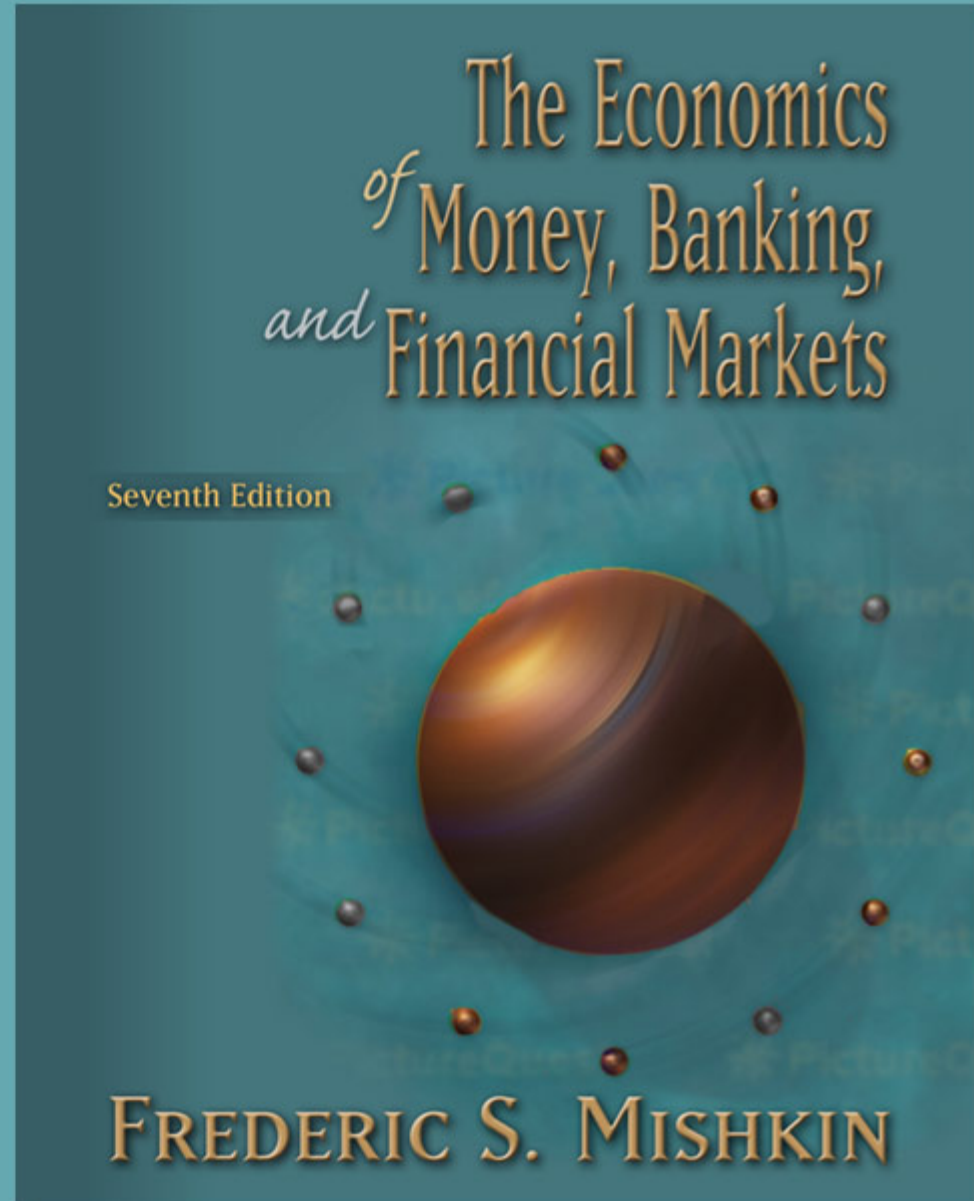


## Chapter 25

### Aggregate Demand and Supply Analysis



# Preview and motivation

- We will build a model of aggregate demand and aggregate supply to study the effects of money and inflation in the aggregate economy (chapter 27).
- Models of aggregate demand
  - one based on money and transactions
  - one based on types of spending in the economy
- Models of aggregate supply
  - examine firm profits to determine the willingness of firms to produce goods & services in the short run.
  - supply of goods & services in the long run depends on factors of production

# What is aggregate demand?

- Aggregate demand is the demand for (willingness to buy or spend on) *all* final goods and services at a given aggregate (or average) price measure.

Aggregate demand can be represented as *aggregate spending* in two ways:

# Aggregate demand: money and velocity

1. “Monetarist” version: A relationship with money, the **velocity** of money, prices and output:

$$M \times V = P \times Y$$

- $M$  = value money in circulation
- $V$  = velocity, or frequency that money is spent.
- $P$  = aggregate, or average, price measure
- $Y$  = value of aggregate output  
= aggregate (national) income

# Aggregate demand: money and velocity

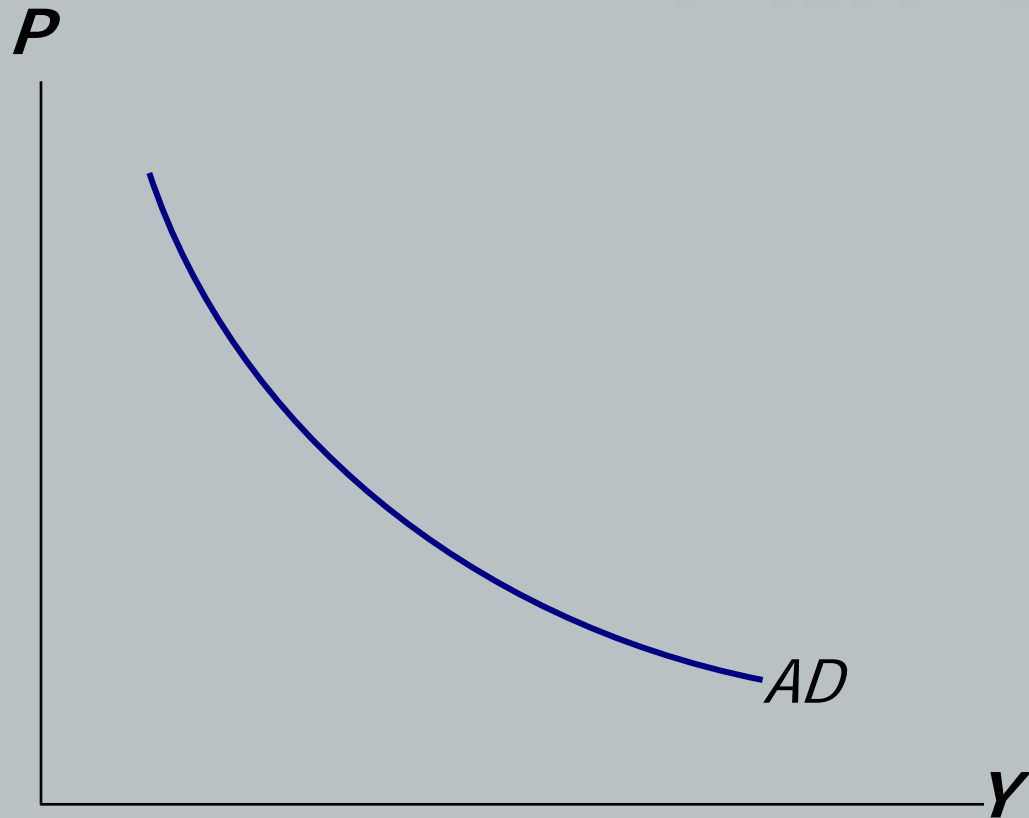
$$M \times V = P \times Y$$

- The left side represents the value of money spent times the frequency of spending in transactions used to buy final goods and services.
- The right side represents the value of those goods and services that are bought or sold in these transactions.

## Aggregate demand: money and velocity

- The velocity of money,  $V$ , does not change much over time: assume it is constant for the time periods that we are considering.
- If  $M$  is constant, then  $P \times Y = \text{constant}$ 
  - If  $P$  increases,  $Y$  decreases.
  - If  $P$  decreases,  $Y$  increases.
- Therefore, there is an inverse relationship between  $P$  and  $Y$ : the aggregate demand curve should slope down.

# The aggregate demand curve



The aggregate demand curve slopes down.

# Shifting the aggregate demand curve

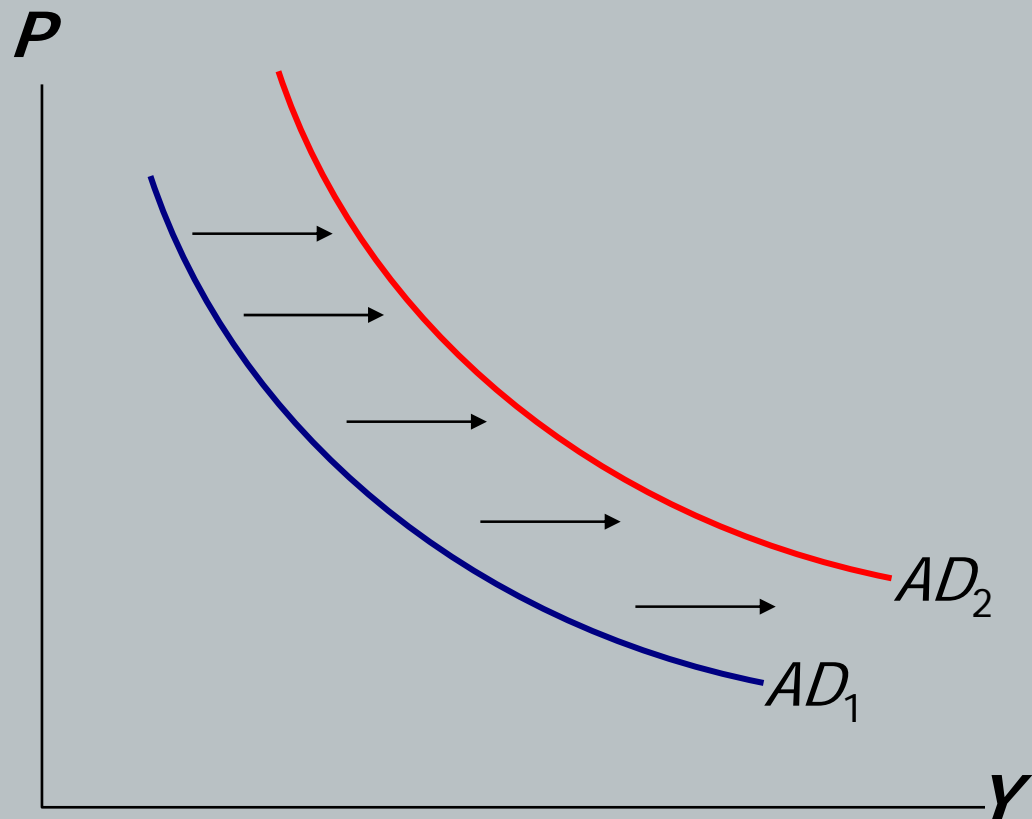
- If  $M$  increases, then  $Y$  will increase at every  $P$  when  $P$  is fixed at some level.

$$M \uparrow \bar{V} = \bar{P} Y \uparrow$$

# Shifting the aggregate demand curve

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

For each price level,  $Y$  is higher.



## Aggregate demand: types of spending

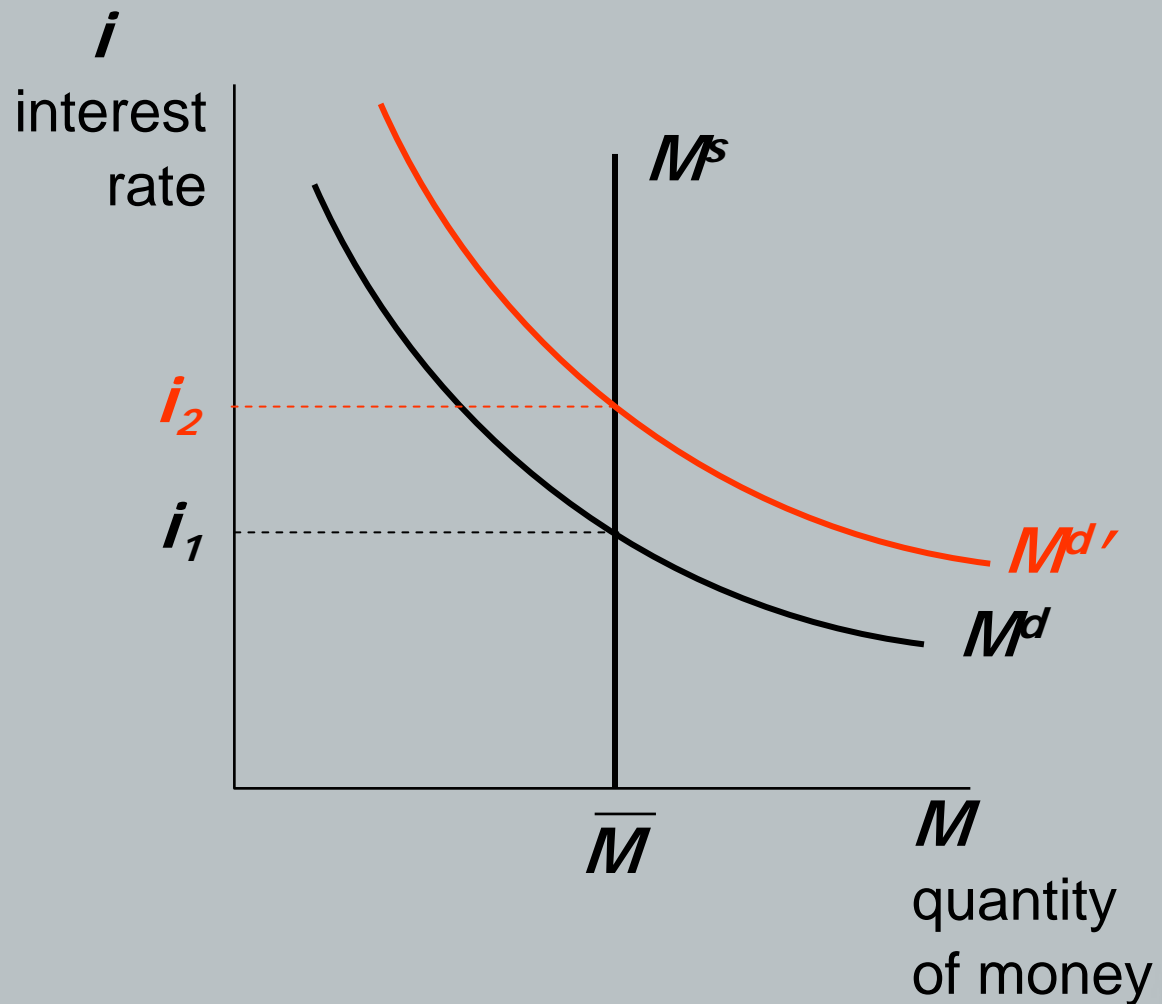
2. “Keynesian” version: Represent aggregate spending by showing the *types* of spending by everyone willing to buy goods & services:

$$Y_{ad} = C + I + G + NX$$

- $Y_{ad}$  = aggregate spending (aggregate demand)
- $C$  = spending by consumers
- $I$  = investment by businesses in machines, factories and other inputs to production, plus spending on new homes.
- $G$  = spending by governments (national, state, local)
- $NX$  = net spending by foreigners (net exports)

# Liquidity preference model: rise in the price level

1.  $P \uparrow$ ,
2.  $M^d \uparrow$ ,  $M^d$  shifts right
3. equilibrium interest rate rises from  $i_1$  to  $i_2$



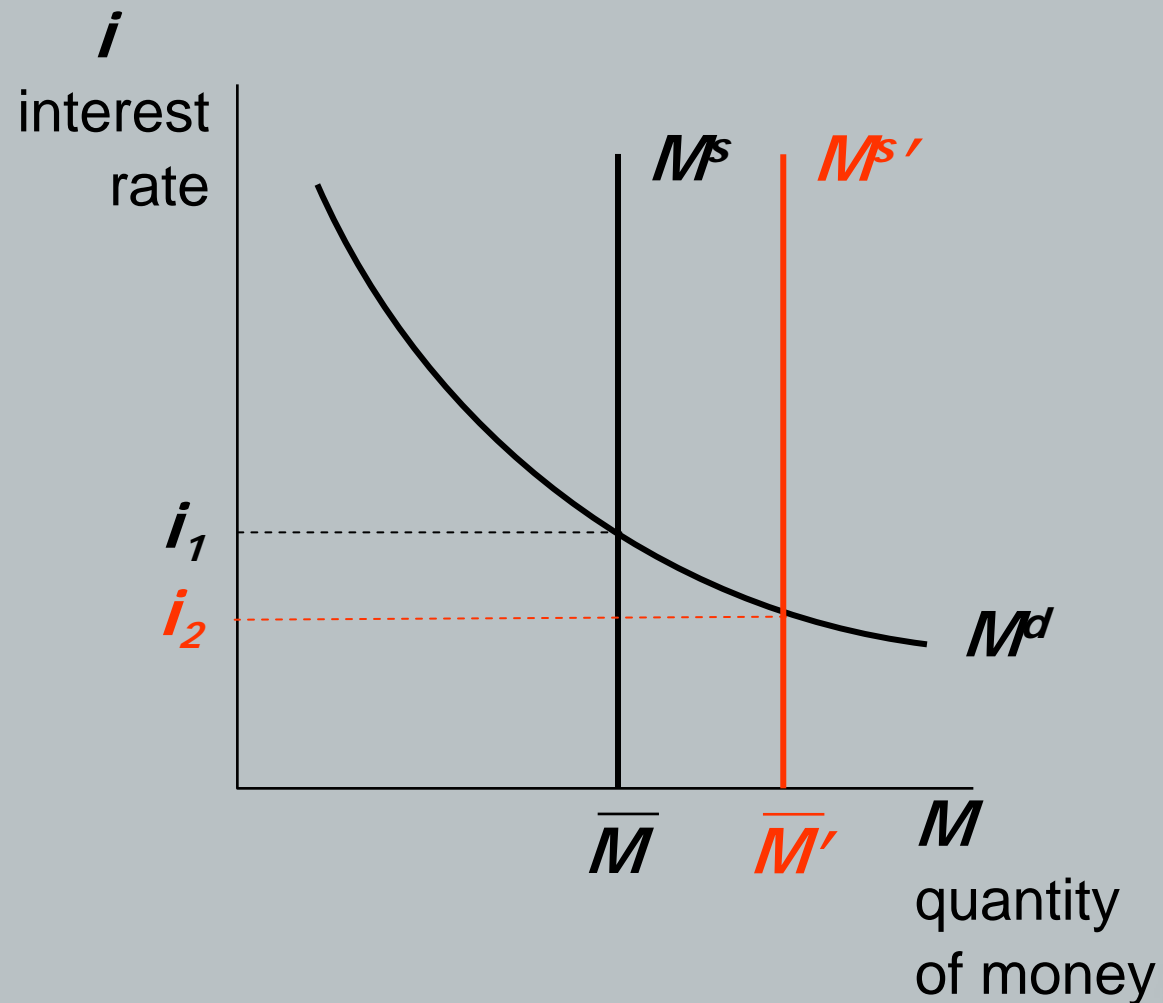
# Aggregate demand: types of spending

$P \uparrow, i \uparrow,$

- $I \downarrow$  because the cost of borrowing for investment projects is more expensive
- $NX \downarrow$  because higher interest rates lead to a greater return on deposits in domestic currency, driving up the price of domestic currency, making exports more expensive and imports less expensive.
- $Y \downarrow$
- An inverse relationship between  $P$  and  $Y$ : the aggregate demand curve slopes downward

# Shifting the aggregate demand curve

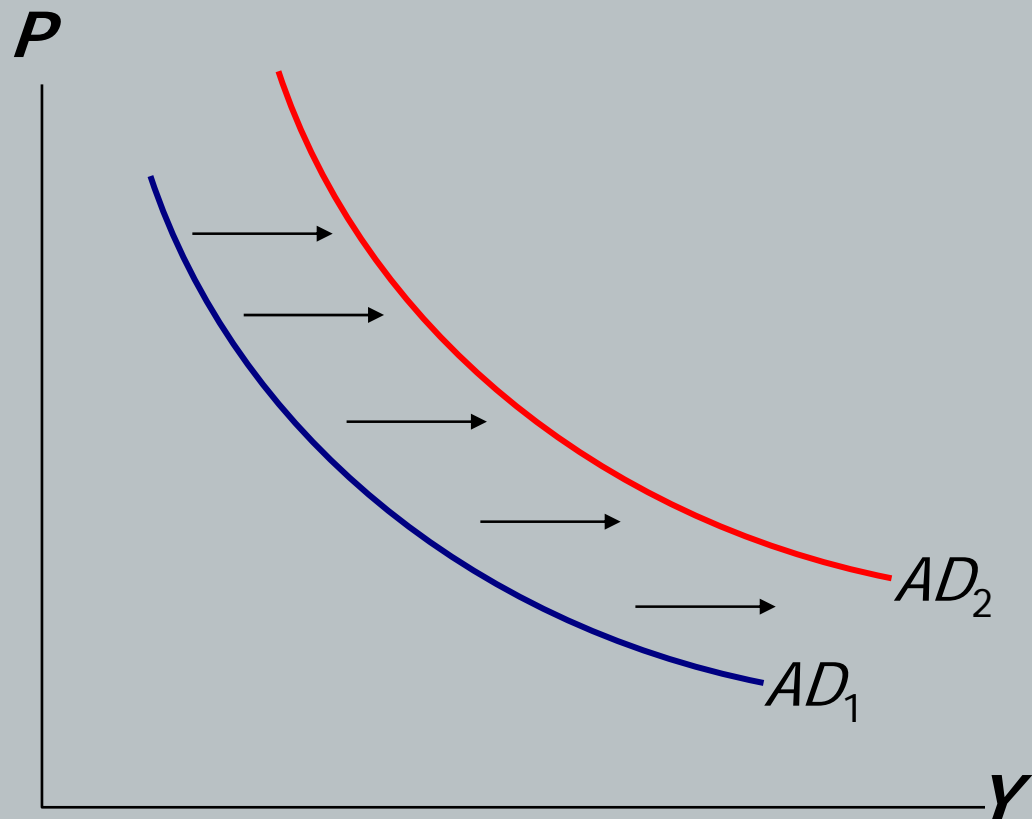
1.  $M \uparrow$ ,
2. equilibrium interest rate fall from  $i_1$  to  $i_2$
3.  $I \uparrow, NX \uparrow$
4.  $Y \uparrow$  at every  $P$



# Shifting the aggregate demand curve

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

For each price level,  $Y$  is higher. However, the reason for the shift is because interest rates change in the Keynesian model.



# Aggregate demand: types of spending

- Other factors that influence spending and planned spending (shift the demand curve):

$$Y_{ad} = C + I + G + NX$$

2. changes in taxes: changes in  $C$  and  $I$
3. changes in government spending: changes in  $G$
4. changes in consumer optimism: changes in  $C$  and  $I$
5. changes in business optimism: changes in  $I$
6. changes in optimism/about US economy and demand for its products: changes in  $NX$

# Crowding out: how much do government deficits affect interest rates?

- How much government spending affects interest rates is a big political issue.
- According to the loanable funds/asset market model, government deficits compete for funds in the credit market and drives up interest rates.
- This has effects on  $C$ ,  $I$ , and  $NX$ .
- If an increase in  $G$  is completely offset by a decrease in  $C$ ,  $I$ , and  $NX$ , then there is complete **crowding out**.

# What is aggregate supply?

- Aggregate supply is the supply of (willingness to sell) *all* final goods and services at a given aggregate (or average) price measure.

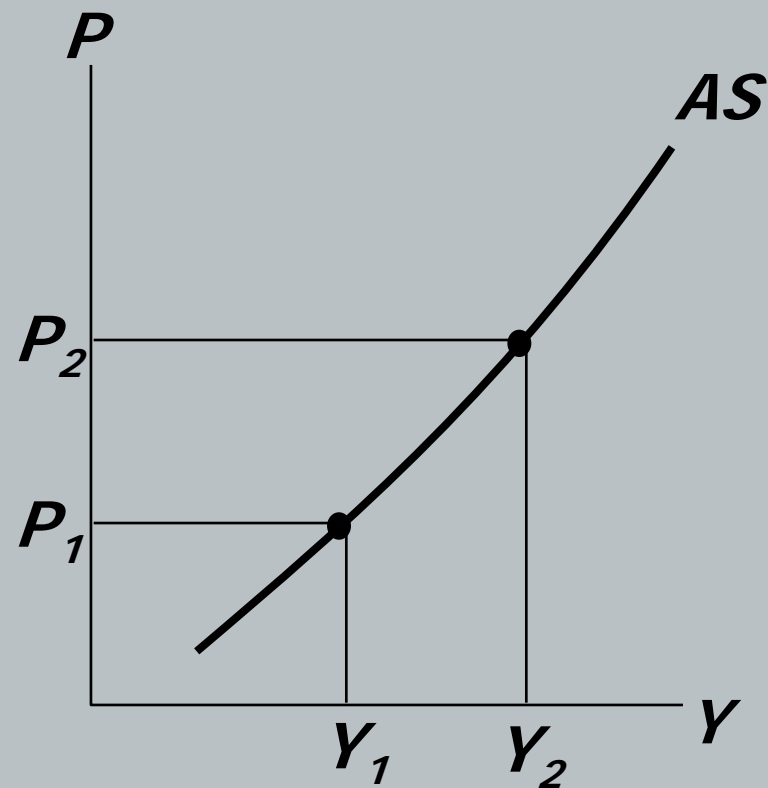
# How is aggregate supply represented?

- Wages and other costs of production may be fixed in the short run.
- If the price level rises and wages and other costs of production are fixed, then firm profits rise.
  - higher firm profits give firms an incentive to produce more
  - An aggregate supply curve will slope upward

# The aggregate supply curve in the short run

The aggregate supply curve is upward sloping if wages are fixed in the short run.

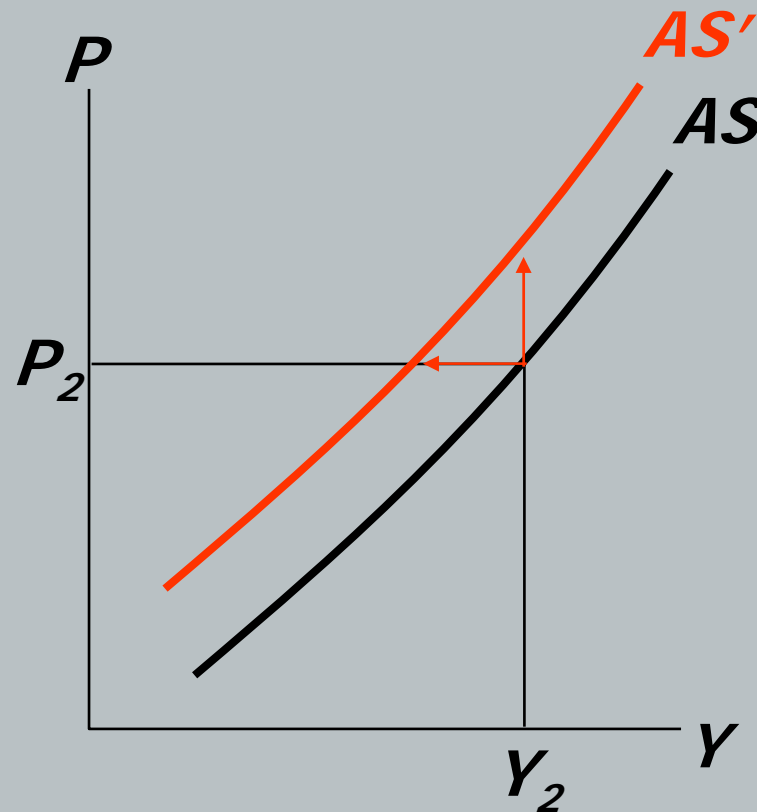
An increase in output prices yields higher profits and gives firms and incentive to produce more.



# Shifting the aggregate supply curve

As wages and the cost of other factors of production increase over time, profits fall, and firms are less willing to produce as much.

The short run aggregate supply curve shifts left or up.



# Factors that shift the short run supply curve

Factors that affect the cost of production and profits:

## 1. The **cost of labor**

- A. when  $Y$  higher than normal ( $Y > Y_n$ ), the demand for labor is high and the price of labor is high.
- B. bargaining by labor unions
- C. wages offered due to expected price changes: if the price level is expected to increase, wages asked for and offered will also tend to increase.

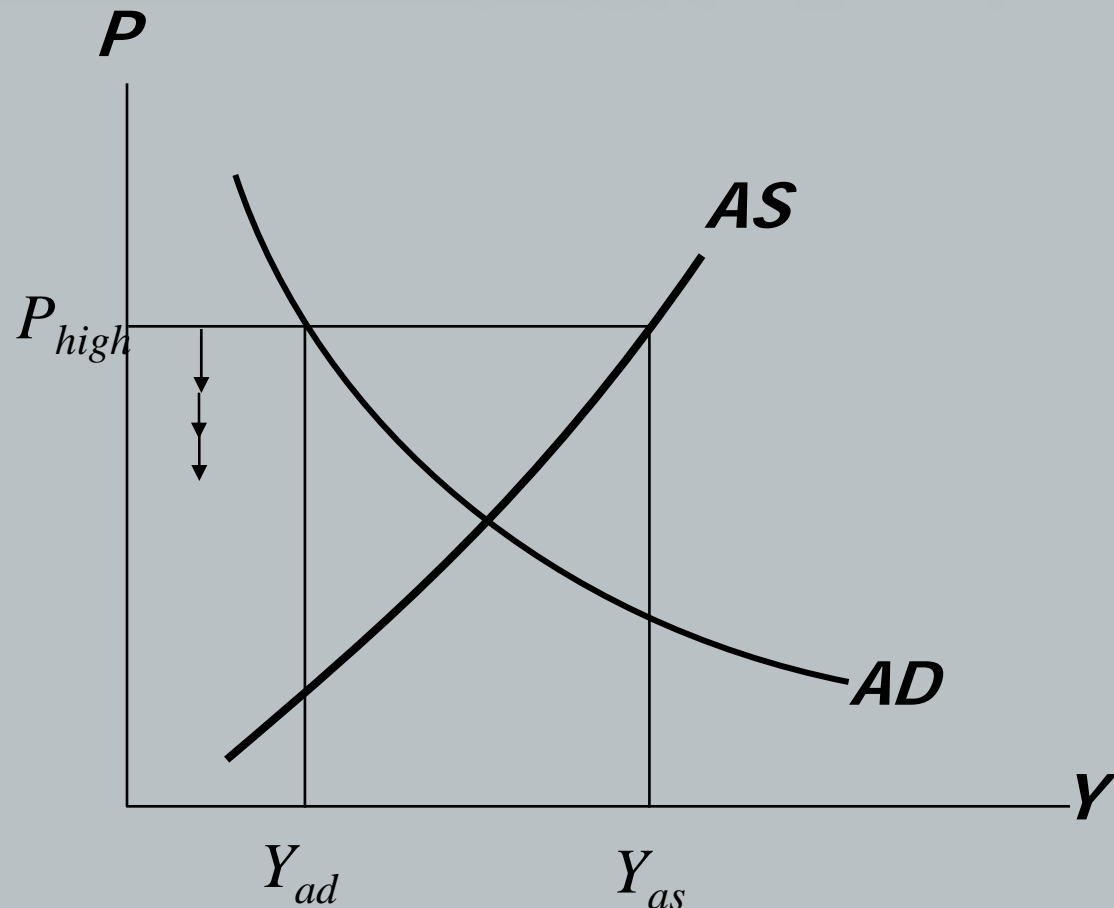
2. **technology**: affects productivity and cost of production.

3. **prices of other factors of production** (energy, raw materials, land)

# Equilibrium in short run

There is a tendency for the price level to adjust until  $Y_{ad} = Y_{as}$

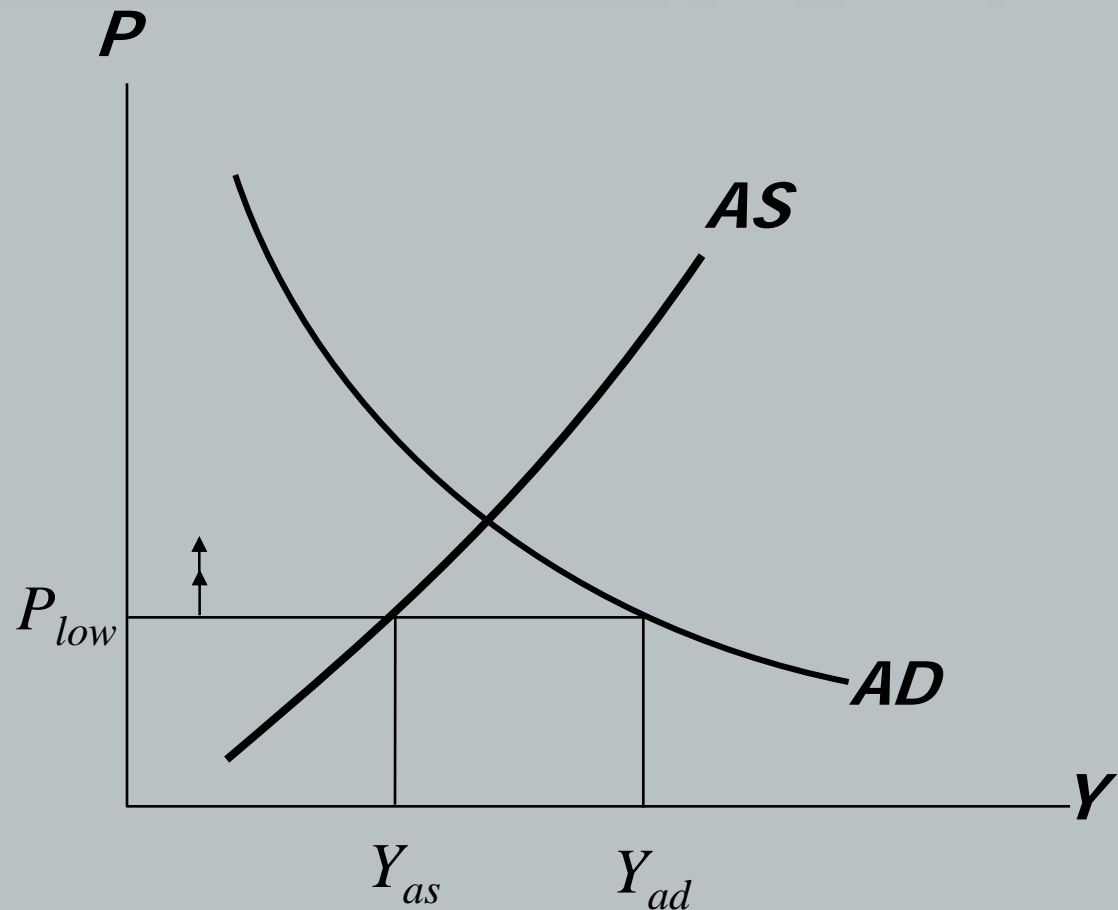
If the price level is such that  $Y_{ad} < Y_{as}$  then firms do not sell all of their output, and so lay off workers. Workers have incentives to accept lower wages when unemployment is high, and production costs fall, reducing the price level.



# Equilibrium in short run

There is a tendency for the price level to adjust until  $Y_{ad} = Y_{as}$

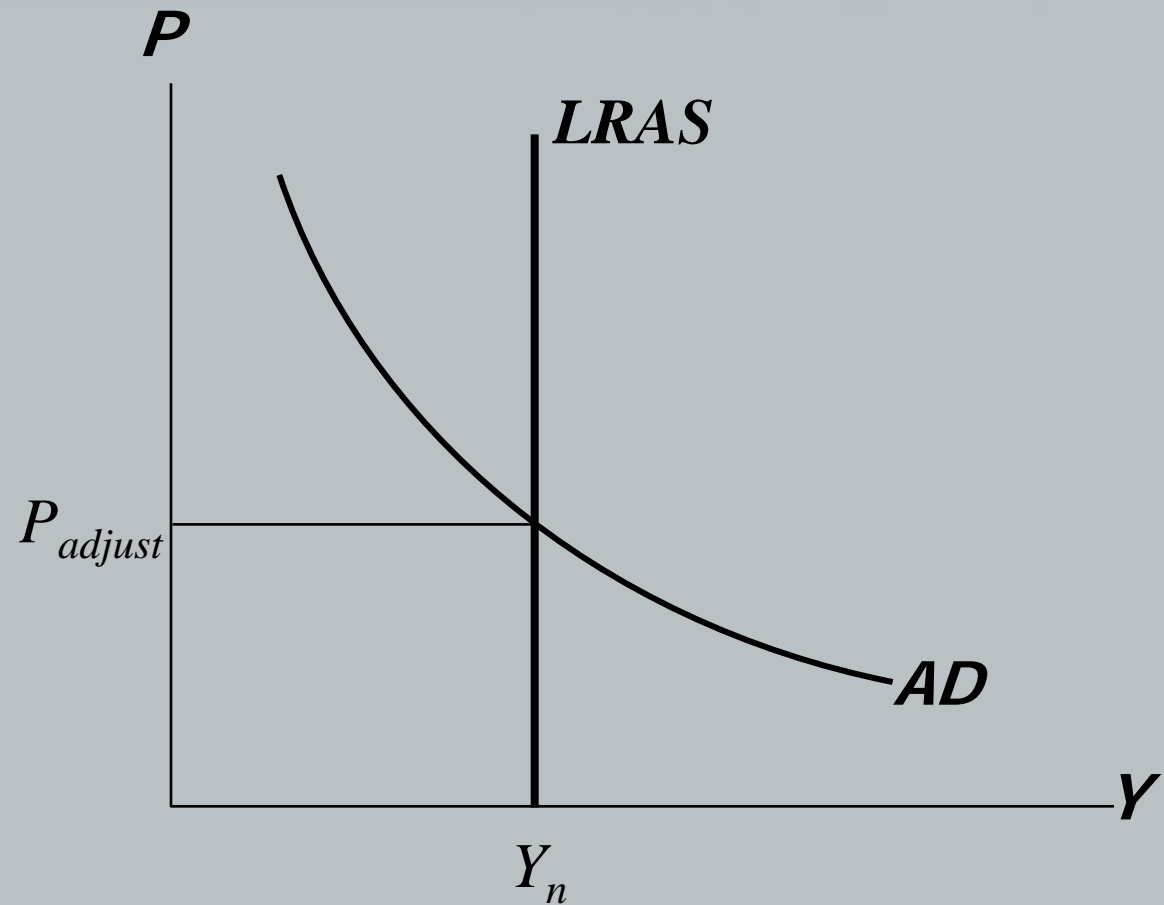
If the price level is such that  $Y_{ad} > Y_{as}$  then firms have incentives would like to sell more output and hire more workers. Workers can demand higher wages, so the cost of production rises, increasing the price level.



# How is aggregate supply represented?

- In the long run, wages and other costs of production are able to adjust.
  - output reaches its normal or *natural level of output* ( $Y_n$ ).
  - the unemployment rate adjusts to its *natural rate*.
  - employment reaches *full employment*.
- In the long run, production of the economy depends on its “potential” in factors of production:
  - labor, education, physical capital, natural resources, technology
  - the supply curve is independent of prices the long run.

# Equilibrium in the long run



# Equilibrium in the long run

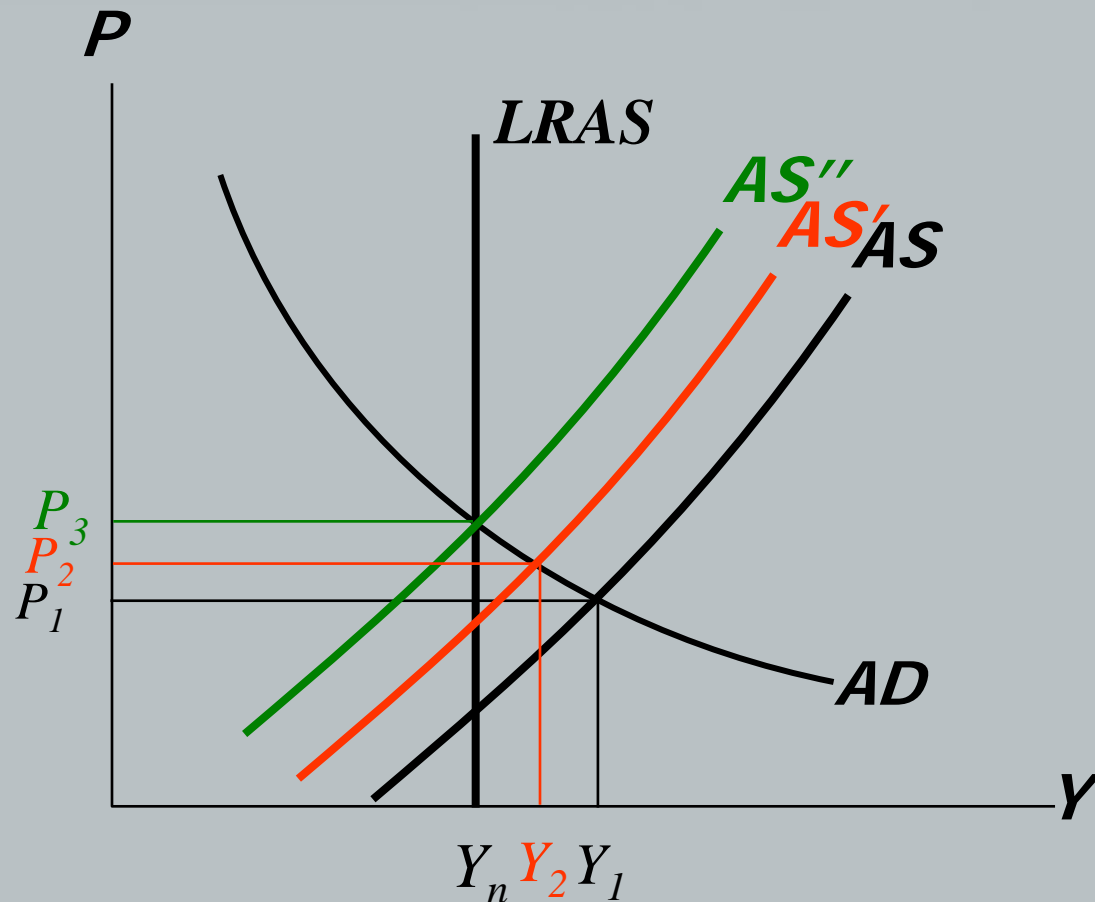
When  $Y > Y_n$

1. Unemployment rate will be lower than the natural rate of unemployment.
2. Wages increase in order to attract more workers: the structurally unemployed and the frictionally unemployed.
3. Profits decrease because the costs of production increase: the short run supply curve shifts right
4. Prices rise to reflect rising wages.

# Equilibrium in the long run

When  $Y > Y_n$

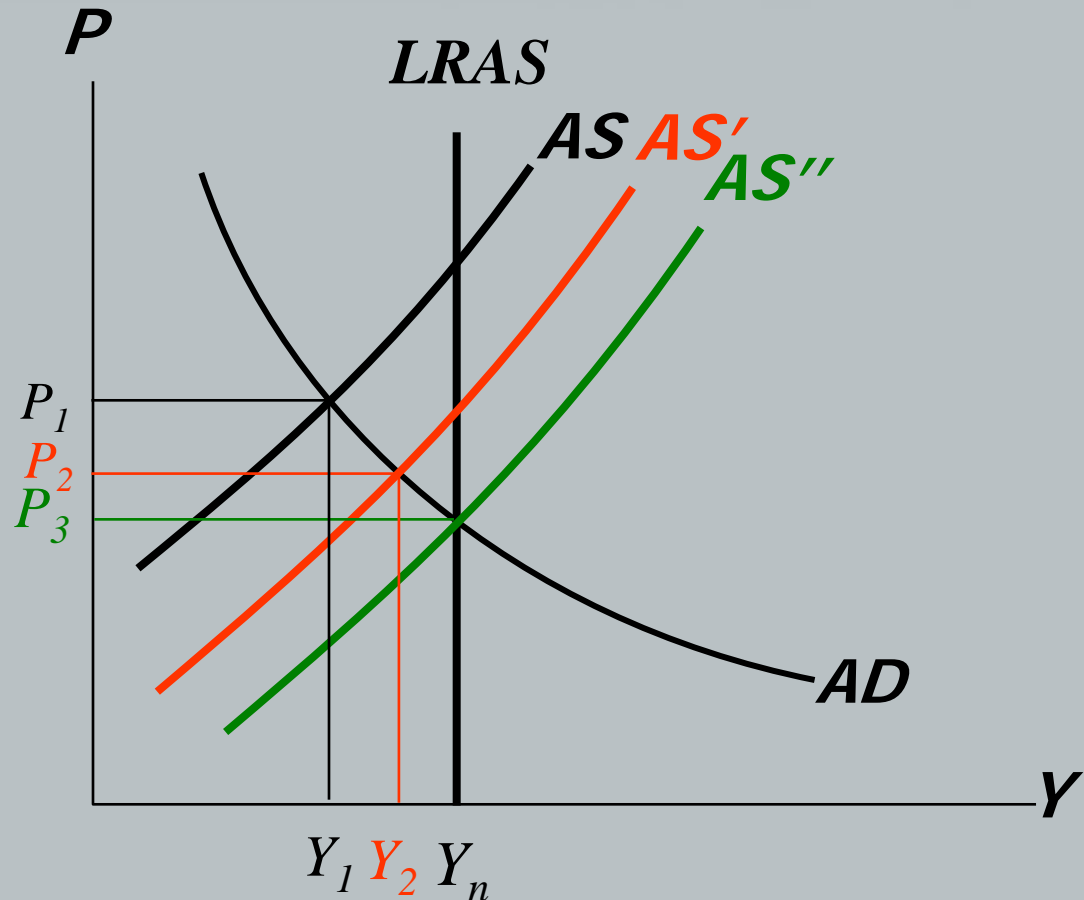
1. Wages  $\uparrow$
2. at given  $P$ , profits  $\downarrow$
3.  $Y$  produced  $\downarrow \Rightarrow AS$  shifts left.
4. The price level rises in response to rising wages.
5. until  $Y = Y_n$  at  $LRAS$ , there is an incentive for wages to increase and the price level to increase.



# Equilibrium in the long run

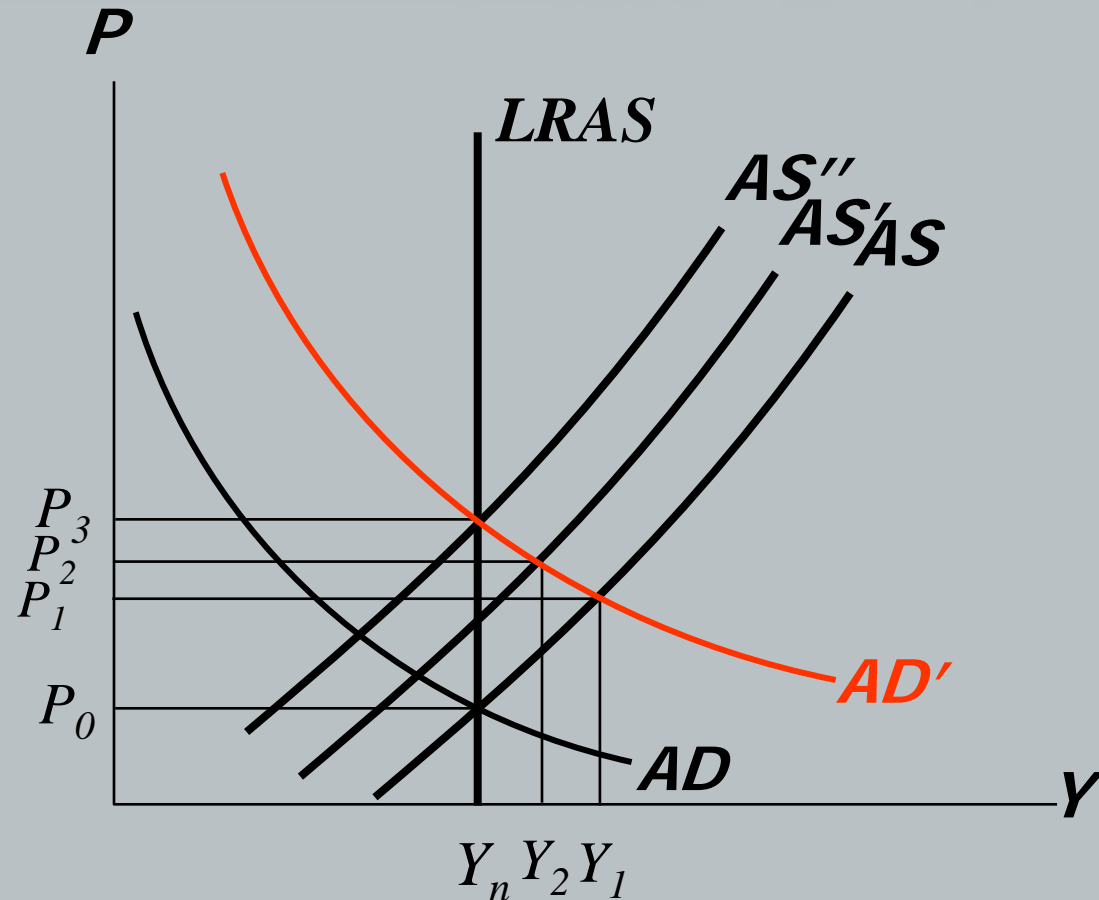
When  $Y < Y_n$

1. Wages  $\downarrow$
  2. at given  $P$ , profits  $\uparrow$
  3.  $Y$  produced  $\uparrow \Rightarrow AS$  shifts right.
  4. The price level falls in response to falling wages.
  5. until  $Y = Y_n$  at long run
- $AS$ , there is an incentive for wages to decrease, output to increase and the price level to decrease.



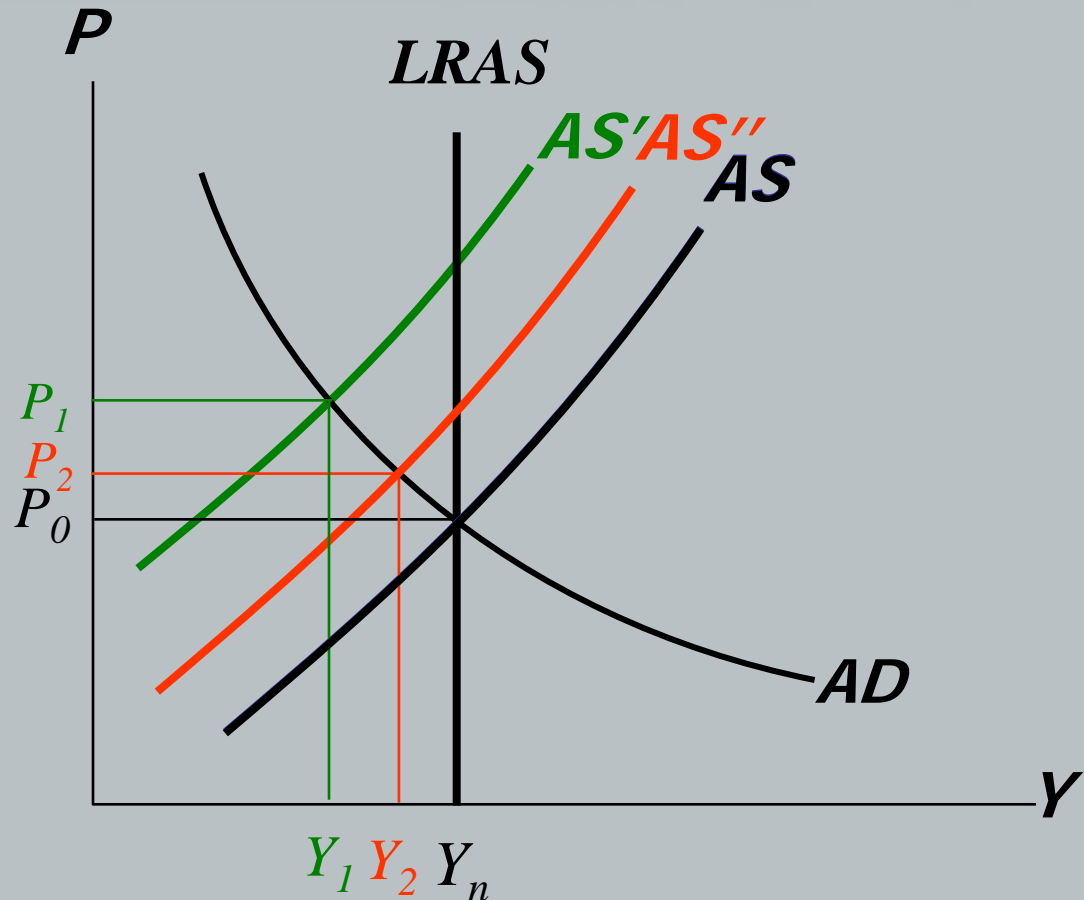
# Shift in aggregate demand

1.  $AD$  shifts right ( $M \uparrow$ )
2.  $Y \uparrow P \uparrow$
3.  $Y > Y_n$ : wages  $\uparrow$ , increasing the cost of production
4.  $AS$  shifts left until  $Y = Y_n$
5.  $Y \uparrow$  in short run only; in long run only  $P \uparrow$



# Equilibrium in the long run

1. AS shifts left (change in cost of production  $\uparrow$ )
2.  $Y \downarrow P \uparrow$
3.  $Y < Y_n$ : wages  $\downarrow$ , reducing cost of production.
4. AS shifts right until  $Y = Y_n$
5.  $Y$  and  $P$  are unchanged in long run.



# Shift in long run aggregate supply

- Changes in population (labor force), education, physical capital, natural resources, technology affect an economy's potential in the long run.
- In the AD/AS model long run supply is constant, but is measured as growing at a roughly constant rate per year.

# How much should government and central bank try to maintain full employment?

- The model says the economy has a self-correcting mechanism:
  - the economy returns to full employment in the long run
- How rapidly do prices, wages and other costs adjust?
  - if slowly, then government could help the economy reach full employment more quickly when there is low aggregate demand or when a supply shock occurs.
  - if rapidly, then government and central banks may make matters worse by making output and prices volatile.