BUSS1040 – Economics for Business Decision Making

Lecture 3: Supply and Demand

School of Economics, Faculty of Arts and Social Sciences

THE UNIVERSITY OF SYDNEY

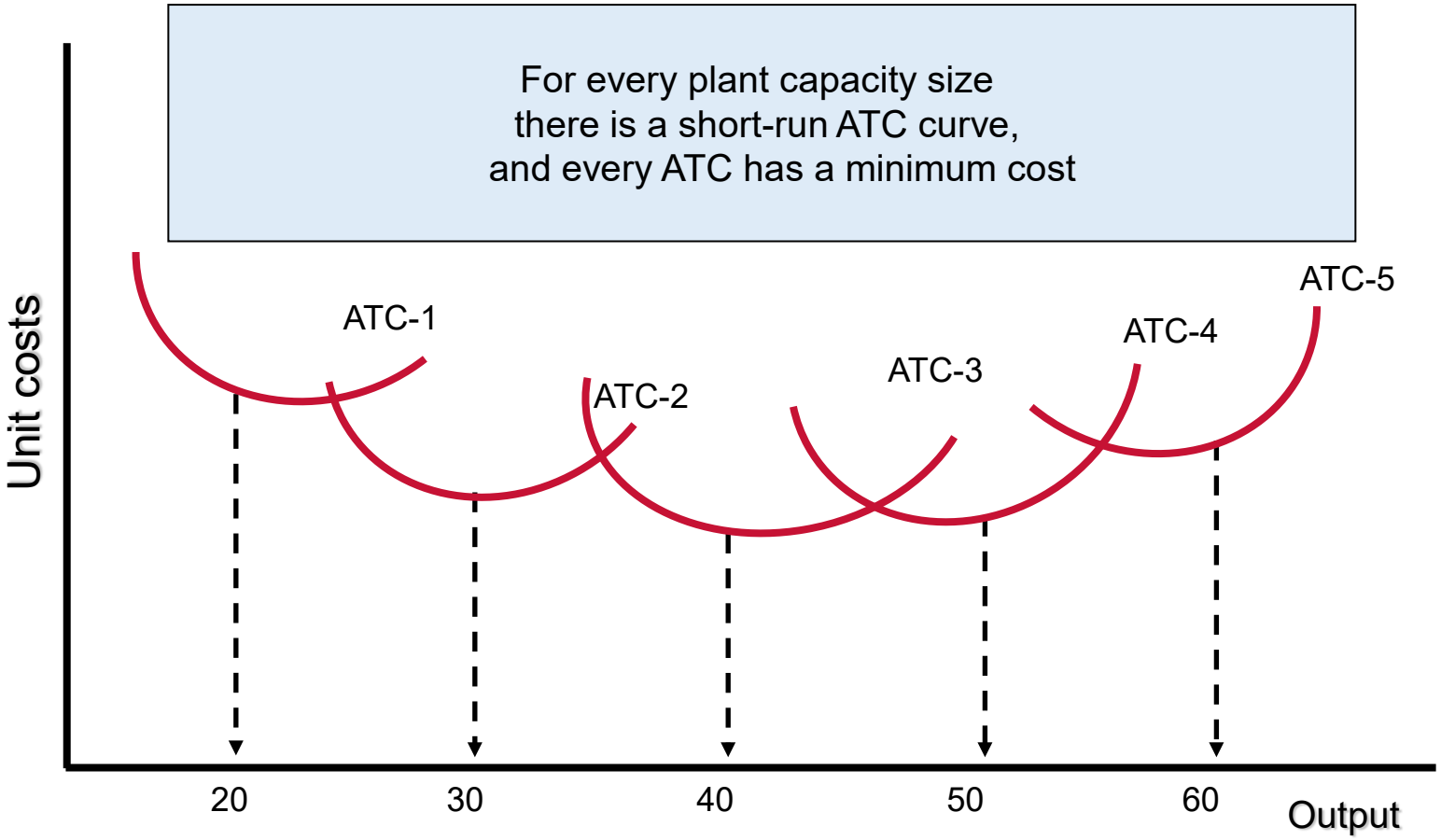
Outline

1. Economies of Scale
2. Supply
3. Demand

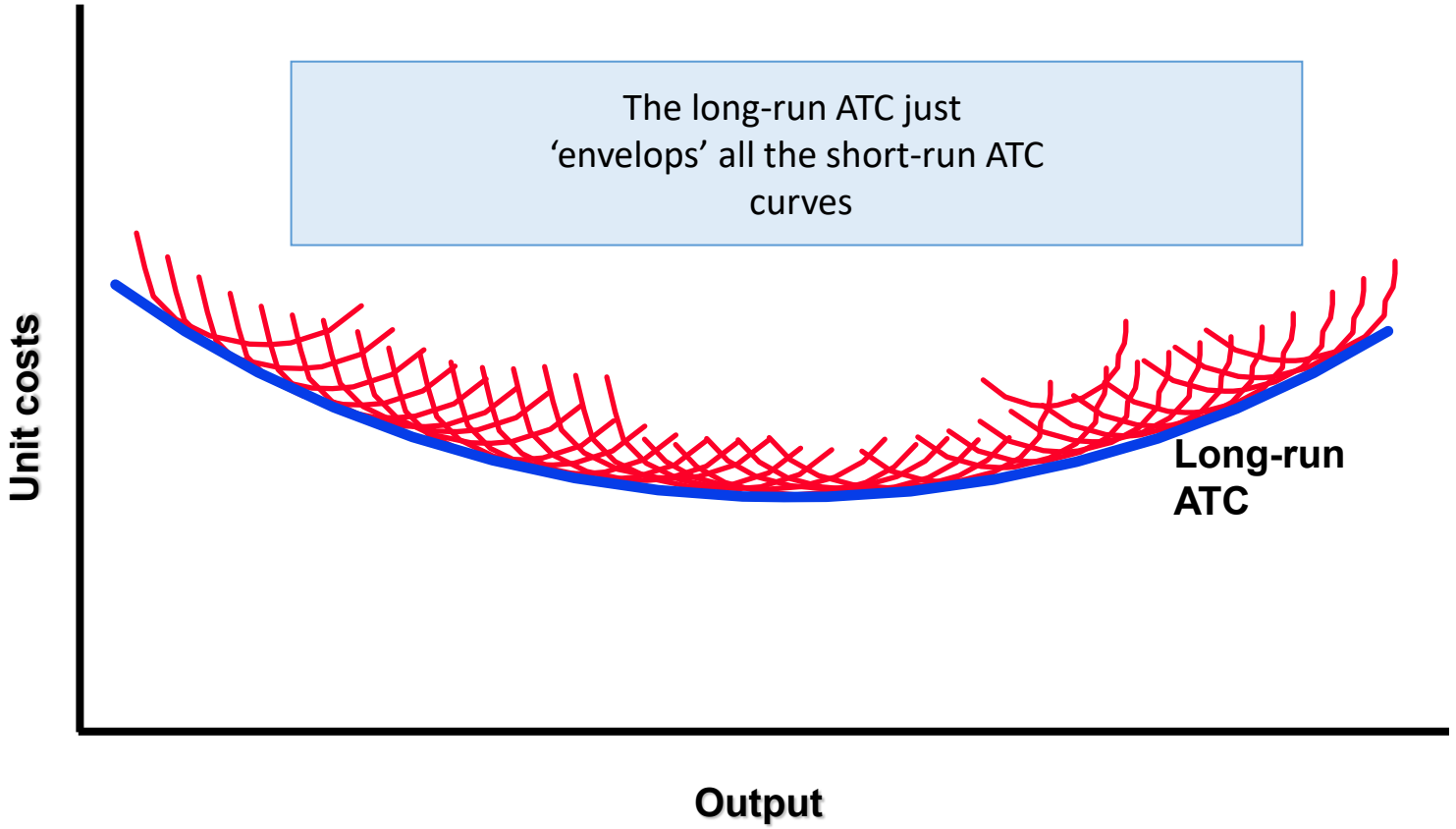
Long-run average cost

- Given the firm's extra flexibility in the long run, **long-run average cost** can be no greater than **short-run average cost**.
- As a result of this, the long-run average cost curve will be the **lower envelope** of all of the short-run average cost curves. See the following figure – it illustrates how to derive a long-run average cost curve from several short-run average cost curves

Long-run Average Cost Curve



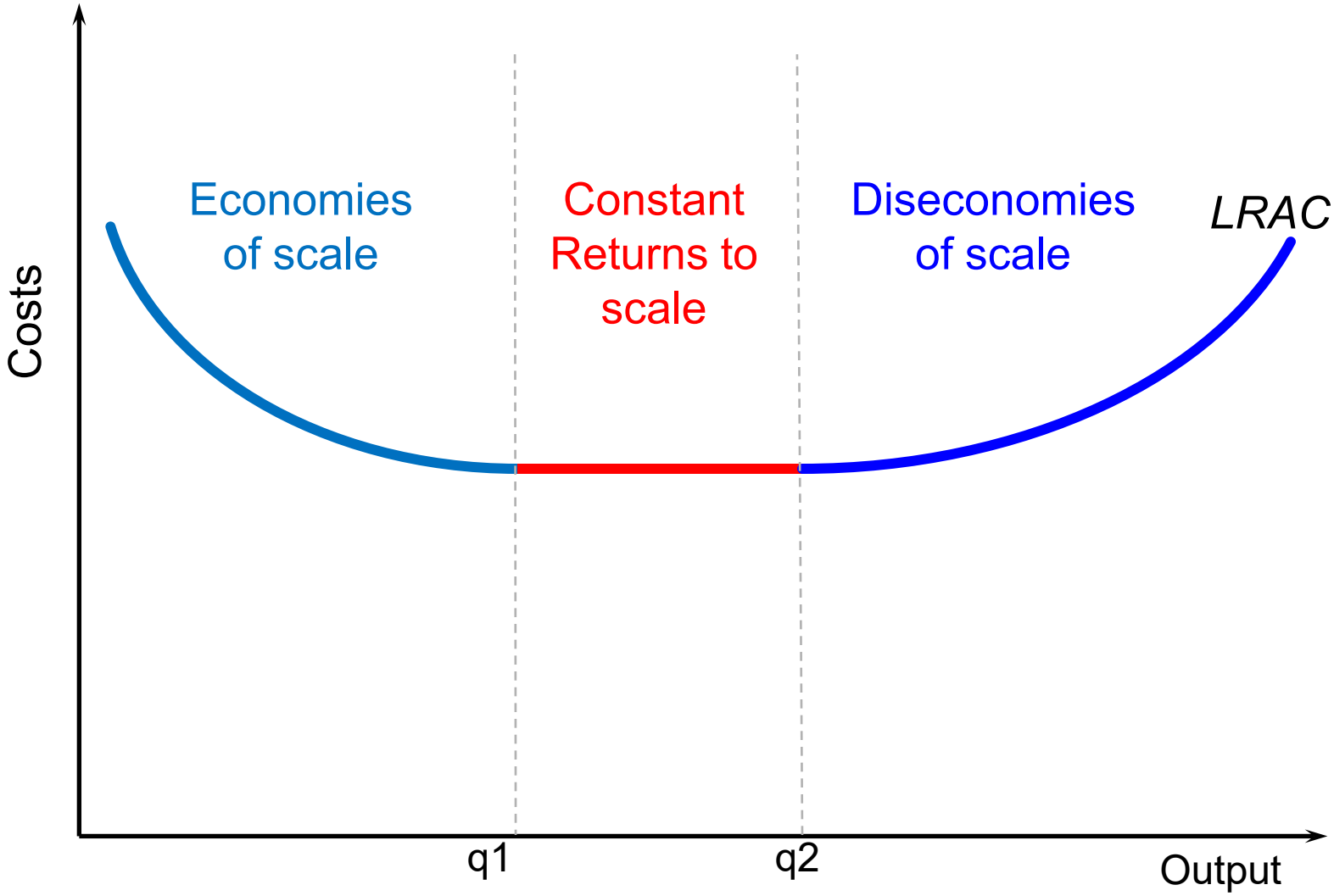
Long-run Average Cost Curve



Economies of scale

- ***Economies of scale*** is when long-run average costs decrease with output.
- ***Diseconomies of scale*** is when long-run average costs increase with output.
- ***Constant returns to scale*** is when long-run average costs are constant as output expands.

Long-run Average Cost Curve



Returns to Scale and Economies of Scale

- There is a direct relationship between returns to scale and economies of scale
- *Economies of scale* reflect the relationship between output and costs.
- Recall that *returns to scale* refers to how the quantity of output changes when there is a proportional change in the quantity of all inputs.
- The relationship arises as the production function (inputs and outputs) is a mirror image of the cost function (relationship between costs and output)

Returns to scale & economies of scale

- When a firm experiences increasing returns to scale (increasing inputs proportionally leads to a more than proportional increase in outputs), it also experiences 'economies of scale' or falling average cost of production.
- When a firm experiences decreasing returns to scale (increasing inputs proportionally leads to a less than proportional increase in outputs), it also experiences 'diseconomies of scale' or increasing average cost of production.
- When a firm experiences constant returns to scale (increasing inputs proportionally leads to a proportional increase in outputs), it experiences neither 'economies or diseconomies of scale'. That is, average cost of production is constant.
- Typically, we think that a firm has regions where it exhibits each of these.

Economies of Scale

› Economies of scale arise from:

- **Labour specialization**

Firms producing at a large scale employ a large number of workers. This allows the firms to practice specialization by splitting jobs into smaller tasks. These individual tasks are assigned to separate workers. In this way workers spend all their work time on the part they know best and it also allows them to perfect their skills.

- **Managerial specialization**

Firms might be able to lower average costs by improving the management structure within the firm. The firm might hire better skilled or more experienced managers.

- **Efficient capital**

The most efficient machines and equipment are based on cutting edge technology and have high production capacity. Firms with large scale production can afford such equipment and benefit from their full capacity. At full utilization such machinery or equipment achieves lower production cost per unit. Firms having small scale production either cannot afford such equipment or cannot utilize such machinery to its full capacity.

- **Bulk-buying products**

With greater buying power, a large firm can purchase its factor inputs in bulk at discounted prices. They can buy more from suppliers at a lower price.

Diseconomies of Scale

- **Diseconomies of scale:** As firm increases its scale of output, LRAC increases. Diseconomies of scale are the forces that cause larger firms to produce goods and services at increased per-unit costs.
- **Reasons:**
  - Duplication of effort— When firms grow to thousands of workers, it is inevitable that someone, or even a team, will take on a project that is already being handled by another person or team.
  - Top-heavy companies—The more employees a firm has, the larger percentage of the workforce will be "management". If a manager does nothing other than manage the workers under them, then the productivity of the firm has been reduced.
  - Inertia— unwillingness to change, because ‘we’ve always done it that way’.
  - Cannibalization— a small firm only competes with other firms, but larger firms frequently find their own products are competing with each other.
  - Inelasticity of Supply— a company which is heavily dependent on its resource supply will have trouble increasing production. For instance a timber company can not increase production above the sustainable harvest rate of its land

Supply

Introduction

- Now we use costs to derive an individual **firm**'s supply function and the **market** supply function.
- We focus on ***competitive markets***, in which there are many buyers and sellers, such that no individual buyer or seller has the power to materially affect the price in the market.
- As a consequence, both sellers and buyers in the market are ***price takers***.

Firm supply

- ***Firm supply*** is the quantity of output a firm is willing and able to supply at a certain price.
  - The **supply curve** traces out all combinations of (i) market price and (ii) quantities that a firm is willing and able to sell at that price.

- Firm supply curve is drawn by changing the price of output, holding everything else that is relevant constant (ceteris paribus).
  - Examples of factors held constant?

Q: Now how much is a firm willing and able to supply at a given price?

Firm supply

- A firm should sell up until **P = MC**

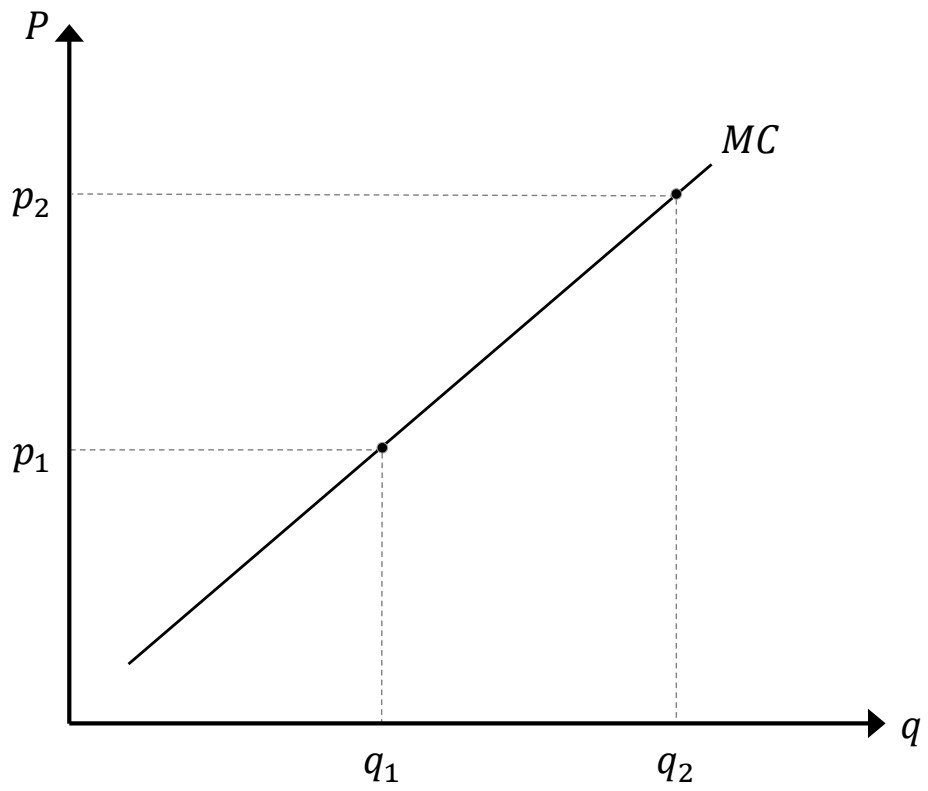
Firm supply

- A firm should sell up until **P = MC**
- The **marginal revenue (MR)** for each unit that the firm sells is the price, P.
  - MR = P (competitive market)
  - Remember, a competitive firm is a price taker – it cannot affect market price. This means price is unchanged, regardless as to how much an individual firm sells.
- First, if a firm supplies a quantity where **P > MC** for the last unit sold (and this is true for at least one additional unit), profits rise when increasing its output by one unit.
  - it will increase its profit since the additional revenue from selling that extra unit (P) outweighs the MC.
- Second, if a firm is producing where P < MC for the last unit made, the firm can increase profit by not making that last unit
  - The extra revenue (P = MR) is less than the extra costs that are incurred.

Firm supply

- Consequently, a firm should sell up until P = MC.
- **Now if price P changes** – from P_1 to P_2 in the next figure.
  - As price rises, so does the firm's MR
  - it now continues to produce until P = MC for the last unit produced.
  - As MC is often increasing, the quantity supplied in the market is higher when price is higher.
- A **movement along the supply curve** when output price changes is called *a 'change in the quantity supplied'*
  - if output price is increasing it is 'an increase in the quantity supplied'
  - for a decrease in output price 'a decrease in the quantity supplied'.

Firm Supply



The Law of Supply

- This means is that a firm's supply curve is given by its MC curve.
- As MC curve is upward sloping due to diminishing marginal product.
- This gives a positive relationship between the price of a good and the quantity of that good supplied.
- This positive relationship is known as the *law of supply.*
  - Note, the law does not always hold, but it often does.

- ***The Law of Supply:*** there is a positive relationship between the price of a good and the quantity supplied, all else constant.
- If the price increases then
  - it's 'worth it', i.e. more profitable, to divert resources to producing more
  - the relatively higher price will compensate for the increased opportunity costs of producing more

- Consider output and costs of Joe's candy shop in the table. If the market price for this type of candy is $1.2, how much candy would you advise Joe to sell?

A. 1
B. 3
C. 4
D. 5
E. 6
F. 8
G. None of the above.

Output (q, candy)	TC	MC	MR
0	2.00	-	
1	2.30	0.3	
2	2.80	0.5	
3	3.50	0.7	
4	4.40	0.9	
5	5.50	1.10	
6	6.80	1.30	
7	8.30	1.50	
8	10.00	1.70	

Note: remember we assume firms aim to maximise profits and P = MR in a competitive market. ADVICE: apply the supply rule, and check profit levels at each level of output q.

› Consider output and costs of Joe's candy shop in the table. If the market price for this type of candy is $1.2, how much candy would you advise Joe to sell?

A. 1 – P > MC => produce 1st unit (π = - 1.1)

B. 3 – P > MC => produce 3rd unit (π = 0.1)

C. 4 - P > MC => produce 4th unit (π = 0.4)

D. 5 – P > MC => produce 5th unit (π = 0.5)

E. 6 – P < MC => not produce 6th unit, π=0.4.

F. 8 – P < MC => not produce 8th unit, π=-0.4

G. None of the above.

Note: remember we assume firms aim to maximise profits and P = MR in a competitive market.

Output (q, candy)	TC	MC	MR
0	2.00	-	
1	2.30	0.3	1.20
2	2.80	0.5	1.20
3	3.50	0.7	1.20
4	4.40	0.9	1.20
5	5.50	1.10	1.20
6	6.80	1.30	1.20
7	8.30	1.50	1.20
8	10.00	1.70	1.20

› Consider output and costs of Joe's candy shop in the table. If the market price for this type of candy is $1.2, how much candy would you advise Joe to sell?

› Applying the rule: produce as long as P≥MC (where P=MR in a competitive market, thus this rule is equivalent to MR≥ MC). In other words, the firm produces until P=MC. In this example, the firm stops producing at MR ≥MC, since producing an additional unit would involve MR<MC – which lowers profits.

Note: remember we assume firms aim to maximise profits and P = MR in a competitive market.

Output (q, candy)	TC	MC	MR
0	2.00	-	-
1	2.30	0.3	1.20
2	2.80	0.5	1.20
3	3.50	0.7	1.20
4	4.40	0.9	1.20
5	5.50	1.10	1.20
6	6.80	1.30	1.20
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0	2.00	-	
1	2.30	0.3	
2	2.80	0.5	
3	3.50	0.7	
4	4.40	0.9	
5	5.50	1.0	
6	6.70	1.2	
7	8.20	1.50	
8	10.00	1.80	

Note: remember we assume firms aim to maximise profits and P = MR in a competitive market. ADVICE: apply the supply rule, and check profit levels at each level of output q.

- Consider output and costs of Joe's candy shop in the table. If the market price for this type of candy is $1.2, how much candy would you advise Joe to sell?

A. 1
B. 3
C. 4
D. 5
E. 6 – produce up to P=MC; though profits at q=6 and q=5 are both 0.5 - why? MR = MC, thus selling a 6th unit does not change profits.
F. 8
G. None of the above.

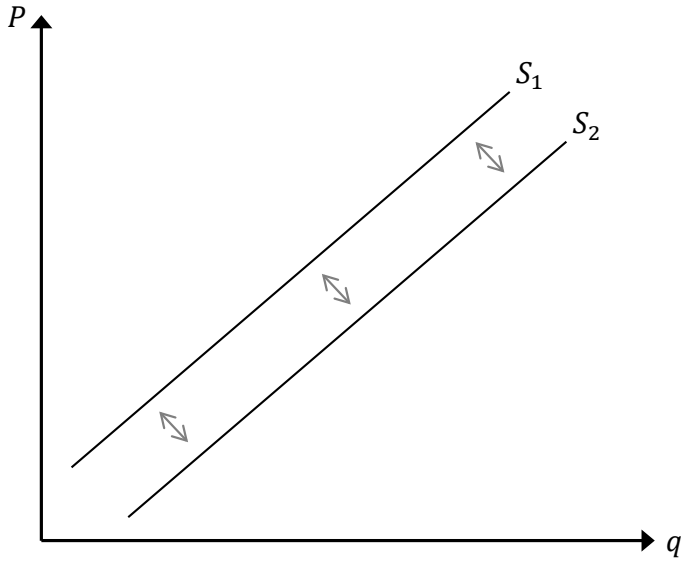
Output (q, candy)	TC	MC	MR
0	2.00	-	-
1	2.30	0.3	1.20
2	2.80	0.5	1.20
3	3.50	0.7	1.20
4	4.40	0.9	1.20
5	5.50	1.0	1.20
6	6.70	1.2	1.20
7	8.20	1.50	1.20
8	10.00	1.80	1.20

Note: remember we assume firms aim to maximise profits and P = MR in a competitive market. ADVICE: apply the supply rule, and check profit levels at each level of output q.

Shifts in supply

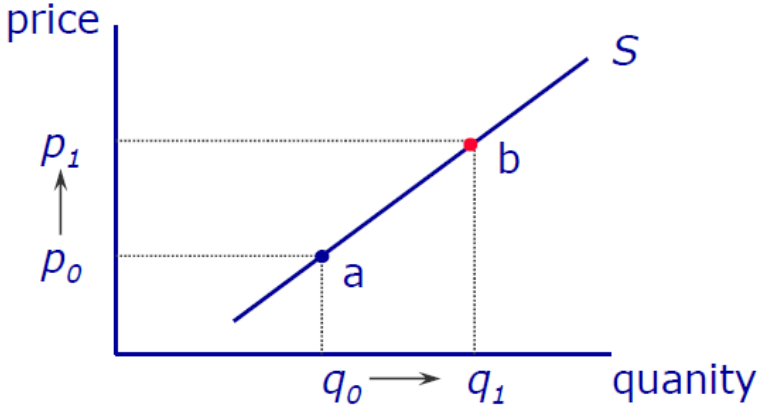
- The firm's supply curve is derived by assuming that only the price and quantity supplied of the product can change.
  - We assume that all other relevant factors are held constant (ceteris paribus).
- If any **other relevant factors** change, the supply curve itself will shift.
  - These factors include the cost of inputs, technology and expectations about the future.
  - At any given output price, the quantity supplied changes.
- If there is a change in one of these factors there will be a *'change in supply'*, either:
  - 'an increase in supply' for shifts of the supply curve to the right (S_1 to S_2); or
  - 'a decrease in supply' for shifts of supply to the left (S_2 to S_1).

Shifts or changes in supply

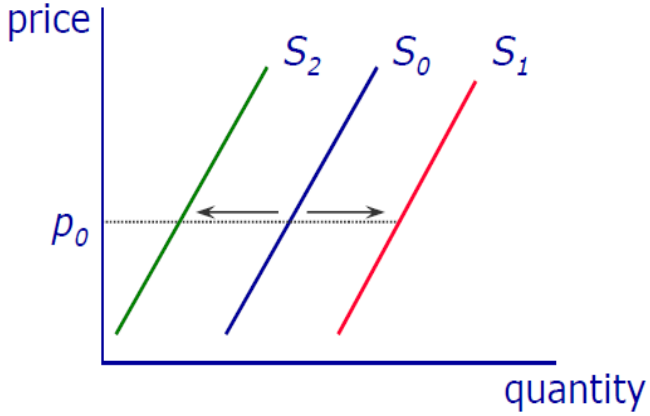


A change in Quantity Supplied vs. a Change in Supply

› If the price of a good itself changes then there is a
  - movement along its' supply curve
  - change in *quantity supplied*



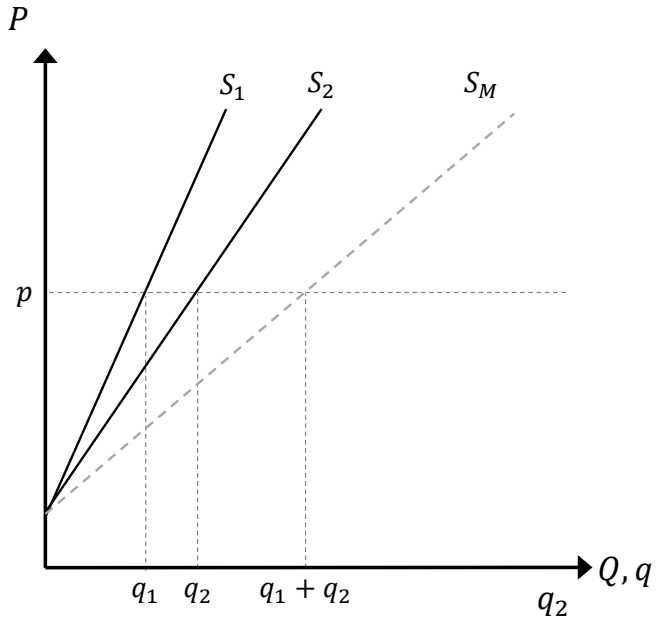
› If another determinant of supply changes *then there is a* shift of the supply *either*
  - an *increase in supply, or*
  - a *decrease in supply*

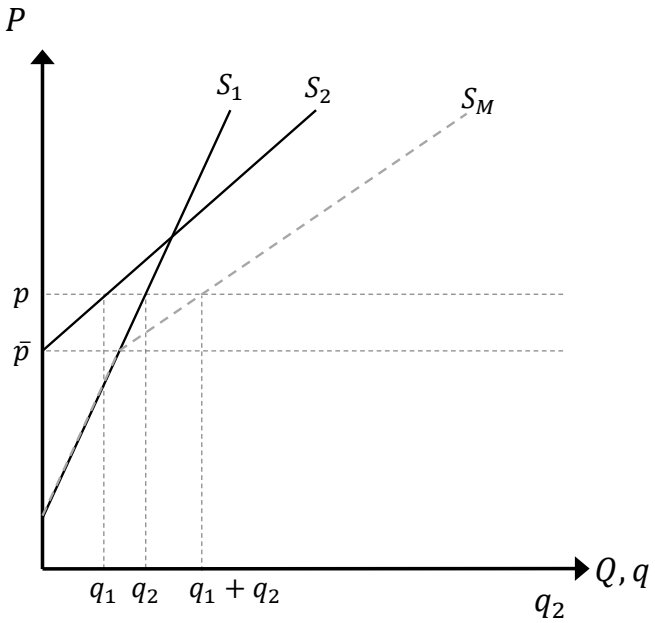


Market supply

- Given that an individual firm's supply curve is given by its MC curve, we can use this to derive the market supply curve.
- The ***market supply* curve** shows the quantity supplied in a market at different market prices, holding everything else constant.
  - Suppose the market price of carrots is $1 and the market consists of 2 suppliers only.
  - At this price, Jackson is willing to sell five carrots and Jared is willing to sell eight carrots. This means that, at $1, the total quantity supplied in the market is 13 carrots. Repeat this for every price to derive the market supply curve.
- Graphically, the market supply curve is the *horizontal summation* of the individual supply curves.
  - The individual MC curves summed horizontally along the q-axis.

Market supply – two examples of horizontal summation of individual S curves





Market Supply

- Assuming there are 2 producers:
- Russell's supply curve:

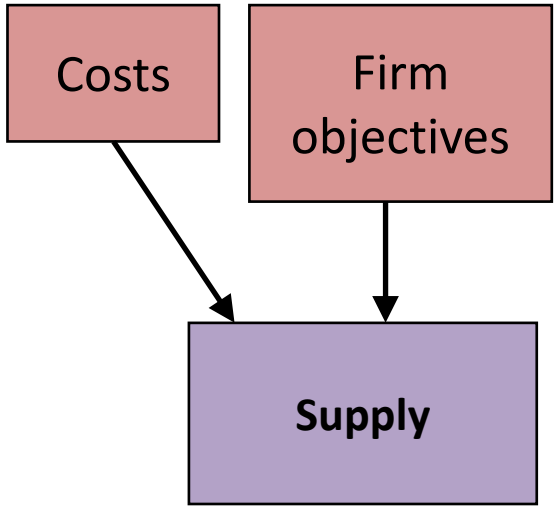
  $p = 0.5 + 0.5q_R \Rightarrow q_R =$
- Tony's supply curve:

  $p = 1 + 0.25q_T \Rightarrow q_T =$
- Market supply curve: $Q_S = q_R + q_T$
- $Q_S = 6p - 5$ for $p \geq 1$
- $Q_S = 2p - 1$ for $0.5 \leq p < 1$
- Note that at prices above 1, the market supply curve is the horizontal summation of the Russell and Tony's supply curves. At prices between 1 and 0.5, only Russell supplies to the market. Hence the market supply curve is simply Russell's supply curve. Strictly speaking the market supply curve is not defined at prices below 0.5 because neither Tony nor Russell supply the market.

Market supply

- The law of supply also holds for the market supply curve.
- We also use the term '*change in the quantity supplied*' to refer to movements along the market supply curve,
- The term '*change in supply*' again refers to a shift of the supply curve itself.

The story so far…



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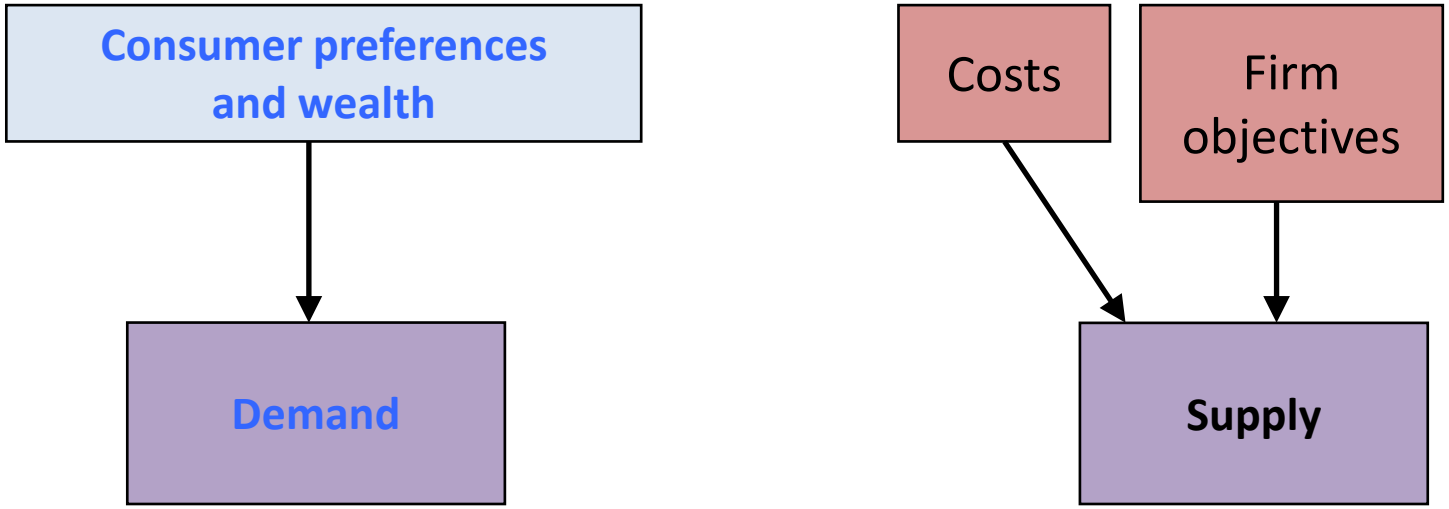
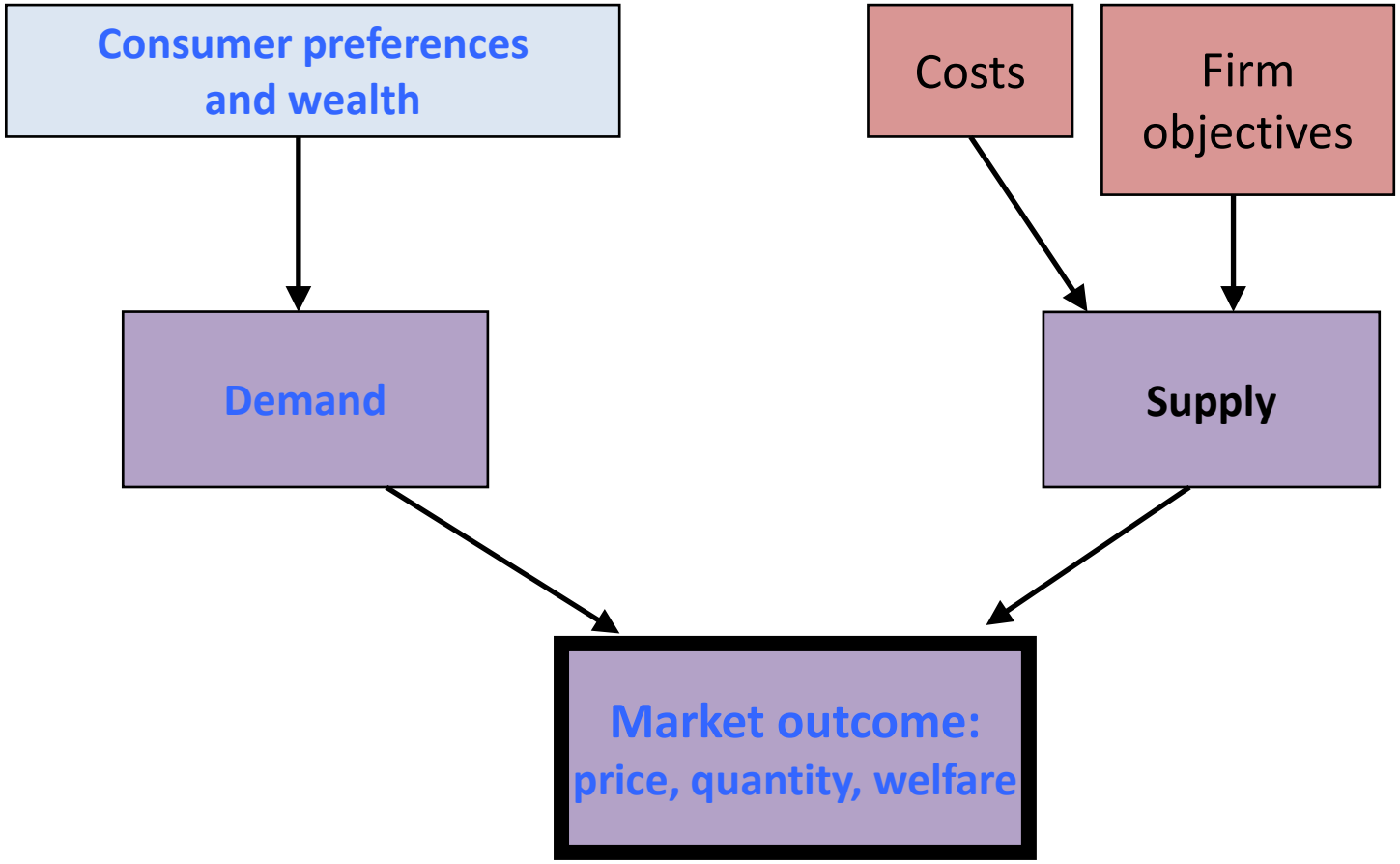


The story so far…



Outline

- **Consumer** behaviour – **DEMAND**
  - Consumers aim to maximize their well-being
  - Relate marginal benefit of consuming a good to demand

- Functioning of **MARKETS**:
  - Demand + Supply => equilibrium
  - Market equilibrium: price, quantity traded
  - Welfare analysis: surplus for consumers and firms

Demand

NW Ch. 6

Background

- **Consumer behaviour** ➔ demand for goods & services

- In economics we examine consumer behaviour assuming each consumer tries to **maximize** their ***well-being***, or the ***benefit*** he or she gets from consuming goods and services, subject to their ***budget constraint*** (trade-offs)

- First, we consider **competitive markets**
  - That's where the choices of individual consumers do not affect the price in the market – consumers are *price takers*.

Benefit and willingness to pay

- A consumer derives some benefit from consuming a particular good or service.
- The benefit a consumer gets is also their **willingness to pay** (WTP).
  - The maximum price a consumer will pay for a good is equal to the benefit they anticipate getting from the item (in money terms).

Total benefit and marginal benefit

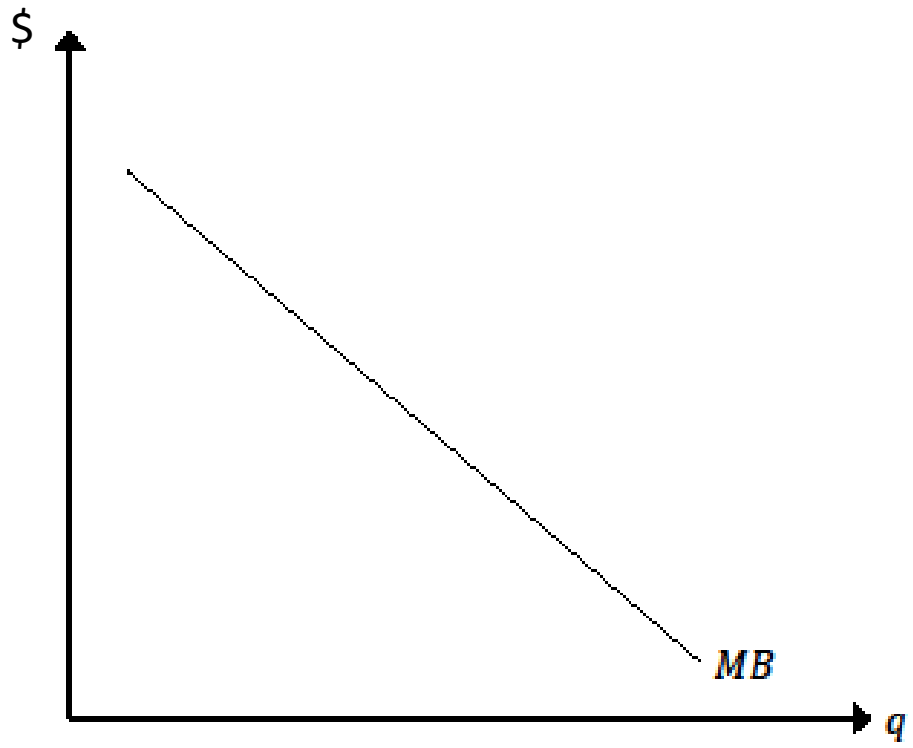
- When a consumer buys multiple units of a good, important to distinguish between **total** and **marginal benefit**.

- Example: Candice's willingness to pay for coffee is $4 for the first cup, $3 for the second and $2 for the third.
  - Her **total benefit** for the three cups is $9.
  - Her **marginal benefit (MB)** measures how much extra benefit she derives from consuming an additional cup.
    - Her marginal benefit is $4 for the first cup, $3 for the second cup and $2 for the third cup of coffee.

Marginal benefit

- Generally, we expect marginal benefit to decline with each additional unit consumed (*declining or **diminishing MB***).
  - The extra benefit a consumer gets from a good gets smaller the more of that good the consumer has already enjoyed.
- When the consumer buys many units of a good, typical to have a continuous (smooth) MB curve.

A typical marginal benefit curve



Individual demand

- We can use a consumer's marginal benefit curve to derive his individual demand curve.

- An **individual's demand** is the *quantity* of a good or service that a consumer is willing and able to buy at a certain *(market) price*.
  - Hence, the individual **demand curve** traces out all combinations of (a) market price and (b) individual demand at that price, *holding everything else constant* (ceteris paribus).

- *Q: what are some of the other determinants of "buying plans", that we hold constant when considering an individual's demand curve?*

Individual demand and MB

- The maximum price a consumer will pay for a good is equal to the benefit they anticipate getting from the item (in money terms).
- A consumer will purchase units of the good up until the point where **P = MB**. Why?

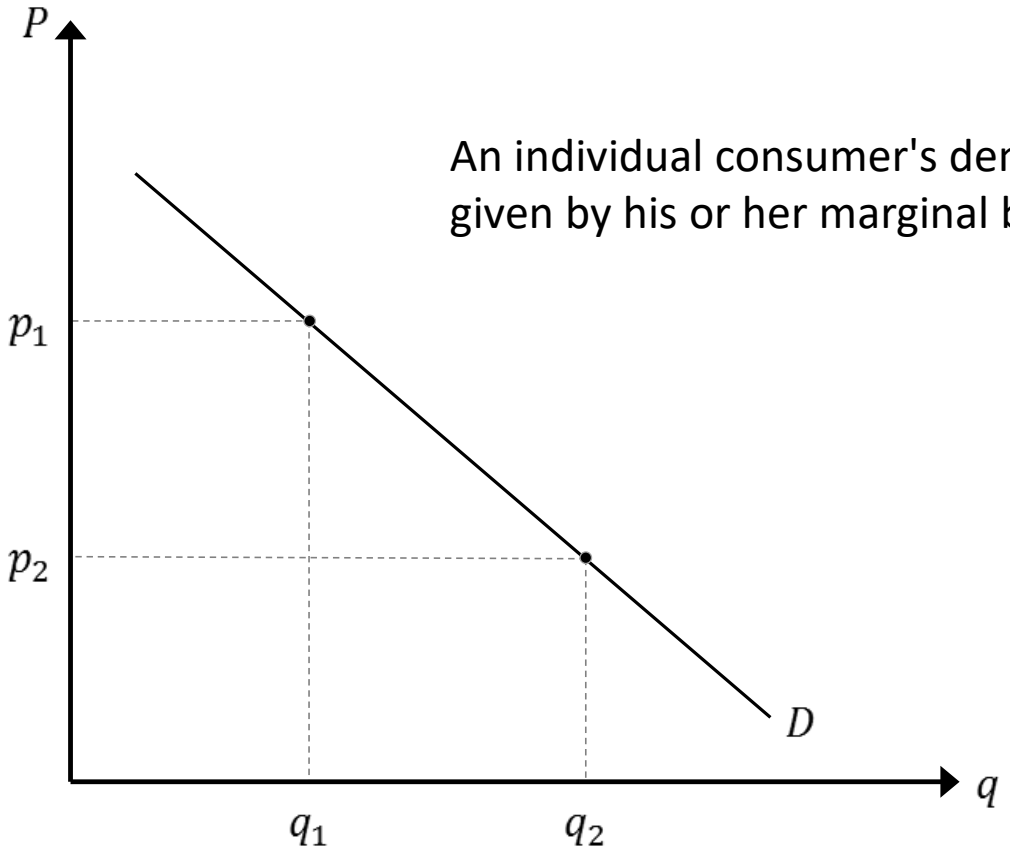
Individual demand and MB

- The maximum price a consumer will pay for a good is equal to the benefit they anticipate getting from the item (in money terms).
- A consumer will purchase units of the good up until the point where **P = MB**. Why?
  - If P<MB for a unit of a good the consumer should buy that unit because her willingness to pay for that unit exceeds the price.
  - If P> MB for a unit of the good, the consumer should not buy that unit.
  - Given diminishing MB, consumer should buy the good until P = MB.

Individual demand

- A consumer purchases units of a good up to P=MB
- Consequently, a consumer's **individual demand curve** is her MB curve.
  - Due to diminishing MB, individual demand is *downward sloping*.
- A demand curve represents how much a consumer is *willing* and *able* to buy at different market prices.

Individual demand



An individual consumer's demand curve is given by his or her marginal benefit curve.

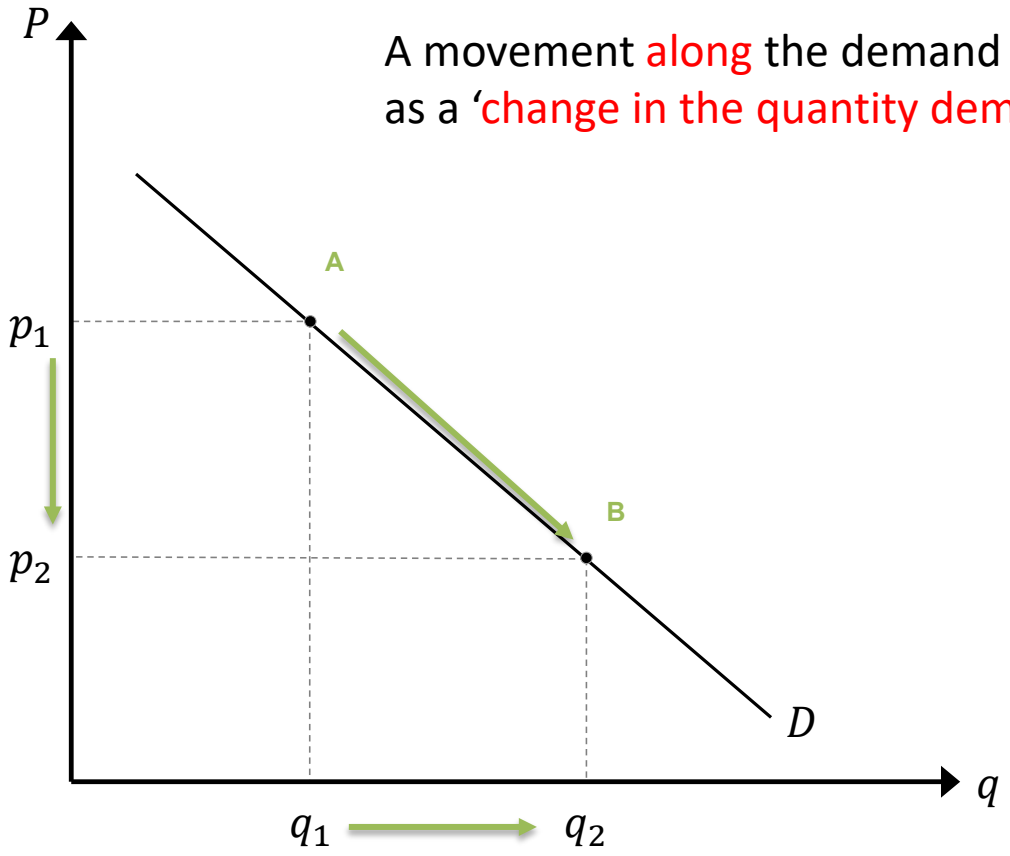
Law of demand

- The downward slope of the demand curve means that a consumer consumes fewer units when the price is higher.
- This negative relationship between price and quantity demanded is known as the *law of demand.*

Movement along a demand curve

- The demand curve is derived by assuming that only price and quantity can change.
- If there is a change in the price/quantity, there will be a **movement along the demand curve**.
  - If there is a movement downwards along the demand curve, this is called an *'increase in the quantity demanded'*.
  - If there is a movement up along the demand curve, this is called a '*decrease in the quantity demanded*'.

Movement along a demand curve



A movement along the demand curve is known as a 'change in the quantity demanded'.

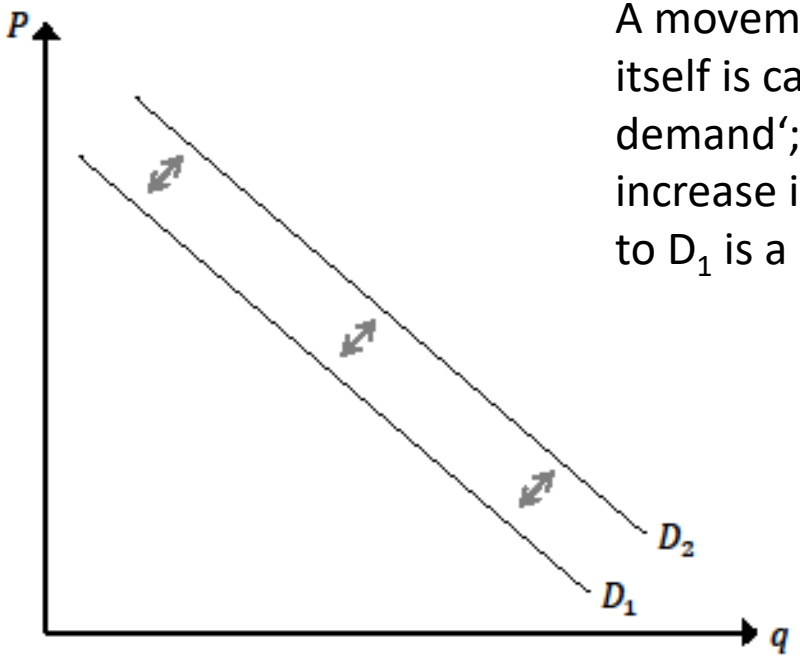
Change in demand

- A demand curve is drawn assuming all **other relevant factors** (other than the price of the good itself and the resulting quantity demanded) are held constant (*ceteris paribus*).
  - These factors include the income, tastes, price expectations and the prices of other related goods.

- If any of these factors change, the demand curve itself will shift in or out.

- A shift of the demand curve is called a **change in demand**.
  - If demand shifts right this is called an *'increase in demand'*;
  - A shift to the left, this is called a '*decrease in demand*'.

Change in demand



A movement of the demand curve itself is called a 'change in demand'; a shift from D_1 to D_2 is an increase in demand. A shift from D_2 to D_1 is a decrease in demand.

Market demand

- An individual consumer's demand curve is given by his MB curve.
  - We can use this to derive the market demand curve.

- The **MARKET demand curve** traces out combinations of (a) market price and (b) quantities that *all consumers in a market* are together willing and able to buy at that price.

Market demand

- We often are interested in demand at the market level (rather than just for one individual).
- The market demand curve can be derived by adding together the quantity demanded by each individual consumer at each price.
  - Example: suppose the market price of apples is $4, and that there are just two consumers in the market.
  - At this price, Sonia is willing to buy six apples and Elizabeth is willing to buy three apples.
  - This means that, at $4, the total quantity demanded in the market is nine apples.

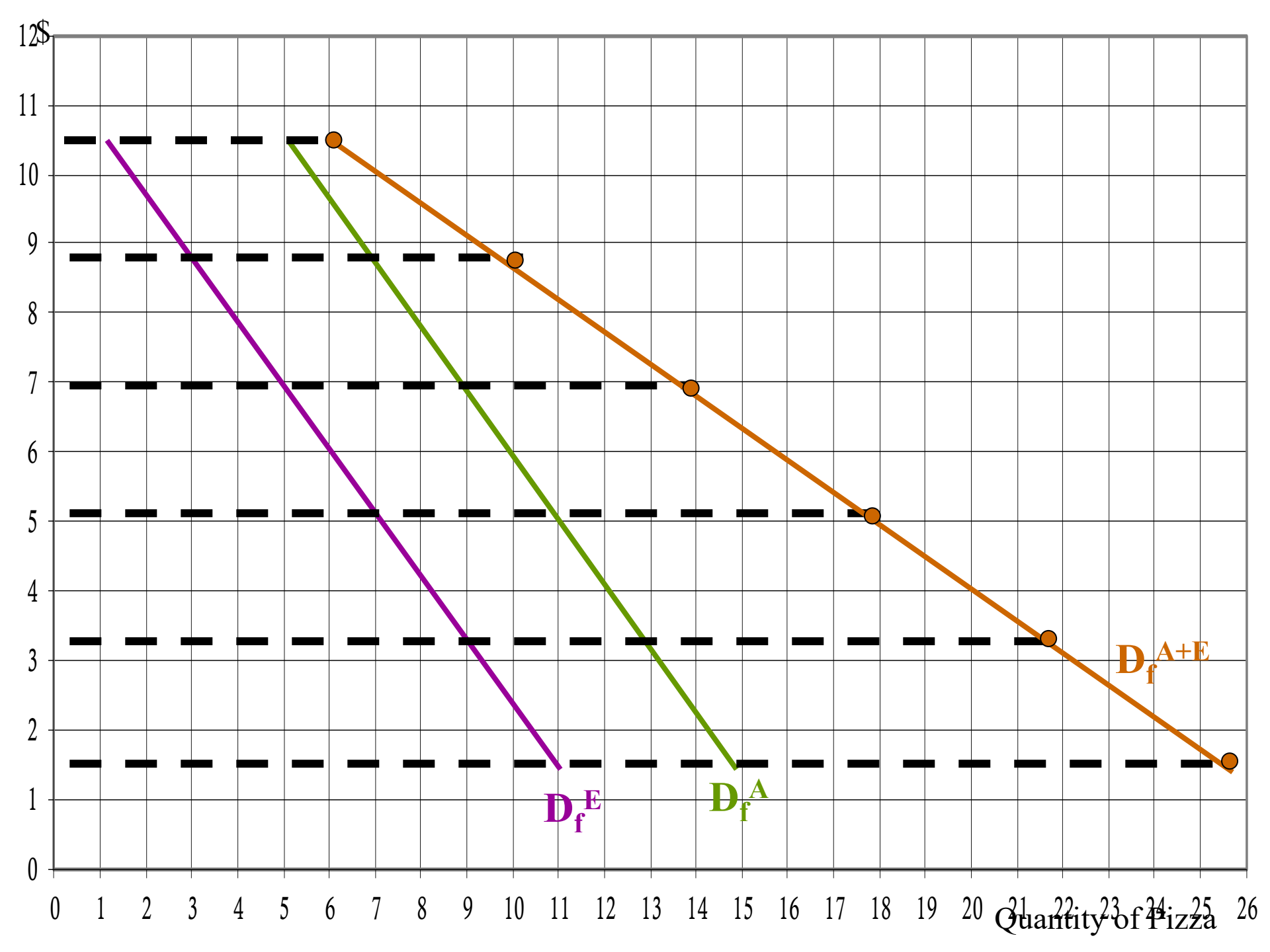
Market demand

- Also need to check how much Sonia and Elizabeth would together be willing to buy when the price of apples is $2, $3, $5, $6 etc.

- This means that, graphically, the market demand curve is the *horizontal summation* of the individual demand curves (the individual MB curves) along the q-axis.

Market Demand

Price	Adam (D_f^A)	Eve (D_f^E)	Market (D_f^{A+E})
$11	5	1	6
$9	7	3	10
$7	9	5	14
$5	11	7	18
$3	13	9	22
$1	15	11	26


$
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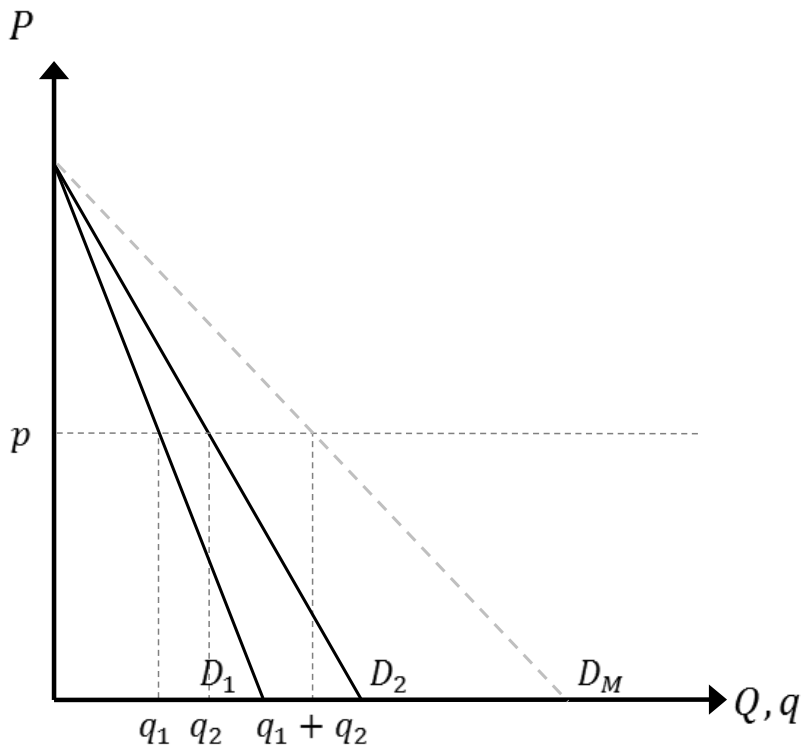
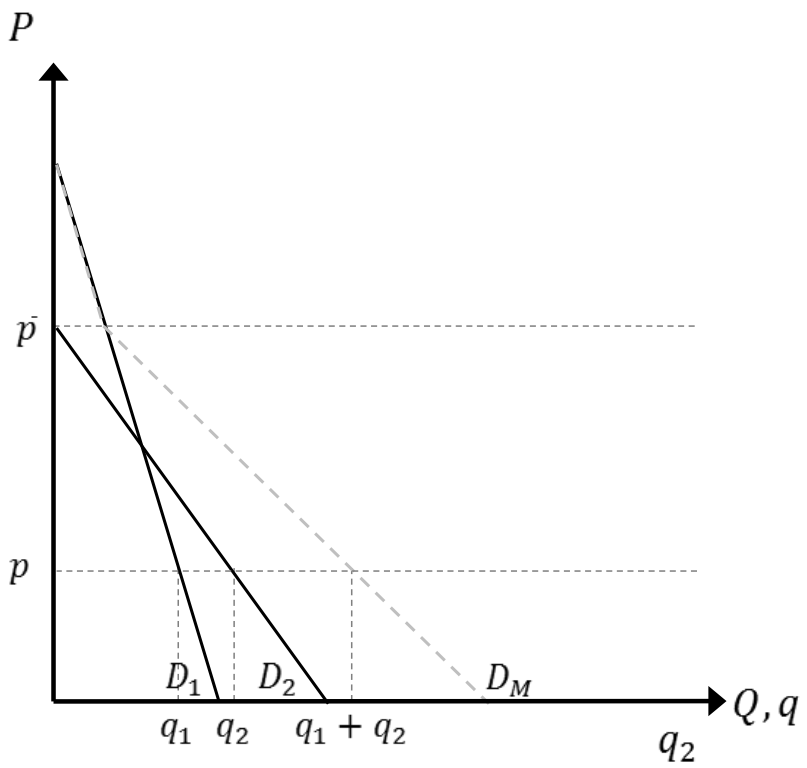
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
Quantity of Pizza
D_f^E
D_f^A
D_f^{A+E}

Market demand – horizontal summation of individual MB curves





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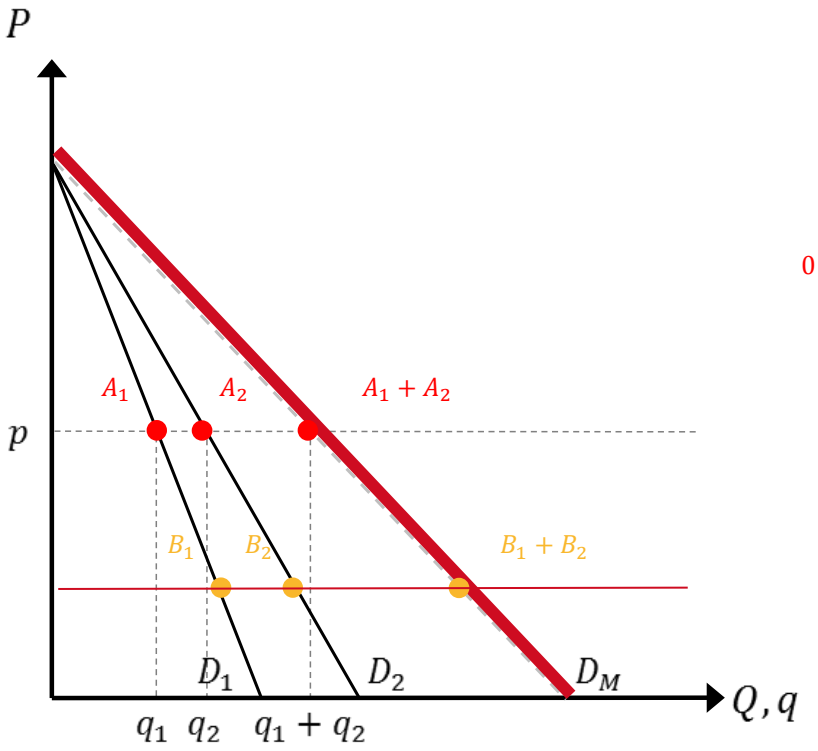

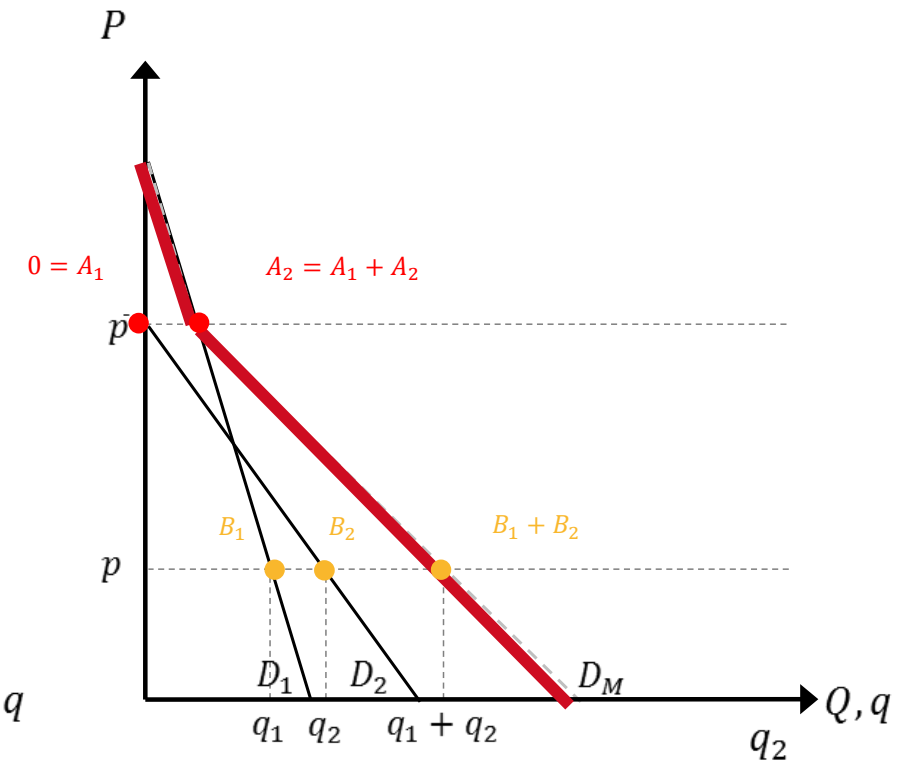

Market demand

- Note, the *law of demand* also holds for the market demand curve.
  - If the law of demand holds for all individual demand curves, it will hold for market demand, which is their horizontal summation.
- We can also use the term ***change in the quantity demanded*** to refer to movements along the market demand curve, and the term ***change in demand*** to refer to a shift of the demand curve itself.

Concluding comments - Demand

- We have now derived the individual and market demand curves.
- A demand curve answers the question ‘if the consumer faces a certain price, what quantity would they buy?’, **for a range of possible prices**.
- Note, it is only possible to answer this question if the consumer is a **price taker** – that is the individual consumer’s choices have no impact on price.

Exercise

Which of the following implies an increase in the market demand for strawberries?

(outward shift of entire demand curve)

A. Decrease in income levels for many households
B. Perfect strawberry-growing weather
C. New advertisement emphasising the health benefits of eating strawberries
D. Falling market price of strawberries

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ANSWER:

C. INCREASES THE MARGINAL BENEFIT OF EATING STRAWBERRIES => INCREASE IN DEMAND

NOTE:
A. DECREASE IN DEMAND (WITH MANGOES BEING A NORMAL GOOD)

B. INCREASE IN SUPPLY

D. MOVEMENT ALONG DEMAND CURVE

Concluding comments

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