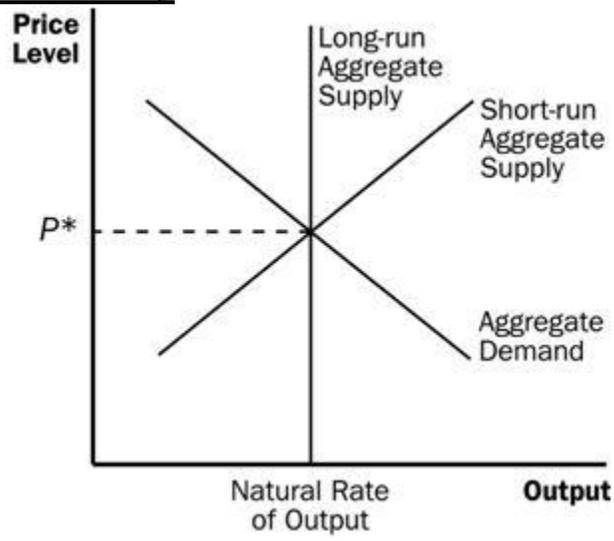


## Aggregate Supply and Demand: Summary



### The Aggregate Demand Curve

The *aggregate demand curve (AD)* shows the relationship between the aggregate price level and the quantity of aggregate output demanded by households, businesses, the government, and the rest of the world

Why is the aggregate demand curve downward sloping?

**Wealth effect:**  $\uparrow$  Prices  $\Rightarrow$   $\downarrow$  value of wealth  $\Rightarrow$   $\downarrow$  Consumption

**Interest rate effect:**  $\uparrow$  Prices  $\Rightarrow$   $\uparrow$  money demand  $\Rightarrow$   $\uparrow$  Interest rates  $\Rightarrow$   $\downarrow$  C,  $\downarrow$  I

**International Trade Effect:**  $\uparrow$  Prices  $\Rightarrow$   $\uparrow$  relative prices of domestic goods  $\Rightarrow$   $\downarrow$  NX

### The Aggregate Supply Curve

The *aggregate supply curve* shows the relationship between the aggregate price level and the quantity of aggregate output supplied in the economy

The *short-run aggregate supply curve (SRAS)* shows the relationship between the aggregate price level and the quantity of aggregate output supplied that exists in the short run, the time period when many production costs can be taken as fixed

Why is the short-run aggregate supply curve upward sloping?

**Sticky wages:**  $\uparrow$  Prices  $\Rightarrow$   $\uparrow$  Revenue but unchanged labor cost  $\downarrow$   
 $\Rightarrow$   $\uparrow$  Profit per unit of output  $\Rightarrow$   $\uparrow$  Output

The *long-run aggregate supply curve (LRAS)* shows the relationship between the aggregate price level and the quantity of aggregate output supplied that would exist if all prices, including nominal wages, were fully flexible

- **Potential Output:** the level of real GDP the economy would produce if all prices, including nominal wages, were fully flexible, and we were at full employment

### AD-AS Equilibrium

A *short-run equilibrium* occurs at the point where the AD curve intersects with the SRAS curve. A *long-run equilibrium* occurs when the AD, SRAS, and LRAS curve all intersect.

Only long-run equilibria are considered “stable”. That is, if we are in a short run equilibrium, the economy will always transition to a long-run equilibrium. This can occur in three ways:

1. **Self-Correcting Mechanism:** absent any action from the Fed or the government nominal wages will adjust in order to shift the SRAS curve back to a long run equilibrium

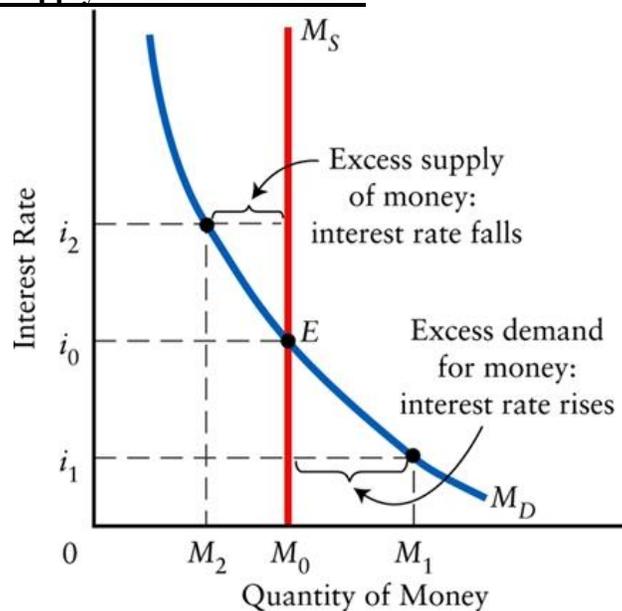
2. **Fiscal Policy:** *fiscal policy* refers to the use of government spending and taxes to stabilize the economy by shifting the AD curve. An increase in government spending or decrease in taxes (called *expansionary fiscal policy*) shifts the AD curve to the right; a decrease in spending or increase in taxes (*contractionary fiscal policy*) shifts the AD curve left

3. **Monetary Policy:** *monetary policy* refers to changes in the money supply by the Fed to stabilize the economy by shifting the AD curve. An increase in the money supply shifts the AD curve to the right; a decrease in the money supply shifts the curve to the left

### The Keynesian vs. the Classical Model

The biggest difference between the Keynesian and Classical model in the AD-AS model is that classical economists *do not believe in sticky wages*. As a result, there is no SRAS curve/the AS curve is always a vertical line at potential GDP. This implies that we are always in long run equilibrium, and that *fiscal/monetary policy have no impact on output, only on prices and/or private investment/spending*.

### Monetary Policy and Money Supply/Demand: A Primer



The *money demand curve* shows the relationship between the interest rate and the quantity of money demanded.

Why is the money demand curve downward sloping?

- Opportunity cost of holding money is the nominal interest rate
- $\uparrow$  nominal interest rate  $\Rightarrow$   $\uparrow$  opportunity cost of money  $\Rightarrow$   $\downarrow$  demand for money

The *money supply curve* shows the amount of currency supplied by the Fed

The Federal Reserve is able to increase or decrease the money supply in order to affect the interest rate and stabilize the economy. This is referred to as *monetary policy*. There are three ways the Fed can affect the money supply:

1. **Changing reserve requirements:** banks are required to keep a percentage of their deposits on hand at all times as *reserves*. This percent is given by the *reserve ratio*. By decreasing the reserve ratio, banks can lend more money, increasing the amount of currency in circulation leading to the creation of more checking deposits and thus a higher money supply. This also works in reverse. This process can be described mathematically by the money multiplier:

$$\text{Money Multiplier} = \frac{1}{RR}$$

$$\Delta \text{Money Supply} = \text{Money Multiplier} \times \text{Initial Deposit}$$

$$\Delta \text{Checking Deposits} = \text{Money Multiplier} \times \text{Initial Deposit} - \text{Initial Deposit}$$

2. **Changing the Discount Rate:** one of the key roles of the Fed is to act as the *lender of last resort*. When banks are in desperate need of currency, they can borrow funds from the Fed. The interest rate charged on these loans is the *discount rate*. By decreasing this number, the Fed can encourage banks to lend more money, which in turn increases the money supply as prescribed by the money multiplier.

3. **Open Market Operations:** This is the most commonly used form of monetary policy. In an *open-market operation*, the Fed buys or sells US Treasury Bills (T-Bills) to commercial banks in exchange for money. In an *open market sale*, the Fed sells T-Bills to the banks in exchange for currency, decreasing the money supply. In an *open market purchase*, the Fed buys T-Bills from the banks in exchange for currency, increasing the money supply. The new funds can be lent out, which further increases (or decreases in the case of a sale) the money supply via the money multiplier.

### Practice Questions

Use the following information for the next two (2) questions.

George's PPF for today is given by the equation below, where Y is the number of machines produced today, X is the quantity of perishable manna produced today, and M is the amount of machines he has at the beginning of the day which are used for production of X and Y:

$$PPF: Y = 4M - \frac{1}{2}X$$

The manna George produces must be consumed today while the additional machines that George produces today will be used in future days to produce either more manna or more machines. Tomorrow, the PPF will be the same but with an updated value of M (usable machines). Assume that machines once produced, last forever. Currently, George owns one machine.

1. If George produces and consumes 6 units of manna today, what is the maximum amount of manna he could consume tomorrow?

- a.) 6 units of manna
- b.) 8 units of manna
- c.) 16 units of manna
- d.) 24 units of manna

2. What is the opportunity cost of consuming manna today in terms of manna tomorrow? In other words, how much more manna could George have tomorrow if he foregoes one unit of manna today?

- a.) ½ additional units of manna tomorrow
- b.) 2 additional units of manna tomorrow
- c.) 4 additional units of manna tomorrow
- d.) 8 additional units of manna tomorrow

Use the following information for the next two (2) questions.

The demand and supply curves in the market for whiskey are given by the following equations:

$$Q^D = 120 - 3P$$

$$Q^S = 2P$$

Where Q is the quantity of whiskey in bottles and P is the price per bottle of whiskey. Suppose that the government in this economy has levied an excise tax of \$5 on the suppliers of whiskey.

3. Given the above information and holding everything else constant, what is the deadweight loss resulting from the imposition of this excise tax?

- a.) \$15      b.) \$24      c.) \$26      d.) \$30

4. The tax revenue received by the government due to the imposition of this excise tax is equal to

- a.) \$75      b.) \$120      c.) \$210      d.) \$250

5. Suppose that Dotty Dumplings made 2000 hamburgers in 2013. Now suppose that they plan to make 2000 hamburgers in 2014, but they also plan to increase their prices by 50%. How would we expect their contribution to GDP to change?

- a) Increase in nominal GDP; increase in real GDP  
 b) Increase in nominal GDP; no change in real GDP  
 c) Increase in nominal GDP; decrease in real GDP  
 d) No change in either nominal or real GDP

6. Given the following information, calculate the GDP Deflator for 2014 using 2013 as the base year and a scale factor of 100

Year	$P_x$	$Q_x$	$P_y$	$Q_y$
2013	20	5	10	2
2014	30	6	15	4

- a) 66.67      b) 100      c) 120      d) 150

7. Given your answer in the previous question, what is the inflation rate in this economy?

- a) 0%      b) 20%      c) -33%      d) 50%

8. Suppose the real GDP per capita of country Y grows at a constant rate of 7%. In addition, you are given the following snapshot of the state of the economy and the population in country Y:

Year	Real GDP per capita	Real GDP (in millions of dollars)	Population (in millions)
1990		5000	50
2010			100

What is the Real GDP per capita in 2010?

- a) \$20      b) \$200      c) \$400      d) Cannot be determined from the information given

9. Suppose that over time, the country of Agra switched from being an agriculturally-based economy to a technologically-based economy. As a result, many people lost their jobs because they lacked the skills to use the new technology. These people would be considered a part of the

- a. frictionally unemployed.  
 b. structurally unemployed.  
 c. cyclically unemployed.  
 d. discouraged workers.

10. Joe decided to quit his job at the University of Wisconsin DoIt Lab because he did not find the work challenging enough. Joe is currently looking for a better job. Therefore, Joe would be labeled as a
- frictionally unemployed.
  - structurally unemployed.
  - cyclically unemployed.
  - discouraged workers.

Use the following information to answer the next **THREE** questions:

In a closed economy, the following two equations characterize the market for loanable funds:

$$\text{Investment function (demand):} \quad Q^D = 1000 - 500r$$

$$\text{Savings function (supply):} \quad Q^S = 700 + 1000r$$

Here,  $r$  is the real interest rate expressed as a decimal (e.g. an interest rate of 10% would be 0.1 in the equation),  $S$  is savings and  $I$  is investment. Initially the government is running a balanced budget.

11. What is the equilibrium real interest rate and quantity of investment in the market?

- The equilibrium real interest rate is 5% and the equilibrium quantity of investment is \$900.
- The equilibrium real interest rate is 20% and the equilibrium quantity of investment is \$900.
- The equilibrium real interest rate is 15% and the equilibrium quantity of investment is \$1200.
- The equilibrium real interest rate is 25% and the equilibrium quantity of investment is \$1200.

12. Now suppose the government switches from running a balanced budget to running a budget deficit and has to finance this deficit by borrowing from the loanable funds market. As a result, the demand for loanable funds changes by \$150 at each level of the real interest rate. What is the new equilibrium real interest rate?

- 20%
- 25%
- 30%
- 50%

13. By how much is private investment spending crowded out as a result of the government deficit?

- \$25
- \$50
- \$75
- \$100

Use the following information to answer the next **TWO** questions:

The country of Middle Earth produces according to the production function  $Y = KL$ .

The labor market in Middle Earth is characterized by the following equations:

$$\text{Labor Demand:} \quad L^D = 100 - \frac{1}{4}w$$

$$\text{Labor Supply:} \quad L^S = \frac{1}{6}w$$

where  $w$  represents the market wage and  $L$  represents the quantity of labor in the market.

Suppose capital is forever fixed at 5 units in Middle Earth and notice that the equilibrium wage in this market is \$240.

14. If the labor market in Middle Earth is at equilibrium, what is the labor productivity at the equilibrium amount of labor?

- a) 2 units of output per unit of labor
- b) 3 units of output per unit of labor
- c) 4 units of output per unit of labor
- d) 5 units of output per unit of labor

15. Now suppose a big group of Hobbits from abroad migrate to Middle Earth, increasing the population of the country substantially. As a result, the labor supply in Middle Earth increases by 5 workers at each wage level. What is the new equilibrium level of output produced by Middle Earth?

- a) 215 units of output
- b) 197.5 units of output
- c) 150 units of output
- d) 100 units of output

The market basket in country C consists of 5 units of good X and 10 units of good Y. In the year 2050, the price of good X is \$10 and the price of good Y is \$5. In the year 2100, the price of good X is \$50 and the price of good Y is \$10.

16. What is the CPI in 2100 taking 2050 as the base year (using a scale factor of 100)?

- a) 150
- b) 350
- c) 200
- d) 120

17. An economy begins in its long-run equilibrium and then a negative demand shock causes aggregate GDP to fall below potential. What can the government do to get the economy back to its long-run equilibrium?

- a) Raise taxes
- b) Raise interest rates
- c) Raise government purchases
- d) Raise the minimum wage

18. An economy begins in its long-run equilibrium and then a negative demand shock causes aggregate GDP to fall below potential. With no government intervention, how will the economy transition back to potential GDP in the long run?

- a) Households will become wealthier, shifting aggregate demand back to the right.
- b) Commodity prices will fall, shifting aggregate demand back to the right.
- c) Productivity will fall, shifting short-run aggregate supply to the right.
- d) Nominal wages will fall, shifting short-run aggregate supply to the right.

19. If the economy is in long run equilibrium, a negative supply shock will

- a) Lead to inflation and lower output in the short run
- b) Lead to deflation and no change in output in the long run
- c) Lead to inflation and lower output in the long run
- d) Lead to deflation and lower output in the short run

20. Suppose the economy is in long run equilibrium. If the Fed engages in expansionary monetary policy:

- a) In the long run GDP increases and the price level increases
- b) In the long run GDP increases and the price level does not change

- c) In the long run neither GDP nor the price level changes
- d) In the long run GDP does not change and the price level increases

Use the following information for the next six (6) questions

$$\text{Money Supply: } M^S = 45000$$

$$\text{Money Demand: } M^D = 50000 - 20000r$$

$$\text{When } Y_D = Y - T = 10000, C = 13000$$

$$\text{When } Y_D = Y - T = 20000, C = 21000$$

$$I = 5600 - 8000r$$

$$G = 1500$$

$$T = 1500$$

$$NX = -900$$

$$Y_{FE} = 50000$$

21. What is the MPC in this economy?

- a) 1.25
- b) .8
- c) .75
- d) .6

22. What is the consumption function?

- a)  $C = 10000 + 1.25(Y - T)$
- b)  $C = 5000 + .75(Y - T)$
- c)  $C = 10000 + .75(Y - T)$
- d)  $C = 5000 + .8(Y - T)$

23. What is the equilibrium GDP in this economy?

- a) 75000
- b) 25000
- c) 40000
- d) 50000

24. Given the equilibrium GDP, what is the state of the economy?

- a) In an expansion
- b) In a recession
- c) Neither an expansion nor a recession
- d) Not enough information

25. Given the current state of the economy, what would occur if they tried to produce at full employment GDP?

- a) Inventories would increase, indicating that producers should reduce production, leading to decreased GDP
- b) Inventories would decrease, indicating that producers should increase production, leading to increased GDP
- c) The economy would be in equilibrium, leading to no change in GDP
- d) Not enough information

26. If the government wants to reach full employment GDP, how much does the government need to change its spending by?

- a) 2000
- b) 5000
- c) 0
- d) -5000

27. Suppose the economy is in a long-run equilibrium and a positive demand shock increases GDP above potential. Absent any government intervention, what would happen in this economy over the long-run?

- a) Prices and real GDP would decrease
- b) Prices and real GDP would increase
- c) Prices would increase, while GDP would decrease
- d) Prices would decrease, while GDP would increase

For the following **three** questions, consider the scenario below:

John and Lora are the only two individuals living on the island of Calypso. They own a garden with apple trees and berry bushes. Once a year they need to harvest their fruits. The following table shows how many berries and apples each individual can harvest **per hour**.

	John	Lora
Berries	200	100
Apples	50	75

28. Which of the following statements is true?

- a) Lora has the absolute advantage in harvesting apples, and John has the absolute advantage in harvesting berries.
- b) Lora has the absolute advantage in harvesting both apples and berries.
- c) John has the absolute advantage in harvesting apples, and Lora has the absolute advantage in harvesting berries.
- d) John has the absolute advantage in harvesting both apples and berries.

29. John's opportunity costs of harvesting 40 berries are

- a) 4 apples
- b) 10 apples
- c) 20 apples
- d) 40 apples

30. If John and Lora specialize,

- a) John should harvest apples and Lora should harvest berries.
- b) Lora should harvest apples and John should harvest berries.
- c) John should harvest both apples and berries.
- d) Lora should harvest both apples and berries.

Use the following information to answer the next two (2) questions.

Montrovia is a small, closed economy that produces tires. The domestic demand and domestic supply of tires in Montrovia is given by the following equations where P is the price per unit and Q is the quantity of tires:

Domestic Demand:  $P = 500 - (5/1000)Q$

Domestic Supply:  $P = 100 + (1/600)Q$

You are also told that the world price for tires is \$150 per tire.

31. Suppose Montrovia is considering opening its tire market to international trade. Holding everything else constant, which of the following statements is true?

- a) If Montrovia opens its tire market to trade, Montrovia will import 40,000 tires and domestic producers in Montrovia will favor this policy change.
- b) If Montrovia opens its tire market to trade, Montrovia will import 70,000 tires and domestic consumers in Montrovia will favor this policy change.
- c) If Montrovia opens its tire market to trade, Montrovia will export 40,000 tires and domestic consumers in Montrovia will favor this policy change.
- d) None of the above answers is correct.

32. Suppose Montrovia opens its tire market to international trade while simultaneously the government of Montrovia implements a tariff that raises the price per tire to \$180. Holding everything else constant, the amount of tariff revenue the government earns from this tariff will equal?

- a) \$480,000
- b) \$16,000
- c) \$2,880,000
- d) \$1,800,000