

Table 2 Real and Nominal GDP (for students' practice)

Year	Calculating nominal GDP
2009	$(\text{€1 per hot dog} \times 100 \text{ hot dogs}) + (\text{€2 per hamburger} \times 50 \text{ hamburgers}) = \text{€200}$
2010	$(\text{€2 per hot dog} \times 150 \text{ hot dogs}) + (\text{€3 per hamburger} \times 100 \text{ hamburgers}) = \text{€600}$
2011	$(\text{€3 per hot dog} \times 200 \text{ hot dogs}) + (\text{€4 per hamburger} \times 150 \text{ hamburgers}) = \text{€1 200}$

Table 2 Real and Nominal GDP (for students' practice)

Year	Calculating real GDP (base year 2009)
2009	$(\text{€1 per hot dog} \times 100 \text{ hot dogs}) + (\text{€2 per hamburger} \times 50 \text{ hamburgers}) = \text{€200}$
2010	$(\text{€1 per hot dog} \times 150 \text{ hot dogs}) + (\text{€2 per hamburger} \times 100 \text{ hamburgers}) = \text{€350}$
2011	$(\text{€1 per hot dog} \times 200 \text{ hot dogs}) + (\text{€2 per hamburger} \times 150 \text{ hamburgers}) = \text{€500}$

GDP AND ECONOMIC WELL-BEING

- GDP is the best single measure of the economic well-being of a society.
 - GDP per person tells us the mean income and expenditure of the people in the economy.
 - Higher GDP per person indicates a higher standard of living.
 - GDP is not a perfect measure of the happiness or quality of life, however.
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GDP AND ECONOMIC WELL-BEING

- Some things that contribute to well-being are not included in GDP.
 - ❑ The value of leisure.
 - ❑ The value of a clean environment.
 - ❑ The value of almost all activity that takes place outside of markets
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Measurement is not always accurate

Size of the underground economy:

Africa

Nigeria, Egypt	68-76%
Tunisia, Morocco	39-45%

Central Europe

Hungary, Bulgaria, Poland	20-28%
Czech Republic, Romania, Slovakia	9-16%

Latin America

Mexico, Peru	40-60%
Chile, Brazil, Venezuela	25-35%

Former Soviet Union

Belarus, Georgia, Ukraine	28-43%
Baltic States, Russia	20-27%

Asia

Thailand	70%
Philippines, Malaysia, Korea	38-50%
Hong Kong, Singapore	13%

OECD

Belgium, Greece, Italy, Spain, Portugal	24-30%
All others	13-23%
Austria, Japan, USA, Switzerland	8-10%

GDP and GNP

Occasionally you may see references not to **gross domestic product (GDP)** but to *gross national product*, or GNP.

GNP is the total factor income earned by residents of a country.

- ❑ It excludes factor income earned by foreigners, like profits paid to foreign investors who own American stocks and payments to foreigners who work temporarily in the United States.
- ❑ And it includes factor income earned abroad by Americans, like the profits of IBM's European operations that accrue to IBM's American shareholders and the wages of Americans who work abroad temporarily.
- ❑ Example: Engineering revenues for a road built by a U.S. company in Saudi Arabia is part of U.S. GNP (built by a U.S. factor of production), not U.S. GDP, and is part of Saudi GDP (built in Saudi Arabia), not Saudi GNP

GDP and GNP

GROSS WHAT?

- GDP is considered a better indicator of short-run movements in production and because data on international flows of factor income are considered somewhat unreliable.
- It doesn't make much difference which measure is used for large economies like the United States, where the flows of net factor income to other countries are relatively small.
 - In 2010, America's GNP was about 1.3% larger than its GDP, mainly because of the overseas profit of U.S. companies.

GROSS WHAT?

For smaller countries, however, GDP and GNP can diverge significantly.

- ❑ Example: Much of Ireland's industry is owned by U.S. corporations; those profits must be deducted from Ireland's GNP.
- ❑ In addition, Ireland has become a host to many temporary workers from poorer regions of Europe, whose wages must also be deducted from Ireland's GNP.
- ❑ As a result, in 2010 Ireland's GNP was only 82% of its GDP.

Table 3 GDP, Life Expectancy, and Literacy

Country	Real GDP per person (2006)	Life expectancy	Adult literacy
United States	\$44 155	78.1 years	99%
Japan	34 022	82.4	99
Germany	35 270	79.1	99
United Kingdom	38 849	78.8	99
Russia	6 932	66.6	99.6
Mexico	8 051	75.8	91
Brazil	5 659	72.3	88.6
China	2 033	73.1	86
Indonesia	1 634	70.5	90.4
India	816	69.3	59.5
Pakistan	810	64.1	49.9
Bangladesh	429	63.2	43.1
Nigeria	792	46.5	68

Source: Nationmaster.com and OECD.

Measuring the Cost of Living

- Inflation is the term used to describe a situation in which the economy's overall price level is rising.
 - The inflation rate is the percentage change in the price level from the previous period.
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THE CONSUMER PRICE INDEX

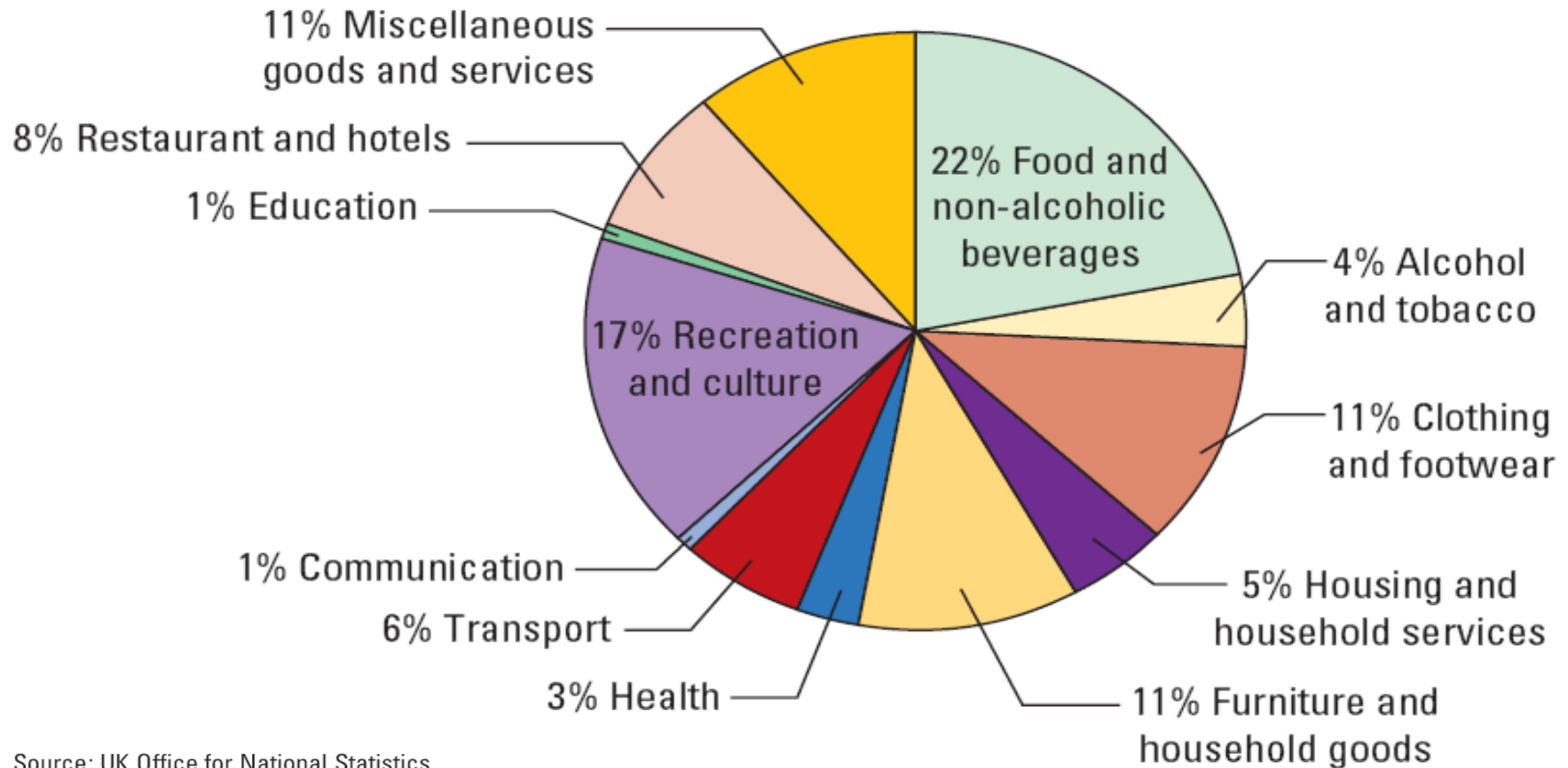
- The *consumer price index (CPI)* is a measure of the overall cost of the goods and services bought by a typical consumer.
 - It is used to monitor changes in the cost of living over time.
 - When the CPI rises, the typical family has to spend more money to maintain the same standard of living.
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The Inflation Rate

- The *inflation rate* is calculated as follows:

$$\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100$$

Figure 1 The Typical Basket of Goods and Services in the UK, 2009



Source: UK Office for National Statistics.

Harmonized indices of Consumer prices

- The same method is used to calculate CPI throughout the EU
 - This allows for direct comparison of inflation rates among EU member states.
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Table 2 Inflation Rates Across the EU

Country	HICP in 2010
Austria	108.32
Belgium	110.42
Bulgaria	134.54
Cyprus	109.71
Czech Republic	113.1
Denmark	109.9
Estonia	123.93
Finland	109.53
France	107.34
Germany	107.7
Greece	112.91
Hungary	127.54
Ireland	105.2
Italy	108.3
Latvia	136.12
Lithuania	127.31
Luxembourg	111.66
Malta	108.13
Netherlands	106.55
Poland	114.5
Portugal	106.89
Romania	131.91
Slovakia	111.64
Slovenia	113.61
Spain	110.52
Sweden	110.44
United Kingdom	112.4

Source: Eurostat.

Real and Nominal Interest Rates

- Interest represents a payment in the future for a transfer of money in the past.
 - The *nominal interest* rate is the interest rate usually reported and not corrected for inflation.
 - It is the interest rate that a bank pays.
 - The *real interest rate* is the nominal interest rate that is corrected for the effects of inflation.
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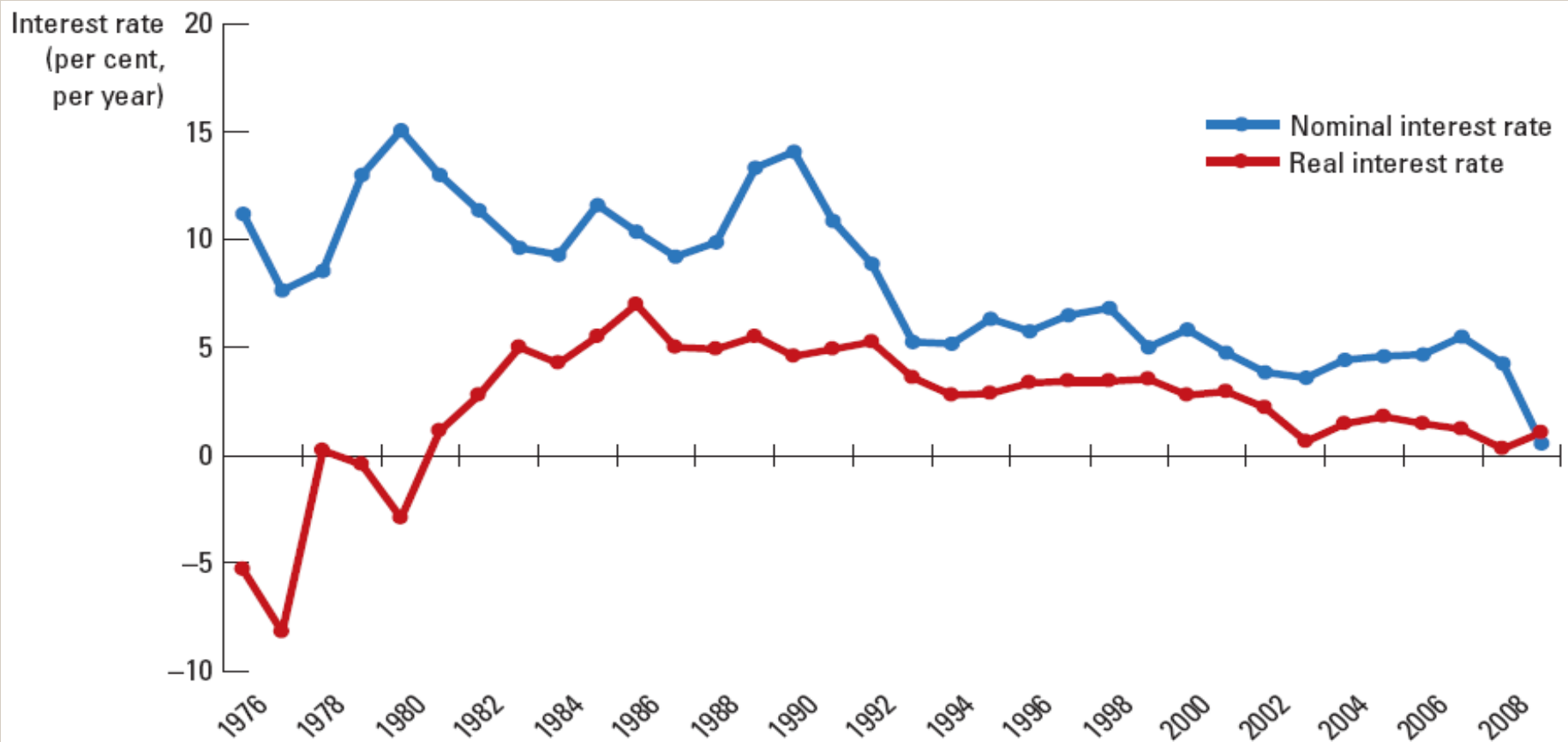
Real and Nominal Interest Rates

- You borrowed €1,000 for one year.
- Nominal interest rate was 15%.
- During the year inflation was 10%.

*Real interest rate = Nominal interest rate –
Inflation*

$$= 15\% - 10\% = 5\%$$

Figure 3 Real and Nominal Interest Rates

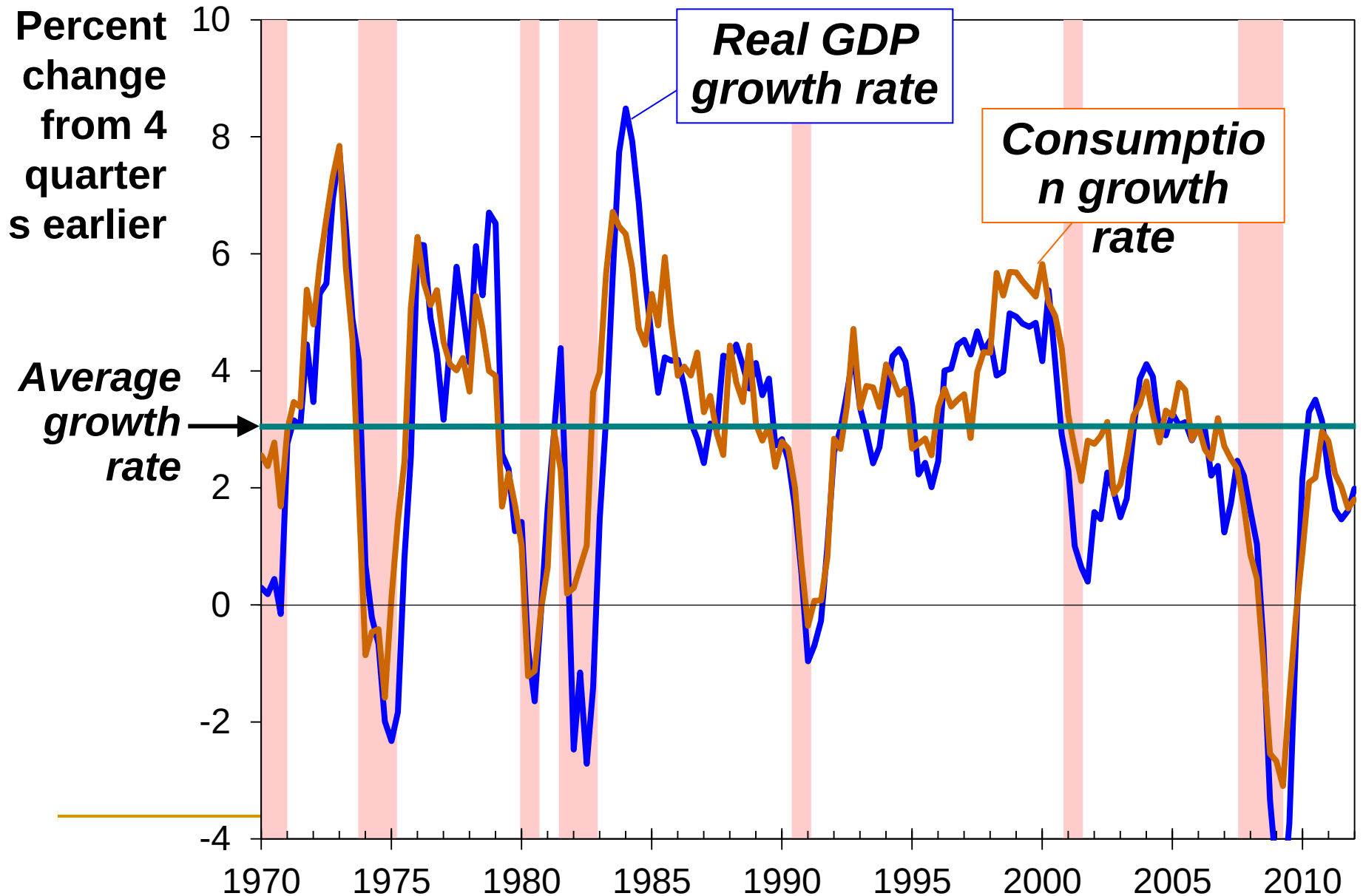


Source: Bank of England and UK Office for National Statistics.

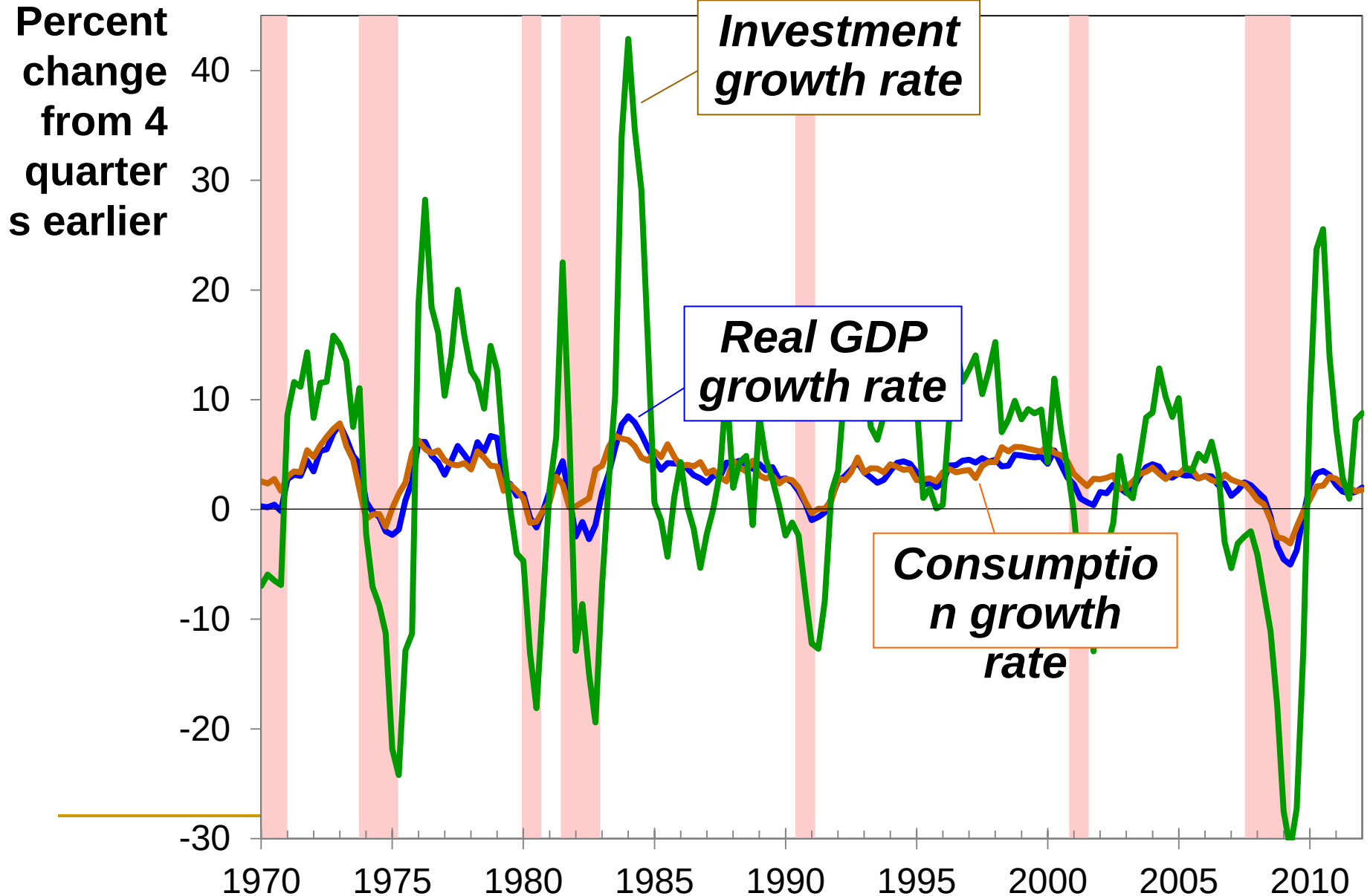
Some facts about the business cycle

- GDP growth in the US averages 3–3.5 percent per year over the long run with large fluctuations in the short run.
- Consumption and investment fluctuate with GDP, but consumption tends to be less volatile and investment more volatile than GDP.
- Unemployment rises during recessions and falls during expansions.

Growth rates of real GDP, consumption



Growth rates of real GDP, consump., investment



Time horizons in macroeconomics

- Long run

Prices are flexible, respond to changes in supply or demand.

- Short run

Many prices are “sticky” at a predetermined level.

The economy behaves much differently when prices are sticky.

Recap of classical macro theory

- Output is determined by the supply side:
 - supplies of capital, labor
 - technology
- Changes in demand for goods & services (***C***, ***I***, ***G***) only affect prices, not quantities.
- Assumes complete price flexibility.
- Applies to the long run.

When prices are sticky...

...output and employment also depend on demand, which is affected by:

- ❑ fiscal policy (**G** and **T**)
- ❑ monetary policy (**M**)
- ❑ other factors, like exogenous changes in **C** or **I**

The model of aggregate demand and supply

- The paradigm most mainstream economists and policymakers use to think about economic fluctuations and policies to stabilize the economy
- Shows how the price level and aggregate output are determined
- Shows how the economy's behavior is different in the short run and long run

Aggregate demand

- The aggregate demand curve shows the relationship between the price level and the quantity of output demanded.
 - For this intro to the *AD/AS* model, we use a simple theory of aggregate demand based on the quantity theory of money.
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The Quantity Equation as Aggregate Demand

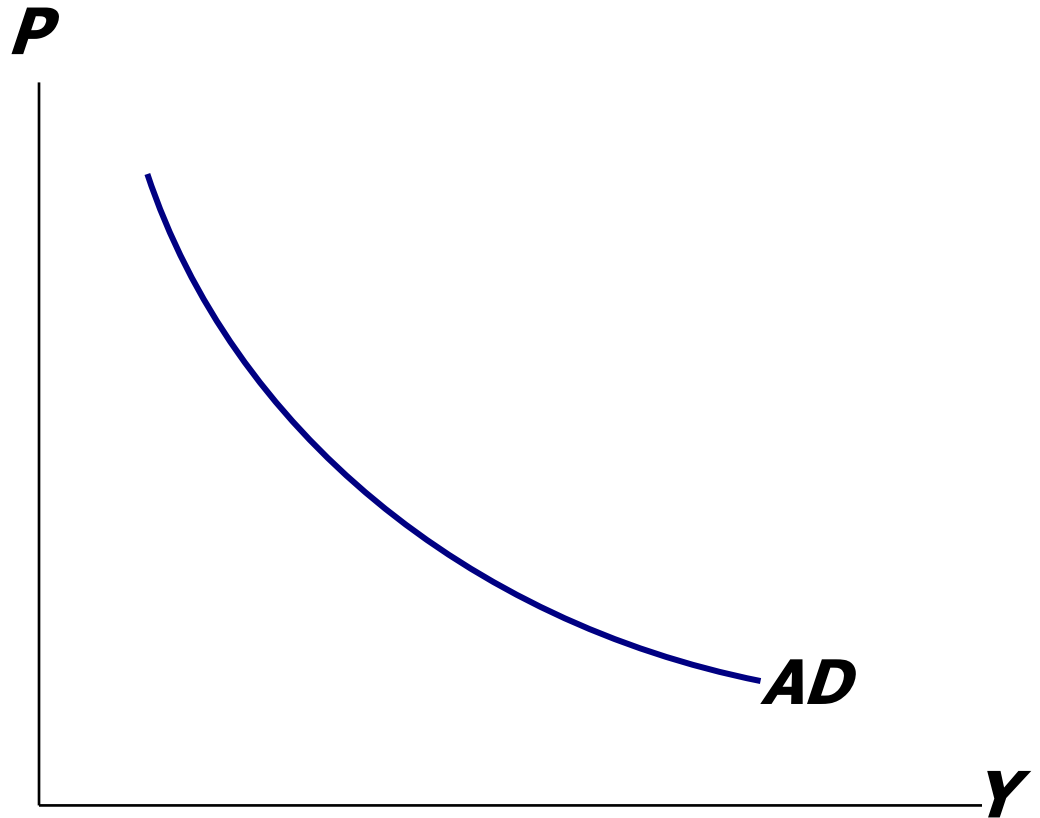
- The quantity equation

$$\mathbf{MV} = \mathbf{PY}$$

- For given values of $\mathbf{M}$ and $\mathbf{V}$, this equation implies an inverse relationship between $\mathbf{P}$ and $\mathbf{Y}$...
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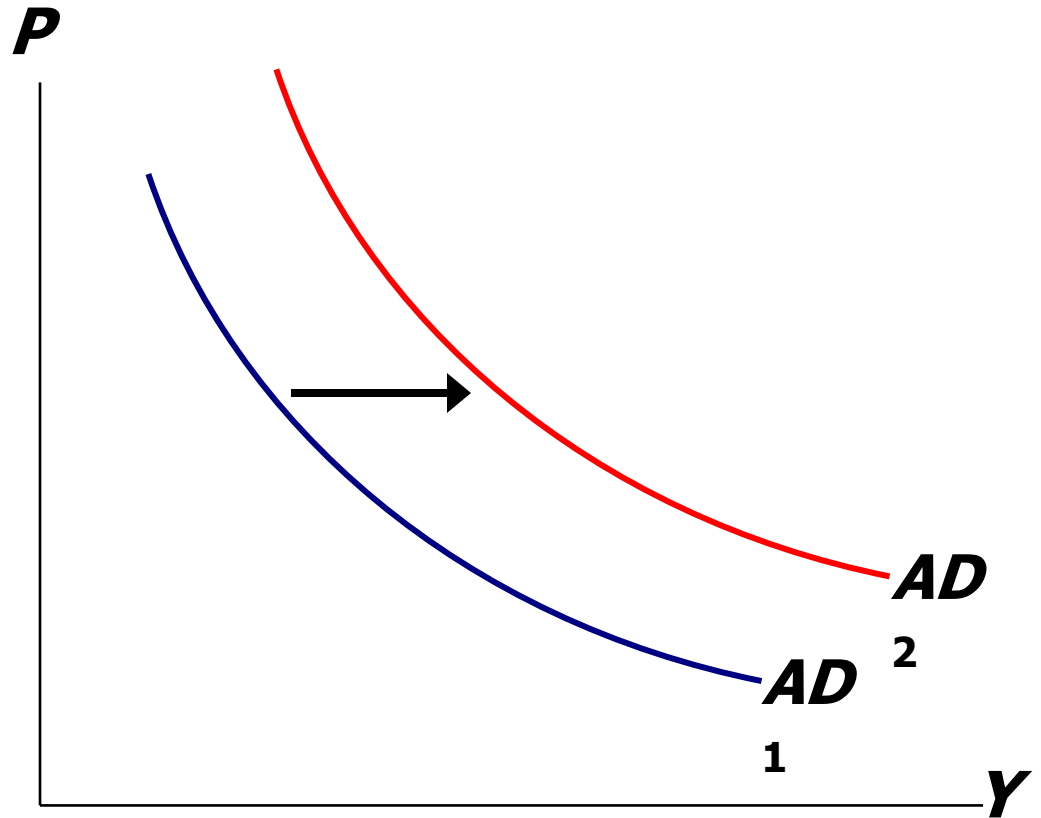
The downward-sloping AD curve

An increase in the price level causes a fall in real money balances (M/P), causing a decrease in the demand for goods & services.



Shifting the AD curve

An increase in the money supply shifts the AD curve to the right.



Aggregate supply in the long run

- In the long run, output is determined by factor supplies and technology

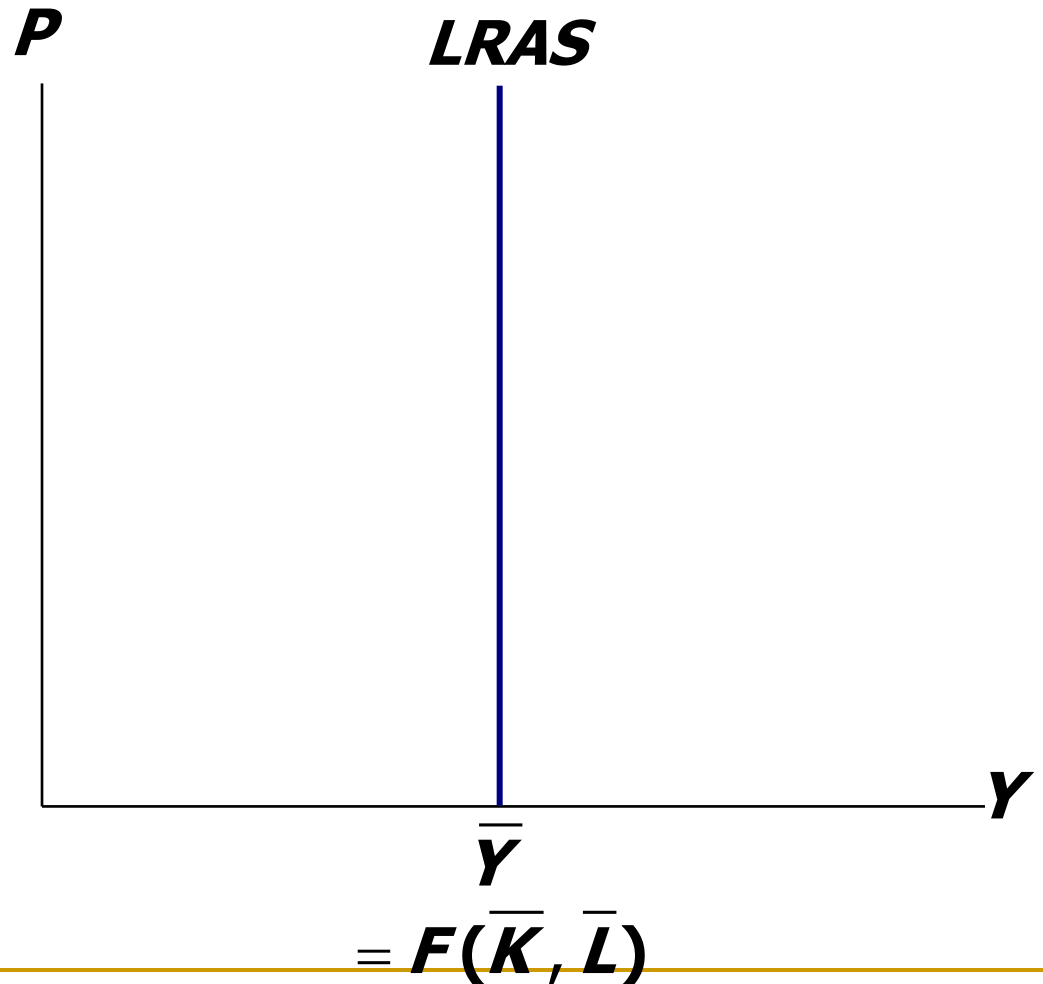
$$\bar{Y} = F(\bar{K}, \bar{L})$$

$\bar{Y}$ is the **full-employment** or **natural** level of output, at which the economy's resources are fully employed.

“Full employment” means that unemployment equals its natural rate (not zero).

The long-run aggregate supply curve

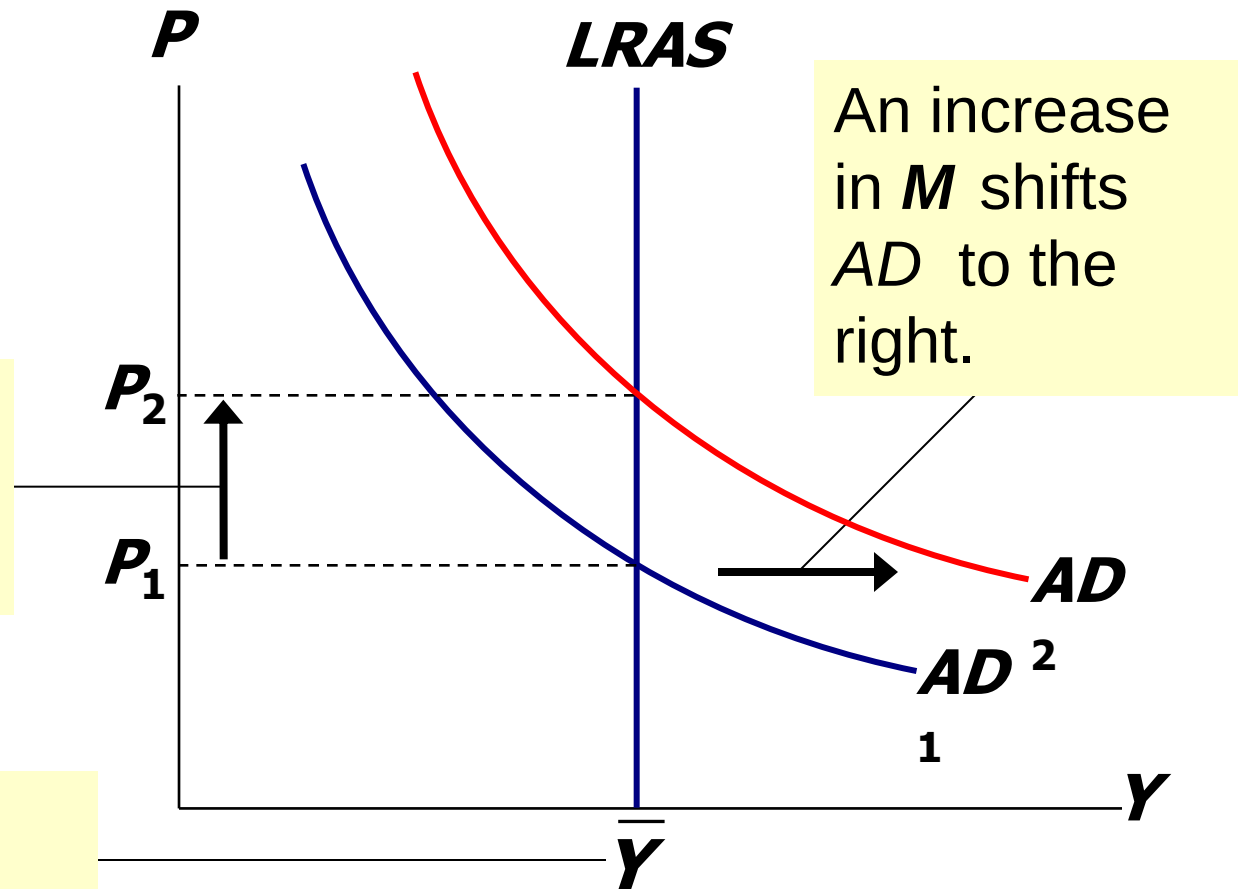
$\bar{Y}$ does not depend on P , so $LRAS$ is vertical.



Long-run effects of an increase in M

In the long run, this raises the price level...

...but leaves output the same.

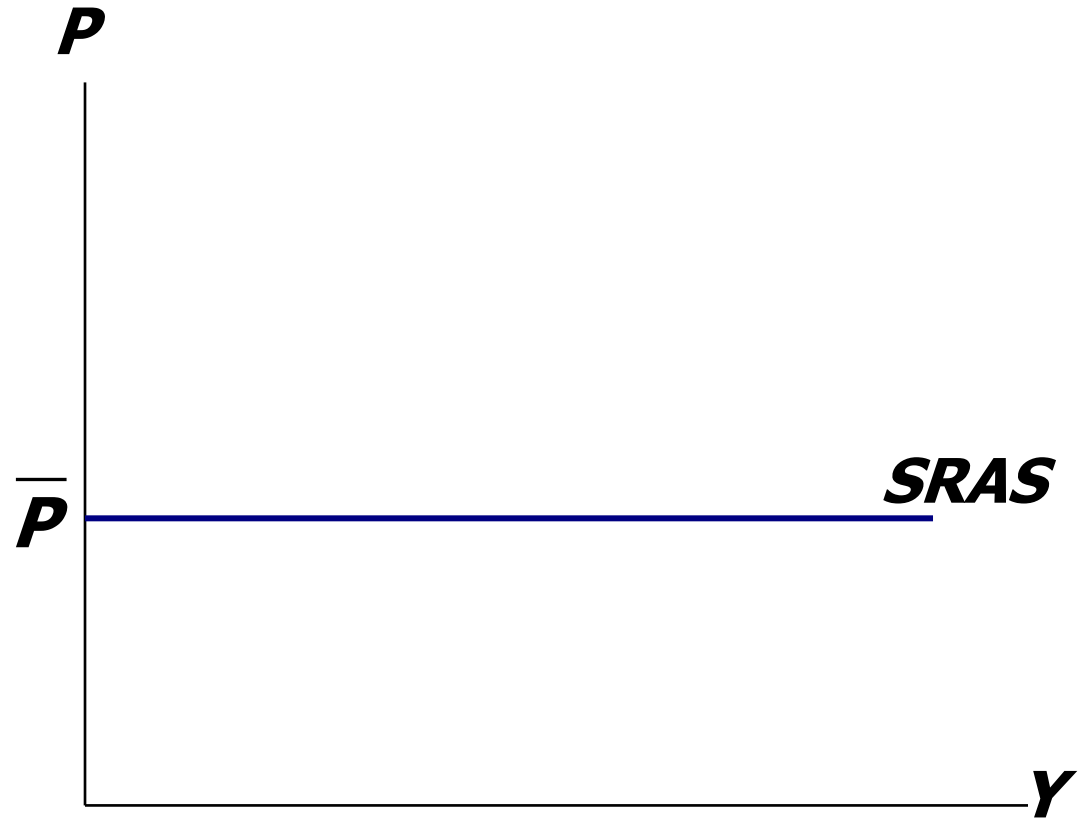


Aggregate supply in the short run

- Many prices are sticky in the short run.
- For now we assume
 - all prices are stuck at a predetermined level in the short run.
 - firms are willing to sell as much at that price level as their customers are willing to buy.
- Therefore, the short-run aggregate supply (*SRAS*) curve is horizontal:

The short-run aggregate supply curve

The *SRAS* curve is horizontal:
The price level is fixed at a predetermined level, and firms sell as much as buyers demand.

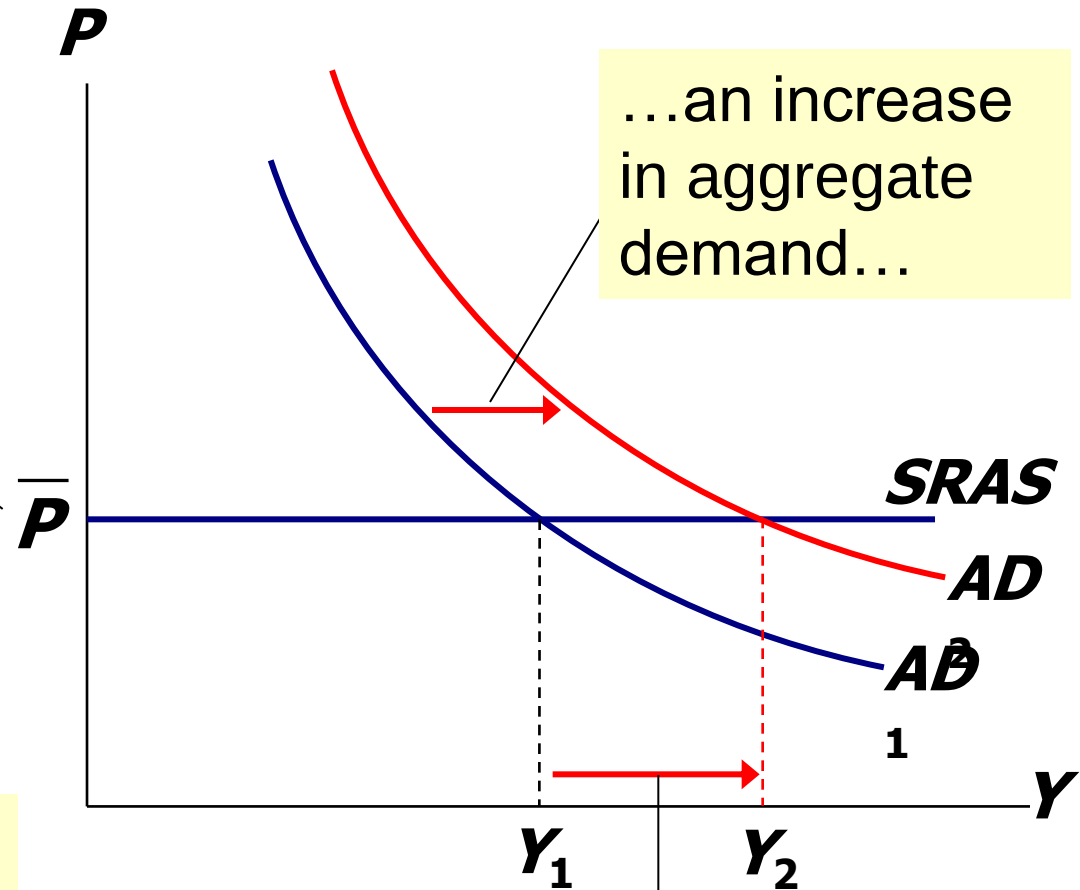


Short-run effects of an increase in M

In the short run
when prices
are sticky,...

...an increase
in aggregate
demand...

...causes
output to rise.



From the short run to the long run

Over time, prices gradually become “unstuck.”
When they do, will they rise or fall?

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

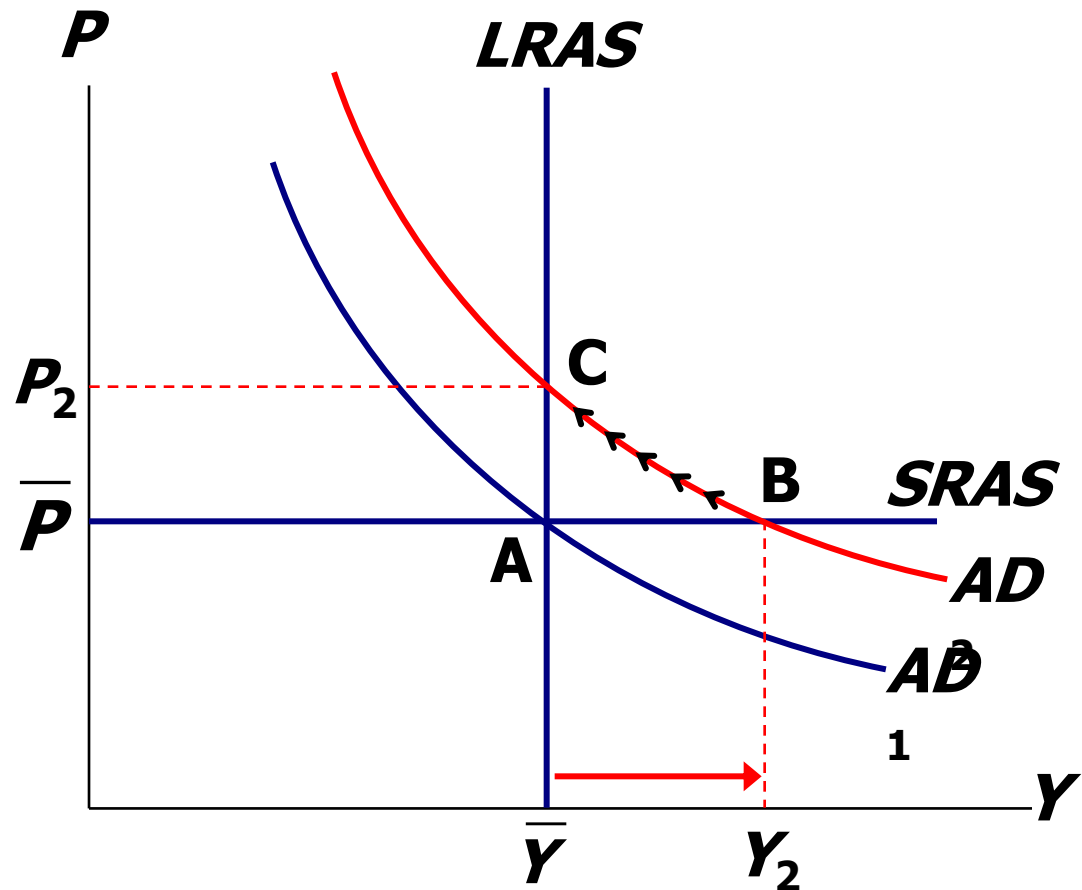
The adjustment of prices is what moves the economy to its long-run equilibrium.

The SR & LR effects of $\Delta M > 0$

A = initial
equilibrium

B = new short-
run eq'm
after Fed
increases
 M

C = long-run
equilibrium



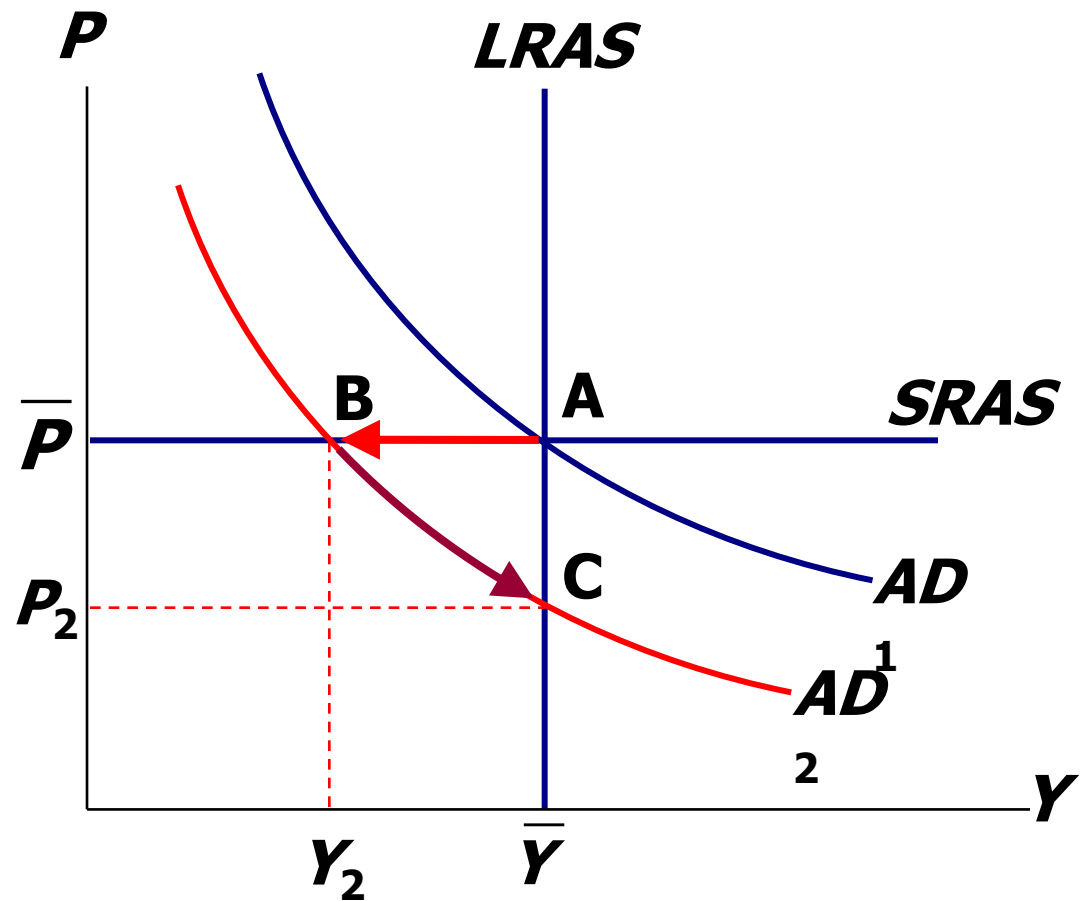
How shocking!!!

- **shocks**: exogenous changes in agg. supply or demand
- Shocks temporarily push the economy away from full employment.
- Example: exogenous decrease in velocity
If the money supply is held constant, a decrease in V means people will be using their money in fewer transactions, causing a decrease in demand for goods and services.

The effects of a negative demand shock

AD shifts left, depressing output and employment in the short run.

Over time, prices fall and the economy moves down its demand curve toward full-employment.



Supply shocks

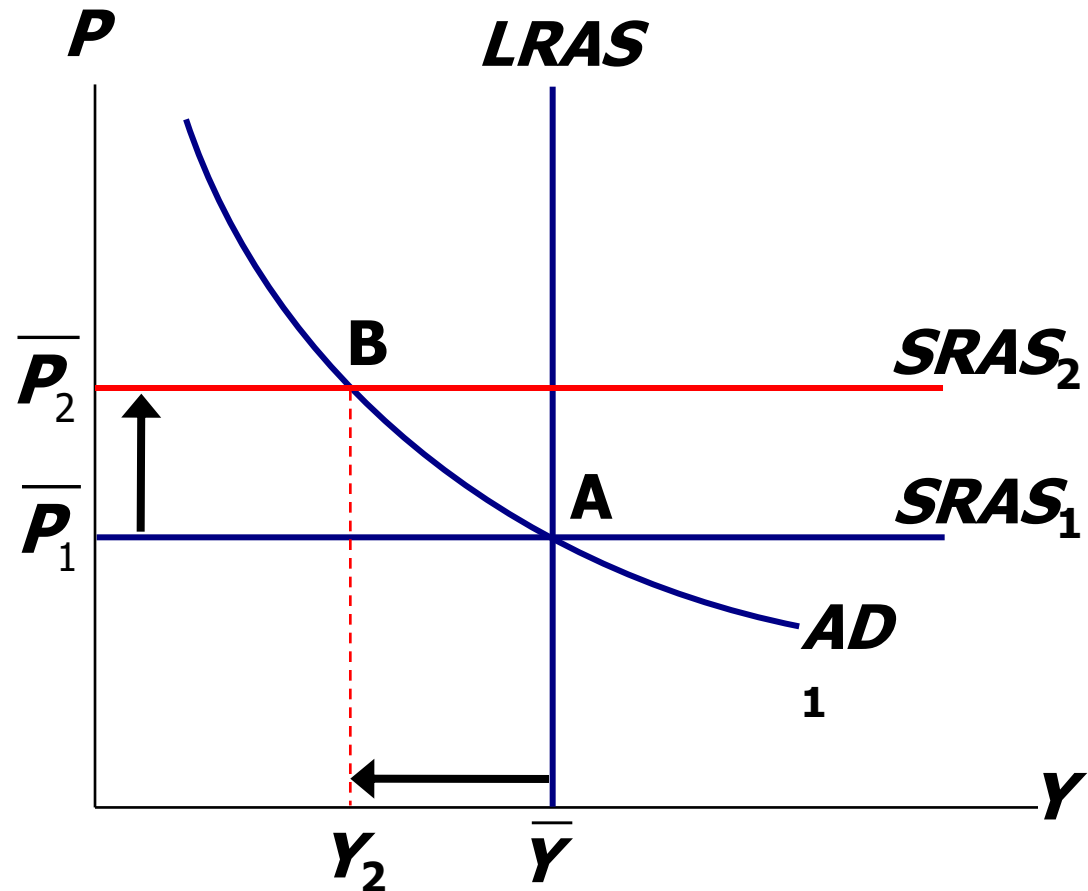
- A **supply shock** alters production costs, affects the prices that firms charge. (also called **price shocks**)
- Examples of *adverse* supply shocks:
 - ❑ Bad weather reduces crop yields, pushing up food prices.
 - ❑ Workers unionize, negotiate wage increases.
 - ❑ New environmental regulations require firms to reduce emissions. Firms charge higher prices to help cover the costs of compliance.
- *Favorable* supply shocks lower costs and prices.

Stabilization policy

- def: policy actions aimed at reducing the severity of short-run economic fluctuations.
 - Example: Using monetary policy to combat the effects of adverse supply shocks...
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Stabilizing output with monetary policy

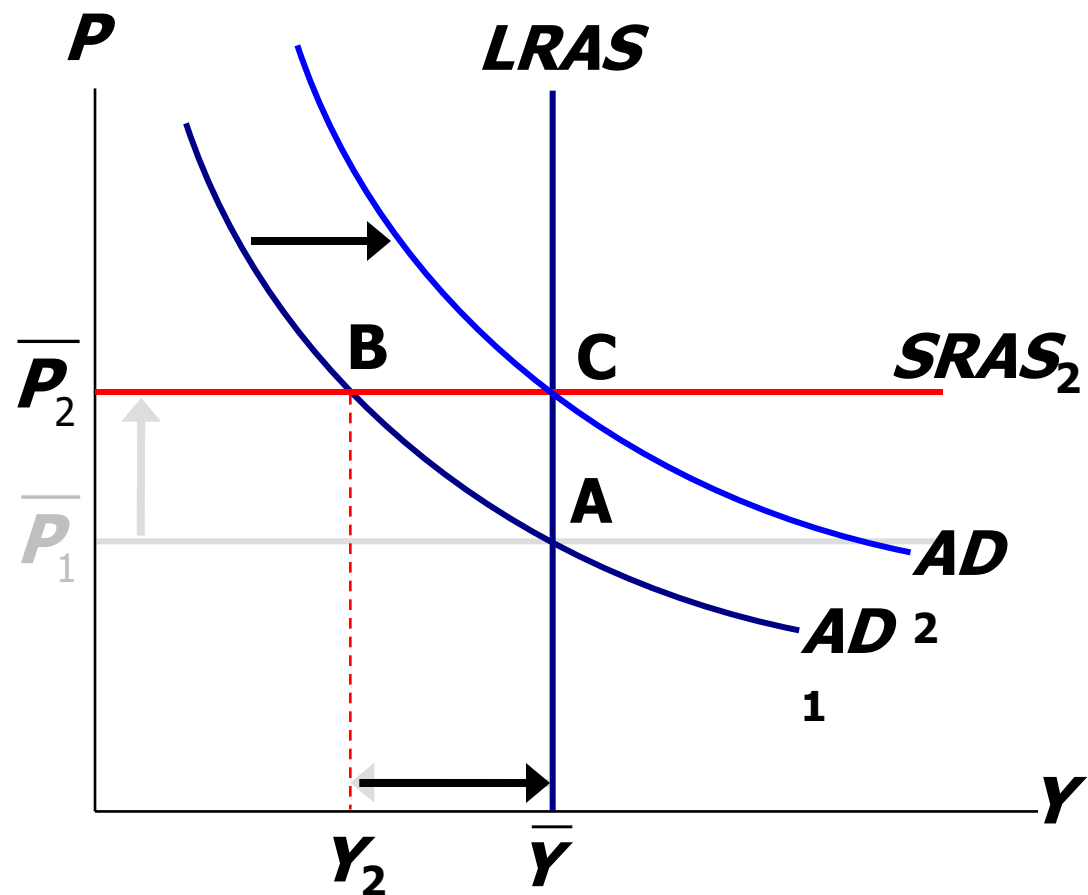
The adverse supply shock moves the economy to point B.



Stabilizing output with monetary policy

But the Fed
accommodate
s the shock by
raising agg.
demand.

results:
 P is permanently
higher, but Y
remains at its
full-employment
level.



SUMMARY

1. Long run: prices are flexible, output and employment are always at their natural rates, and the classical theory applies.

Short run: prices are sticky, shocks can push output and employment away from their natural rates.

2. Aggregate demand and supply:
a framework to analyze economic fluctuations

SUMMARY

3. The aggregate demand curve slopes downward.
4. The long-run aggregate supply curve is vertical, because output depends on technology and factor supplies, but not prices.
5. The short-run aggregate supply curve is horizontal, because prices are sticky at predetermined levels.

SUMMARY

- 6. Shocks to aggregate demand and supply cause fluctuations in GDP and employment in the short run.
- 7. The central bank can attempt to stabilize the economy with monetary policy.

The End