3.E: Demand and Supply (Exercises)

3.1: Demand, Supply, and Equilibrium in Markets for Goods and Services

Self-Check Questions

Q1

Review Figure 3.1.3. Suppose the price of gasoline is \( \$1.60 \) per gallon. Is the quantity demanded higher or lower than at the equilibrium price of \( \$1.40 \) per gallon? And what about the quantity supplied? Is there a shortage or a surplus in the market? If so, of how much?

Review Questions

Q2

What determines the level of prices in a market?
Q3
What does a downward-sloping demand curve mean about how buyers in a market will react to a higher price?

Q4
Will demand curves have the same exact shape in all markets? If not, how will they differ?

Q5
Will supply curves have the same shape in all markets? If not, how will they differ?

Q6
What is the relationship between quantity demanded and quantity supplied at equilibrium? What is the relationship when there is a shortage? What is the relationship when there is a surplus?

Q7
How can you locate the equilibrium point on a demand and supply graph?

Q8
If the price is above the equilibrium level, would you predict a surplus or a shortage? If the price is below the equilibrium level, would you predict a surplus or a shortage? Why?

Q9
When the price is above the equilibrium, explain how market forces move the market price to equilibrium. Do the same when the price is below the equilibrium.

Q10
What is the difference between the demand and the quantity demanded of a product, say milk? Explain in words and show the difference on a graph with a demand curve for milk.

Q11
What is the difference between the supply and the quantity supplied of a product, say milk? Explain in words and show the difference on a graph with the supply curve for milk.

Critical Thinking Questions
Q12

Review Figure 3.1.3. Suppose the government decided that, since gasoline is a necessity, its price should be legally capped at \(1.30\) per gallon. What do you anticipate would be the outcome in the gasoline market?

Q13

Explain why the following statement is false: “In the goods market, no buyer would be willing to pay more than the equilibrium price.”

Q14

Explain why the following statement is false: “In the goods market, no seller would be willing to sell for less than the equilibrium price.”

Problems

Q15

Review Figure 3.1.3 again. Suppose the price of gasoline is \(1.00\). Will the quantity demanded be lower or higher than at the equilibrium price of \(1.40\) per gallon? Will the quantity supplied be lower or higher? Is there a shortage or a surplus in the market? If so, of how much?

Solution

S1

Since \(1.60\) per gallon is above the equilibrium price, the quantity demanded would be lower at \(550\) gallons and the quantity supplied would be higher at \(640\) gallons. (These results are due to the laws of demand and supply, respectively.) The outcome of lower \(Q_d\) and higher \(Q_s\) would be a surplus in the gasoline market of \(640 - 550 = 90\) gallons.

3.2: Shifts in Demand and Supply for Goods and Services
Self-Check Questions

Q1

Why do economists use the *ceteris paribus* assumption?

Q2

In an analysis of the market for paint, an economist discovers the facts listed below. State whether each of these changes will affect supply or demand, and in what direction.

a. There have recently been some important cost-saving inventions in the technology for making paint.

b. Paint is lasting longer, so that property owners need not repaint as often.

c. Because of severe hailstorms, many people need to repaint now.

d. The hailstorms damaged several factories that make paint, forcing them to close down for several months.

Q3

Many changes are affecting the market for oil. Predict how each of the following events will affect the equilibrium price and quantity in the market for oil. In each case, state how the event will affect the supply and demand diagram. Create a sketch of the diagram if necessary.

a. Cars are becoming more fuel efficient, and therefore get more miles to the gallon.

b. The winter is exceptionally cold.

c. A major discovery of new oil is made off the coast of Norway.

d. The economies of some major oil-using nations, like Japan, slow down.

e. A war in the Middle East disrupts oil-pumping schedules.

f. Landlords install additional insulation in buildings.

g. The price of solar energy falls dramatically.

h. Chemical companies invent a new, popular kind of plastic made from oil.

Review Questions
Q4
When analyzing a market, how do economists deal with the problem that many factors that affect the market are changing at the same time?

Q5
Name some factors that can cause a shift in the demand curve in markets for goods and services.

Q6
Name some factors that can cause a shift in the supply curve in markets for goods and services.

Critical Thinking Questions

Q7
Consider the demand for hamburgers. If the price of a substitute good (for example, hot dogs) increases and the price of a complement good (for example, hamburger buns) increases, can you tell for sure what will happen to the demand for hamburgers? Why or why not? Illustrate your answer with a graph.

Q8
How do you suppose the demographics of an aging population of “Baby Boomers” in the United States will affect the demand for milk? Justify your answer.

Q9
We know that a change in the price of a product causes a movement along the demand curve. Suppose consumers believe that prices will be rising in the future. How will that affect demand for the product in the present? Can you show this graphically?

Q10
Suppose there is soda tax to curb obesity. What should a reduction in the soda tax do to the supply of sodas and to the equilibrium price and quantity? Can you show this graphically? *Hint:* assume that the soda tax is collected from the sellers
## Problems

### Q11

Table below shows information on the demand and supply for bicycles, where the quantities of bicycles are measured in thousands.

<table>
<thead>
<tr>
<th>Price</th>
<th>( Q_d )</th>
<th>( Q_s )</th>
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<td>56</td>
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<tr>
<td>$240</td>
<td>24</td>
<td>70</td>
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</tbody>
</table>

a. What is the quantity demanded and the quantity supplied at a price of \( \$210 \)?

b. At what price is the quantity supplied equal to \( (48,000) \)?

c. Graph the demand and supply curve for bicycles. How can you determine the equilibrium price and quantity from the graph? How can you determine the equilibrium price and quantity from the table? What are the equilibrium price and equilibrium quantity?

d. If the price was \( \$120 \), what would the quantities demanded and supplied be? Would a shortage or surplus exist? If so, how large would the shortage or surplus be?

### Q12

The computer market in recent years has seen many more computers sell at much lower prices. What shift in demand or supply is most likely to explain this outcome? Sketch a demand and supply diagram and explain your reasoning for each.

a. A rise in demand

b. A fall in demand

c. A rise in supply

d. A fall in supply

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**Solution**

https://socialsci.libretexts.org/Bookshelves/Economics/Book%3A_Microeconomics_(OpenStax)/03%3A_Demand_and_Supply...
S1

To make it easier to analyze complex problems, Ceteris paribus allows you to look at the effect of one factor at a time on what it is you are trying to analyze. When you have analyzed all the factors individually, you add the results together to get the final answer.

S2

a. An improvement in technology that reduces the cost of production will cause an increase in supply. Alternatively, you can think of this as a reduction in price necessary for firms to supply any quantity. Either way, this can be shown as a rightward (or downward) shift in the supply curve.

b. An improvement in product quality is treated as an increase in tastes or preferences, meaning consumers demand more paint at any price level, so demand increases or shifts to the right. If this seems counterintuitive, note that demand in the future for the longer-lasting paint will fall, since consumers are essentially shifting demand from the future to the present.

c. An increase in need causes an increase in demand or a rightward shift in the demand curve.

d. Factory damage means that firms are unable to supply as much in the present. Technically, this is an increase in the cost of production. Either way you look at it, the supply curve shifts to the left.

S3

a. More fuel-efficient cars means there is less need for gasoline. This causes a leftward shift in the demand for gasoline and thus oil. Since the demand curve is shifting down the supply curve, the equilibrium price and quantity both fall.

b. Cold weather increases the need for heating oil. This causes a rightward shift in the demand for heating oil and thus oil. Since the demand curve is shifting up the supply curve, the equilibrium price and quantity both rise.

c. A discovery of new oil will make oil more abundant. This can be shown as a rightward shift in the supply curve, which will cause a decrease in the equilibrium price along with an increase in the equilibrium quantity. (The supply curve shifts down the demand curve, so price and quantity follow the law of demand. If price goes down, then the quantity goes up.)

d. When an economy slows down, it produces less output and demands less input, including energy, which is used in the production of virtually everything. A decrease in demand for energy will be reflected as a decrease in the demand for oil, or a leftward shift in demand for oil. Since the demand curve is shifting down the supply curve, both the equilibrium price and quantity of oil will fall.

e. Disruption of oil pumping will reduce the supply of oil. This leftward shift in the supply curve will show a movement up the demand curve, resulting in an increase in the equilibrium price of oil and a decrease in the equilibrium quantity.

f. Increased insulation will decrease the demand for heating. This leftward shift in the demand for oil causes a movement down the supply curve, resulting in a decrease in the equilibrium price and quantity of oil.

g. Solar energy is a substitute for oil-based energy. So if solar energy becomes cheaper, the demand for oil will decrease as consumers switch from oil to solar. The decrease in demand for oil will be shown as a leftward shift in the demand curve. As the demand curve shifts down the supply curve, both equilibrium price and quantity for oil will fall.
h. A new, popular kind of plastic will increase the demand for oil. The increase in demand will be shown as a rightward shift in demand, raising the equilibrium price and quantity of oil.

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### 3.3: Changes in Equilibrium Price and Quantity: The Four-Step Process

#### Self-Check Questions

**Q1**

Let's think about the market for air travel. From August 2014 to January 2015, the price of jet fuel decreased roughly 47%. Using the four-step analysis, how do you think this fuel price decrease affected the equilibrium price and quantity of air travel?

**Q2**

A tariff is a tax on imported goods. Suppose the U.S. government cuts the tariff on imported flat screen televisions. Using the four-step analysis, how do you think the tariff reduction will affect the equilibrium price and quantity of flat screen TVs?

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### Review Questions

**Q3**

How does one analyze a market where both demand and supply shift?

**Q4**

What causes a movement along the demand curve? What causes a movement along the supply curve?

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### Critical Thinking Questions


Q5

Use the four-step process to analyze the impact of the advent of the iPod (or other portable digital music players) on the equilibrium price and quantity of the Sony Walkman (or other portable audio cassette players).

Q6

Use the four-step process to analyze the impact of a reduction in tariffs on imports of iPods on the equilibrium price and quantity of Sony Walkman-type products.

Q7

Suppose both of these events took place at the same time. Combine your analyses of the impacts of the iPod and the tariff reduction to determine the likely impact on the equilibrium price and quantity of Sony Walkman-type products. Show your answer graphically.

Problems

Q8

Demand and supply in the market for cheddar cheese is illustrated in Table below. Graph the data and find the equilibrium. Next, create a table showing the change in quantity demanded or quantity supplied, and a graph of the new equilibrium, in each of the following situations:

a. The price of milk, a key input for cheese production, rises, so that the supply decreases by 80 pounds at every price.

b. A new study says that eating cheese is good for your health, so that demand increases by 20% at every price.

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<td>$3.80</td>
<td>600</td>
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</table>
Supply and demand for movie tickets in a city are shown in Table below. Graph demand and supply and identify the equilibrium. Then calculate in a table and graph the effect of the following two changes.

a. Three new nightclubs open. They offer decent bands and have no cover charge, but make their money by selling food and drink. As a result, demand for movie tickets falls by six units at every price.

b. The city eliminates a tax that it had been placing on all local entertainment businesses. The result is that the quantity supplied of movies at any given price increases by 10%.

<table>
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<td>$9.00</td>
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Solution

S1

Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.

Step 2. Did the economic event affect supply or demand? Jet fuel is a cost of producing air travel, so an increase in jet fuel price affects supply.

Step 3. An increase in the price of jet fuel caused a decrease in the cost of air travel. We show this as a downward or rightward shift in supply.

Step 4. A rightward shift in supply causes a movement down the demand curve, lowering the equilibrium price of air travel and increasing the equilibrium quantity.
S2

Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.

Step 2. Did the economic event affect supply or demand? A tariff is treated like a cost of production, so this affects supply.

Step 3. A tariff reduction is equivalent to a decrease in the cost of production, which we can show as a rightward (or downward) shift in supply.

Step 4. A rightward shift in supply causes a movement down the demand curve, lowering the equilibrium price and raising the equilibrium quantity.

3.4: Price Ceilings and Price Floors

Self-Check Questions

Q1

What is the effect of a price ceiling on the quantity demanded of the product? What is the effect of a price ceiling on the quantity supplied? Why exactly does a price ceiling cause a shortage?

Q2

Does a price ceiling change the equilibrium price?

Q3

What would be the impact of imposing a price floor below the equilibrium price?

Review Questions
Q4
Does a price ceiling attempt to make a price higher or lower?

Q5
How does a price ceiling set below the equilibrium level affect quantity demanded and quantity supplied?

Q6
Does a price floor attempt to make a price higher or lower?

Q7
How does a price floor set above the equilibrium level affect quantity demanded and quantity supplied?

Critical Thinking Questions

Q8
Most government policy decisions have winners and losers. What are the effects of raising the minimum wage? It is more complex than simply producers lose and workers gain. Who are the winners and who are the losers, and what exactly do they win and lose? To what extent does the policy change achieve its goals?

Q9
Agricultural price supports result in governments holding large inventories of agricultural products. Why do you think the government cannot simply give the products away to poor people?

Q10
Can you propose a policy that would induce the market to supply more rental housing units?
A low-income country decides to set a price ceiling on bread so it can make sure that bread is affordable to the poor. The conditions of demand and supply are given in Table below. What are the equilibrium price and equilibrium quantity before the price ceiling? What will the excess demand or the shortage (that is, quantity demanded minus quantity supplied) be if the price ceiling is set at \(\$2.40\)? At \(\$2.00\)? At \(\$3.60\)?

<table>
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</tbody>
</table>

**Solution**

**S1**

A price ceiling (which is below the equilibrium price) will cause the quantity demanded to rise and the quantity supplied to fall. This is why a price ceiling creates a shortage.

**S2**

A price ceiling is just a legal restriction. Equilibrium is an economic condition. People may or may not obey the price ceiling, so the actual price may be at or above the price ceiling, but the price ceiling does not change the equilibrium price.

**S3**

A price ceiling is a legal maximum price, but a price floor is a legal minimum price and, consequently, it would leave
room for the price to rise to its equilibrium level. In other words, a price floor below equilibrium will not be binding and will have no effect.

3.5: Demand, Supply, and Efficiency

Self-Check Questions

Q1
Does a price ceiling increase or decrease the number of transactions in a market? Why? What about a price floor?

Q2
If a price floor benefits producers, why does a price floor reduce social surplus?

Review Questions

Q3
What is consumer surplus? How is it illustrated on a demand and supply diagram?

Q4
What is producer surplus? How is it illustrated on a demand and supply diagram?

Q5
What is total surplus? How is it illustrated on a demand and supply diagram?

Q6
What is the relationship between total surplus and economic efficiency?
Q7
What is deadweight loss?

Critical Thinking Questions

Q8
What term would an economist use to describe what happens when a shopper gets a "good deal" on a product?

Q9
Explain why voluntary transactions improve social welfare.

Q10
Why would a free market never operate at a quantity greater than the equilibrium quantity? Hint: What would be required for a transaction to occur at that quantity?

Solution

S1
Assuming that people obey the price ceiling, the market price will be below equilibrium, which means that $Q_d$ will be more than $Q_s$. Buyers can only buy what is offered for sale, so the number of transactions will fall to $Q_s$. This is easy to see graphically. By analogous reasoning, with a price floor the market price will be above the equilibrium price, so $Q_d$ will be less than $Q_s$. Since the limit on transactions here is demand, the number of transactions will fall to $Q_d$. Note that because both price floors and price ceilings reduce the number of transactions, social surplus is less.

S2
Because the losses to consumers are greater than the benefits to producers, so the net effect is negative. Since the lost consumer surplus is greater than the additional producer surplus, social surplus falls.