Managerial Economics

(W3) Market forces: Demand and Supply

Overview

I. Market Demand Curve
- The Demand Function
- Determinants of Demand
- Consumer Surplus

II. Market Supply Curve
- The Supply Function
- Supply Shifters
- Producer Surplus

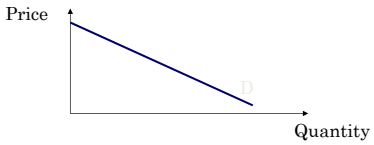
III. Market Equilibrium

IV. Price Restrictions

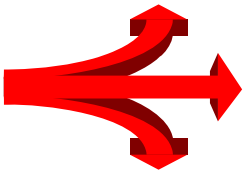
V. Comparative Statics

Market Demand Curve

- Shows the amount of a good that will be purchased at alternative prices, holding other factors constant.
- *Law of Demand*
  - The demand curve is downward sloping.



Determinants of Demand



- Income
  - Normal good
  - Inferior good
- Prices of Related Goods
  - Prices of substitutes
  - Prices of complements
- Advertising and consumer tastes
- Population
- Consumer expectations

The Demand Function

- A general equation representing the demand curve

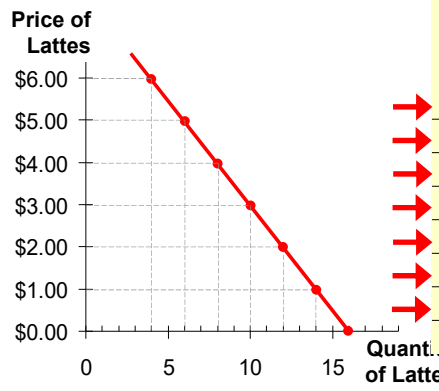
$$Q_x^d = f(P_x, P_Y, M, H,)$$

  - Q_x^d = quantity demand of good X.
  - P_x = price of good X.
  - P_Y = price of a related good Y.
    Substitute good.
    Complement good.
  - M = income.
    Normal good.
    Inferior good.
  - H = any other variable affecting demand.

Inverse Demand Function

- Price as a function of quantity demanded.
- Example:
  - Demand Function
    - $Q_x^d = 10 - 2P_x$
  - Inverse Demand Function:
    - $2P_x = 10 - Q_x^d$
    - $P_x = 5 - 0.5Q_x^d$

Helen's Demand Schedule & Curve



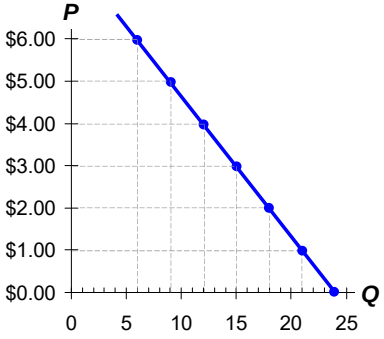
Price of lattes	Quantity of lattes demanded
$0.00	16
1.00	14
2.00	12
3.00	10
4.00	8
5.00	6
6.00	4

Market Demand versus Individual Demand

- The quantity demanded in the market is the sum of the quantities demanded by all buyers at each price.
- Suppose Helen and Ken are the only two buyers in the Latte market. (Q^d = quantity demanded)

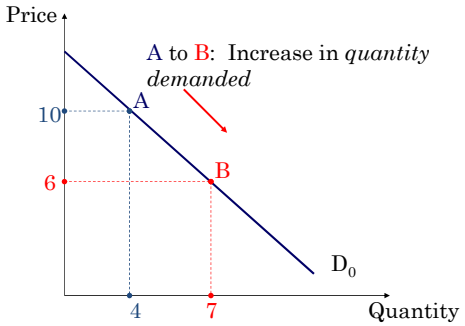
Price	Helen's Q^d		Ken's Q^d		Market Q^d
$0.00	16	+	8	=	24
1.00	14	+	7	=	21
2.00	12	+	6	=	18
3.00	10	+	5	=	15
4.00	8	+	4	=	12
5.00	6	+	3	=	9
6.00	4	+	2	=	6

The Market Demand Curve for Lattes

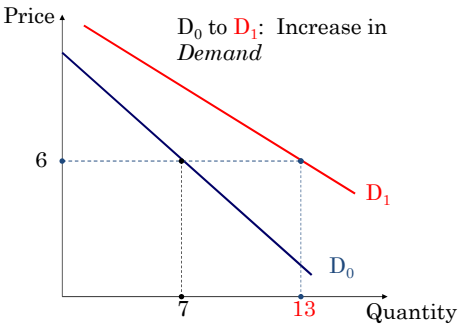


P	Q^d (Market)
$0.00	24
1.00	21
2.00	18
3.00	15
4.00	12
5.00	9
6.00	6

Change in Quantity Demanded



Change in Demand



Change in Quantity Demanded versus Change in Demand

- The distinction between change in demand and change in quantity demanded is vital to understand the analysis of demand

Change in *Quantity Demanded*
- Movement along the demand curve.
- Caused by a change in the price of the product

- Change in *Demand*
  - A shift in the demand curve, either to the left or right
  - Caused by a change in a determinant other than the price (income, tastes, etc)

Change in Quantity Demanded versus Change in Demand

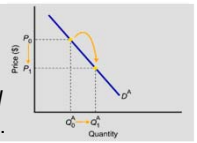
Variables that Affect Quantity Demanded	A Change in This Variable . . .
Price	Represents a movement along the demand curve
Income	Shifts the demand curve
Prices of related goods	Shifts the demand curve
Tastes	Shifts the demand curve
Expectations	Shifts the demand curve
Number of buyers	Shifts the demand curve

A Change in Demand Versus a Change in Quantity Demanded

To summarize:

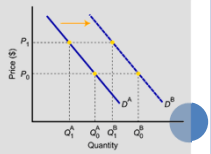
Change in price of a good or service leads to

Change in *quantity demanded* (**Movement along the curve**).



Change in income, preferences, or prices of other goods or services leads to

Change in demand (**Shift of curve**).



Consumer Surplus:

- The value consumers get from a good but do not have to pay for.
- Consumer surplus will prove particularly useful in marketing and other disciplines emphasizing strategies like value pricing and price discrimination.

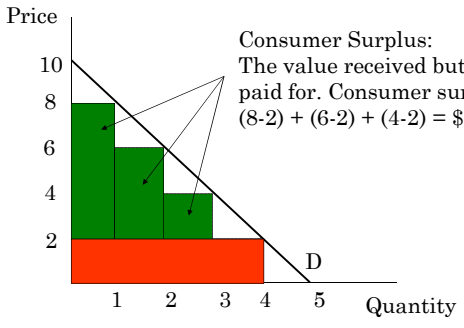
I got a great deal!

- That company offers a lot of bang for the buck!
- Dell provides good value.
- Total value greatly exceeds total amount paid.
- Consumer surplus is large.

I got a lousy deal!

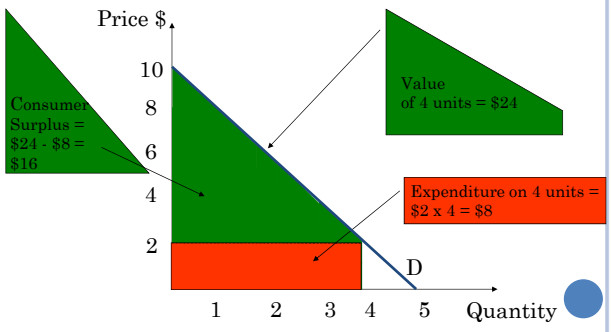
- That car dealer drives a hard bargain!
- I almost decided not to buy it!
- They tried to squeeze the very last cent from me!
- Total amount paid is close to total value.
- Consumer surplus is low.

Consumer Surplus: The Discrete Case



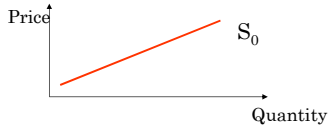
Consumer Surplus: The value received but not paid for. Consumer surplus = (8-2) + (6-2) + (4-2) = $12.

Consumer Surplus: The Continuous Case

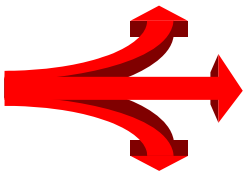


Market Supply Curve

- The supply curve shows the amount of a good that will be produced at alternative prices.
- *Law of Supply*
  - The supply curve is upward sloping.



Supply Shifters



- Input prices
- Technology or government regulations
- Number of firms
  - Entry
  - Exit
- Substitutes in production
- Taxes
  - Excise tax
  - Ad valorem tax
- Producer expectations

Change in Quantity Supplied versus Change in Supply

- As in the demand, attention must be paid to the difference between changes in the supply and changes in the quantity supplied
- Change in *Quantity Supplied*
  - Movement along the supply curve
  - Caused by a change in the market price of the product
- Change in *Supply*
  - A shift in the supply curve, either to the left or right
  - Caused by a change in a determinant other than price (input prices, technology, expectations, etc)

Change in Quantity Supplied versus Change in Supply

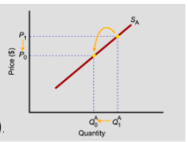
Variables that Affect Quantity Supplied	A Change in This Variable . . .
Price	Represents a movement along the supply curve
Input prices	Shifts the supply curve
Technology	Shifts the supply curve
Expectations	Shifts the supply curve
Number of sellers	Shifts the supply curve

A Change in Supply Versus a Change in Quantity Supplied

To summarize:

Change in price of a good or service leads to

Change in *quantity supplied* (**Movement along the curve**).



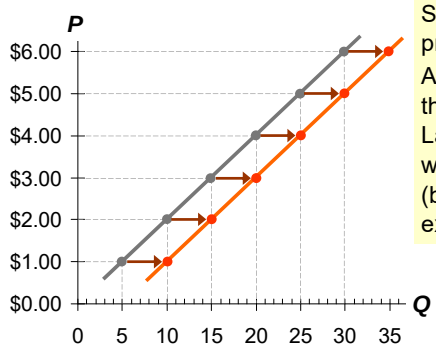
Change in costs, input prices, technology, or prices of related goods and services leads to

Change in supply (**Shift of curve**).

Supply Curve Shifters: Input Prices

- Examples of input prices:
  wages, prices of raw materials.
- A fall in input prices makes production more profitable at each output price, so firms supply a larger quantity at each price, and the ***S*** curve shifts to the right.

Supply Curve Shifters: Input Prices



Suppose the price of milk falls. At each price, the quantity of Lattes supplied will increase (by 5 in this example).

The Supply Function

- An equation representing the supply curve:
  - $Q_x^S = f(P_x, P_R, W, H,)$

Q_x^S = quantity supplied of good X.
P_x = price of good X.
P_R = price of a production substitute.
W = price of inputs (e.g., wages).
H = other variable affecting supply.

Inverse Supply Function

Price as a function of quantity supplied.
Example:

- Supply Function
  $Q_x^s = 10 + 2P_x$
- Inverse Supply Function:
  $2P_x = 10 + Q_x^s$
  $P_x = 5 + 0.5Q_x^s$

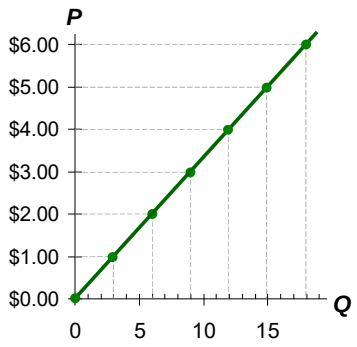
The Supply Schedule

- **Supply schedule**:
  A table that shows the relationship between the price of a good and the quantity supplied.
- Example:
  Starbucks' supply of lattes.

- Notice that Starbucks' supply schedule obeys the Law of Supply.

Price of lattes	Quantity of lattes supplied
$0.00	0
1.00	3
2.00	6
3.00	9
4.00	12
5.00	15
6.00	18

Starbucks' Supply Schedule & Curve



Price of lattes	Quantity of lattes supplied
$0.00	0
1.00	3
2.00	6
3.00	9
4.00	12
5.00	15
6.00	18

Market Supply versus Individual Supply

- The quantity supplied in the market is the sum of the quantities supplied by all sellers at each price.
- Suppose Starbucks and Jitters are the only two sellers in this market. (Q^s = quantity supplied)

Price	Starbucks		Jitters		Market Q^s
$0.00	0	+	0	=	0
1.00	3	+	2	=	5
2.00	6	+	4	=	10
3.00	9	+	6	=	15
4.00	12	+	8	=	20
5.00	15	+	10	=	25
6.00	18	+	12	=	30

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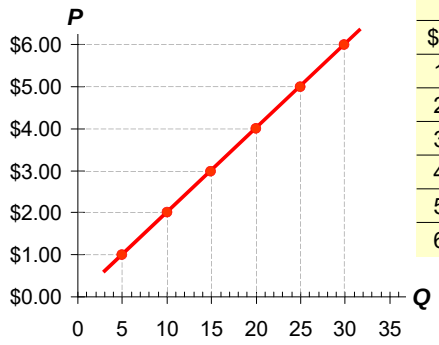
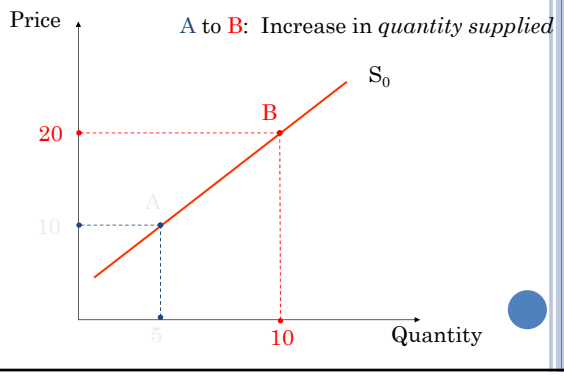
The Market Supply Curve

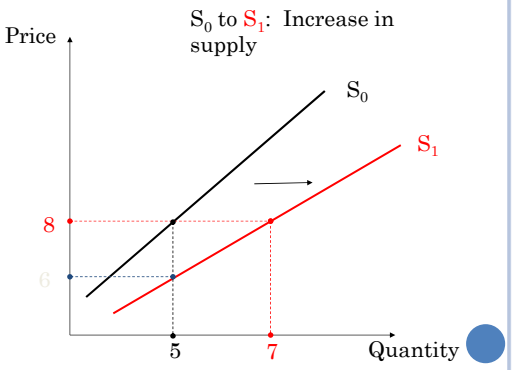


P	Q^S (Market)
$0.00	0
1.00	5
2.00	10
3.00	15
4.00	20
5.00	25
6.00	30

Change in Quantity Supplied

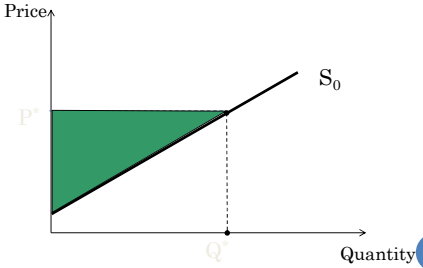


Change in Supply



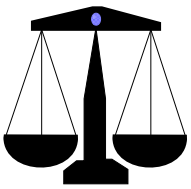
Producer Surplus

- The amount producers receive in excess of the amount necessary to induce them to produce the good.

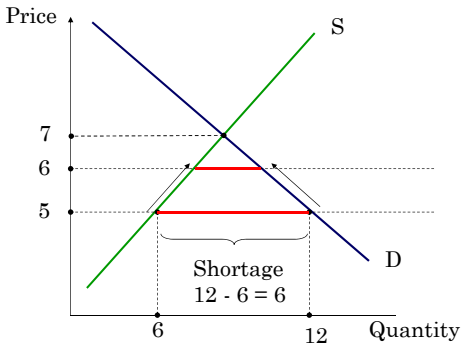


Market Equilibrium

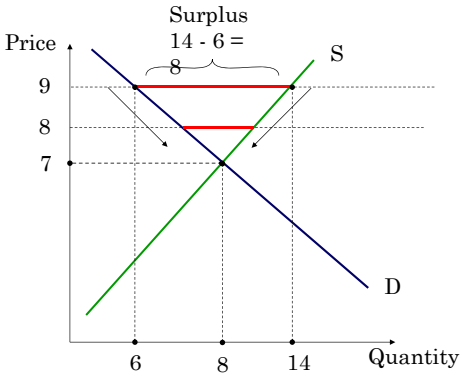
- The Price (P) that Balances supply and demand
  - $Q_x^S = Q_x^d$
  - No shortage or surplus
- Steady-state



If price is too low…



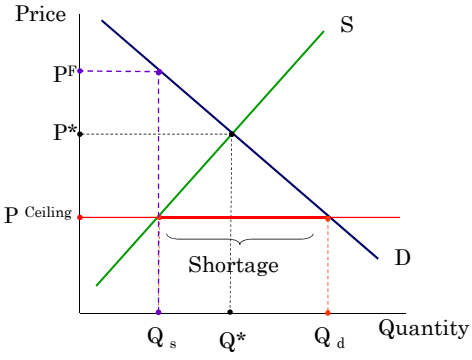
If price is too high…



Price Restrictions

- Price Ceilings
  - The *maximum* legal price that can be charged.
  - Examples:
    - Gasoline prices in the 1970s.
    - Housing in New York City.
    - Proposed restrictions on ATM fees.
- Price Floors
  - The *minimum* legal price that can be charged.
  - Examples:
    - Minimum wage.
    - Agricultural price supports.

Impact of a Price Ceiling



Full Economic Price

- The dollar amount paid to a firm under a price ceiling, plus the nonpecuniary price.

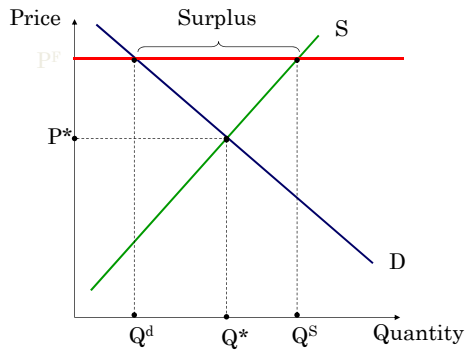
$$P^F = P^c + (P^F - P^C)$$

- P^F = full economic price
- P^C = price ceiling
- $P^F - P^C$ = nonpecuniary price

An Example from the 1970s

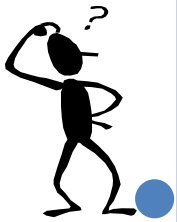
- Ceiling price of gasoline: $1.
- 3 hours in line to buy 15 gallons of gasoline
  - Opportunity cost: $5/hr.
  - Total value of time spent in line: 3 × $5 = $15.
  - Non-pecuniary price per gallon: $15/15=$1.
- Full economic price of a gallon of gasoline: $1+$1=2.

Impact of a Price Floor



Comparative Static Analysis

- How do the equilibrium price and quantity change when a determinant of supply and/or demand change?



Applications of Demand and Supply Analysis

- Event: The *WSJ* reports that the prices of PC components are expected to fall by 5-8 percent over the next six months.
- Scenario 1: You manage a small firm that manufactures PCs.
- Scenario 2: You manage a small software company.

Use Comparative Static Analysis to See the Big Picture!

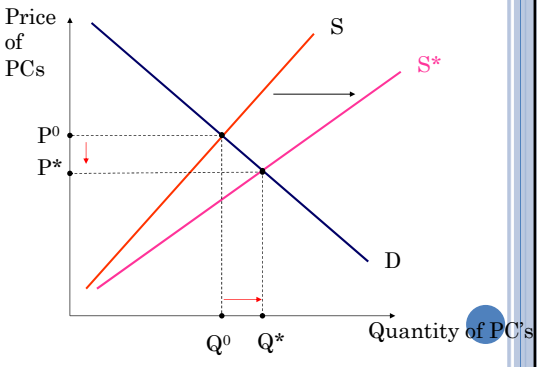
- *Comparative static analysis* shows how the equilibrium price and quantity will change when a determinant of supply or demand changes.

Scenario 1: Implications for a Small PC Maker

Step 1: Look for the "Big Picture."

Step 2: Organize an action plan (worry about details).

Big Picture: Impact of Decline in Component Prices on PC Market



Big Picture Analysis: PC Market

- Equilibrium price of PCs will fall, and equilibrium quantity of computers sold will increase.
- Use this to organize an action plan
  - contracts/suppliers?
  - inventories?
  - human resources?
  - marketing?
  - do I need quantitative estimates?

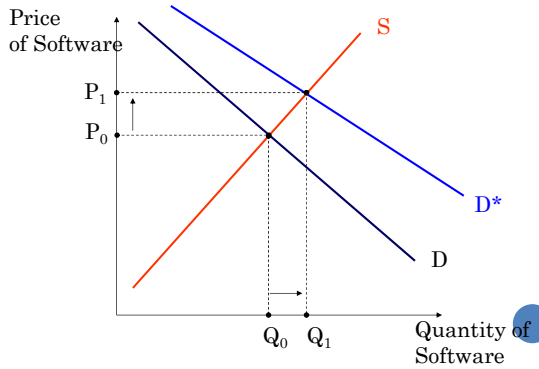
Scenario 2: Software Maker

- More complicated chain of reasoning to arrive at the "Big Picture."
- Step 1: Use analysis like that in Scenario 1 to deduce that lower component prices will lead to

  a lower equilibrium price for computers.

  a greater number of computers sold.
- Step 2: How will these changes affect the "Big Picture" in the software market?

Big Picture: Impact of Lower PC Prices on the Software Market



Big Picture Analysis: Software Market

Software prices are likely to rise, and more software will be sold.

- Use this to organize an action plan.

Conclusion

- Use supply and demand analysis to
  - clarify the "big picture" (the general impact of a current event on equilibrium prices and quantities).
  - organize an action plan (needed changes in production, inventories, raw materials, human resources, marketing plans, etc.).