

Chapter 4 Lecture Notes

I. Circular Flow Model Revisited

Recall that the circular flow model is a simplified representation of how the economy operates. There are two specific individual decision making units: (1) households and (2) firms and these units interact with each other in two markets: (1) the input market and (2) the output market. The **input market** (also called factor markets) is the market for factors of production. There are markets for land, markets for capital and markets for labor. In the input market it is the households that supply the inputs, and it is the firms that demand inputs to produce goods. Firms pay to get inputs, while households receive money as they supply their inputs. The **output market** (also called product market) is the market for goods and services. In this market it is the firm that supplies the output, while the households demand output. Consumers pay money to the factor market in order to purchase output, and that money is received by firms.

Both firms and households face decisions in this market system

Firms must decide

- (1) How much output to supply in the product market?
- (2) How much input to demand in the factor market?

While households must decide

- (3) How much output to demand in the product market
- (4) How much input to supply in the factor market.

In this chapter we will focus on questions (1) and (3).

II. Demand in Product Markets

What determines how much of a good will be demanded by households? There are several possible determining factors that could play a role in the household decision. These could include:

- (1) The price of the product
- (2) Income/Wealth of the household
- (3) Prices of other products
- (4) Consumer tastes and preferences
- (5) Expectations of future income, wealth and prices
- (6) Total number of buyers

However, the relationship that we're most interested in is the relationship between the price of the product and quantity demanded. Quantity demanded (q^d) is the total amount that a household would buy in a given period (if it could buy all it wanted) at a given price. It is this relationship between price and quantity demanded that we want to

examine in isolation. In order to isolate the effect on one variable on another, we have to hold all other variables fixed (“ceteris paribus”)

It turns out that changes in price will affect the quantity demanded. While changes in other factors, such as income or preferences, will affect demand. We will make clear the distinction between this subtle difference shortly.

A. The Law of Demand

To illustrate the relationship between price and quantity demanded we first present a **demand schedule**. The schedule shows the quantity of a good that a household would be willing to purchase at different price levels.

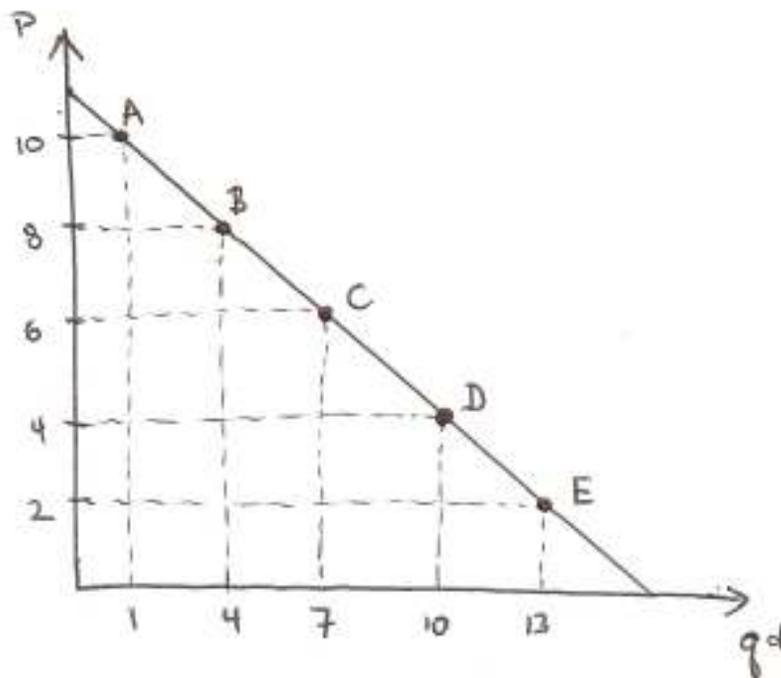
Table 1 shows a hypothetical demand schedule for Al for pizzas.

Table 1: Al’s Demand Schedule for Pizza

Point	Price	q^d
A	\$10	1
B	\$8	4
C	\$6	7
D	\$4	10
E	\$2	13

We oftentimes present the demand schedule graphically. When we do so it is called a **demand curve**. By convention we plot price on the y-axis and quantity demanded on the x-axis. Figure 2 show’s Al demand curve for pizza.

Figure 2: Al’s Demand Curve



As can be seen in Figure 2, there is a negative relationship between prices and quantity demanded. When prices go up, the quantity demanded falls (*ceteris paribus*), and when prices fall, the quantity demanded rises. The demand curve always slopes downward. This negative relationship between prices and quantity demanded is called the **law of demand**.

B. Other Determinants of Demand

1. Income and Wealth Let's first define what we mean by income and wealth. **Income** is the sum of all household wages, salaries, interest, etc... that are earned in a given period of time. Income is what we call a flow measure because we must specify a time period. **Wealth**, on the other hand, is the total value of what a household owns net what it owes. It is a stock measure because it is measured at a given point in time. We would expect that households with higher incomes and/or higher wealth can afford to buy more goods and services if the good is **normal**. A **normal good** is a good for which demand increases when income is higher, and which demand decreases if income is lower. Most goods are normal goods.

There are however a group of goods in which households would *demand less* when their income rises, and would *demand more* when their income falls. These types of goods are called **inferior goods**. Examples of inferior goods are typically harder to find. Some good examples are long bus rides. When households have low income, they might only be able to afford a trip from San Francisco to Los Angeles on a bus. However, when their income rises they will demand less bus rides and start flying more. Foods such as Ramen noodles or spam may also decrease as income increases.

To summarize:

For normal goods

Income/wealth ↑	Demand ↑
Income/wealth ↓	Demand ↓

For inferior goods

Income/wealth ↑	Demand ↓
Income/wealth ↓	Demand ↑

2. Prices of Other Goods

Sometimes a change in the prices of other goods can have an effect on the quantity demanded of a particular good.

Goods are **substitutes** if they serve as a replacement for each other. Suppose goods X and Y are substitutes. Then an increase in the price of good X will cause the demand for good Y to increase. Conversely, a decrease in the price of good X will cause the demand for good Y to decrease. Coke and Pepsi are good examples of substitutes. If the price of Coke were to suddenly double, we would expect that the demand for Pepsi would increase as a result.

Goods are **complements** if they “go together”. Several examples can include hot dogs and hot dog buns, PCs and printers and Blu-Rays and Blu-Ray players. Suppose good X and good Y are complements. An increase in the price of good X will cause a decrease in the demand for good Y. On the other hand, a decrease in the price of good X will cause an increase in the demand for good Y. As an example, if the price of hot dogs double, we would expect the demand for hot dog buns to decrease.

To summarize:

For substitutes

Price of Good X ↑	Demand for Good Y ↑
Price of Good X ↓	Demand for Good Y ↓

For complements

Price of Good X ↑	Demand for Good Y ↓
Price of Good X ↓	Demand for Good Y ↑

3. Tastes and Preferences

Changes in tastes and preferences can cause demand to change. For example, suppose the Food and Drug Agency issued a report showing that diet Sodas are a leading cause of cancer. How do you suppose that would affect demand? We would expect that such a report would adversely affect consumer preferences for diet sodas and there will be a sharp decrease in the demand for diet sodas.

4. Expectations of future income, wealth, and prices

Expectations of the future can affect household decisions today. Households that expect higher income in the future would probably spend more today and thus demand should increase. For example, imagine that you expect to get \$500 for your birthday. Even though your birthday is not for another month, you might go to the store and purchase goods today because you expect your wealth to increase by \$500 one month from now. Obviously, expectations of higher future income or wealth will cause demand to increase today. While, expectations of lower future income or wealth will cause demand to decrease today.

Expectation of price changes will cause demand to shift as well. For example, if you believed that the price of cars will drop in the near future, it would make sense to delay the purchase of buying a car until the price drops. Thus an expectation of lower price in the future will cause demand today to decrease. Conversely, an expectation of higher price in the future will cause demand to increase today.

C. Shift of Demand Curve vs. Movement Along the Curve

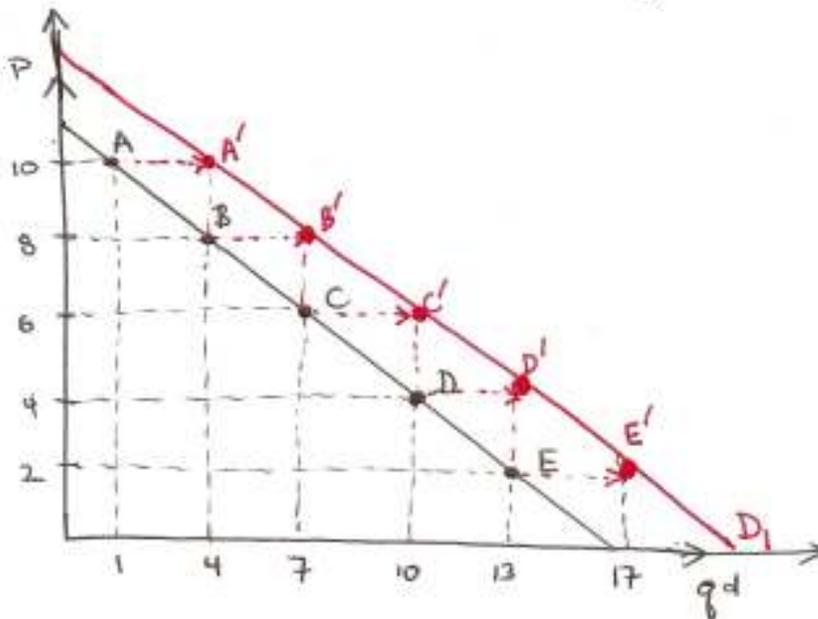
We have already seen that when price increases or decreases this will have an effect on *quantity demanded*. For example, refer back to Figure 2 which showed Al’s demand curve for pizza. We see that if the price of pizza went from \$6 to \$8, Al will move from Point C to Point B and his quantity demanded would decrease from 7 pizzas to 4 pizzas. In this example, Al has **moved along his demand curve**. What if some other factor changed? Suppose that Al saw an increase in income. We have already argued that an

increase in income will lead to an increase in demand. If the price of pizza was \$6, Al would demand more pizza than he did before his income went up. This will be true at every possible price level. An increase in income will result in a new demand schedule for Al and hence a new demand curve.

Table 2: Al's Initial and New Demand Schedule for Pizza after an increase in income

Point	Price	q^d (Initial Demand)	q^d (New Demand)
A	\$10	1	4
B	\$8	4	7
C	\$6	7	10
D	\$4	10	13
E	\$2	13	17

Figure 3: Al's New Demand Curve



We see that when another variable other than price changes this will mean an entirely different demand schedule and an entirely different demand curve. In Figure 3 we illustrate this by the demand curve shifting to the right.

This leads to two important points.

- (1) Changes in the price of a good will lead to a change in quantity demanded (**movement along the demand curve**).
- (2) Changes in any other factors (income, wealth, prices of other goods, tastes, expectations) will result in a change in demand (**shift the demand curve**).
 - a. When demand increases the demand curve will shift to the right
 - b. When demand decreases the demand curve will shift to the left

Tables 3a and 3b summarize what will cause the demand curve to shift either to the right or the left. Instead of trying to memorize each scenario, think about why the demand curve would shift if the given variable changes.

Table 3a: Increases in Demand will Shift the Demand Curve to the Right

Variable	Increases/Decreases
Income with normal good	↑
Income with inferior good	↓
Price of substitute good	↑
Price of complementary good	↓
Consumer preference for good	↑
Expected future price	↑

Table 3b: Decreases in Demand will Shift the Demand Curve to the Left

Variable	Increases/Decreases
Income with normal good	↓
Income with inferior good	↑
Price of substitute good	↓
Price of complementary good	↑
Consumer preference for good	↓
Expected future price	↓

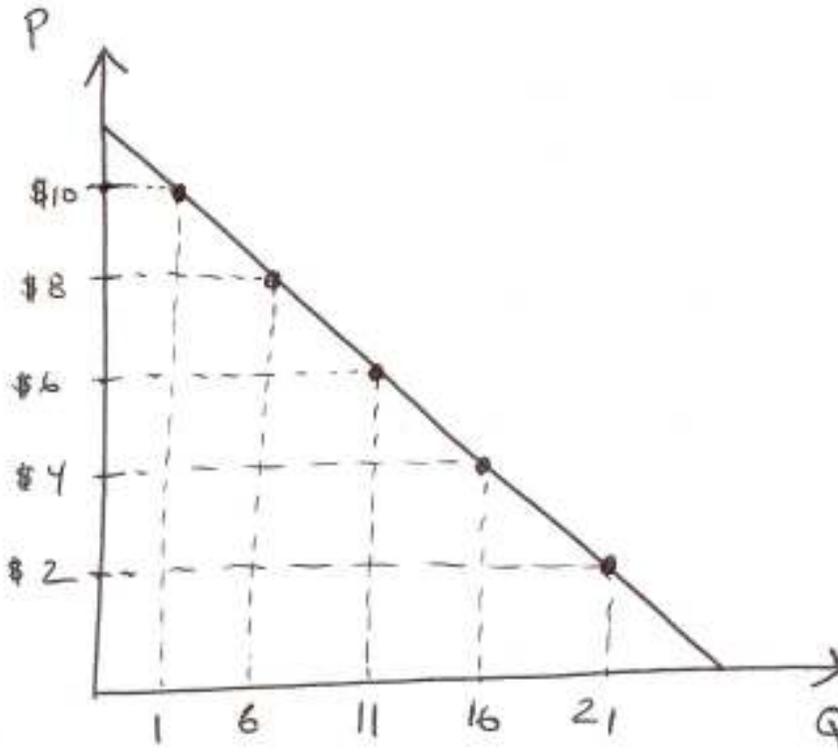
D. Market Demand Curve

In our example so far we have examined the demand schedule and demand curve for one individual. There are millions of individuals in the economy each with his or her own demand schedule. A **market demand curve** is simply a graphical representation of a demand schedule that adds up all the quantity demanded by all households at a given price. Let's return to Al's original demand schedule that we showed in Table 1. For the sake of simplicity, suppose that there is only 1 additional person in the economy named Bea who also has a demand schedule for pizza. Table 4 shows the two individual demand schedules and the market demand schedule.

Table 4: Market Demand Schedule

Price	q^d (Al)	q^d (Bea)	Market Demand
\$10	1	0	$1+0 = 1$
\$8	4	2	$4+2 = 6$
\$6	7	4	$7 + 4 = 11$
\$4	10	6	$10 + 6 = 16$
\$2	13	8	$13 + 8 = 21$

Figure 4: Market Demand Curve



III. Supply in Product Markets

Now we turn the other side of the equation and look at how firms make decisions on how much output to produce. Although there are many variables that factor in the decision, there is one overriding goal that most firms try to achieve and that is to maximize **profit**.

Here we will define profit as total revenue – total costs.

With that in mind here is a short list of variables that could affect the supply decision for a firm:

- (1) Price of the product
- (2) Cost of inputs (cost of labor, cost of capital, cost of land)
- (3) Technology
- (4) Producer's expectations about future prices
- (5) Number of Producers

As with demand the relationship we are most interested in is the relationship between price of the product and quantity supplied. **Quantity supplied** is the amount of a good that a firm would be willing to sell at a given price. In studying the relationship between price and quantity supplied, we will be holding all other factors that might affect supply constant (*ceteris paribus* assumption).

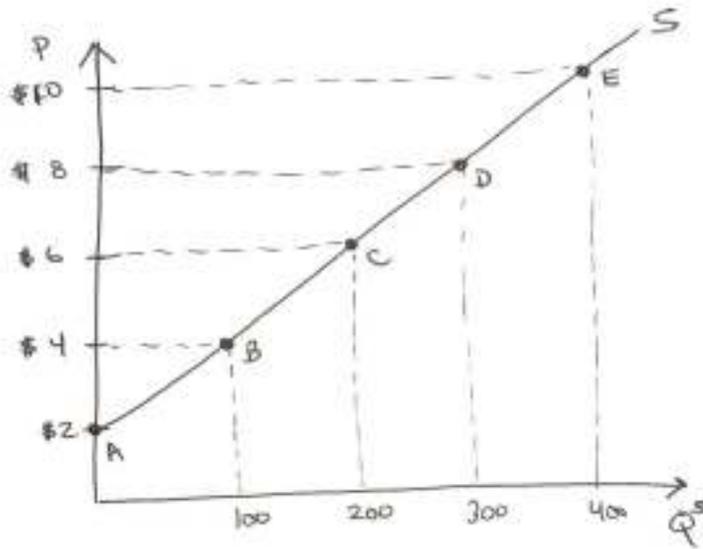
A. Law of Supply

A **supply schedule** shows how much a firm would be willing to produce at given price levels. A **supply curve** is a graphical representation of a supply schedule. Table 5 shows a representative supply schedule for a pizza firm, while Figure 5 shows the supply curve for the Pizzeria.

Table 5: Pizzeria Uno's Supply Schedule for Pizza

Point	Price	q^s
A	\$2	0
B	\$4	100
C	\$6	200
D	\$8	300
E	\$10	400

Figure 5: Pizzeria Uno's Supply Curve



Note the positive relationship between price and quantity supplied. An increase in the market price will lead to an increase in quantity supplied, while a decrease in the market price will lead to a decrease in the quantity supplied. The supply curve is drawn upward with a positive slope. This relationship between price and quantity supplied is called the **law of supply**.

B. Other Determinants of Supply

1. **Costs of Inputs:** A change in the cost of inputs will affect the firm's supply decision. For example, suppose that wages were to decline. This would have the effect of decreasing the cost of production for the firm. Since total costs have decreased, pizza production becomes more profitable at any given price levels. The pizzeria should then be able to supply more pizza at the given prices. The opposite will be true if costs of inputs were to increase.

2. **Technology:** A change in technology has the same effect as a change in the cost of inputs. An improvement of technology allows firms to save on labor or capital costs since they will be able to produce more goods with the same amount of labor and capital. Technological improvement will lead to a decline in costs and thus an increase in supply.

3. **Producer Expectations about Future Prices:** Suppose that firms believe that next month's price will be lower than today's price. In other words they will get less for their

products next month than they would this month. We would expect firms to supply more today to take advantage of the higher prices before they fall.

4. Number of Producers: Since the market supply curve is the sum of the quantity supplied for all producers in an economy, an increase in the number of producers will increase market supply.

C. Shift of Supply Curve vs. Movement Along the Curve

Just like demand, when the price of a product changes, *ceteris paribus*, there will be a change in the quantity supplied. We will see **movement along the supply curve.** When other factors other than price changes (input prices, technology, taxes, expected prices, number of producers) then we will see a **shift in the supply curve.**

When we say the supply curve “increases” we generally mean that the cost of production has decreased and the firm can supply more. We show this by shifting the supply curve downward and to the right. When the supply curve “decreases”, the cost of production has increased and the firm can supply less. We show this scenario by shifting the supply curve upward and to the left.

Tables 6(a) and 6(b) summarizes the factors that would cause the supply curve to shift either upwards or downwards

Table 6a: Changes in Supply will Shift the Supply Curve Downward and to the Right

Variable	Increases/Decreases
Cost of Inputs (land, labor or capital)	↓
Technological Advance	↑
Number of Producers	↑
Expected future price	↓

Table 6b: Changes in Supply will Shift the Supply Curve Upward and to the Left

Variable	Increases/Decreases
Cost of Inputs (land, labor or capital)	↑
Technological Advance	↓
Number of Producers	↓
Expected future price	↑

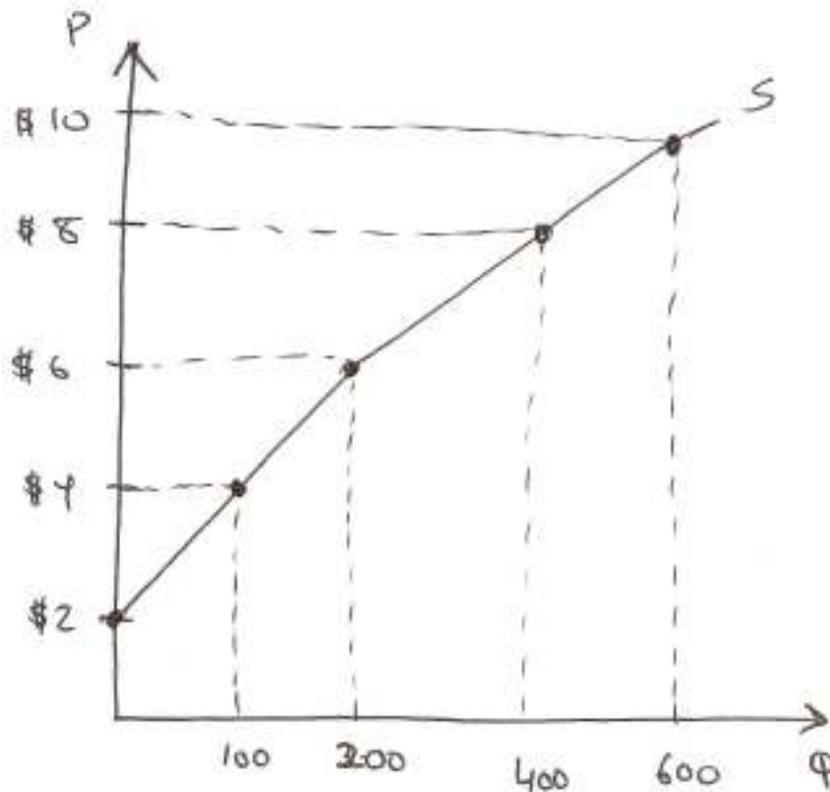
D. Market Supply Curve

The **market supply curve** is derived by adding the individual supply curves of all the firms in a particular market. It is the sum of all the individual quantity supplied at each given price. For example, suppose that there were two pizza firms providing pizza. Pizzeria Uno and Domino’s. Table 7 shows each firm’s individual demand schedule and the market demand schedule.

Table 7: Market Supply Schedule

Price	q^s (Pizzeria Uno)	q^s (Dominos)	Market Supply (Q^s)
\$2	0	0	$0+0 = 0$
\$4	100	0	$100 + 0 = 100$
\$6	200	0	$200 + 0 = 200$
\$8	300	100	$300 + 100 = 400$
\$10	400	200	$400 + 200 = 600$

Figure 7: Market Supply Curve



IV. Market Equilibrium

So far we have looked at how two side of the product market (demand and supply) have worked. Now we bring the two sides of the market together to show how market prices and quantities are determined.

Let's examine the market supply and demand for pizza. Table 8(a) and (b) show hypothetical market demand and supply schedules.

Table 8(a): Hypothetical market demand schedule for pizzas.

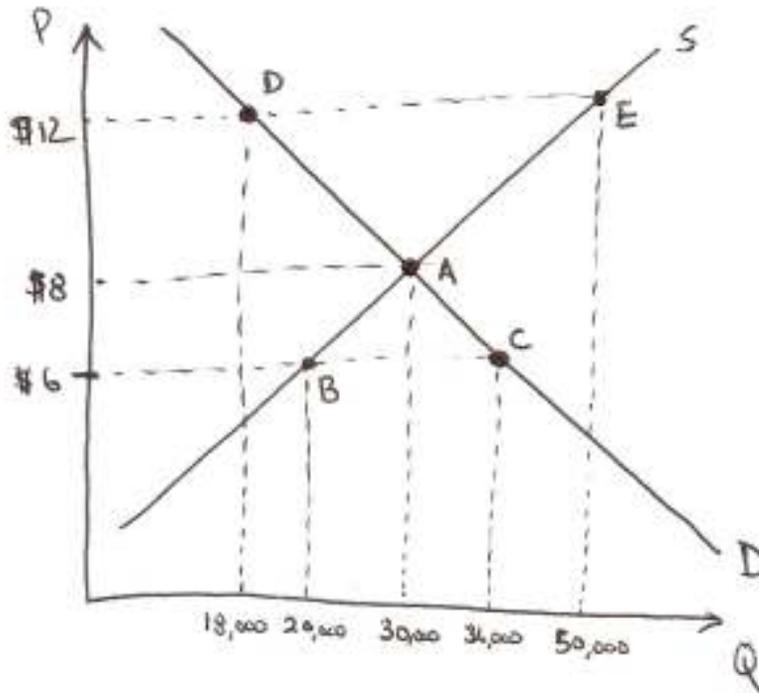
Point	Price	Quantity Demanded
D	\$12	18,000
A	\$8	30,000
C	\$6	36,000

Table 8(b): Hypothetical market supply schedule for pizzas.

Point	Price	Quantity Supplied
E	\$12	50,000
A	\$8	30,000
B	\$6	20,000

Figure 8 shows graphically what would happen if we drew the market supply and demand schedules together.

Figure 8: Market Supply and Demand Curves

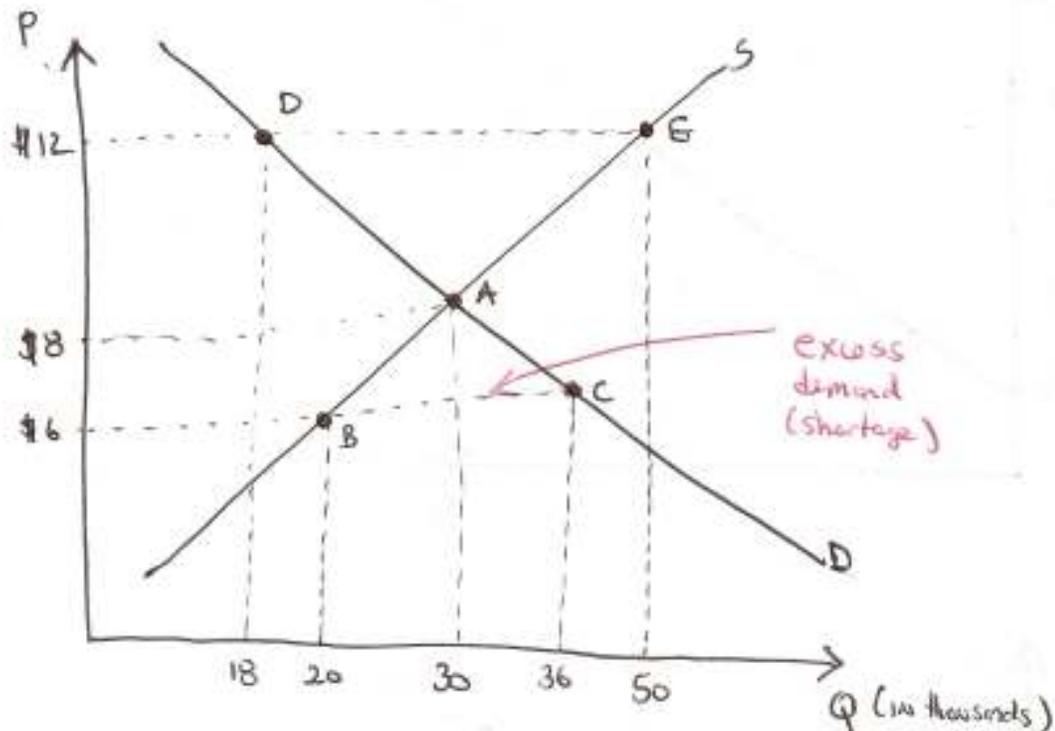


We will now look at three scenarios

A. Excess Demand ($Q^d > Q^s$)

Suppose the price for pizzas was \$6. Looking at the demand and supply schedules we see that at \$6, firms will supply 20,000 pizzas (Point B) while households will demand 36,000 pizzas (Point C). A situation where at the prevailing market price the quantity demanded is greater than the quantity supplied is called **excess demand**. Excess demand is also called a **shortage**. Figure 9 shows the shortage.

Figure 9: Excess Demand



In Figure 9 we can see that the shortage is equal to 16,000 pizzas. This shortage will cause the price of pizza to rise. Firms will increase the price they charge for their limited supply of pizza, and anxious consumers will pay higher prices to get one of the fewer pizzas available. As the price increases, the excess demand shrinks for two reasons:

- (1) As price increases, the market moves upward along the demand curve (from Point C to Point A), decreasing the quantity demanded.
- (2) As price increases, the market moves upward along the supply curve (from Point B to Point A), increasing the quantity supplied.

The price will **continue to rise** until excess demand is eliminated (Point A).

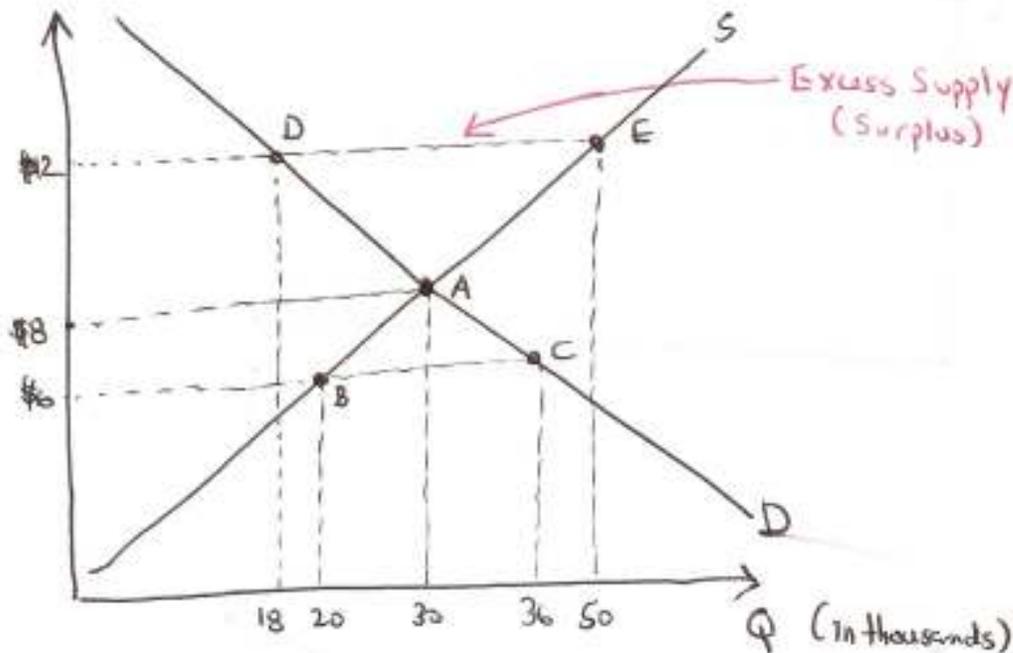
B. Excess Supply ($Q^d < Q^s$)

What happens if the price for pizza is \$12? Looking at the supply and demand curves in Figure 9 we see that the quantity demanded at \$12 will be 18,000 pizzas (Point D) while the quantity supplied at that price will be 50,000 pizzas. A situation where the quantity supplied is greater than the quantity demanded is called an **excess supply (or surplus)**. In this example the surplus will be 32,000 pizzas. This mismatch will cause the price of pizzas to fall. Firms will have a lot of leftover pizzas and rather than letting them go to waste will start cutting prices. As prices fall, excess supply will fall because:

- (1) As prices decrease, the market moves downward along the demand curve (from Point D to Point A), increasing the quantity demanded
- (2) As prices decrease, the market moves downward along the supply curve (from Point E to Point A), decreasing the quantity supplied.

The price will **continue to fall** until excess supply is eliminated. See Figure 10

Figure 10: Excess Supply



C. Market Equilibrium ($Q^d = Q^s$)

Suppose the market price for pizza is \$8. We can see that at \$8 the quantity demanded of pizzas is equal to 30,000 pizzas, while the quantity supplied is equal to 30,000 pizzas. When the quantity demanded of a product equals the quantity supplied at a given price we have reached **market equilibrium**. At the market equilibrium there will be no pressure to change the price. This is illustrated in Point A. Market equilibrium price will be \$8 and the equilibrium quantity will be 30,000.

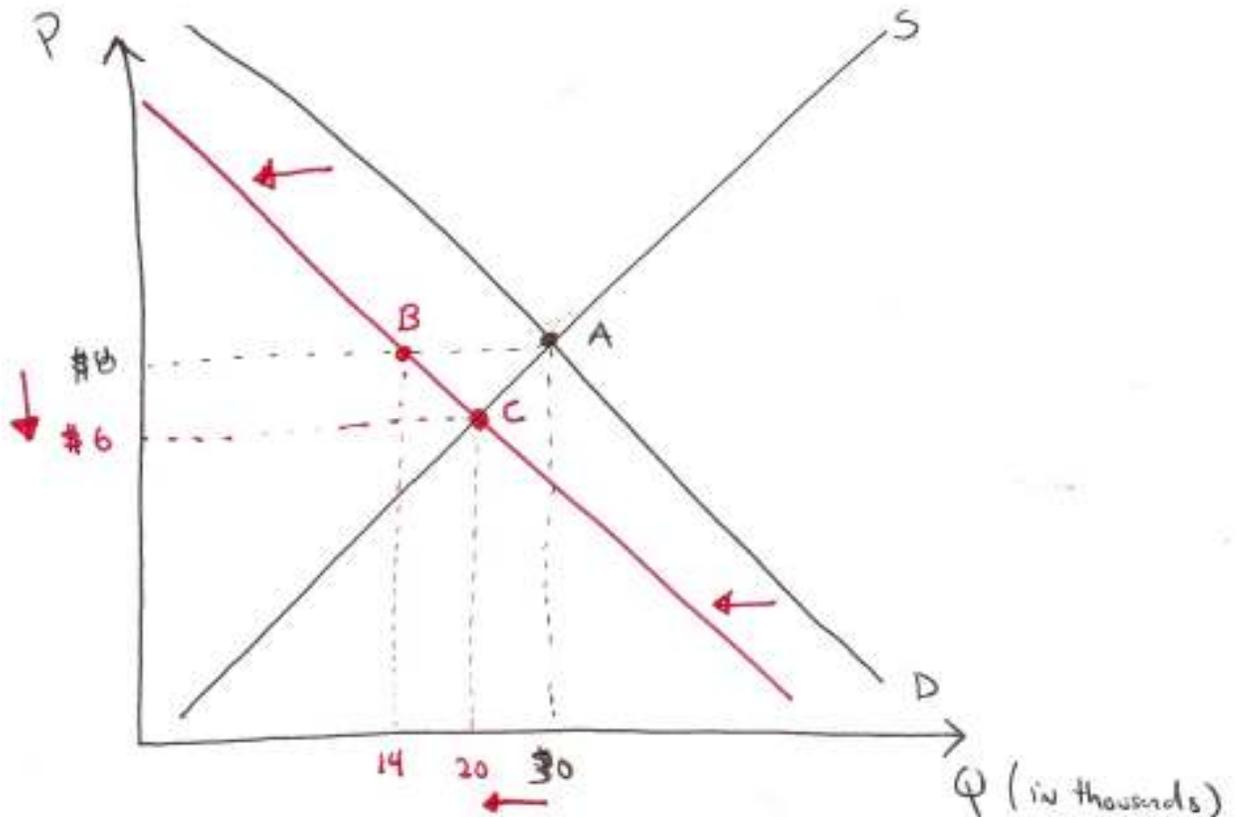
V. Shifts in Supply and Demand: Effect on Market Equilibrium

A. **Change in Demand**

Let us examine how a change in demand will affect equilibrium price and equilibrium quantity. Let's assume that pizza is a normal good and that households are seeing a reduction in income due to the recession. How will this affect price and quantity?

Suppose the market was initially at equilibrium at Point A. At Point A, the price of pizza was \$8 and the quantity of pizza was 30,000. Now suppose that income decreases for households. As we saw earlier, this will cause the demand curve to shift to the left. At \$8, the new quantity demanded will be 14,000 (Point B), while the quantity supplied will remain unchanged at 30,000. Now because of the decrease in demand we have excess supply at \$8. The market price cannot stay at that level for long. Prices will fall and will continue to fall until quantity supplied equals quantity demanded (Point C). At Point C, the equilibrium price is now \$6, while the equilibrium quantity is at 20,000. A decrease in demand has resulted in **lower equilibrium price and quantity**.

Figure 11: Change in Demand



B. Change in Supply

Let's now see how changes in supply can affect equilibrium price and quantity. Suppose that input costs for firms were to increase. Higher wages, for example, will increase the costs for pizza firms and we should see the supply curve decrease (shift upward to the left). This is illustrated in Figure 12. We start at initial equilibrium at Point A. At that point equilibrium price is at \$8 and equilibrium quantity is at 30,000. Now the supply curve shifts to the left. At the original \$8 price, the quantity supplied is now equal to 14,000 while the quantity demanded remains at 30,000. We now have a shortage (excess demand) of 16,000. Prices must increase until we reach equilibrium. The new equilibrium is where the demand curve intersects the new supply curve (Point C). At Point C, equilibrium price is **higher than before, and quantity is now lower.**

Practice Problems

C. Simultaneous Change in Supply and Demand

It is possible that supply and demand could shift simultaneously. If they shift in the same direction then the equilibrium quantity will certainly change in the same direction. That is if both the supply and demand curve shifts to the right, equilibrium quantity will rise, whereas if both the supply and demand curve shifts to the left, equilibrium quantity will fall. The direction of equilibrium price however is uncertain. Equilibrium price change will depend on whether the supply or demand curve shifted more.

If the curves shift in opposite directions, then the equilibrium price will certainly change, but the effect on equilibrium quantity will be unclear. For example, if supply decreases (shift to the left), but demand increases (shifts to the right) the equilibrium price will definitely increase, but the effect on equilibrium quantity will be unclear. Similarly, if supply increases (shifts to the right), but demand decreases (shifts to the left), the equilibrium price will definitely decrease. You should draw several examples on your own to show that these statements hold true.

Table 9 summarizes the effect of shifts in Supply and Demand on price and quantity (only 1 curve shifting).

Table 9

Change in Demand/Supply	Change in Equilibrium Price	Change in Equilibrium Quantity
Increase in Demand	↑	↑
Decrease in Demand	↓	↓
Increase in Supply	↓	↑
Decrease in Supply	↑	↓