Chapter 4. The Market Forces of Supply and Demand

Liandong Yang-Gregory Mankiw

February 19, 2024

Introduction

- Our goal this chapter is to introduce the demand and supply of certain goods and services, how supply and demand together determines market prices, and the forces that can change supply and demand.
- We are not going to talk about how the demand ans supply of certain goods and services are strictly derived. They will be covered in future.
- In this chapter we just accept economists' consensus on demand and supply.

Markets and Competition

- Before we introduce demand and supply, we should discuss market and competition.
- Market: a group of buyers and sellers of a good and service.
  - The buyers determine the demand for the product.
  - The sellers determine the supply of the product.
- Example: Local farmer's market, Ebay, Robinhood, Alibaba.

Competition

- Competitive market: a market in which there are many buyers and many sellers so each has a negligible impact on the market price.
- The perfectly competitive market:
  - The goods offered for sale are all exactly the same.
  - The buyers and sellers are so numerous that no single buyer or seller has any influence over the market price.

Competition

- Competitive market: a market in which there are many buyers and many sellers so each has a negligible impact on the market price.
- The perfectly competitive market:
  - The goods offered for sale are all exactly the same.
  - The buyers and sellers are so numerous that no single buyer or seller has any influence over the market price.

Competition

- Price takers: buyer and sellers in perfectly competitive markets must accept the price the market determines, they are said to be price taker.
- Example of perfectly competitive market: the wheat market.

Competition

- Scarcity's inevitable companion is competition with other people for "more".
- There are a few ways to compete:
  - Violence
  - Political power: government can redistribute wealth.
  - Discrimination: allocations by authorities.
  - First come, first serve.
  - Competitive cooperation by exchanges.

Competition

- The primary focus of economic analysis is on:
  - a : competition in exchange of rights to services and goods.
  - b : coordinated cooperation in creating wealth.
- Competition by offers of exchange is a form of cooperation. "I'll do this for you if you'll do this for me - at better terms than someone else.

Demand

- The demand curve: the relationship between price and quantity demanded.
- The quantity demanded: the amount of a good that buyers are willing and able to purchase.
  - The quantity demanded of a good can be affected by many factors, but **PRICE** plays a central role.
  - If the price of eggs rose to 5 dollars per dozen, most people would buy fewer eggs.
- The law of demand: the claim that, other things being equal, the quantity demanded of a good falls when the price of the good rises.

Example of demand equation, demand schedule and demand curve

- We mentioned in the math review session that there are three ways to present the relationship of two linear variables, a linear equation, a chart (table), and a graph (a straight line).
- Here we start with the simplest relationship between price and quantity demanded, a linear relationship.
- Example: Catherine demand of ice cream, $Q_d = 12 - 2P$

- Example: Catherine demand of ice cream, $Q_d = 12 - 2P$
- This equation is a slope intercept form equation. The coefficient -2 follows that law of demand that if price increases, the quantity demanded of ice cream will decrease.
- The intercept 12 means if the ice cream is free, Catherine will eat 12 ice creams.
- Only price is on the right side of the equation, because we assume other factors (income, weather, preference, the price of similar goods) being equal.

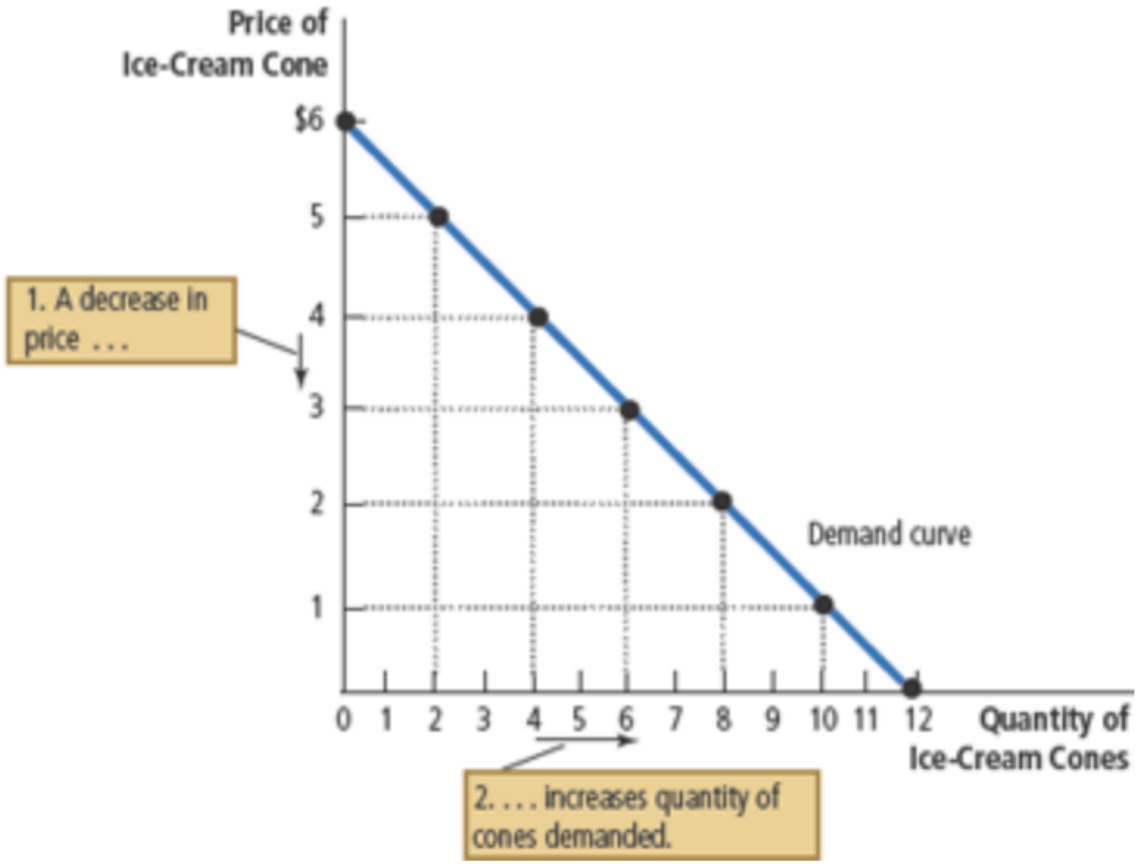
Example of demand equation, demand schedule and demand curve

- Example: Catherine demand of ice cream, $Q_d = 12 - 2P$
- Demand schedule: a table that shows relationship between the price of good and the quantity demanded.
- Catherine's demand schedule of ice cream
-

Price of ice cream	\$0	1	2	3	4	5	6
Quantity of ice cream demanded	12	10	8	6	4	2	0

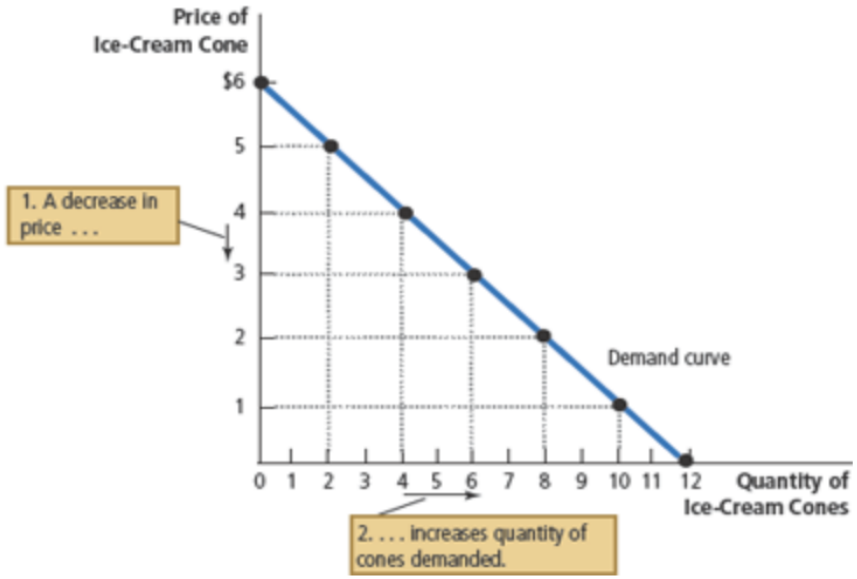
Example of demand equation, demand schedule and demand curve

- Example: Catherine demand of ice cream, $Q_d = 12 - 2P$



- It is convention to plot the price on the y-axis (vertical axis) and quantity demanded on x-axis (horizontal axis). Because we know the graph of $Q_d = 12 - 2P$ is a straight line, we only need to plot two points and connect them.

- The two points we use are: first, when price is zero, quantity demanded is 12; second, when price is \$6, the quantity demanded is zero.

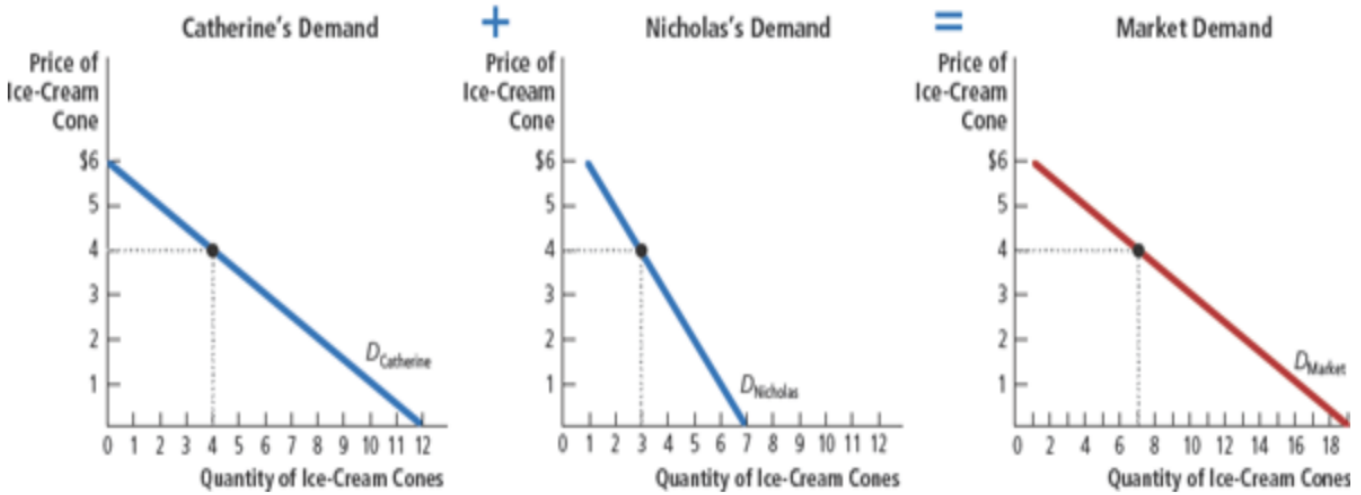


Example of demand equation, demand schedule and demand curve

- Now we know how to draw one person's (Catherine) demand carve. But in a perfectly competitive market, there are numerous buyers. Then how to draw the market demand curve?
- Market demand: the sum of all the individual demands for a particular good or service.

Price of Ice-Cream Cone	Catherine		Nicholas		Market
$0	12	+	7	=	19 cones
1	10		6		16
2	8		5		13
3	6		4		10
4	4		3		7
5	2		2		4
6	0		1		1

Price of Ice-Cream Cone	Catherine		Nicholas		Market
$0	12	+	7	=	19 cones
1	10		6		16
2	8		5		13
3	6		4		10
4	4		3		7
5	2		2		4
6	0		1		1



Shifts in the demand curve

- The demand curve: the relationship between price and quantity demanded.
- The law of demand: the claim that, **other things being equal**, the quantity demanded of a good falls when the price of the good rises.
- How to show the effect of other determinants on the demand?
- We can shift the demand curve.

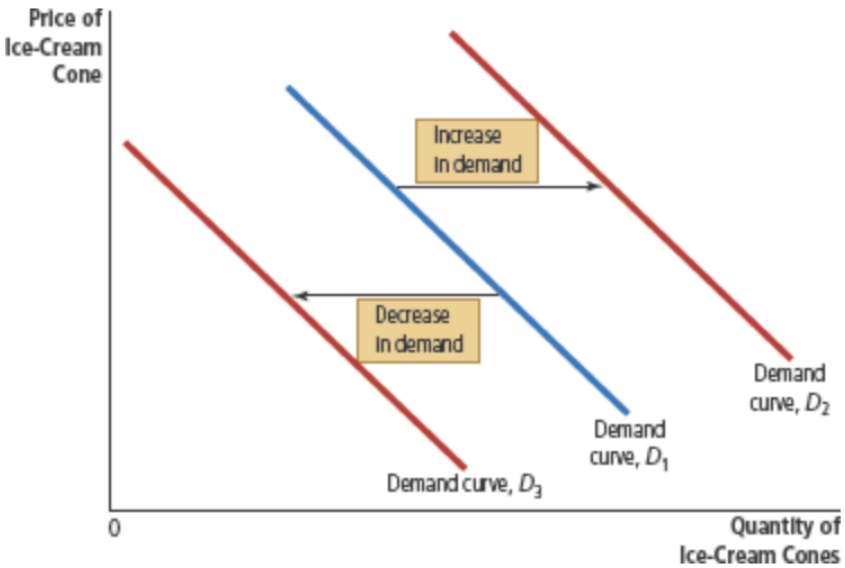
Shifts in the demand curve

- If something happens to alter the quantity demanded at any given price, the demand curve shifts.
- Example: Scientist discovers that regularly eating ice cream can make people live longer. This discovery will raise the demand for ice cream.
- Catherine's demand schedule of ice cream

Price of ice cream	$0	1	2	3	4	5	6
Quantity demanded (original)	12	10	8	6	4	2	0
Quantity demanded (new)	24	20	16	12	8	4	2

Shifts in the demand curve

- A change that increases the quantity demanded at every price shifts the demand curve to the right and is called **an increase in demand**.
- A change that reduces the quantity demanded at every price shifts the demand curve to the left and is called **a decrease in demand**.



Shifts in the demand curve

- Variables that can shift demand curve:
- Income
  - If the demand for something falls when income falls, that good is called normal good.
  - If the demand for something rises when income falls, that good is called an inferior good. Frozen pizza, public transportation.

Shifts in the demand curve

- Variables that can shift demand curve:
- Prices of related goods:
  - Substitutes: two goods for which an increase in the price of one leads to an increase in the demand for the other. Coca and Pepsi, ice cream and frozen yogurt.
  - Complements: two goods for which an increase in the price of one leads to a decrease in the demand for the other. Computers and software, iphone and airpod, printer and printing papers.

Shifts in the demand curve

- Variables that can shift demand curve:
- Tastes, Numbers of buyers
- Expectation, What would you do now if you are expecting a 50 percent raise in your salary?

Variable	A Change in This Variable
Price of the good itself	Represents a movement along the demand curve
Income	Shifts the demand curve
Price of related goods	Shifts the demand curve
Expectations	Shifts the demand curve
Number of buyers	Shifts the demand curve
Tastes	Shifts the demand curve

Practice

- The number of times you eat at Pandas Express per month before is

Price of one meal	0	4	8	12	16	20
Meals per month (before)	10	8	6	4	2	0

- Now suppose the price of Chick-fli-A increases by 50 percent. The number of times you eat at Pandas Express per week after is:

Price of one meal	0	4	8	12	16	20
Meals per month (after)	12	10	8	6	4	2

- Draw you demand curve of Panda Express before and after the price of Chick-fli-A increases by 50 percent.

Supply

- The supply curve: the relationship between price and quantity supplied.
- Quantity supplied: the amount of good that sellers are willing and able to sell.
- Similar to quantity demanded, there are also many determinants of the quantity supplied, but again, price plays a special role.
- law of supply: Other things being equal, when the price of a good rises, the quantity supplied also rises, and when price falls, the quantity supplied falls as well.

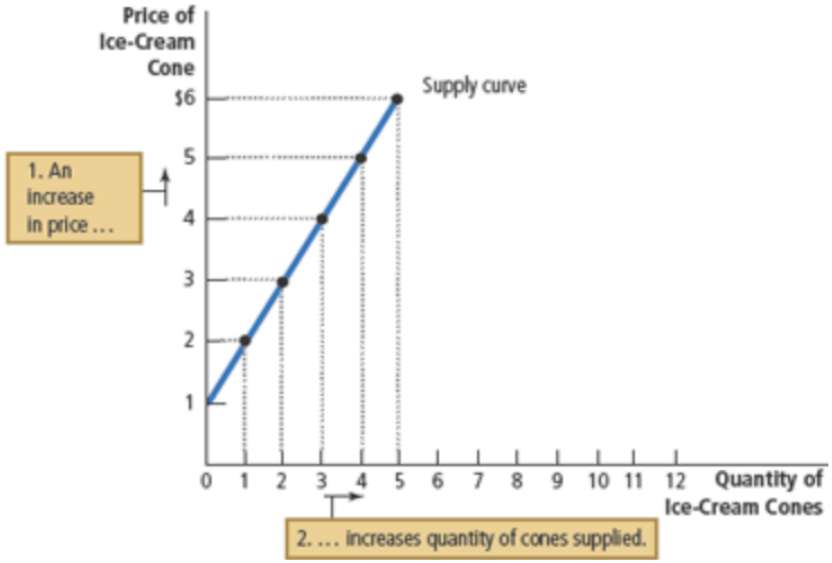
Supply

- Supply schedule: a table that shows the relationship between the price of a good and the quantity supplied.
- Ben's supply schedule of ice cream
-

Price of ice cream	\$0	1	2	3	4	5	6
Quantity supplied	0	0	1	2	3	4	5

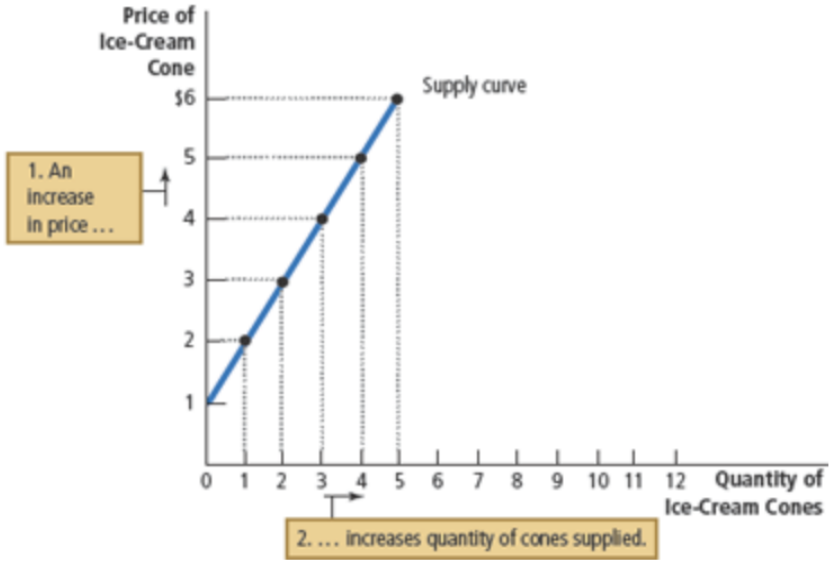
Supply

- Supply curve: a graph of the relationship between the price of a good and the quantity supplied.
- Ben's supply curve of ice cream



Supply

- Supply curve: a graph of the relationship between the price of a good and the quantity supplied.
- Ben's supply curve of ice cream



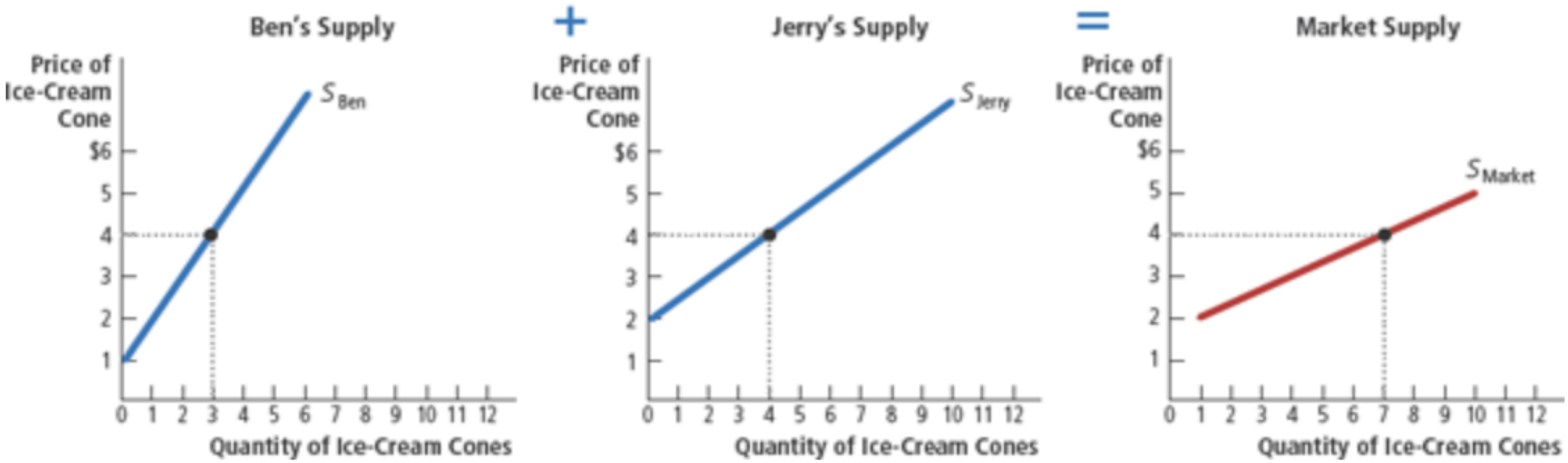
Market Supply

- Market supply: the sum of the supplies of all sellers.
- Market supply as the sum of individual supplies

Price of Ice-Cream Cone	Ben		Jerry		Market
$0	0	+	0	=	0 cones
1	0		0		0
2	1		0		1
3	2		2		4
4	3		4		7
5	4		6		10
6	5		8		13

Market Supply

- Market supply: the sum of the supplies of all sellers.

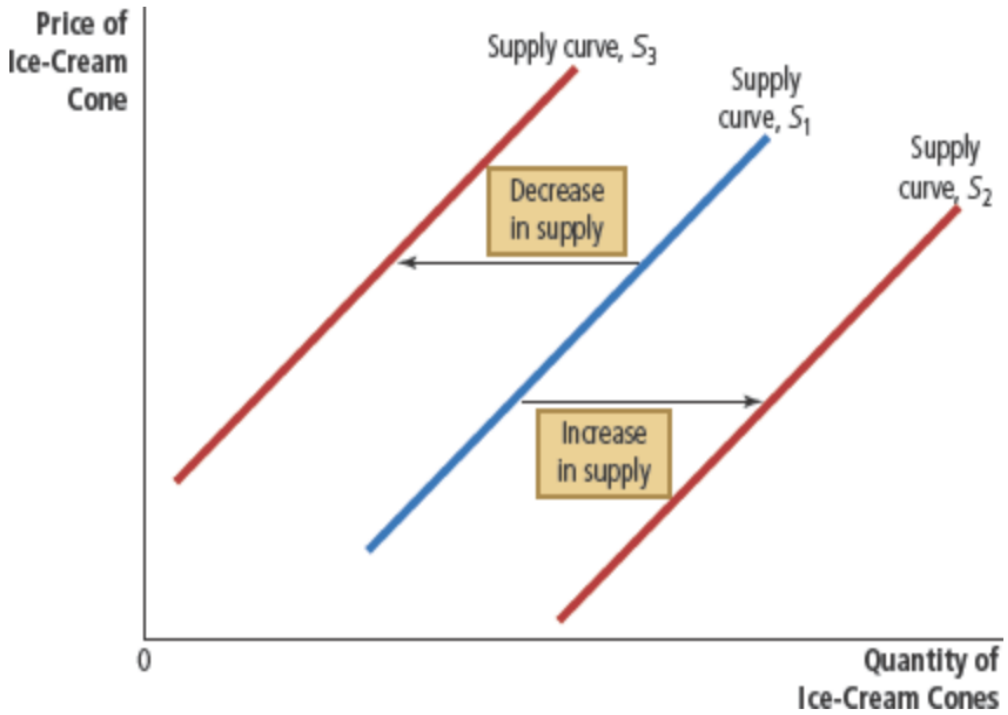


Shifts in Supply Curve

- A market supply curve holds constant all the variables other than price that affect quantity supplied, but these variables can't be constant forever.
- For suppliers of ice cream, sugar is one input. If the price of sugar falls, selling ice cream is more profitable.
- This increases the ice cream supply: **At any price**, sellers are willing to produce more. As a result, the supply curve shifts to the right.

Shifts in Supply Curve

- A change that raises the quantity supplied at every price shifts the supply curve to the right and is called **an increase in supply**.
- A change that reduces the quantity supplied at every price shifts the supply curve to the left and is called **a decrease in supply**.



Shifts in Supply Curve

- Variables that can shift the supply curve:
- Input prices, Technology, Expectations, Number of sellers.

Variable	A Change in This Variable
Price of the good itself	Represents a movement along the supply curve
Input prices	Shifts the supply curve
Technology	Shifts the supply curve
Expectations	Shifts the supply curve
Number of sellers	Shifts the supply curve

Market Supply and Market Demand Together

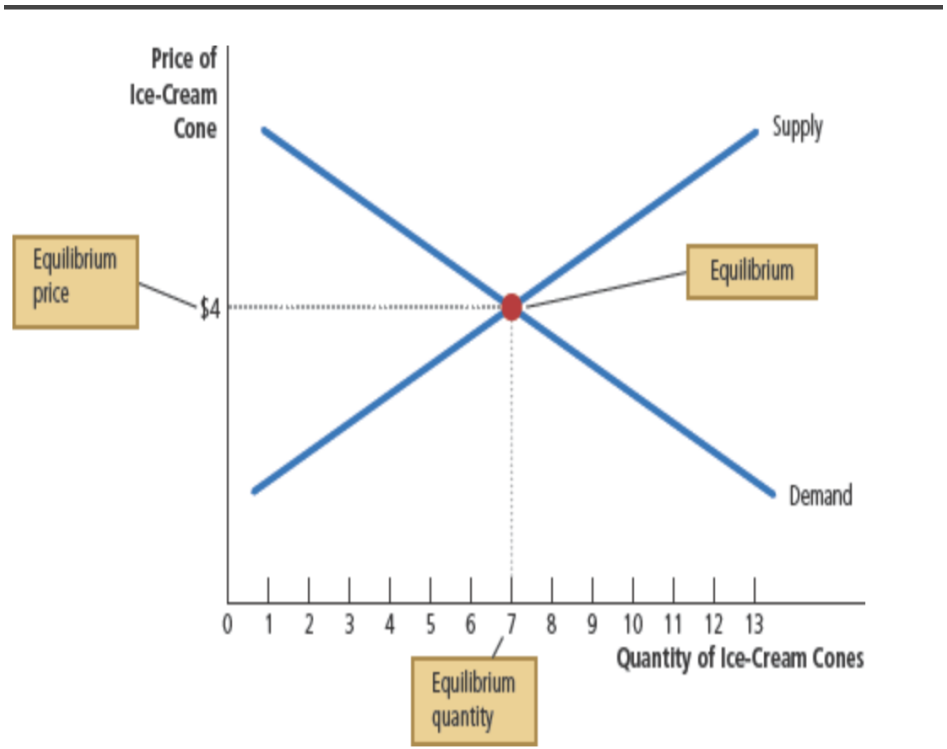
- Equilibrium: a situation in which the price has reached the level at which the market quantity supplied equals the market quantity demanded.
- Equilibrium price: the price that balances the market quantity supplied and the market quantity demanded.
- Equilibrium quantity: the market quantity supplied and the market quantity demanded at the equilibrium price.

Market Supply and Market Demand Together

- Equilibrium: a situation in which the price has reached the level at which the market quantity supplied equals the market quantity demanded.
- Equilibrium price: the price that balances the market quantity supplied and the market quantity demanded.
- Equilibrium quantity: the market quantity supplied and the market quantity demanded at the equilibrium price.

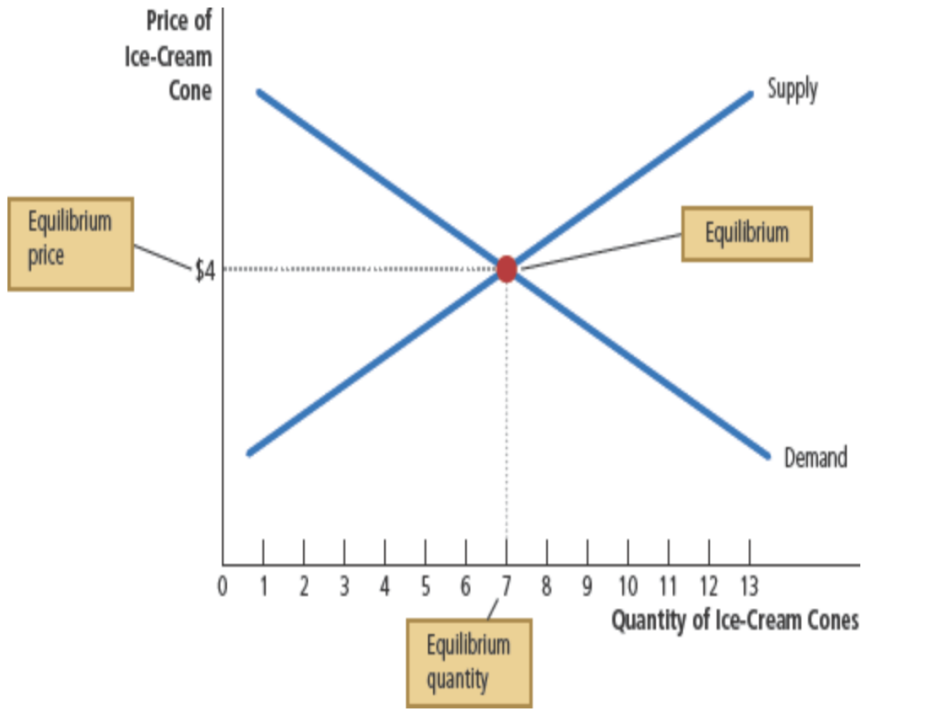
Market Supply and Market Demand Together

- The equilibrium price is also called market-clearing price because, at this price, buyer have bought all they want to buy, and sellers have sold all they want to sell.



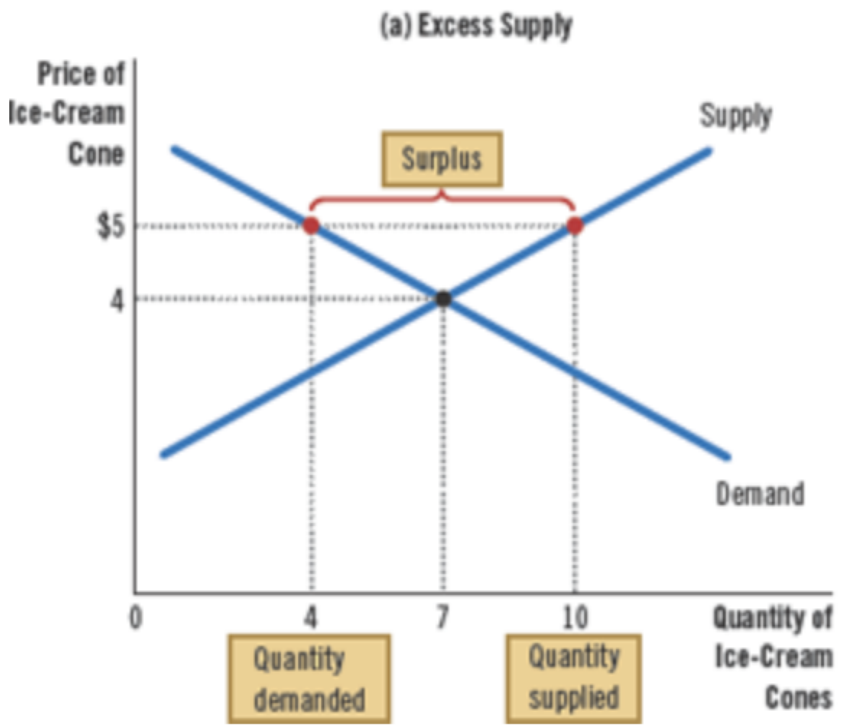
Market Supply and Market Demand Together

- The equilibrium price is also called market-clearing price because, at this price, buyer have bought all they want to buy, and sellers have sold all they want to sell.



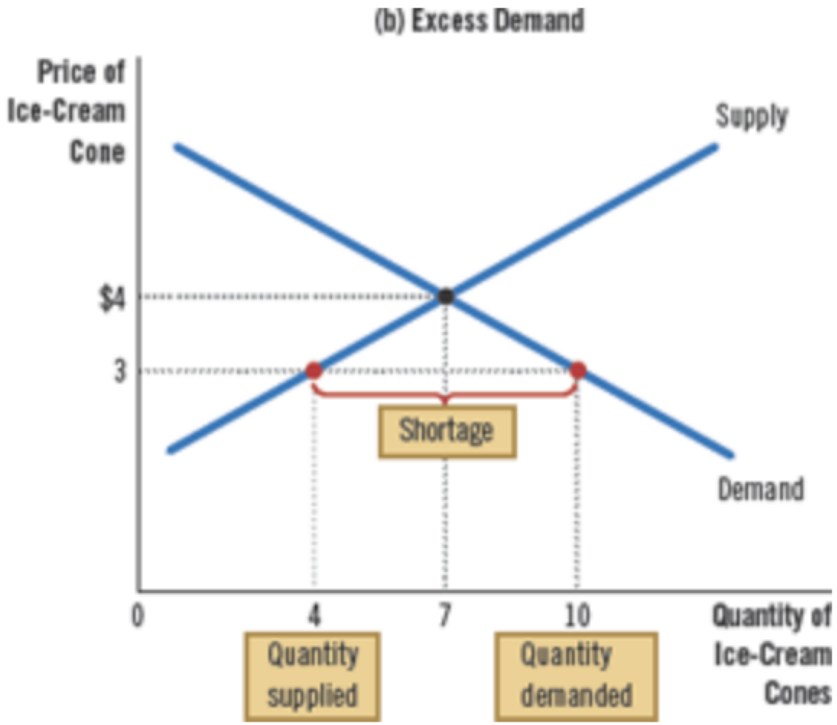
Market Supply and Market Demand Together

- Surplus: a situation in when the quantity supplied is greater than the quantity demanded. It is also called a situation of excess supply. The price is higher than the equilibrium price. To sell the unsold ice cream, sellers need to lower the price.



Market Supply and Market Demand Together

- Shortage: a situation in when the quantity demanded is greater than the quantity supplied. It is also called a situation of excess demand. The price is lower than the equilibrium price. If there is a long line waiting for the ice cream, sellers will increase the price.



Three Steps to Analyzing Changes in Equilibrium

- The equilibrium price and quantity depend on the positions of the supply and demand curves.
- When an event shifts the demand curve or supply curve or both, the equilibrium changes, resulting in a new equilibrium price and a new equilibrium quantity.

Three Steps to Analyzing Changes in Equilibrium

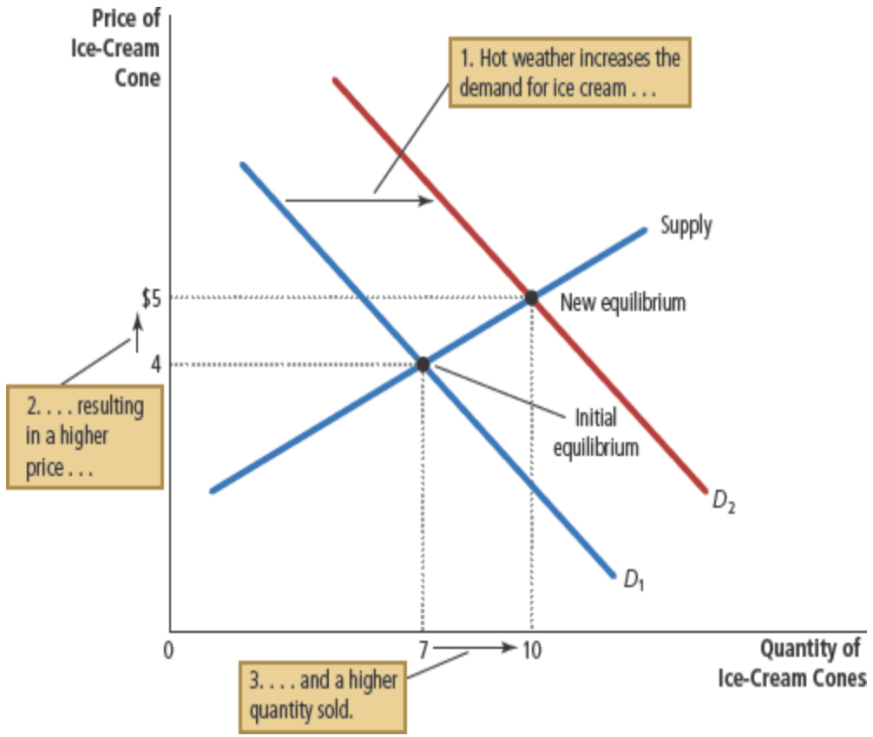
- When an event happens or some events happen,
  - First, we decide which curve is shifted, the demand curve or the supply curve, or both.
  - Second, decide whether the curve shifts to the right or to the left.
  - Third, use the new curves to find the new equilibrium price and quantity and compare the new equilibrium with the old one.

A Shift in Demand Changes the Market Equilibrium

- Suppose this summer is exceptionally hot, how does this affect the ice cream market?
  - First, the ice cream demand curve shifts because weather can affect consumers' demand for ice cream.
  - Second, the ice cream demand curve shifts to the right because consumers' demand more ice cream than before at any price level if this summer is exceptionally hot.
  - Third, at the old equilibrium price, there will be shortage of ice cream because market demand is larger than the market supply. Knowing this, the ice cream firms will increase the price.
- Note: in this example, we assume other things equal except the summer is exceptionally hot. Therefore, the supply curve doesn't change. Even though in reality, things are not this simple.

A Shift in Demand

- Suppose this summer is exceptionally hot, how does this affect the ice cream market?

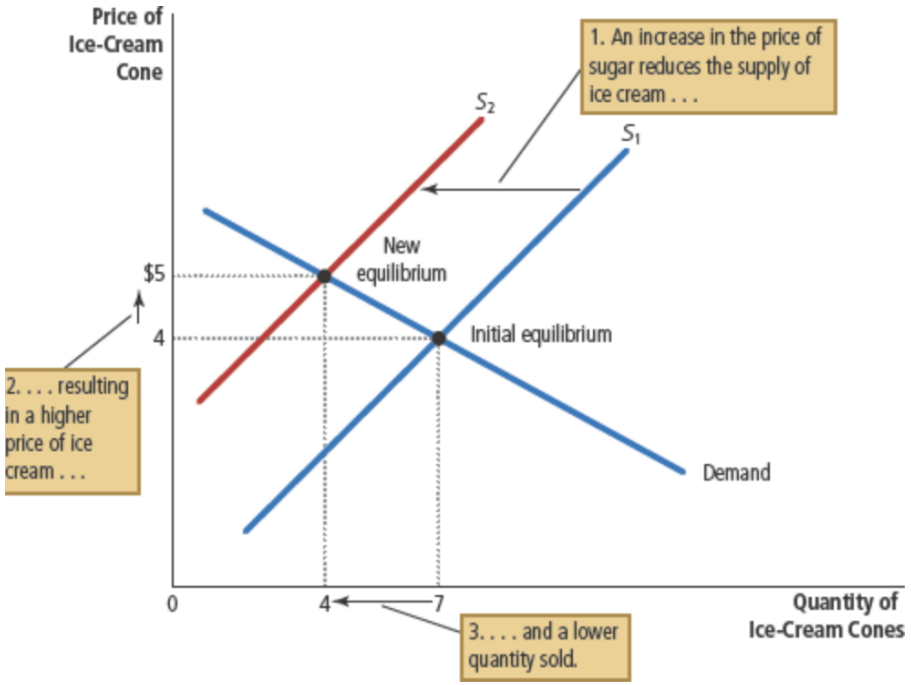


A Shift in Supply Changes the Market Equilibrium

- Suppose a hurricane destroys part of sugarcane crop and drives up the price of sugar. How does this affect the market for ice cream?
  - First, the increase in the price of sugar, an input for ice cream, raises the cost of producing ice cream. It therefore affects the supply curve.
  - Second, higher cost reduces the profit of selling ice cream at every price level. Producers respond by produce less ice cream at every price level.
  - Third, at the old price, there is now an excess demand for ice cream, and this shortage causes firms to raise the price. Because the sugar price increases, the price of ice cream rises, and the quantity sold falls.
- Note: in this example, we assume other things equal except that the sugar price increases.

A Shift in Supply Changes the Market Equilibrium

- Suppose a hurricane destroys part of sugarcane crop and drives up the price of sugar. How does this affect the market for ice cream?

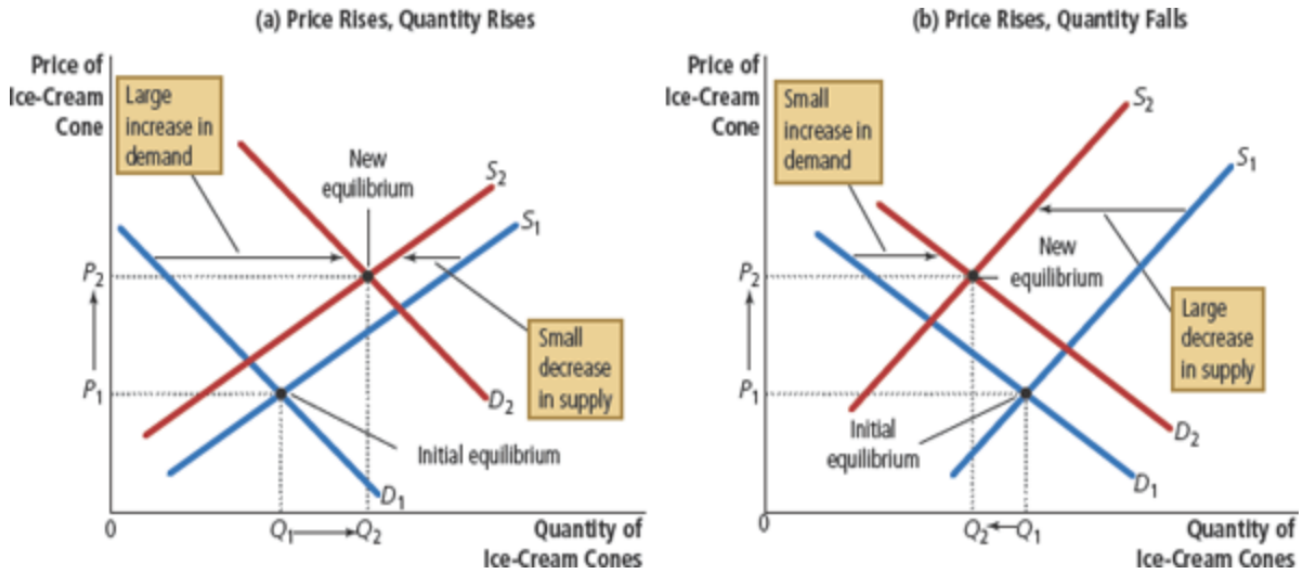


Both Supply and Demand Shift

- Suppose a heat wave and hurricane strikes in the same summer. How does this affect the market for ice cream?
  - First, Both curves shift. The heat wave shifts the demand curve. The hurricane shifts the supply curve by driving up sugar price.
  - Second, demand curve shifts to the right and supply curve shifts to the left.
  - Third, there are two possible outcomes depending on the relative size of the demand and supply shifts. In both cases, the equilibrium price rises, but the change in equilibrium quantity is ambiguous.

Both Supply and Demand Shift

- Suppose a heat wave and hurricane strikes in the same summer. How does this affect the market for ice cream?



As a quick quiz, make sure you can explain at least a few of the entries in this table using a supply-and-demand diagram.

	No Change in Supply	An Increase in Supply	A Decrease in Supply
No Changein Demand	P same Q same	P down Q up	P up Q down
An Increasein Demand	P up Q up	P ambiguous Q up	P up Q ambiguous
A Decreasein Demand	P down Q down	P down Q ambiguous	P ambiguous Q down