ECON 202 - MACROECONOMIC PRINCIPLES

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Chapter 9 - Aggregate Demand and Aggregate Supply

Aggregate Demand and Aggregate Supply - Topics

1. Explain the role sticky wages and prices play in economic fluctuations
2. List the determinants of aggregate demand
3. Distinguish between the short-run and long-run aggregate supply curves
4. Describe the adjustment process back to full employment

Business Cycles and Economic Fluctuations

- Recession: GDP falls for two consecutive quarters (i.e., 6 months)
- Since WWII the U.S. had 10 recessions
- Depression is a severe recession (e.g., 30's when GDP fell by 33%)
- Unemployment rises sharply during recessions

Okun's Law

Output will be 2.5×cyclical unemployment rate below the full employment level

- If cyclical unemployment is 2%
- Then output will be 2.5×2%=5% below the full employment output level

Fluctuations

- Economic variables that move in the same direction as GDP are called pro-cyclical
  - Investment
  - Consumption
  - Prices of stocks
- Economic variables that move in the opposite direction of GDP are called counter-cyclical
  - Unemployment rate

Short-Run vs Long-Run

- Price systems regulates the economy
- Prices coordinate the economy
- But what if prices are "sticky", what if prices cannot freely and quickly adjust?
- Then demand and supply will not be brought immediately into equilibrium and coordination breaks down
- Result is a prolonged inefficiency of the economy (e.g., high unemployment)

Two Types of Prices

- **Auction prices** can adjust quickly
  - e.g. stocks
- **Custom prices** adjust slowly (sticky prices)
  - e.g. machine parts, wages,. . .

- Sticky wages cause sticky costs for firms, and hence sticky product prices

- In the short-run firms will meet changes in demand with changes in production, not price changes

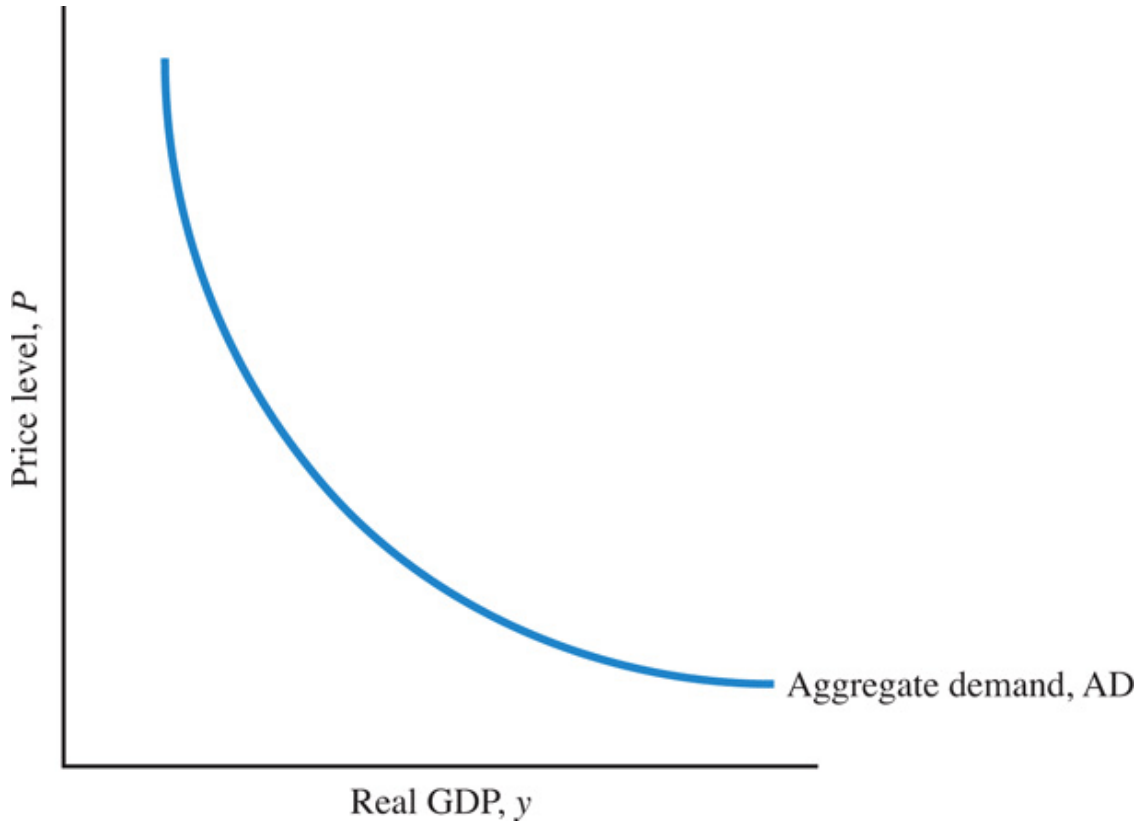
Short-Run vs. Long-Run

- Short-Run $\rightarrow$ Keynesian economics
  - Is the period when prices do NOT change
  - In the macroeconomic short-run, demand determines output
- Long-Run$\rightarrow$ Classical economics
  - Prices adjust fully to changes in demand

Aggregate Demand (AD)

- Aggregate demand curve plots total demand for GDP as a function of price level
- AD is downward sloping
- AD fluctuates with the price level
  - Price level $\uparrow$, purchasing power $\downarrow$, hence AD $\downarrow$
  - Price level $\downarrow$, increases purchasing power, hence AD $\uparrow$

Aggregate Demand (AD)



- The aggregate demand curve slopes downward, indicating that the quantity of aggregate demand increases as the price level in the economy falls

Why is AD Downward Sloping

1. **Wealth effect:**
   - The increase in spending that occurs because the **real value of money increases** when the price level falls

2. **Interest rate effect:**
   - With a given money supply, a lower price level will lead to lower interest rates and higher consumption and investment spending (it's cheaper to borrow)

3. **The impact of foreign trade:**
   - A lower price level makes domestic goods cheaper relative to foreign goods $\rightarrow$ demand for domestic goods $\uparrow$

What Shifts the AD Curve

- Money supply changes
- Changes in taxes
- Changes in government spending G: AD $= C + G$
- Changes in HH, firm, or foreign demand
- Attention: changes in the price level do NOT shift the curve

Shifts in AD

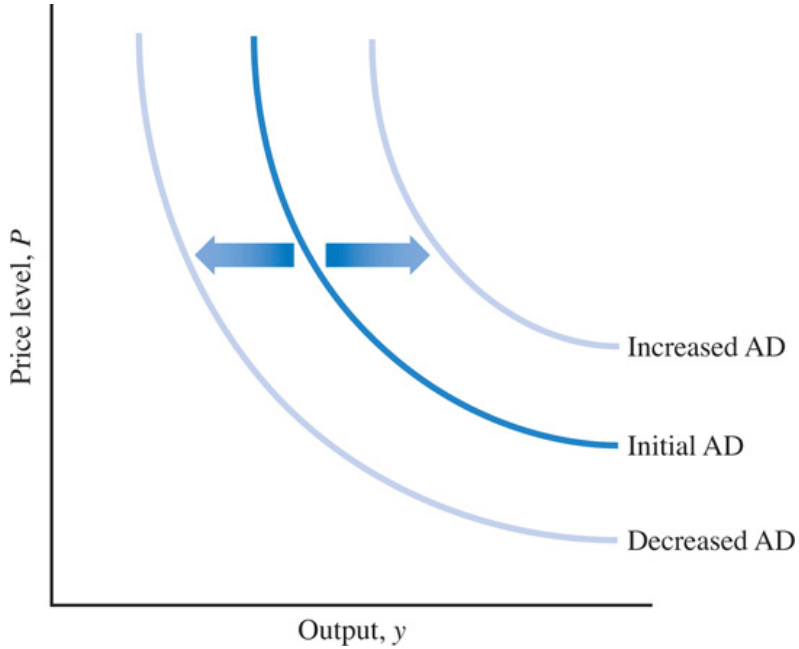


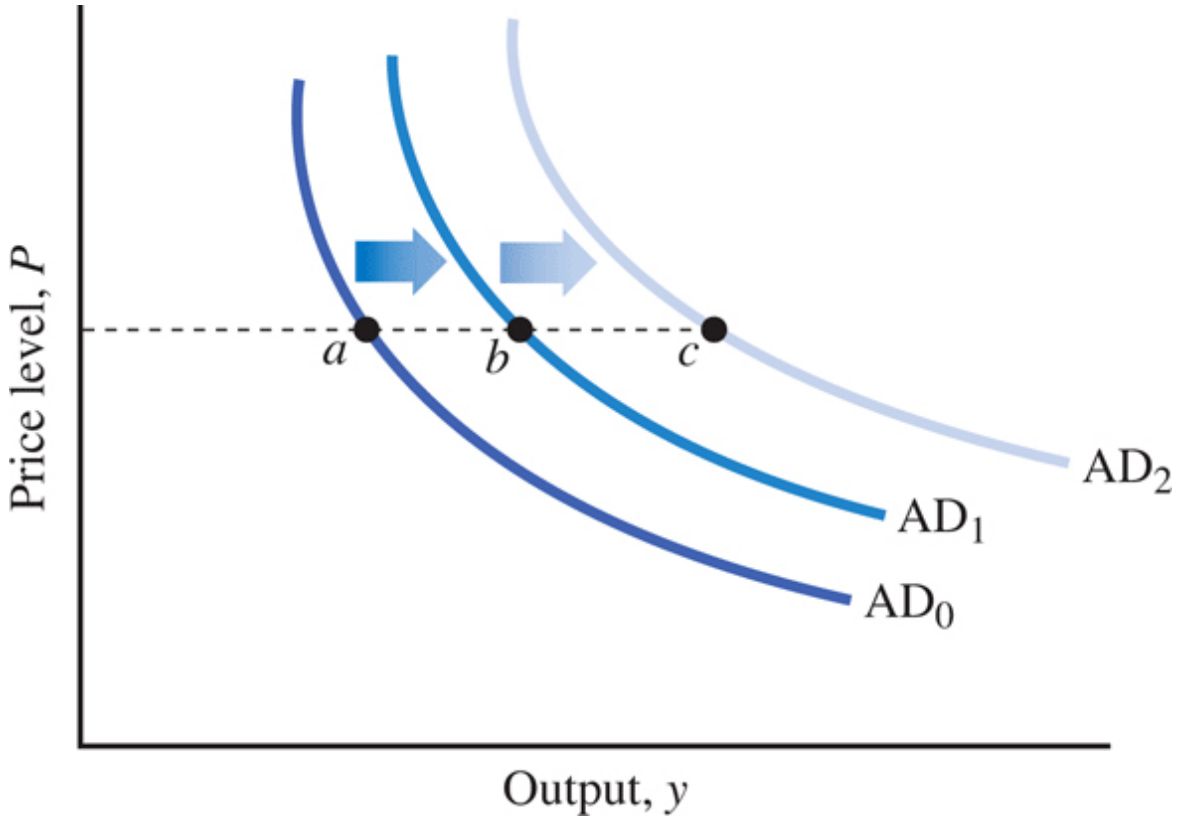
TABLE 9.1 Factors That Shift Aggregate Demand

Factors That Increase Aggregate Demand	Factors That Decrease Aggregate Demand
Decrease in taxes	Increase in taxes
Increase in government spending	Decrease in government spending
Increase in the money supply	Decrease in the money supply

Multiplier

- The ratio of the final shift in AD to the initial shift in AD is known as the multiplier
- As **government spending increases** and the AD curve shifts to the right, output will subsequently increase too
- Increased output also means increased income for households, followed by higher consumption
- This additional consumption spending causes a further shift in the AD curve

Multiplier



- Initially, an increase in desired spending will shift the AD curve horizontally to the right from a to b
- The total shift from a to c will be larger. The ratio of the total shift to the initial shift is known as the multiplier: $\frac{c-a}{b-a}$

Multiplier Mechanics

- The relationship between the level of income and consumption spending is called the consumption function:

$$C = C_a + b \times y$$

  - C_a: autonomous consumption, or the amount of consumption spending that does not depend on the level of income
  - $b \times y$: the part of consumption that depends on income:
  - b: marginal propensity to consume (MPC), or

$$MPC = \frac{\text{Additional Consumption}}{\text{Additional Income}}$$

  - y: level of income in the economy
- Marginal propensity to save:

$$MPS = \frac{\text{Additional savings}}{\text{Additional Income}}$$

Multiplier and MPC

TABLE 9.2 THE MULTIPLIER IN ACTION
The initial $10 million increase in aggregate demand will, through all the rounds of spending, eventually lead to a $25 million increase.

Round of Spending	Increase in Aggregate Demand (millions)	Increase in GDP and Income (millions)	Increase in Consumption (millions)
1	$10.00	$10.00	$6.00
2	6.00	6.00	3.60
3	3.60	3.60	2.16
4	2.16	2.16	1.30
.	.	.	.
Total	**$25.00**	**$25.00**	**$15.00**

- Multiplier $= 1/(1 - \text{MPC})$

Multiplier

- In this example the we have MPC =0.6
- So that after n years we have: $\$10 \times (0.6^0 + 0.6^1 + ... + 0.6^n)$
- If we play this infinitely often we have: $\$10 \times (0.6^0 + 0.6^1 + ... + 0.6^\infty)$
- which will be: $\$10 \times \frac{1}{1-0.6} = \$10 \times 2.5 = \$25$ in the long-run

Math Detail

- MPC is $0 < b < 1$, then

$$\sum_{i=0}^{n} b^i = b^0 + b^1 + b^2 + ... + b^n$$

and

$$b \times \sum_{i=0}^{n} b^i = b^1 + b^2 + ... + b^{n+1}$$

so that subtracting the second from the first expression we have

$$1 \times \sum_{i=0}^{n} b^i - b \times \sum_{i=0}^{n} b^i = b^0 - b^n$$

Math Detail (cont.)

and after collecting the sum we get

$$(1-b)\sum_{i=0}^{n} b^i = b^0 - b^n,$$

$$\rightarrow \sum_{i=0}^{n} b^i = \frac{b^0 - b^n}{1-b}.$$

We now let $n \rightarrow \infty$ and not that $b^0 = 1$ so that we have

$$lim_{n\rightarrow\infty} \sum_{i=0}^{n} b^i = \frac{1-b^\infty}{1-b} = \frac{1}{1-b},$$

because $lim_{n\rightarrow\infty} b^n = 0$ if $0 < b < 1$. So we now know that the infinity sum of b (or MPCs) is

$$b^0 + b^1 + b^2 + ... + b^\infty = \frac{1}{1-b},$$

which is the formula for the multiplier.

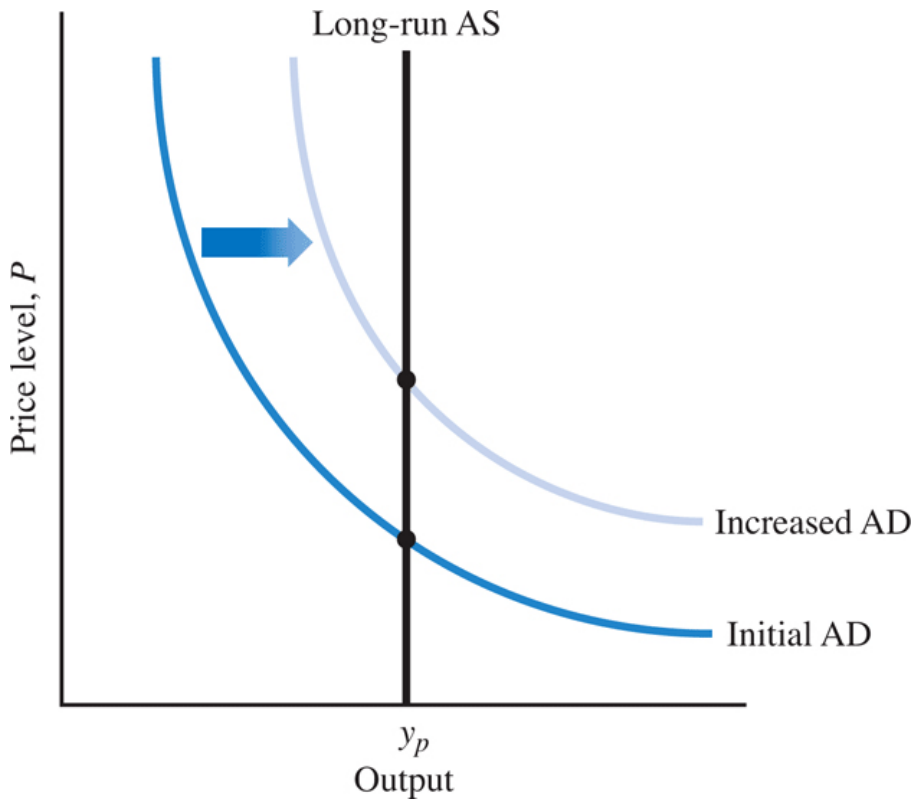
Aggregate Supply (AS)

- AS depicts relationship between the price level and the quantity of output supplied
- Long-run AS curve (classical AS)
- Short-run AS curve (Keynesian AS)
- Supply curve at full employment is:

$$Y^* = A^* \times F(K^*, L^*)$$

- Long-run supply is independent of prices and hence a vertical line
- Output depends solely on the supply factors—capital, labor—and the state of technology (TFP)

Aggregate Supply



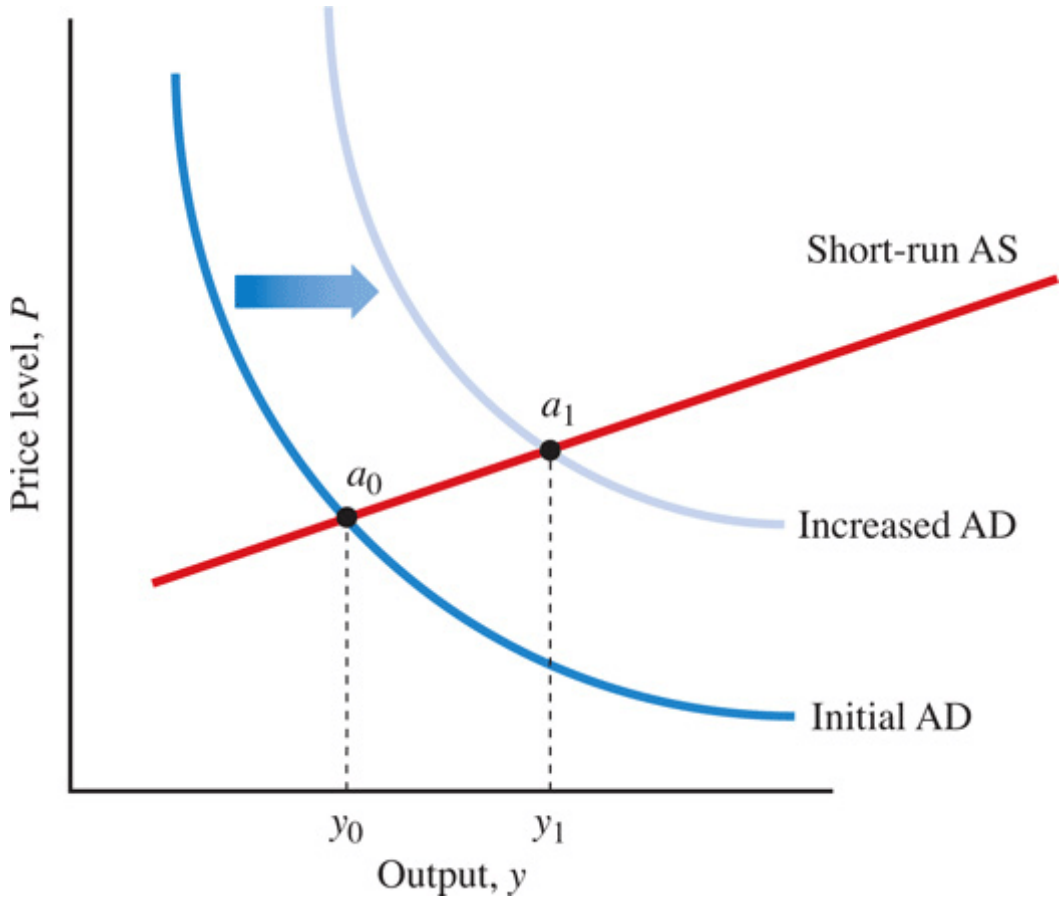
- Output Y* stays constant, only prices adjust.
- In the long run, output is determined solely by the supply of capital and the supply of labor, not the price level.

Short-Run Aggregate Supply

Short-run aggregate supply curve

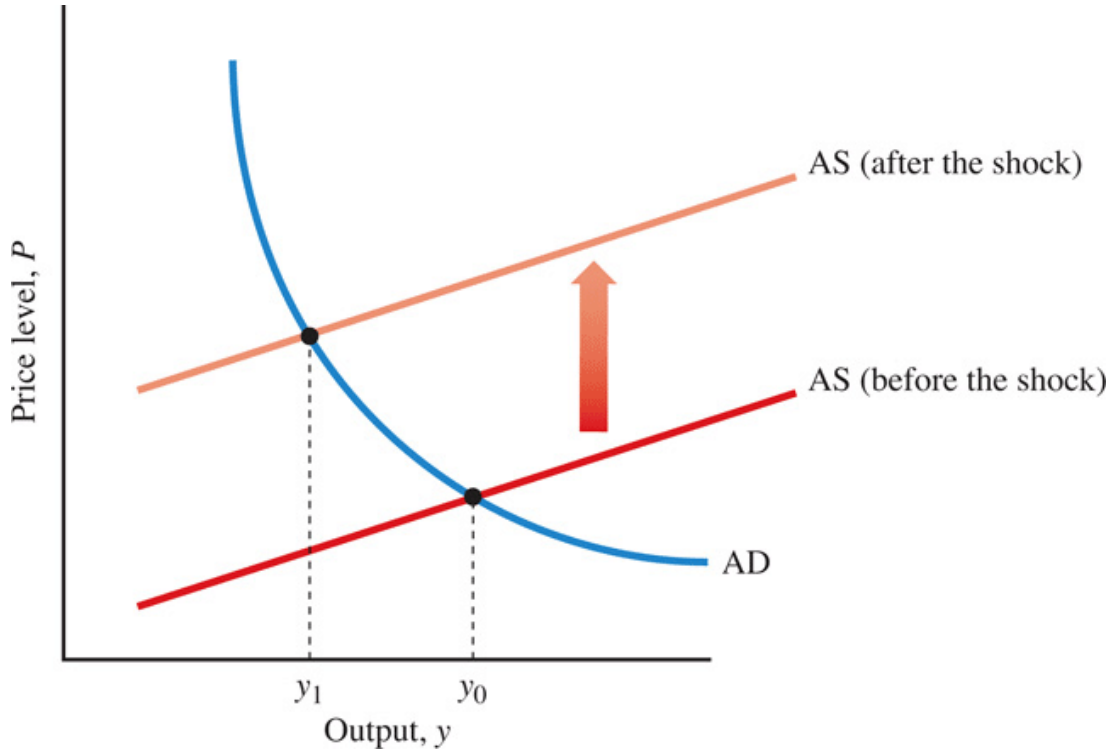
- A relatively flat AS curve that represents the idea that prices do not change very much in the short run and that firms **adjust production** to meet demand
- Sticky prices in the short-run
- AS is relatively flat, since prices adjust little
- Empirically, changes in demand have small price effects (hence supply must be flat)

Short-Run AS



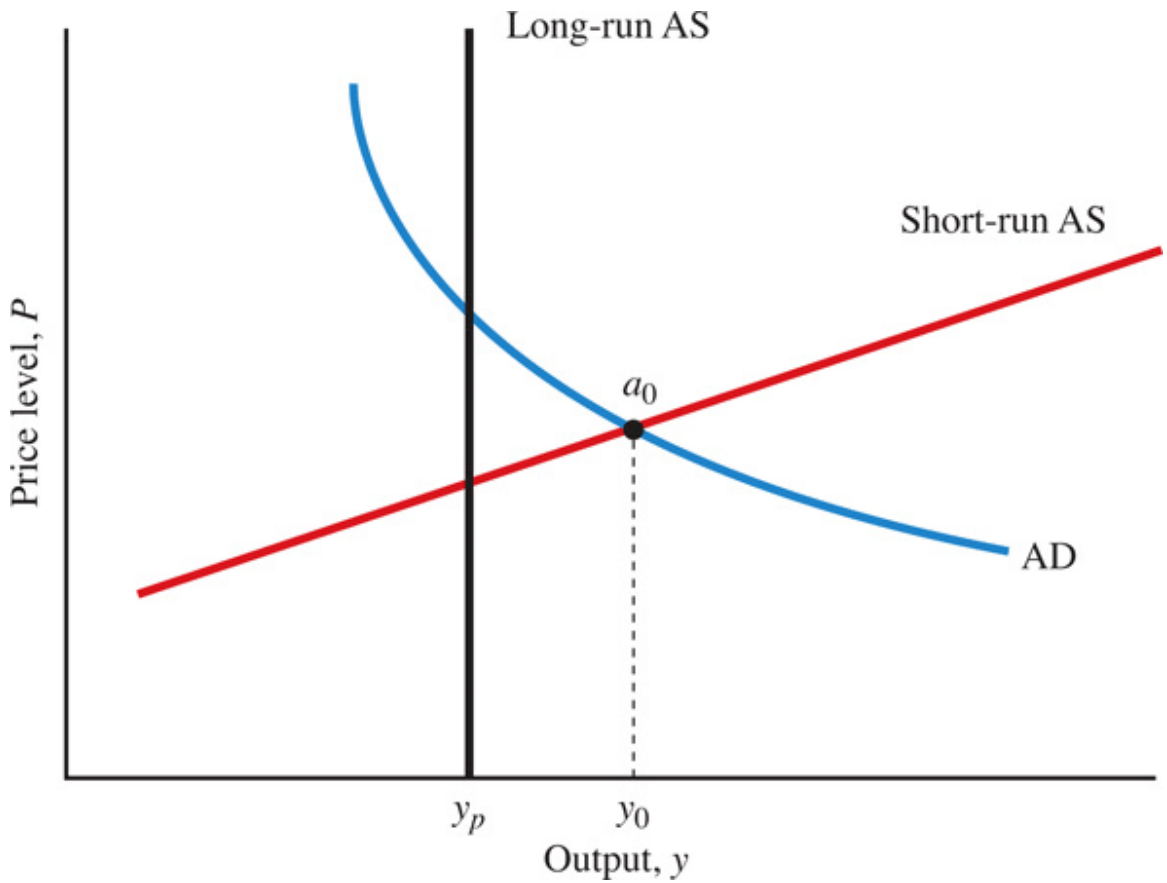
- With a short-run aggregate supply curve, shifts in aggregate demand lead to large changes in output but small changes in price

AS Shock



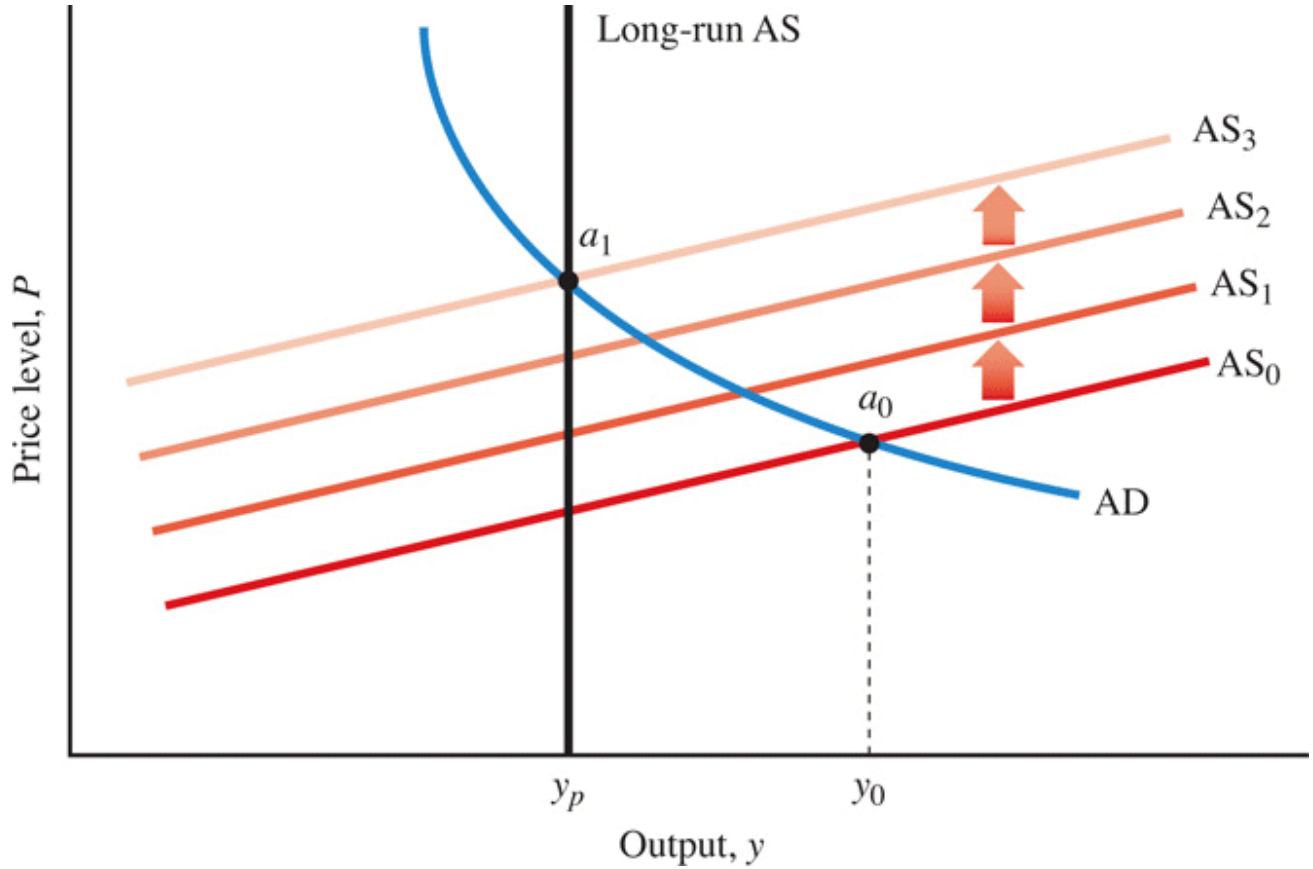
- External disturbances hit short-run supply e.g., Oil price shock
- Adverse supply shocks can cause a recession (a fall in output) with increasing prices. This phenomenon is known as stagflation.

From Short-Run to Long-Run



- AD intersects the short run AS curve at a $y-$level that exceeds the potential level of y $\rightarrow$boom economy
- As firms compete for labor and raw materials$\rightarrow$tendency for wages and prices to$\uparrow$

From Short-Run to Long-Run



- ↑wages and prices will shift the short run AS curve ↑
- Adjustments in wages and prices will continue as long as the level of output exceeds potential output
- Keynesian (short-run) AS continuous to rise until it hits the long-run AS