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**Module 731
Microeconomics &
Accounting**

Courses 3, 4, 5 & 6

Welcome!

Hes·SO VALAIS WALLIS
School of Management

CENGAGE

ECONOMICS
N. GREGORY MANKIW
AND MARK P. TAYLOR

FIFTH EDITION

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Courses 3, 4, 5 & 6

The market forces of supply and demand (chapter 3)



I. Market Forces Of Supply And Demand

Introduction to supply and demand

- Supply and demand are the forces that make market economies work.
- Supply and demand determine prices in a market economy and how prices, in turn, allocate the economy's scarce resources.
- The model of the market based on supply and demand, like any other model, is based on a series of assumptions.

II. The Assumptions Of The Market Model

Supply and Demand

The terms *supply* and *demand* refer to the behaviour of people as they interact with one another in markets.

A *market* is a group of buyers and sellers of a particular good or service.

A *competitive market* is a market in which there are many buyers and sellers so that each has a negligible impact on the market price.

Assumption for Efficient Outcomes

- The model of supply and demand which leads to this 'efficient' outcome is based on the following:
 - Many buyers and sellers.
 - Perfect information for all buyers and sellers.
 - Freedom of entry and exit.
 - Identical goods.
 - Buyers and sellers act in self interest.
 - Clearly defined property rights.

Competitive Markets

A market in which there are many buyers and many sellers so that each has a negligible impact on the market price.

Characteristics of a perfectly competitive market:

- All goods for sale are the same.
- No buyer or seller can influence market price on their own.

Because buyers and sellers must accept the market price as given, they are often called "price takers."

The Demand Curve: The Relationship between Price and Quantity demanded

Quantity demanded is the amount of a good that buyers are willing and able to purchase.

Law of Demand is the claim that, other things equal, the quantity demanded of a good falls when the price of the good rises.

Demand schedule is a table that shows the relationship between the price of the good and the quantity demanded.

The Demand Curve: The Relationship between Price and Quantity Demanded

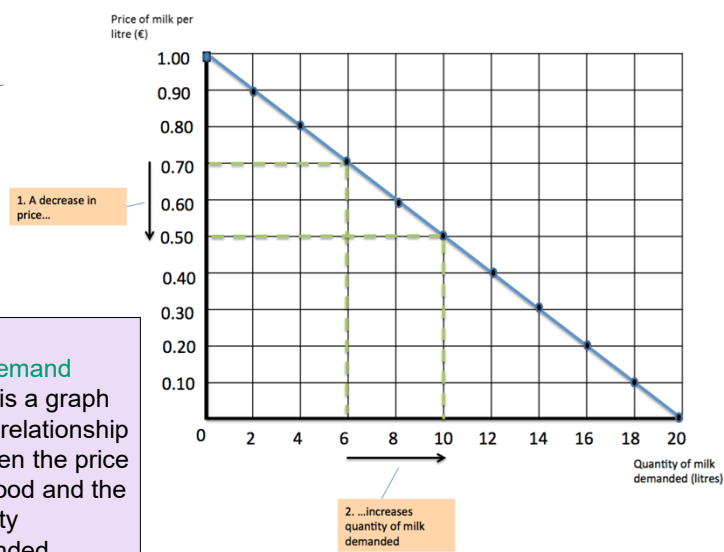
Table 1.
Rachel's
Demand
Schedule

Price of milk per litre (€)	Quantity of milk demanded (litres per month)
0.00	20
0.10	18
0.20	16
0.30	14
0.40	12
0.50	10
0.60	8
0.70	6
0.80	4
0.90	2

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Figure 1. Rachel's Demand Schedule and Demand Curve



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Market Demand Versus Individual Demand

Market demand refers to the sum of all individual demands for a particular good or service.

Graphically, individual demand curves are summed horizontally to obtain the market demand curve.

III. Shifts Versus Movements Along The Demand Curve

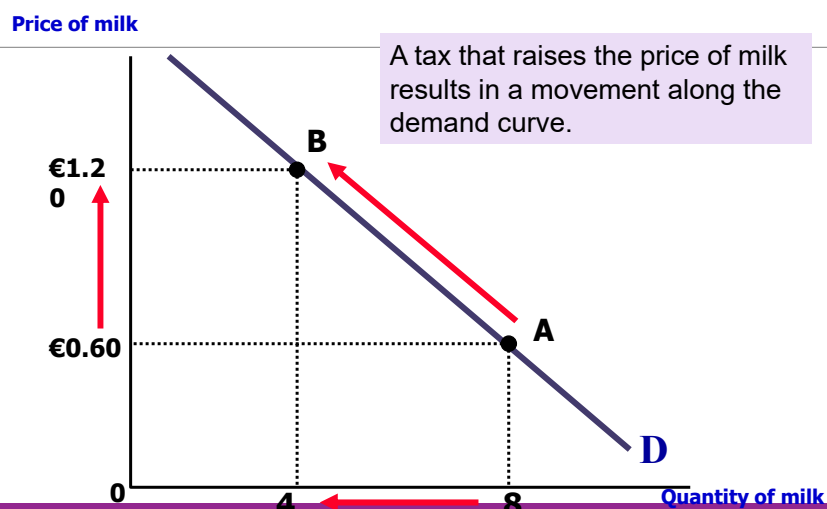
Introduction to shifts and movements

- **Ceteris paribus** - other factors affecting demand are held constant so that we can analyze the effect of a change in price on demand.
- A shift in the demand curve is caused by a factor affecting demand **other than a change in price**.
- Movement along the demand curve.
 - Caused by a change in the price of the product.

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Figure 2. Changes In Quantity Demanded



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Movement Along the Demand Curve

Assume the price of milk falls.

- More will be demanded because of the income and substitution effects.
- **The income effect.** Assume that incomes remain constant. A fall in the price of milk means that consumers can now afford to buy more with their income.
- **The substitution effect.** Milk is lower in price compared to other similar products, so some consumers will choose to substitute the more expensive drinks with the now cheaper milk.

A Shift in the Demand Curve

- A shift in the demand curve, to the left or right.
 - Caused by any change that alters the quantity demanded at every given price.
- Shifts caused by factors other than price.
 - 1) Prices of related goods (substitutes and complements).
 - **Substitutes:** two goods for which an increase in the price of one good leads to an increase in the demand for the other.
 - **Complements:** two goods for which an increase in the price of one good leads to a decrease in the demand for the other.

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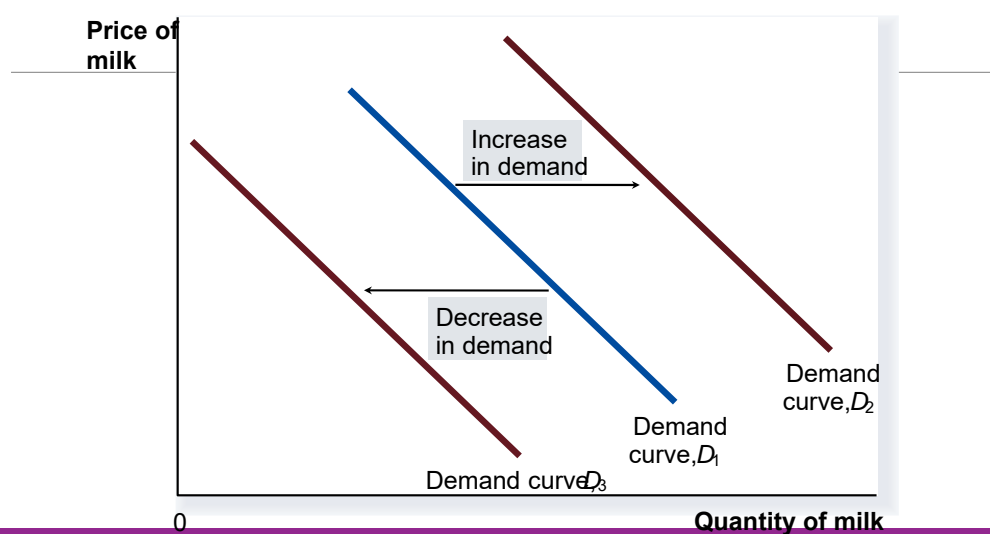
A Shift in the Demand Curve

- 2) Income
 - A lower income means that you have less to spend in total, so you would have to spend less on some – and probably most – goods.
 - If the demand for a good falls when income falls or rises, as income rises, the good is called a **normal good**.
 - If the demand for a good rises when income falls, the good is called an **inferior good**.
- 3) Tastes. More people may like something.
- 4) Number of buyers (population).
- 5) Advertising.
- 6) Expectations of consumers where demand is influenced by expectations of future income and future prices.

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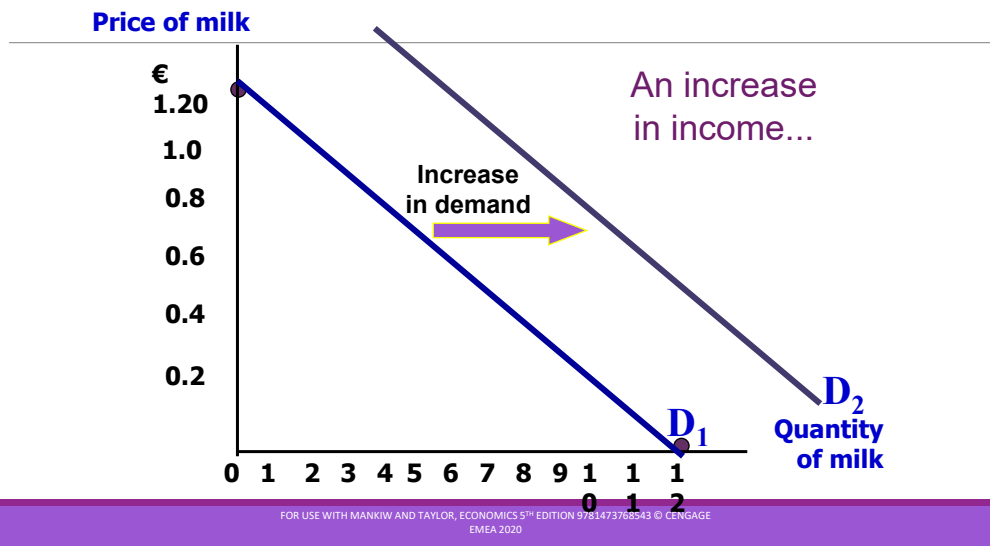
Figure 3 Shifts in the Demand Curve



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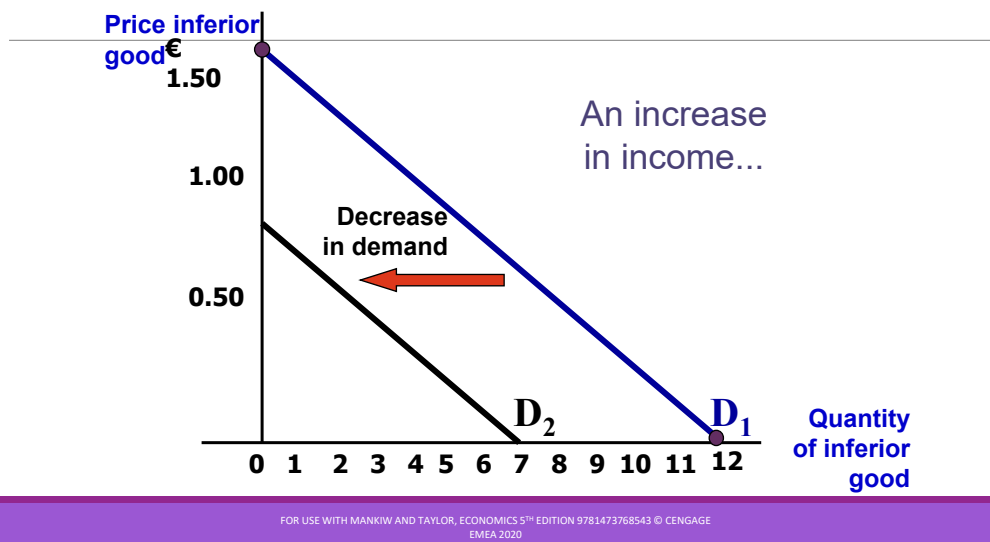
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Figure 4 Consumer Income Normal Good



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Figure 5. Consumer Income Inferior Good



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IV. Supply

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Supply

Quantity supplied is the amount of a good that sellers are willing and able to sell.

Law of supply is the claim that, other things equal, the quantity supplied of a good rises when the price of the good rises.

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The Supply Curve: The Relationship between Price and Quantity Supplied

Quantity supplied is the amount of a good that sellers are willing and able to sell.

Law of supply is the claim that, other things equal, the quantity supplied of a good rises when the price of the good rises.

The *supply schedule* is a table that shows the relationship between the price of the good and the quantity supplied.

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The Supply Curve: The Relationship between Price and Quantity Supplied

Table 2:
Richard's
Supply
Schedule

Price of milk per litre (€)	Quantity of milk supplied (litres per month)
0.00	0
0.10	0
0.20	2
0.30	4
0.40	6
0.50	8
0.60	10
0.70	12
0.80	14
0.90	16
1.00	18

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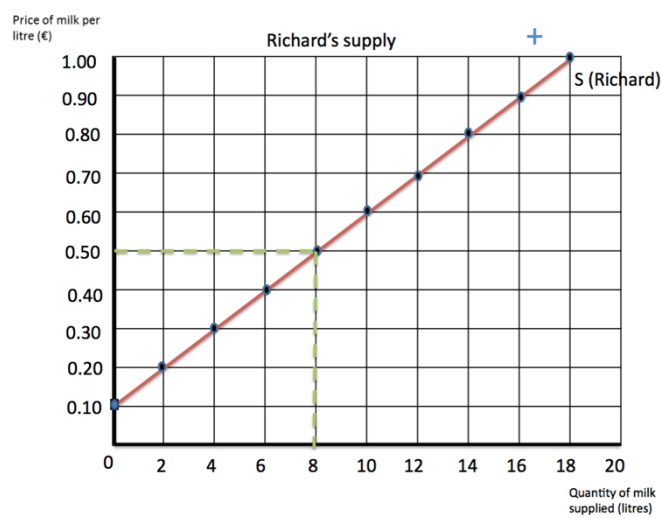
The Supply Curve: The Relationship between Price and Quantity

The *supply curve* is the graph of the relationship between the price of a good and the quantity supplied.

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Figure 6. Richard's Supply Curve



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Table 3. Market Supply Versus Individual

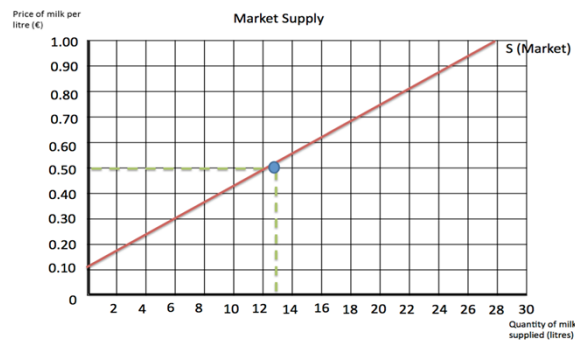
Market supply refers to the sum of all individual supplies for all sellers of a particular good or service.

Price of milk per litre (€)	Richard +	Megan =	Market
0	0	0	0
0.1	0	1	1
0.2	2	2	4
0.3	4	3	7
0.4	6	4	10
0.5	8	5	13
0.6	10	6	16
0.7	12	7	19

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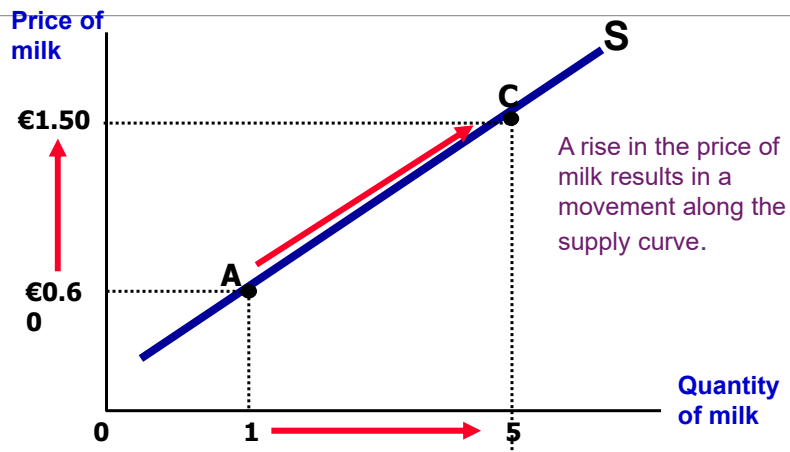
Figure 7. The Market Supply

Graphically, individual supply curves are summed horizontally to obtain the market supply curve.



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Figure 8. Supply schedule



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Shifts in the Supply Curve

- The supply curve shows how much producers offer for sale at any given price, holding constant all other factors that may influence producers' decisions about how much to sell.
- When any of these other factors change, the supply curve will shift.
- These are shown on the next slide.

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Shifts in the Supply Curve

- ① Profitability of other goods in production and prices of goods in joint supply.
- ② Technology.
- ③ Natural/Social Factors such as the weather and changing attitudes.
- ④ Input prices – the prices of the factors of production.
- ⑤ Expectations of producers about the future state of the market.
- ⑥ A change in the number of sellers in the market.

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Shifts in the Supply Curve

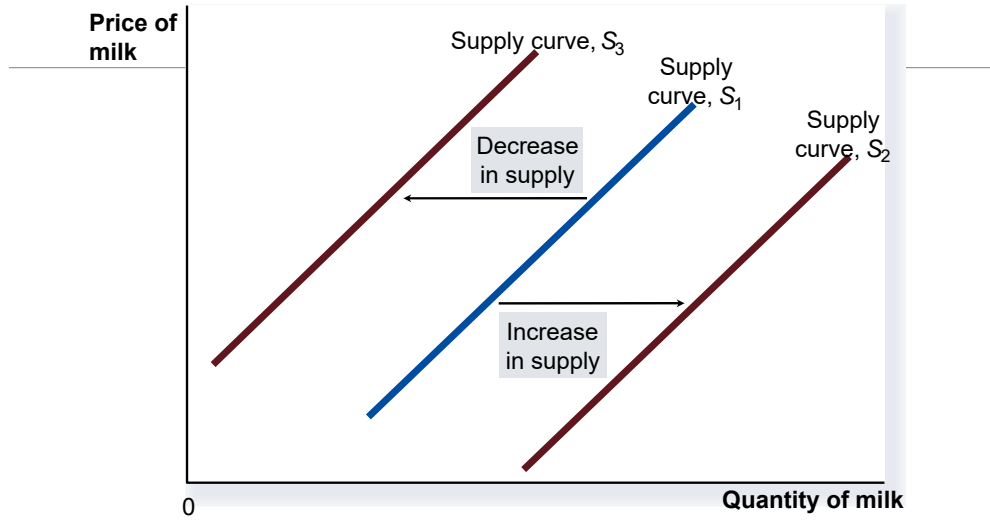
Change in Supply

- A shift in the supply curve, either to the left or right.
- Caused by a change in a determinant other than price.

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Figure 9. Shifts in the Supply Curve



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V. Supply And Demand Together

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Equilibrium

Equilibrium Price

- The price that balances quantity supplied and quantity demanded.
- On a graph, it is the price at which the supply and demand curves intersect.

Equilibrium Quantity

- The quantity supplied and the quantity demanded at the equilibrium price.
- On a graph it is the quantity at which the supply and demand curves intersect.

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Table 3. Equilibrium

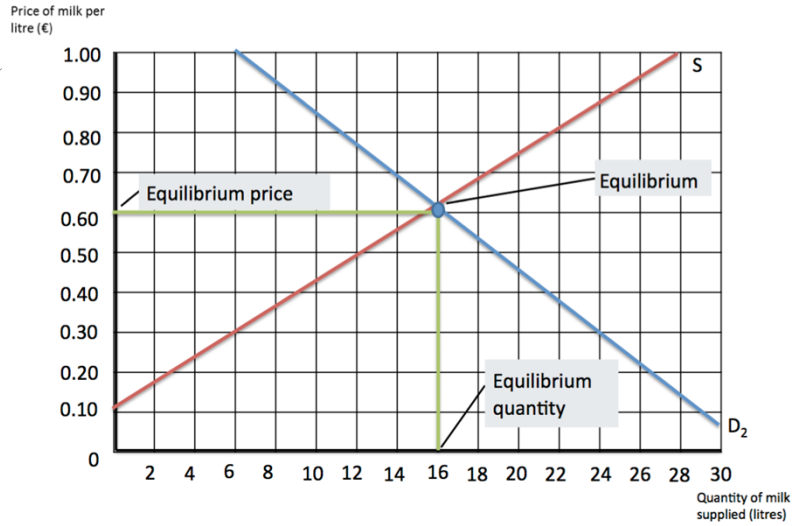
Demand Schedule		Supply Schedule	
price €	quantity	price €	quantity
0.00	19	0.00	0
0.50	16	0.50	1
1.00	13	1.00	3
1.50	10	1.50	5
2.00	7	2.00	7
2.50	4	2.50	9
3.00	1	3.00	11

At €2.00, the quantity demanded is equal to the quantity supplied in this example.

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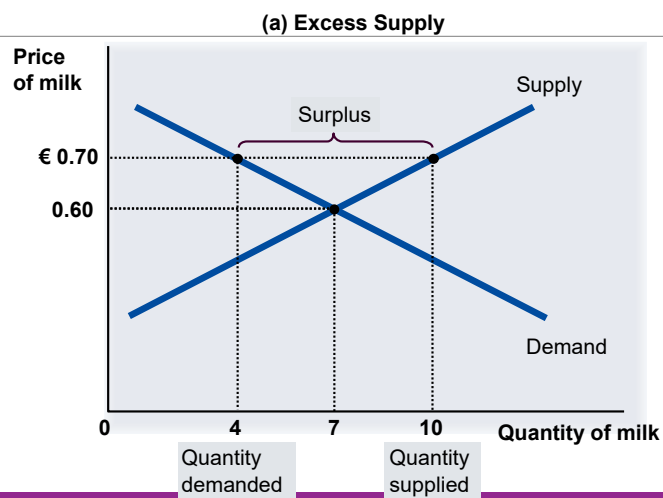
Figure 10. The Equilibrium of Supply and Demand



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Figure 11. Markets Not in Equilibrium



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Equilibrium

Surplus

- When price > equilibrium price, then quantity supplied > quantity demanded.
- There is excess supply or a surplus.
- Suppliers will lower the price to increase sales, thereby moving toward equilibrium.

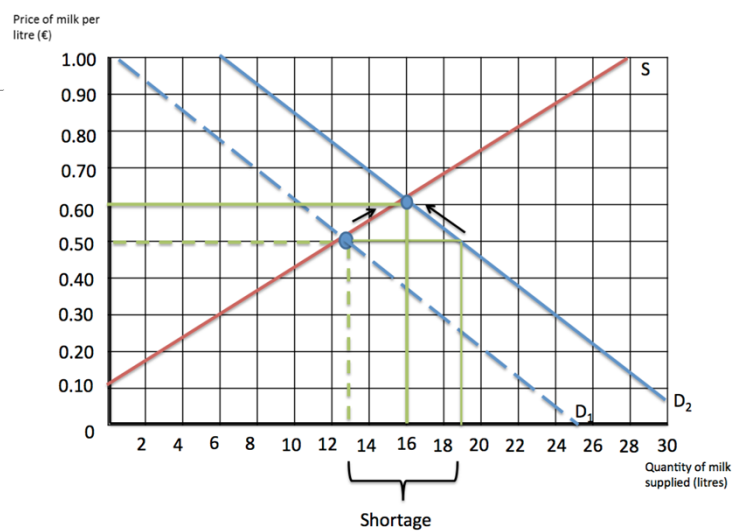
Shortage

- When price < equilibrium price, then quantity demanded > the quantity supplied.
- There is excess demand or a shortage.
- Suppliers will raise the price due to too many buyers chasing too few goods, thereby moving toward equilibrium.

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Figure 12. Markets Not in Equilibrium



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Equilibrium

Law of supply and demand

- The claim that the price of any good adjusts to bring the quantity supplied and the quantity demanded for that good into balance.

VI. Prices as signals

Prices as signals to buyers and sellers

The main function of price in a free market is to act as a signal to both buyers and sellers.

- For buyers, price tells them something about what they have to give up (usually an amount of money) to acquire the benefits.
- Price rise changes the nature of the trade-off buyers face.
- For sellers, price acts as a signal in relation to the profitability of production.
- Price rises for sellers indicates a shortage so will increase production.

VII. Analyzing Changes in Equilibrium

Three Steps to Analyzing Changes in Equilibrium

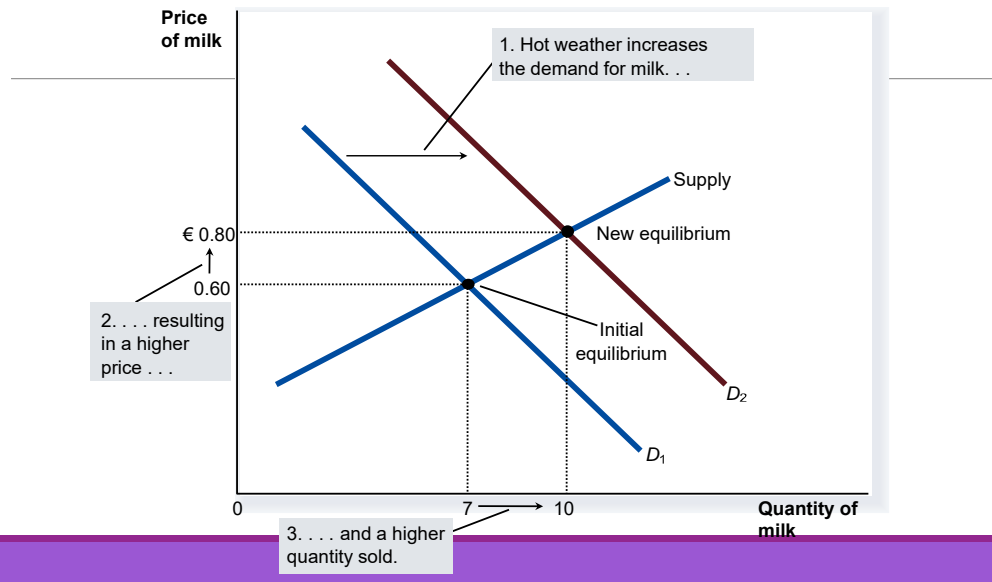
Shifts in Curves versus Movements along Curves.

- A shift in the supply curve is called a change in supply.
- A movement along a fixed supply curve is called a change in quantity supplied.
- A shift in the demand curve is called a change in demand.
- A movement along a fixed demand curve is called a change in quantity demanded.

Three Steps to Analyzing Changes in Equilibrium

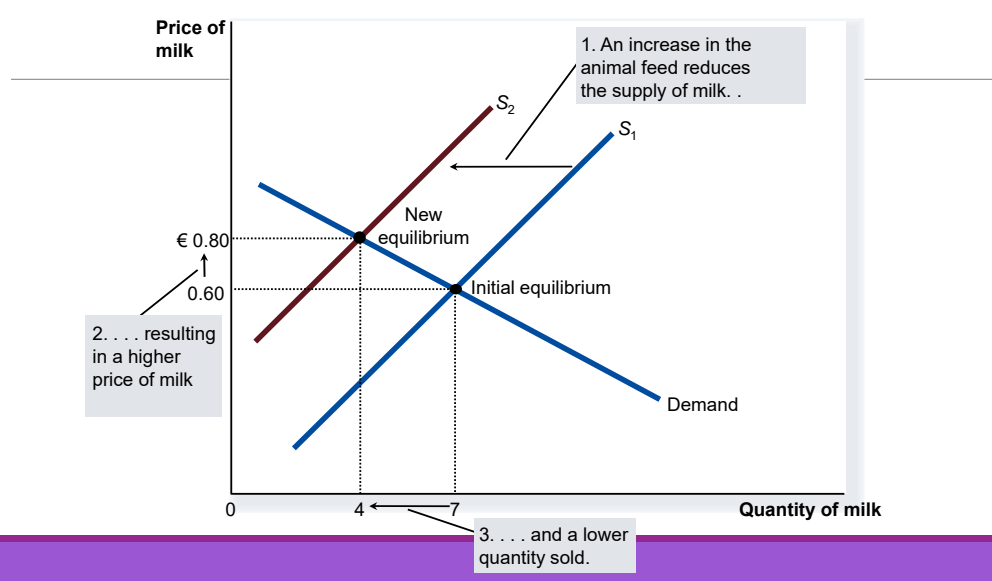
- ① Decide whether the event shifts the supply or demand curve (or both).
- ② Decide whether the curve(s) shift(s) to the left or to the right.
- ③ Use the supply and demand diagram to see how the shift affects equilibrium price and quantity.

Figure 13. How an Increase in Demand Affects the Equilibrium



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Figure 14. How a Decrease in Supply Affects the Equilibrium



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Table 4: What Happens to Price and Quantity When Supply or Demand Shifts?

	No Change in Supply	An Increase in Supply	A Decrease in Supply
No Change in Demand	<i>P</i> same <i>Q</i> same	<i>P</i> down <i>Q</i> up	<i>P</i> up <i>Q</i> down
An Increase in Demand	<i>P</i> up <i>Q</i> up	<i>P</i> ambiguous <i>Q</i> up	<i>P</i> up <i>Q</i> ambiguous
A Decrease in Demand	<i>P</i> down <i>Q</i> down	<i>P</i> down <i>Q</i> ambiguous	<i>P</i> ambiguous <i>Q</i> down

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VIII. Elasticity

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Elasticity: An Introduction

Elasticity:

- Allows us to analyze supply and demand with greater precision.
- Is a measure of how much buyers and sellers respond to changes in market conditions.

IX. The Price Elasticity of Demand

The Price Elasticity of Demand and its Determinants

Price elasticity of demand is a measure of how much the quantity demanded of a good responds to a change in the price of that good.

Price elasticity of demand is the percentage change in quantity demanded given a one percent change in the price.

Determinants of price elasticity of demand include:

- Availability of close substitutes.
- Necessities versus luxuries.
- Proportion of income devoted to the product.
- Time horizon.

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The Price Elasticity of Demand and its Determinants

Demand tends to be more elastic:

- the larger the number of close substitutes.
- if the good is a luxury.
- the more narrowly defined the market.
- the longer the time period.

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Computing the Price Elasticity of Demand

The price elasticity of demand is the percentage change in the quantity demanded divided by the percentage change in price.

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

- Example: The price of breakfast cereal rises by 10% and quantity demanded falls by 20%.

$$\text{Price elasticity of demand} = (20\%)/(10\%) = 2$$

Calculating Price elasticity

The **midpoint method** is preferable when calculating the price elasticity of demand because it gives the same answer regardless of the direction of the change.

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$

- Example: the price rises from €4 to €6 and quantity demanded falls from 120 to 80.
- % change in price = $(6 - 4)/5 \times 100\% = 40\%$
- % change in quantity demanded = $(120 - 80)/100 = 40\%$
- price elasticity of demand = $40/40 = 1$

Calculating Price elasticity

The **point elasticity of demand method** measures elasticity at a particular point on the demand curve.

$$\text{Price elasticity of demand} = \frac{P}{Q_d} \times \frac{dQ_d}{dP}$$

The Variety of Demand Curves

Price Inelastic Demand

- Quantity demanded does not respond strongly to price changes.
- Price elasticity of demand is less than one.

Price Elastic Demand

- Quantity demanded responds strongly to changes in price.
- Price elasticity of demand is greater than one.

The Variety of Demand Curves

1. Perfectly Price Inelastic

- Quantity demanded does not respond to price changes.

2. Perfectly Price Elastic

- Quantity demanded changes infinitely with any change in price.

3. Unit Price Elastic

- Quantity demanded changes by the same percentage as the price.

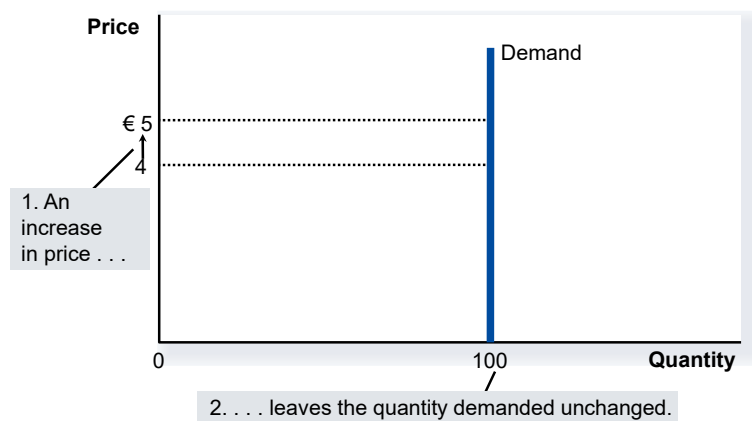
Because the price elasticity of demand measures how much quantity demanded responds to the price, it is closely related to the slope of the demand curve.

- This is shown in the next few slides.

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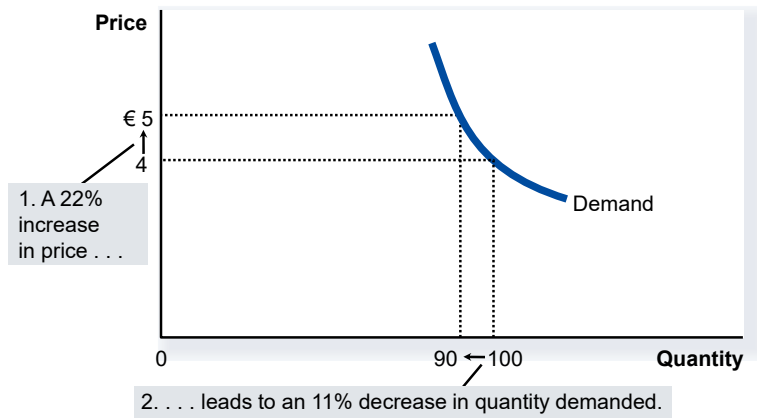
Figure 15 a Perfectly Price Inelastic Demand: Elasticity Equals 0



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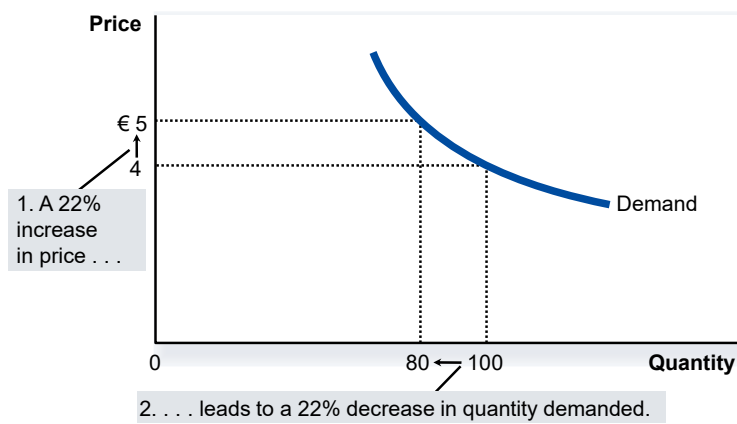
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Figure 15 (b) Price Inelastic Demand: Elasticity Is Less Than 1



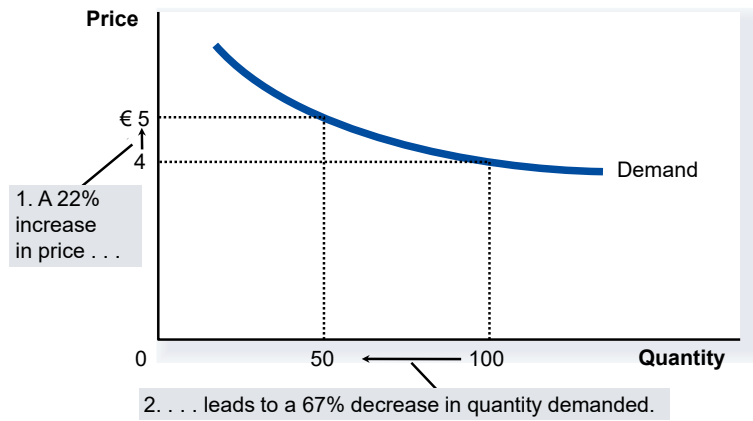
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Figure 15 c. Unit Elastic Demand: Elasticity Equals 1



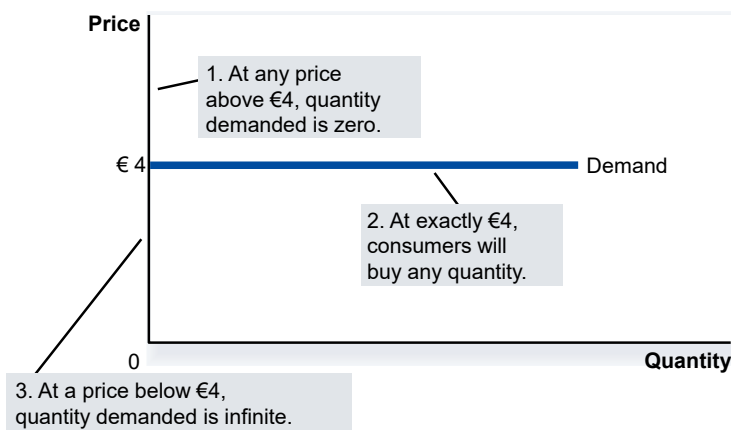
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Figure 15d. Price Elastic Demand: Elasticity Is Greater Than 1



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Figure 15e. Perfectly Price Elastic Demand: Elasticity Equals Infinity



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Total Expenditure, Total Revenue and the Price Elasticity of Demand

Total revenue is the amount paid by buyers and received by sellers of a good.

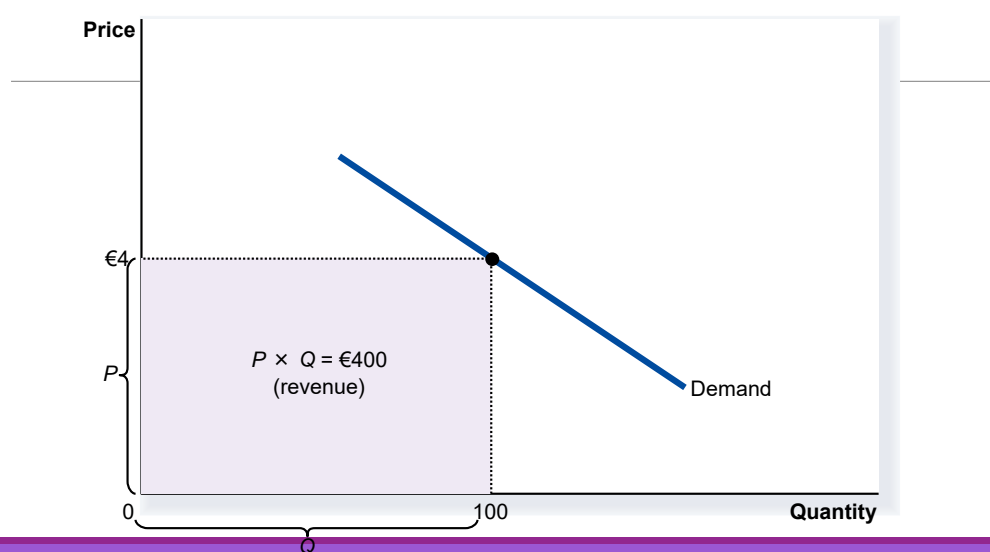
Computed as the price of the good times the quantity sold.

$$TR = P \times Q$$

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Figure 16. Total Revenue



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Price Elasticity and Total Revenue along a Linear Demand Curve

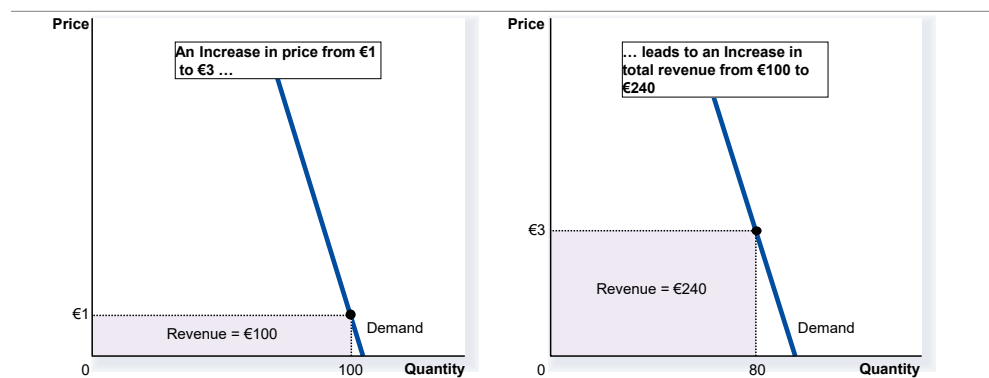
With a price inelastic demand curve:

- An increase in price....
 - ...leads to a decrease in quantity that is proportionately smaller.
 - Thus, *total revenue increases*.

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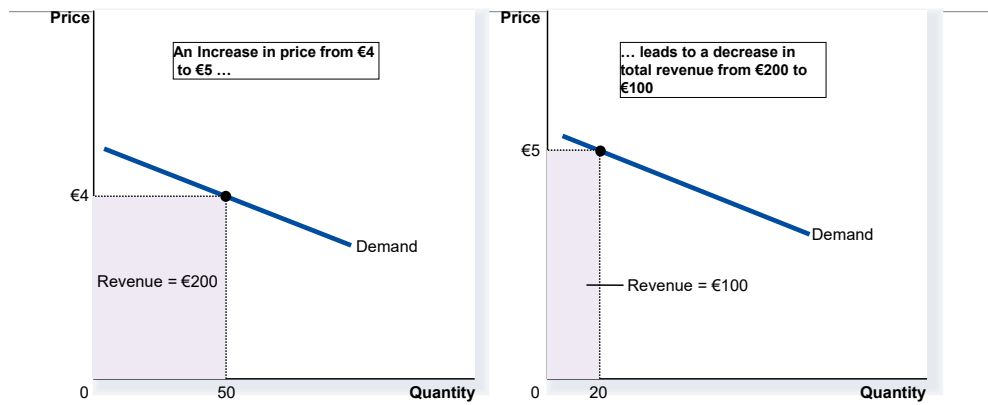
Figure 17. Total Revenue Changes When Price Changes: Price Inelastic Demand



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Figure 18. How Total Revenue Changes When Price Changes: Price Elastic Demand



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Table 5. Elasticity and Total Revenue along a Linear Demand Curve

- At points with a low price and a high quantity, demand is inelastic.
- At points with a high price and a low quantity, demand is elastic.

		Total revenue (Price × Quantity)	Percent change in price	Percent change in quantity	Price elasticity	Quantity description
€7	0	€0	15	200	13.0	Elastic
6	2	12	18	67	3.7	Elastic
5	4	20	22	40	1.8	Elastic
4	6	24	29	29	1.0	Unit elastic
3	8	24	40	22	0.6	Inelastic
2	10	20	67	18	0.3	Inelastic
1	12	12	200	15	0.1	Inelastic
0	14	0				

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X. Other Demand Elasticities

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Income Elasticity of Demand

Income elasticity of demand measures how much the quantity demanded of a good responds to a change in consumers' income.

It is computed as the percentage change in the quantity demanded divided by the percentage change in income.

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

Higher income raises the quantity demanded for *normal goods* but lowers the quantity demanded for *inferior goods*.

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Income Elasticity of Demand

Demand for goods consumers regard as necessities tends to be income inelastic.

- Examples include food, fuel, clothing, utilities, and medical services.

Demand for goods consumers regard as luxuries tends to be income elastic.

- Examples include sports cars, furs, and expensive foods.

Cross Elasticity of Demand

The *cross-price elasticity of demand* measures how much the quantity demanded of one good responds to a change in the price of another good.

It is computed as the percentage change in quantity demanded of the first good, divided by the percentage change in the price of the second good.

- *Substitutes* have positive cross-price elasticities.
- *Complements* have negative cross-price elasticities.

XI. The Price elasticity of Supply

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The Price Elasticity of Supply and its Determinants

Price elasticity of supply is a measure of how much the quantity supplied of a good responds to a change in the price of that good.

Price elasticity of supply is the percentage change in quantity supplied, resulting from a one percent change in price.

Determinants:

- Time period. Supply is more price elastic in the long run.
- Productive capacity and the ability of sellers to change the amount of the good they produce.
- Size of the firm or industry.
- Mobility of the factors of production.

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Computing the Price Elasticity of Supply

The price elasticity of supply is computed as the percentage change in the quantity supplied divided by the percentage change in price.

$$\text{Price elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

Example:

A rise in price of bicycles of 10 per cent increases supply by 15 per cent.

Price elasticity of supply = $(15\%)/(10\%) = 1.5$

Computing the Price Elasticity of Supply

The *midpoint method* measures the price elasticity of supply between two points, denoted (Q_1, P_1) and (Q_2, P_2) :

$$\text{Price elasticity of supply} = \frac{(Q_2 - Q_1)/[(Q_2 + Q_1)/2]}{(P_2 - P_1)/[(P_2 + P_1)/2]}$$

The *point elasticity of supply* method measures elasticity at a particular point on the supply curve.

$$\text{Price elasticity of supply} = \frac{P}{Q_s} \times \frac{dQ_s}{dP}$$

The Variety of Supply Curves

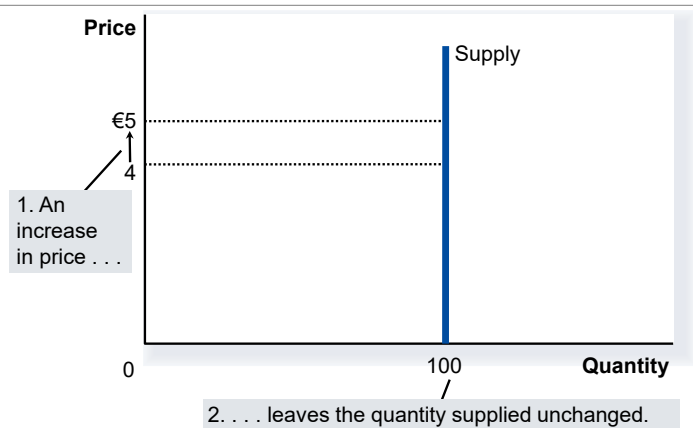
In general, the flatter the slope of the supply curve that passes through a given point, the more elastic the supply.

This is best shown diagrammatically as in the next few slides.

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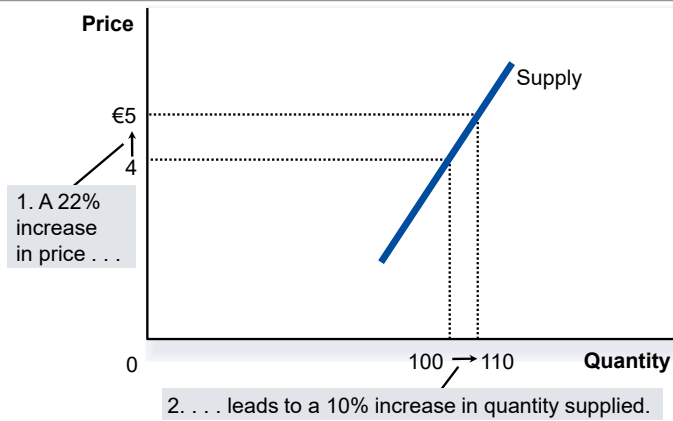
Figure 19 a. Perfectly Priced Inelastic Supply: Elasticity Equals 0



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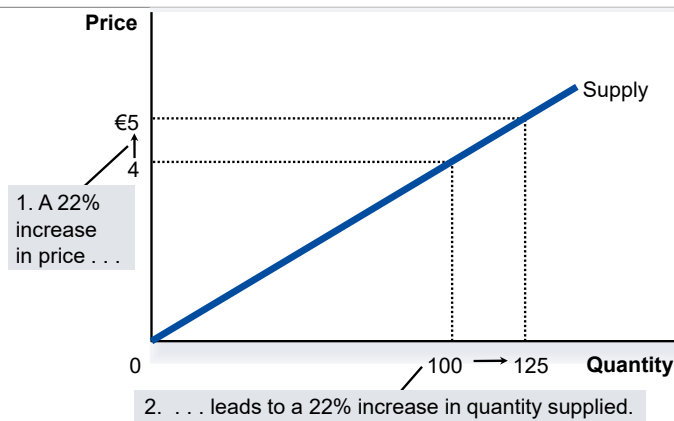
Figure 19 b. Price Inelastic Supply: Elasticity Is Less Than 1



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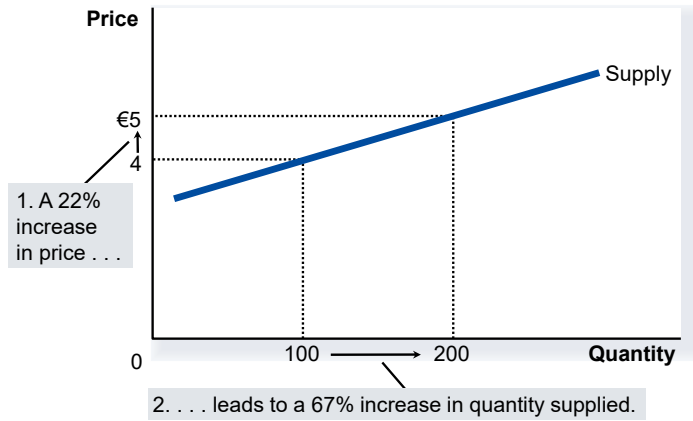
Figure 19c. Unit Elastic Supply: Elasticity Equals 1



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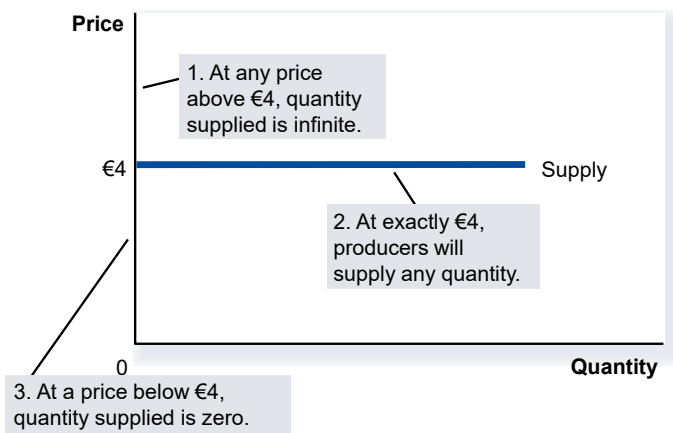
Figure 19d. Price Elastic Supply: Elasticity Is Greater Than 1



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Figure 19e. Perfectly Price Elastic Supply: Elasticity Equals Infinity



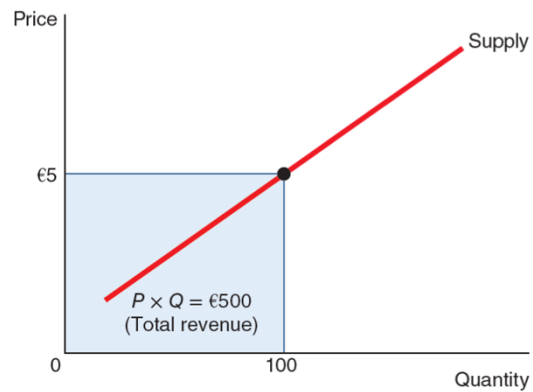
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Total Revenue and the Price elasticity of Supply (Figure 20)

When studying changes in supply in a market, we are often interested in the resulting changes in the **total revenue** received by producers.

Total revenue received by sellers is $P \times Q$, the price of the good times the quantity of the good sold.



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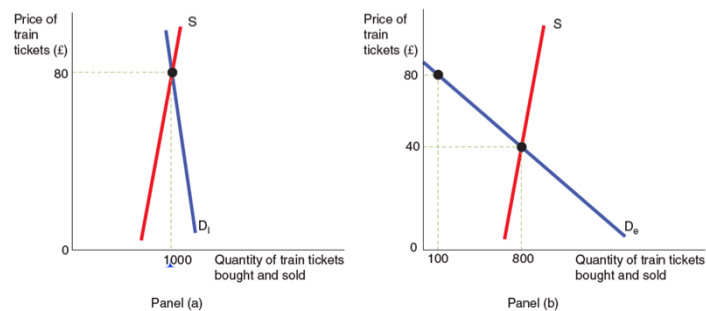
XII. Applications of Supply and Demand elasticity

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Why does the Price of Train travel Vary at Different Times of the Day?

- Figure 21 Panel a) Peak time travel: Demand is price inelastic, so tickets are expensive.
- Figure 21 Panel b) Off peak time travel: Demand is price elastic, so to maximize revenues ticket prices are lowered.



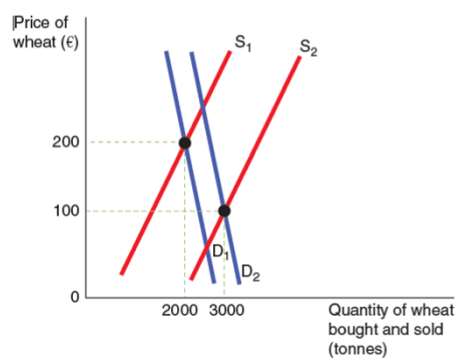
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Why Have Farmers' Incomes Fallen Despite Increases in Productivity?

Figure 22: Increased productivity in farming has led to...

- Considerable rise in supply S₁ to S₂, but only a small rise in demand from D₁ to D₂
- Result = lower prices for farmers.



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Useful Advice

- ① Examine whether the supply or demand curve shifts.
- ② Determine the direction of the shift of the curve.
- ③ Use the supply and demand diagram to see how the market equilibrium changes.