Perfectly Competitive Market Model

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Markets

- **Market**: any arrangement that enables a group of buyers and sellers of a particular product to do business with each other.
- **Competitive Market**:A market with many buyers and sellers, each has a negligible effect on price.
- In a perfectly competitive market:
  - All goods exactly the same
  - Buyers & sellers so numerous that no one can affect market price– each is a "price taker"

Demand

- comes from the behavior of buyers
- If you demand something, then
  1. Want it
  2. Can afford it and
  3. Have made a definite plan to buy it.
- Wants are the unlimited desires or wishes people have for goods and services.
- Demand reflects a decision about which wants to satisfy.
- Among other things, price is a key factor affecting this decision.

Law of Demand

- Quantity Demanded - amount of a good that a consumer is willing and able to buy.
- What do you expect the relationship between the price of a good and its quantity demanded?
- Other things remaining the same, the higher the price of a good, the smaller is the quantity demanded.

Law of Demand

Ceteris Paribus, there exists a negative relationship between the price of a good and its quantity demanded.

Demand Function

Demand Function

A demand schedule specifies the quantities demanded at each price when all the other influences on consumers' planned purchases remain the same(or *ceteris paribus*)

$$Q_D = f(\mathrm{P})$$

where Q_D is quantity demanded and P is price.

Demand Curve

A demand curve shows the graphic relationship between the quantity demanded of a good and its price when all the other influences on consumers' planned purchases remain the same(or *ceteris paribus*)

The convention is to plot inverse demand function, that is, $P = g(Q_D)$

Reasons for negative relationship between price of a good and its quantity demanded

When the price falls, other things remaining constant, consumers are willing and able to buy greater quantities and hence quantity demanded increases.

1. (Negative) Substitution Effect
2. (Negative) Income Effect

Substitution Effect

The change in the quantity demanded of a good that results from a change in price, making a good more or less expensive relative to other goods .i.e. its relative price increases.

Income Effect

The change in the quantity demanded of a good that results from the effect of a change in the good's price on consumer's purchasing power.

Market demand schedule(resp. curve)

Obtained by the horizontal summation of all buyer' demand schedules(resp. curves)

Price	**Buyer 1**	**Buyer 2**	**Market demand**
5	10	0	
4	20	15	
3	30	30	
2	40	45	
1	50	60	

Practice Problem

Suppose there are only two buyers for pizza: Alex and Ben. Alex's (inverse) demand function for pizza is:

$$P^A = \frac{20 - Q_D^A}{5}$$

Ben's demand function for pizza is:

$$Q_D^B = 15 - 3P^B$$

for $P \leq 5$ and 0 otherwise.

1. If price of pizza is \$4.5, what is the total amount demanded by Alex?
2. If price of pizza is \$3, what is the total amount demanded by Ben?
3. If price of pizza is \$3, what is the total amount demanded in the market?
4. Derive the market demand function for pizza.
5. Graph the individual and market demand functions.

Supply

- comes from the behavior of sellers
- If a firm supplies something, then
  1. has the resources and technology to produce it
  2. can profit from producing it
  3. have definite plans to produce it and sell it
- Supply is more than just having the resources and technology to produce the good.
- Supply reflects a decision about which technologically feasible items to produce.
- Among other things, price is a key factor affecting this decision.

Law of Supply

- Quantity Supplied - amount of a good that a producer is willing and able to sell.
- What do you expect the relationship between the price of a good and its quantity supplied?
- Other things remaining the same, the higher the price of a good, the higher is the quantity supplied; and the lower is the price of a good, the lower is the quantity supplied.

Law of Supply

Ceteris Paribus, there exists a positive relationship between the price of a good and its quantity supplied.

Supply Schedule

Supply Schedule

A supply schedule lists the quantities supplied at each price when all the other influences on producers' planned sales remain the same(or *ceteris paribus*)

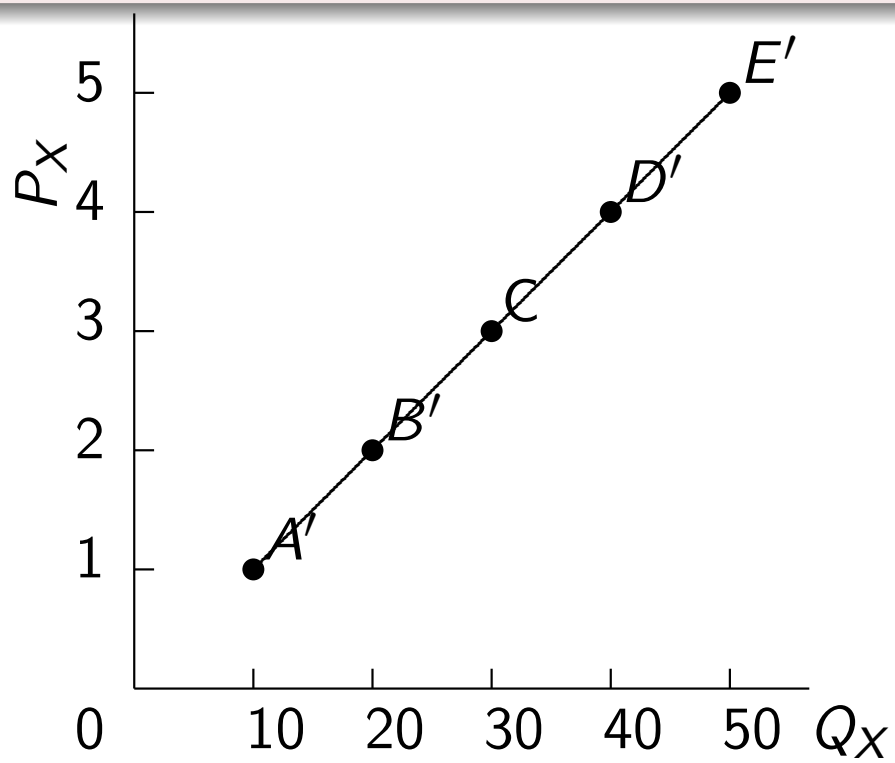
Example:

Price of Good X	**Quantity Supplied of Good X**
5	50
4	40
3	30
2	20
1	10

Supply Curve

Supply Curve

A supply curve shows the graphic relationship between the quantity supplied of a good and its price when all the other influences on producers' planned sales remain the same(or *ceteris paribus*)

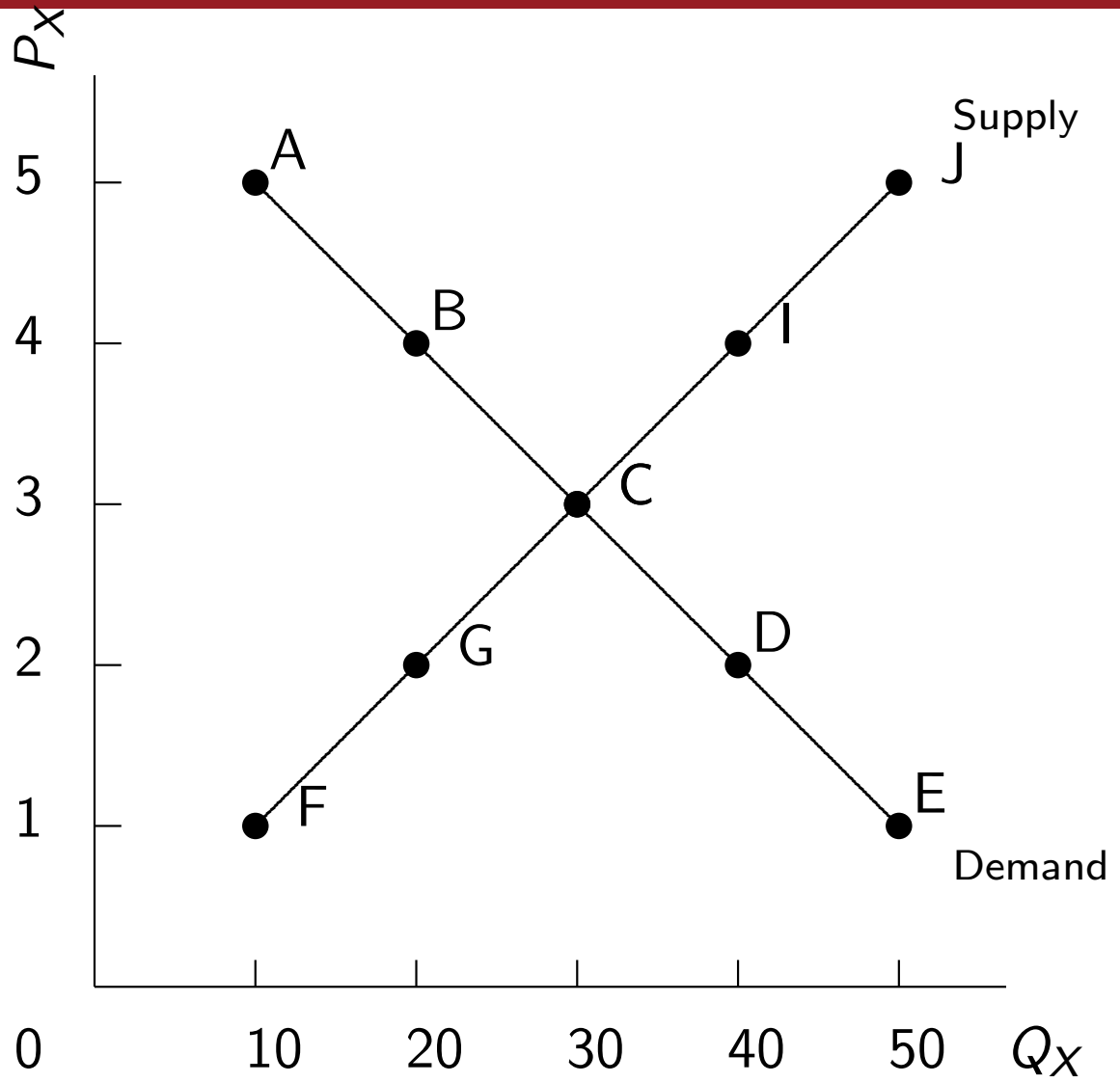


Market supply schedule(resp. curve)

Obtained by the horizontal summation of all firms' supply schedules(resp. curves)

Price	**Firm 1**	**Firm 2**	**Market supply**
5	50	55	
4	40	45	
3	30	35	
2	20	25	
1	10	15	

Demand-Supply interaction



Shortage and Surplus

Shortage/Excess demand

Condition under which quantity demanded exceeds quantity supplied. In this case $Q_d - Q_s > 0$.

Surplus/Excess supply

Condition under which quantity supplied exceeds quantity demanded. In this case $Q_d - Q_s < 0$.

Market equilibrium

Equilibrium is a situation in which opposing forces balance each other.

Equilibrium

Equilibrium is defined as the condition that exists when total quantity supplied in a market and total quantity demanded in a market are equal.

- At this point, there is no tendency for price to change.
- At this point, quantity demanded equals quantity supplied.

Equilibrium Price

Price at which the quantity demanded equals quantity supplied.

Equilibrium Quantity

Quantity bought and sold at the equilibrium price.

Mathematical Representation of a Demand-Supply model

$$Q_D(P) = a - bP(a, b > 0)$$
$$Q_S(P) = -c + dP(c, d > 0)$$

The equilibrium price P^* solves the condition:

$$Q_D(P^*) = Q_S(P^*)$$

Practice Problems

Consider a market with the following demand and supply functions. Find P^* and Q^*

- $$Q_D = 51 - 3P$$
  $$Q_S = 6P - 10$$

- $$Q_D = 3 - P^2$$
  $$Q_S = 6P - 4$$

Determinants of demand

A non-exhaustive list of factors that affect the quantity of the product that buyers are willing and able to buy is:

- Price of the product in question
- Prices of other relevant products
- Income and wealth
- Tastes and preferences
- Expectations about future income, wealth, and prices

Demand of a good and Price of a related good

Substitutes

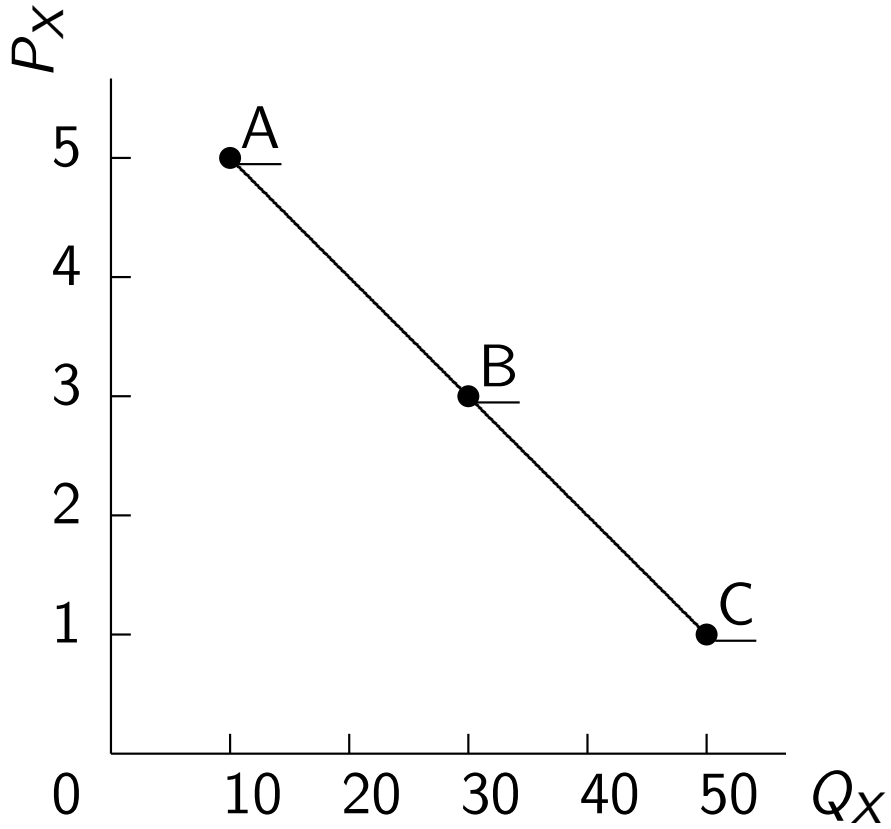
- One good can be used in place of the other
- Example: Butter and margarine, pens and pencils, coke and pepsi
- Question: Suppose the price of Coke decreases, what happens to the demand for Pepsi?
- a change in the price of one causes a shift in the demand for the other in the **same** direction as the price change

Complements

- Both goods are used in conjunction with one another
- Example: hamburgers and fries, desktop computers and printers
- Question: Suppose the price of Coffee increases, what happens to the demand for Sugar?
- a change in the price of one causes a shift in the demand for the other in the **opposite** direction as the price change

Movement along demand curve

Demand Curve displays the relationship between price of a product and its quantity demanded

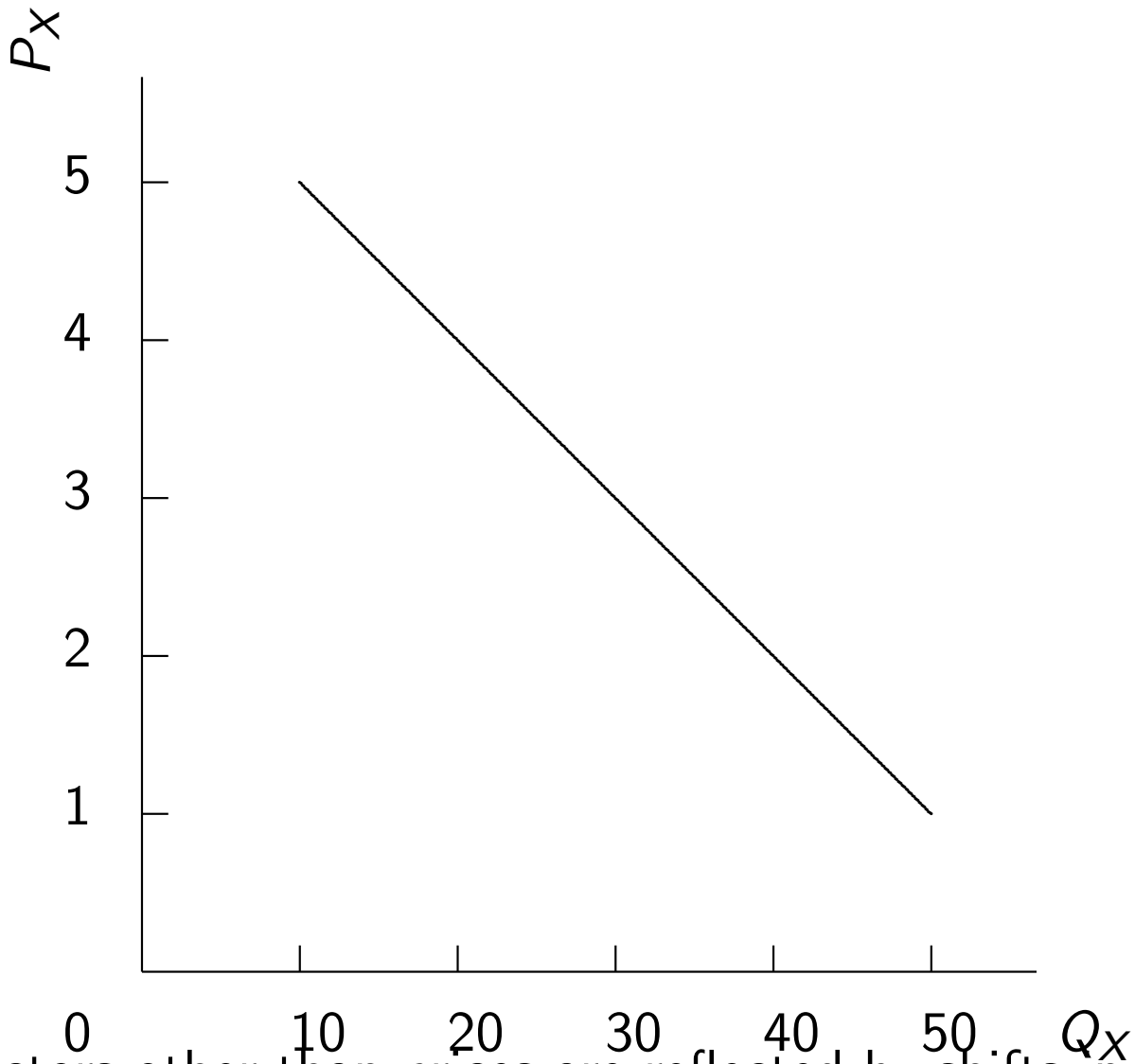


- Changes in product's own prices will be depicted by a movement along the curve.

Ceteris Paribus Assumption

- In order to graph the relationship between two variables (like price and quantity demanded) with one curve, you must make the *ceteris paribus* assumption.
- If you allow one of the other factors, that were previously held constant to change, the curve will shift.
- The new curve represents the relationship between the primary variables (like price and quantity demanded), holding constant all other relevant factors at their new levels.

Shifts in demand curve



Change in factors other than prices are reflected by shifts in the curve.

Difference between Demand and Quantity Demanded

- Demand refers to the entire relationship between the price of a good and the quantity demanded of that good. It is illustrated by demand curve and demand schedule, ceteris paribus.
- Change in demand occurs when this relationship between the price of a good and the quantity demanded at that price changes
- Reflected by a **shift** in the demand curve
- An increase (resp. decrease) in demand causes a rightward (resp. leftward) shift of the demand curve

- The quantity demanded of a good or service is the amount that consumers plan to buy during a particular time period, and at a particular price.
- Change in quantity demanded refers to the change in buying plans of consumer, when **only** the price of the good changes.
- Reflected by a movement **along** the demand curve.
- An increase (resp. decrease) in quantity demanded results in a downward (resp. upward) movement along the demand

Demand of a good and Income of the individual

Normal goods

- Goods for which demand rises when income rises
- Example: Demand for air travel
- Question: Suppose that guitar strings are a normal good for Alex. This year, he graduated from college and his income has doubled. What is likely to happen to his demand for guitar strings?
- a change in income causes a shift in the demand of the good in the **same** direction as the income change

Inferior goods

- Goods for which demand falls when income rises
- Example: Demand for long distance bus travel
- Question: Suppose that ramen noodles are a inferior good for Alex. This year, he graduated from college and his income has doubled. What is likely to happen to his demand for ramen noodles ?
- a change in income causes a shift in the demand of the good in the **opposite** direction as the income change

Other determinants of demand

- Expectations about future income, wealth, and prices
  - If prices are expected to increase in the future, the consumer may decide to buy the good earlier (increase consumption today and decrease consumption in the future).
  - If the consumer is uncertain about future income, they may decide to save money and forgo consumption of major expenditures.
- Tastes and Preferences
  - how much the consumer likes a particular product may change over time depending on factors like weather, information, fashion, etc.

Practice Problems

1. Consider the market for restaurant meals. Use a demand and supply graph to predict the market effects of an increase in consumer income.

2. The market for posters is given by the following demand and supply curves:

$$Q_D = I - 10000P$$
$$Q_S = -35000 + 15000P$$

where I is the monthly budget that an average firm spends on posters. Find the equilibrium price and quantity of posters as a function of I. Calculate the change in P^* and Q^* when I changes from 65000 to 75000.

Impact of changes in demand on equilibrium

	Price	Quantity
Increase in demand	Increases	Increases
Decreases in demand	Decreases	Decreases

We can use this knowledge about market behavior for

- Predicting Changes: When demand changes, both price and quantity move in **same** direction.
- Explaining Changes: If equilibrium price and quantity move in same direction, the changes were caused by a change in demand

Determinants of supply

A non-exhaustive list of factors that affect the quantity of the product that sellers are willing and able to sell is:

- Price of the product in question
- Prices of factors of production
- Prices of other related products
- Technology
- Expectations about future and prices

Difference between Supply and Quantity supplied

- Supply refers to the entire relationship between the price of a good and the quantity supplied of that good. It is illustrated by supply curve and supply schedule, ceteris paribus.
- Change in supply occurs when this relationship between the price of a good and the quantity supplied at that price changes
- Reflected by a **shift** in the supply curve
- An increase (resp. decrease) in supply causes a rightward (resp. leftward) shift of the supply curve

- The quantity supplied of a good or service is the amount that producers plan to offer for sale during a particular time period, and at a particular price.

- Change in quantity supplied refers to the change in selling plans of producer, when **only** the price of the good changes.
- Reflected by a movement **along** the supply curve.
- An increase (resp. decrease) in quantity supplied results in a downward (resp. upward) movement along the supply curve.

Supply of a good and Price of a related good

Substitutes in production

- Use same resources for production
- Example: a farmer could raise cattle or sheep, a farmer could grow corn or wheat
- Question: Suppose the price of wheat goes up,what happens to the supply for corn?
- a change in the price of one causes a shift in the supply for the other in the **opposite** direction as the price change

Complements in production

- Both goods are produces in conjunction with one another or one is the by-product of other
- Example: beef and cowhide, Lumber and Sawdust
- Question: Suppose the price of lumber increases, what happens to the supply for sawdust? Draw.
- a change in the price of one causes a shift in the supply for the other in the **same** direction as the price change

Other determinants of supply

- Prices of factors of production
  - Any factor that increases costs, will decrease the supply. For any given quantity, the firm requires a higher price.
  - Any factor that decreases costs, will increase the supply. For any given quantity, the firm does not require as high a price.
- Technology- affects the same way as the prices of factors of production as it also affects marginal costs
- Expectations about future and prices -If suppliers believe that prices of output will rise in the future, they may supply less today and wait till the prices have risen

Practice Problems

1. Consider the market for shoes in a nation that initially imports half the shoes it consumes. Use a demand and supply graph to predict the market effect of a ban on shoe imports.

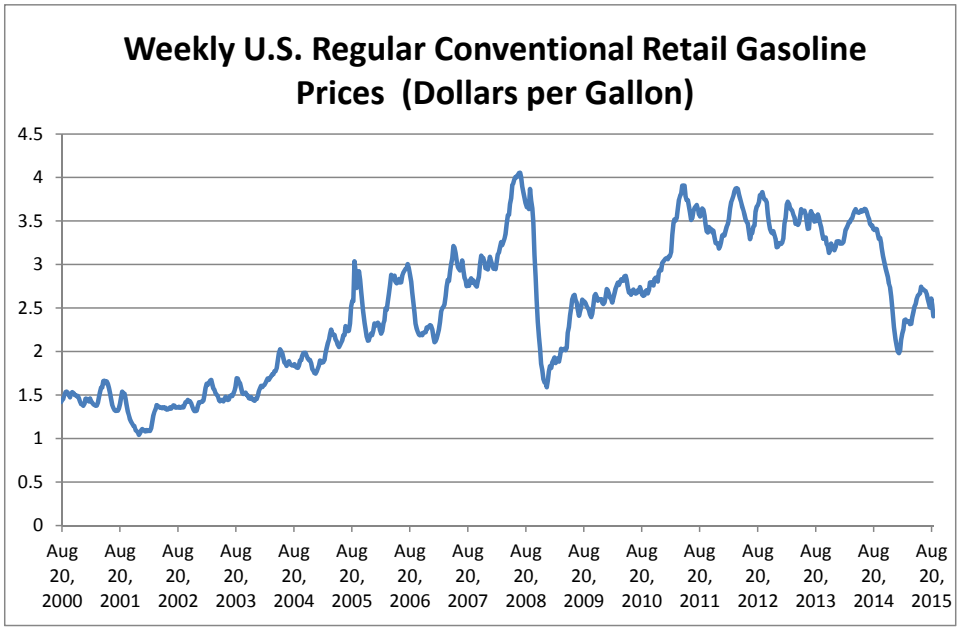
2. The market for posters is given by the following demand and supply curves:

$$Q_D = 65000 - 10000P$$
$$Q_S = -X + 15000P$$

where X is the average monthly fixed costs of operation. Find the equilibrium price and quantity of posters as a function of X. Calculate the change in P^* and Q^* when X changes from 35000 to 45000.

Practice Problem

You came across the following chart in newspaper.



You notice that gasoline prices have been bouncing around a lot. Specifically, you notice the big decline in prices in 2008 and 2014. Use a demand and supply graph to explain these fluctuations in gasoline prices.

Impact of changes in supply on equilibrium

	Price	Quantity
Increase in supply	Decreases	Increases
Decreases in supply	Increases	Decreases

We can use this knowledge about market behavior for

- Predicting Changes: When supply changes, price and quantity move in **different** direction.
- Explaining Changes: If equilibrium price and quantity move in different directions, the changes were caused by a change in supply.

Practice Problem

The market for posters is given by the following demand and supply curves:

$$Q_D = I - 10000P$$
$$Q_S = -X + 15000P$$

where I is the monthly budget that an average firm spends on posters and X is the average monthly fixed costs of operation. Find the equilibrium price and quantity of posters as a function of I and X. Calculate the change in P^* and Q^* when

1. I changes from 65000 to 75000 and X changes from 35000 to 45000.
2. I changes from 75000 to 65000 and X changes from 35000 to 45000.
3. I changes from 75000 to 65000 and X changes from 45000 to 35000.
4. I changes from 65000 to 75000 and X changes from 45000 to 35000.

Impact of changes in both demand and supply on equilibrium

Demand and Supply change in same direction

	Price	Quantity
Increase in supply	Decreases	Increases
Increase in demand	Increases	Increases

	Price	Quantity
Decrease in supply	Increases	Decreases
Decrease in demand	Decreases	Decreases

While changes in equilibrium quantity are determinate, equilibrium prices may go up or down or remain unchanged.

Impact of changes in both demand and supply on equilibrium

Demand and Supply change in opposite direction

	Price	Quantity
Increase in supply	Decreases	Increases
Decrease in demand	Decreases	Decreases

	Price	Quantity
Decrease in supply	Increases	Decreases
Increase in demand	Increases	Increases

While changes in equilibrium prices are determinate, equilibrium quantity may go up or down or remain unchanged.

Changes in Demand and Supply: Summary

	Supply unchanged	Supply increases	Supply decreases
Demand unchanged	Q unchanged P unchanged	Q increases P decreases	Q decreases P increases
Demand increases	Q increases P increases	Q increases P increases or decreases	Q increases or decreases P increases
Demand decreases	Q decreases P decreases	Q increases or decreases P decreases	Q decreases P decreases or increases