

# Elements of Microeconomics: TA Session

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# Demand

**Quantity demanded:** the amount of a good that buyers are willing and able to purchase *at a certain price*

**Demand:** a schedule showing the quantity of a good that buyers are willing and able to purchase *at each price* (i.e. the position of the demand curve)

**Law of demand:** Other things being equal, the quantity demanded of a good falls when its price rises

- ▶ The demand curve is downward sloping

# Supply

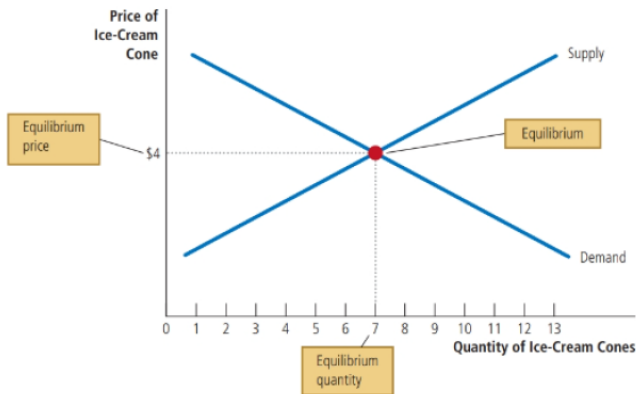
**Quantity supplied:** the amount of a good that sellers are willing and able to sell *at a certain price*

**Demand:** a schedule showing the quantity of a good that sellers are willing and able to sell *at each price* (i.e. the position of the supply curve)

**Law of supply:** Other things being equal, the quantity supplied of a good rises when its price rises

- ▶ The supply curve is upward sloping

# Supply, demand, and equilibrium



**Law of supply and demand:** the price of any good adjusts to bring the quantity supplied and the quantity demanded of that good into balance

# Comparative statics

How does hotter weather change the equilibrium in the ice cream market?

**Comparative statics:** The determination of the changes in the endogenous variables of a model (e.g. equilibrium price and quantity of ice cream) that that will result from a change in the exogenous variables or parameters (e.g. weather) of that model

- ▶ In comparative statics, we care about how the new equilibrium differs from the old one, but not how exactly the economy gets there

# Three steps in comparative statics

1. Determine whether the event shifts the supply curve, the demand curve, or both
2. Determine whether the curve(s) shift to the left or the right
3. Use the supply-and-demand diagram to locate the new equilibrium and compare it to the old one

# Supply and demand in the gasoline market

In the first half of 2022, U.S. retail gasoline prices rose to record high. Use a supply-and-demand diagram to show whether the following changes can explain the rise.

1. As Covid lockdowns eased, people were travelling much more
2. Tensions rose in major oil-producing countries such as Russia and Iran
3. Vast oil reserves were discovered off the South American coast

# Supply and demand in the gasoline market

In the first half of 2022, U.S. retail gasoline prices rose to record high. Use a supply-and-demand diagram to show whether the following changes can explain the rise.

4. U.S. economic recovery increased people's income
5. Gasoline price were low in 2021, which elevated demand
6. A series of electric vehicle (EV) crashes made people more averse to EVs



# Supply and demand in the gas market - explained

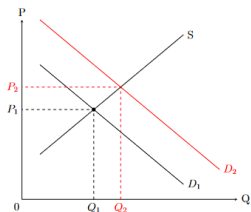


Figure 1: Demand increases

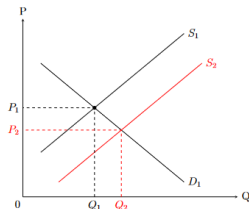


Figure 3: Supply increases

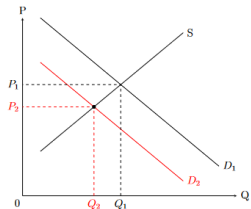


Figure 2: Demand decreases

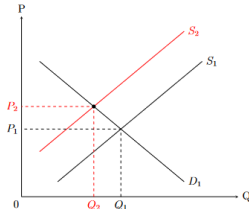


Figure 4: Supply decreases

# Supply and demand in the gas market - explained

Now for the solutions:

1. Yes. People are travelling more, which increases the demand for gasoline, as in Figure 1 of the previous slide. Equilibrium price and quantity both rise.
2. Yes. Tensions in oil-producing countries decrease the supply of gasoline, as in Figure 4. Equilibrium price rises, and quantity falls.
3. No. New oil reserves increase gasoline supply, as in Figure 3. Equilibrium price falls and quantity rises.

## Supply and demand in the gas market - explained

4. This depends on whether gasoline is a normal good or an inferior good. If it's a normal good, demand rises with income, as in Figure 1. Equilibrium price and quantity rise. If it's an inferior good, demand falls when income rises, as in Figure 2. Equilibrium price and quantity fall.
5. No. Low gasoline prices in the past resulted in an increase in the quantity demanded, not a rightward shift in the demand curve. For the equilibrium to change from 2021 to 2022, something must happen to either the supply curve or the demand curve or both, which is not the case with this question. Therefore, low gas prices in 2021 cannot explain the high prices in 2022.
6. Yes. EVs and gasoline vehicles are substitutes. People don't like EVs as much, which means the demand for gasoline vehicles rises. Gasoline vehicles and gasoline are compliments, which means the demand for gasoline rises, as in Figure 1. Equilibrium price and quantity rises.

# Math problems related to market equilibrium

The demand and supply functions of a good are given by:

$$Q_d = 110 - 5P$$

$$Q_s = 6P$$

where  $P$ ,  $Q_d$  and  $Q_s$  denote price, quantity demanded and quantity supplied respectively.

1. Find the inverse demand and supply functions
2. Find the equilibrium price and quantity
3. Is there a shortage or a surplus at the price of 13? What is the amount of shortage/surplus?

# Math problems related to market equilibrium - explained

1. The demand function could be rewritten as  $5P = 110 - Q_d$ , which gives the inverse demand function:  $P = 22 - \frac{1}{5}Q_d$ . The inverse supply function is  $P = \frac{1}{6}Q_s$ .
2. At equilibrium, quantity supplied equals quantity demanded,  $Q_d = Q_s$ . We have  $Q_d = 110 - 5P = 6P = Q_s$ . Solving for  $P$ , we get  $P^* = 10$ . Then,  $Q^* = 110 - 5P^* = 6P^* = 60$ .
3. At a price of 13, quantity demanded is  $Q_d = 110 - 5 \times 13 = 45$ , quantity supplied is  $Q_s = 6 \times 13 = 78$ . Quantity supplied exceeds quantity demanded, so there is a surplus of the good. The amount of the surplus is  $Q_s - Q_d = 78 - 45 = 33$ .

# Multiple changes to supply and demand

Suppose the market for apples was in equilibrium. Then two things happened simultaneously: (1) the end of a drought resulted in a better apple harvest, (2) new research discovers apples' additional benefits to health. Compare the new equilibrium with the old one:

1. How does the equilibrium quantity change?
2. How does the equilibrium price change?

## Multiple changes to supply and demand - explained

A better apple harvest increases supply of apples, and the new research increases demand. An increase in supply tends to increase equilibrium quantity and decrease equilibrium price (see Figure 3), and an increase in demand tends to increase both equilibrium quantity and price (see Figure 1). As both changes tend to increase equilibrium quantity, the overall effect is that equilibrium quantity rises.

## Multiple changes to supply and demand - explained

The effect on equilibrium price seems ambiguous; it depends on the relative magnitude of the increase in supply vs. the increase in demand. If there is a large increase in demand and a small increase in supply, equilibrium price will rise (see Figure 5 on the next slide). If there is a small increase in demand and a large increase in supply, equilibrium price will fall (see Figure 6 on the next slide).



# Multiple changes to supply and demand - explained

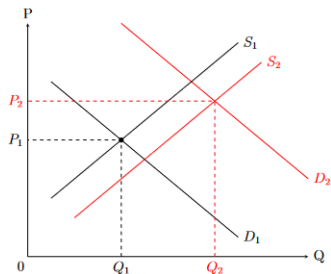


Figure 5: Large increase in demand, small increase in supply

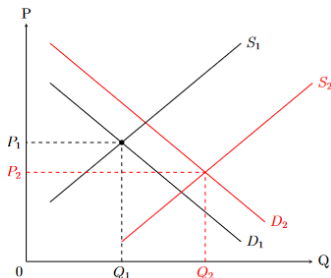


Figure 6: Large increase in supply, small increase in demand