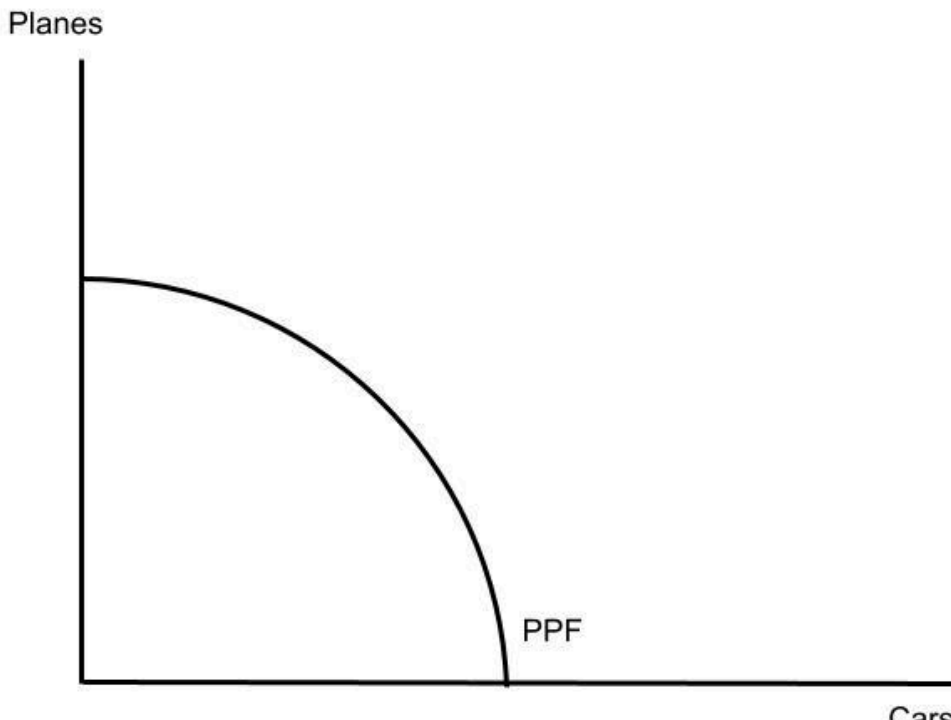


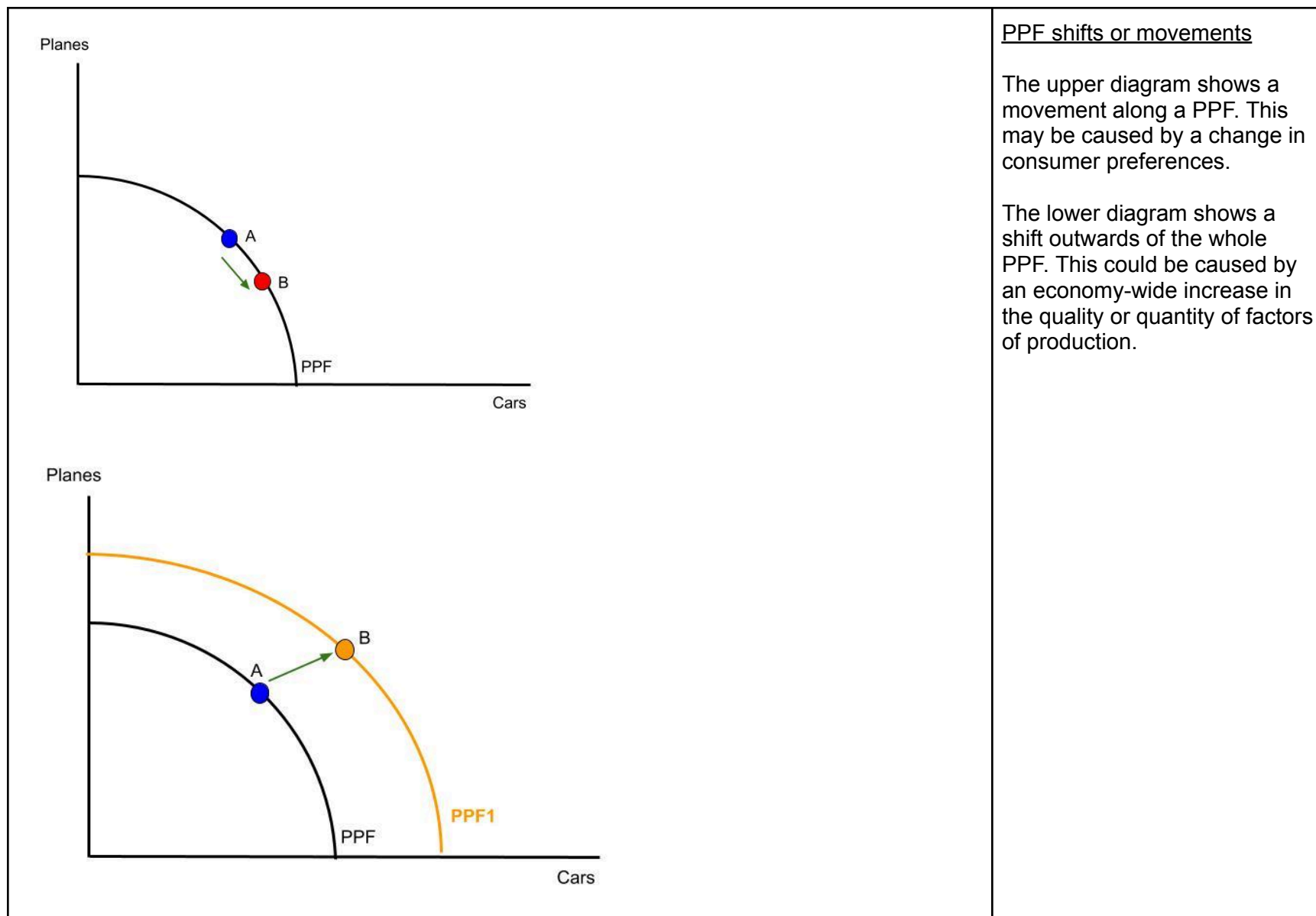
Key Diagrams for Microeconomics: Economics A-level | Edexcel A (Theme 1 and Theme 3)

Produced by Tom Furber, [economics tutor](https://www.economics-tutor.com) | [tfurber.com](https://www.tfurber.com)

Theme 1 diagrams	
Diagram	Name
	<u>PPF (Production possibility frontier)</u> Shows the possible production combinations of two goods that a society can produce. Points on the PPF are productively efficient - they maximise use of available resources. The slope of the PPF represents the opportunity cost of producing one more car. As more and more cars are produced, producing one extra car requires giving up even more planes. This is because car production runs into diminishing marginal returns / gets progressively more difficult. So opportunity cost increases. PPF topic notes: • Edexcel

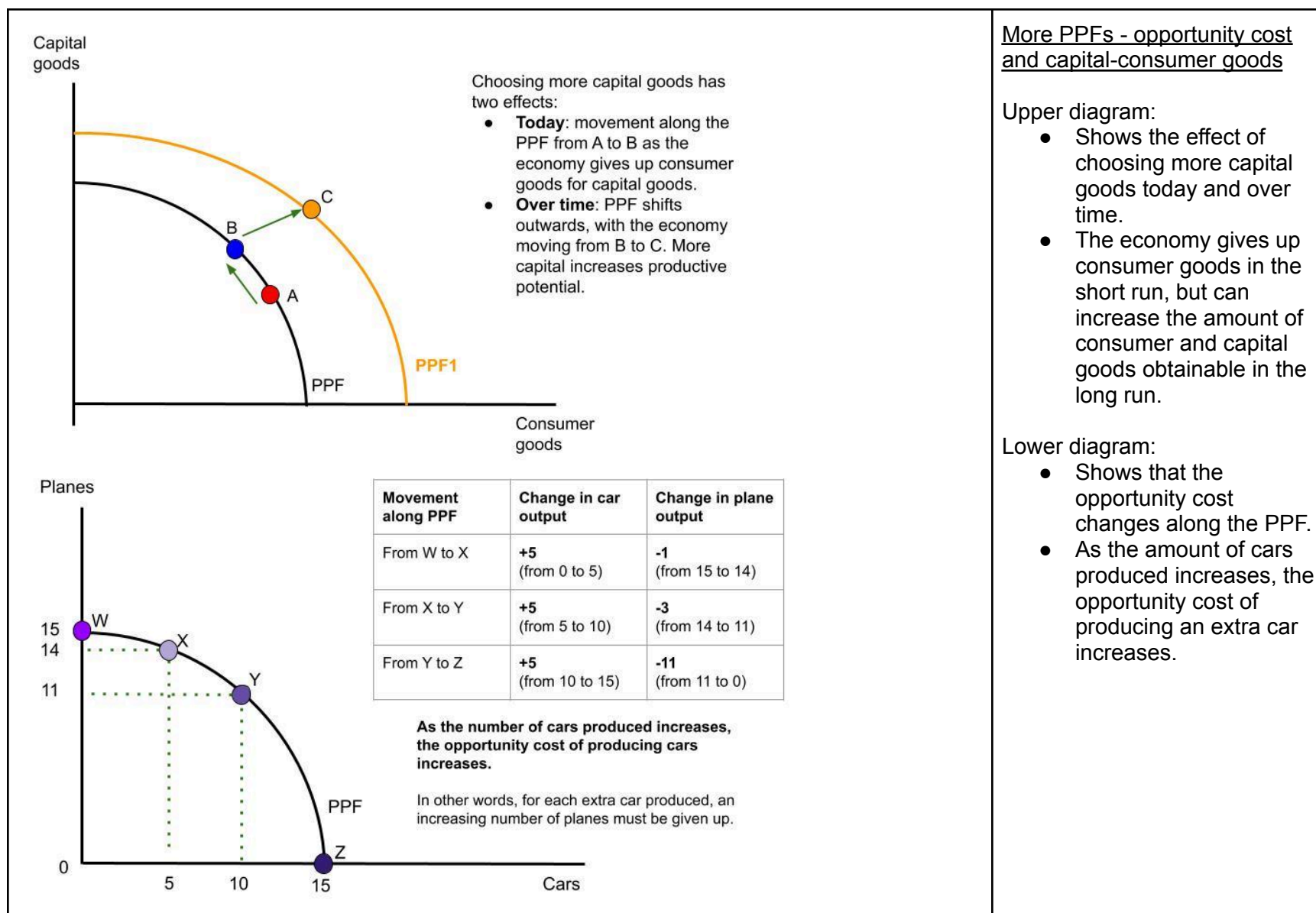
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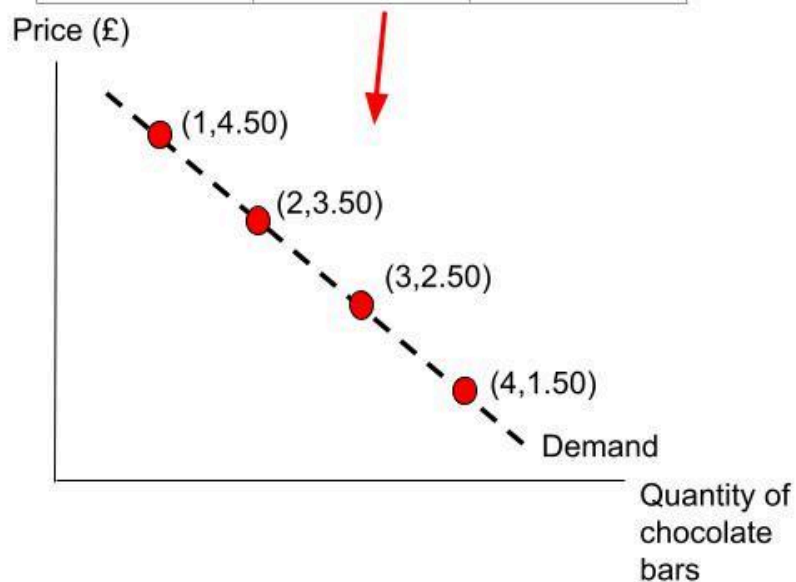
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Number of chocolate bars consumed	Total utility (£)	Marginal utility (£)
0	0	N/A
1	5	+5
2	9	+4
3	12	+3
4	14	+2
5	15	+1



Individual demand curve derived from utility table

Table:

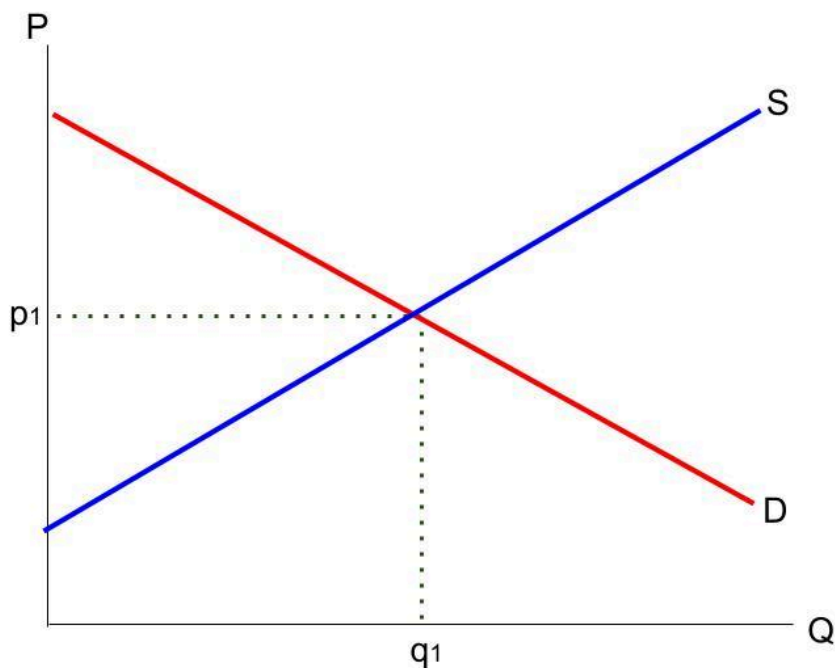
- **Total utility** = satisfaction from consuming a good.
- **Marginal utility** = change in utility from consuming one more unit.
- As the number of chocolate bars increases, marginal utility decreases. “**Diminishing marginal utility**”.

Diagram:

- Consider a price of £4.50 per chocolate bar. The consumer benefits from buying 1 chocolate bar as marginal utility exceeds the price, but not the second. So the consumer buys one chocolate bar.
- **Repeat for different prices** (£3.50, £2.50, £1.50).
- **Linking coordinates gives an individual's demand curve.**

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Supply and demand “curves”

This diagram shows market supply and demand.

Market demand is downward-sloping.

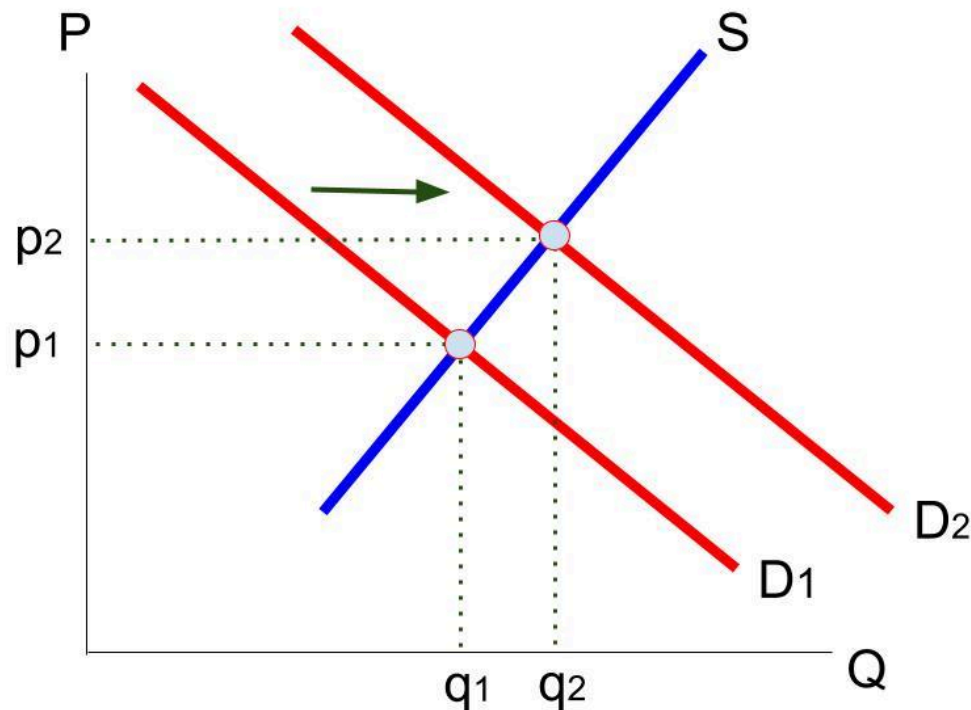
- As the price increases, the marginal utility of the current unit no longer exceeds the price. This encourages consumers to cut back demand. So demand falls.
- As price increases, consumers may substitute away from the good to cheaper alternatives.

Market supply is upward-sloping.

- As the price (P) increases, the firm makes a higher profit from selling one more unit.
- This encourages firms to increase supply.

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Supply and demand - demand shift right

Demand shift right could be caused by:

- Change in tastes.
- Increase in advertising.
- Increase in real incomes for a normal good (and a decrease in real incomes for an inferior good).
- Decrease in price of a complementary good or an increase in the price of a substitute.

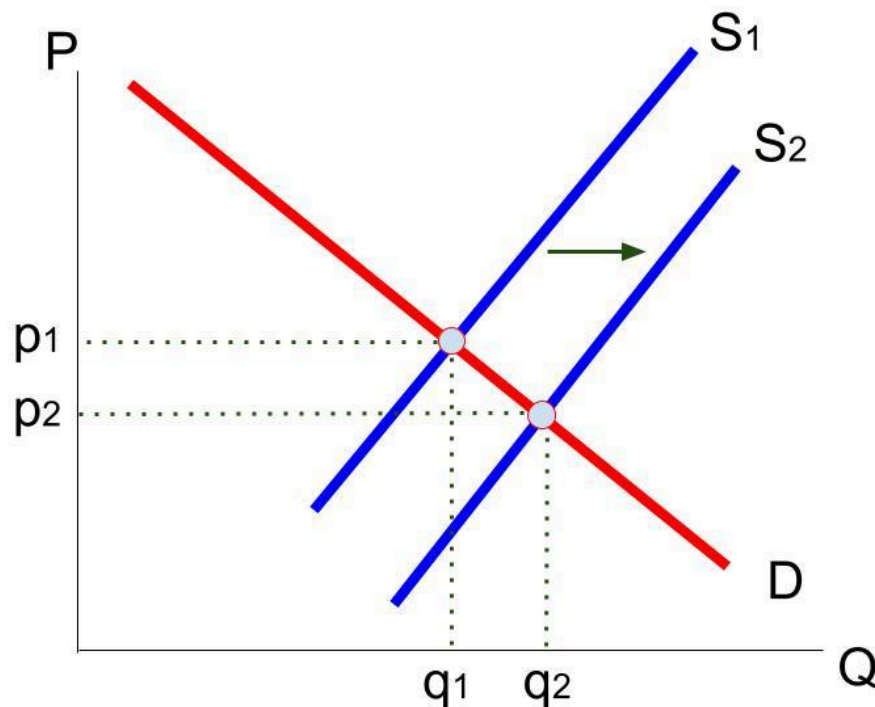
This results in higher price (from p_1 to p_2) and higher quantity from q_1 to q_2 .

Demand topic notes:

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Supply and demand - supply shift right

Supply shift right can be caused by:

- Reduced labour costs due to reduced wages or higher labour productivity for given wages.
- Reduced machinery / capital costs.
- Technological improvements that reduce the cost of production.

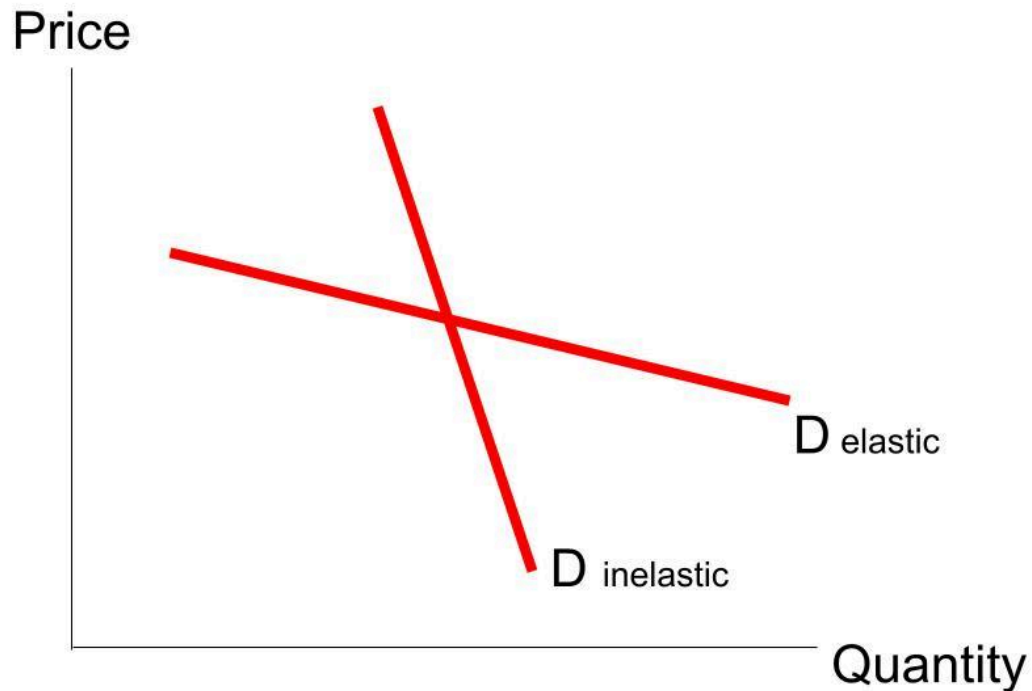
This reduces the price from p_1 to p_2 and increases quantity from q_1 to q_2 .

Supply topic notes:

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Different price elasticities of demand

The price elasticity of demand = responsiveness of demand to a change in price.

Price-inelastic demand:

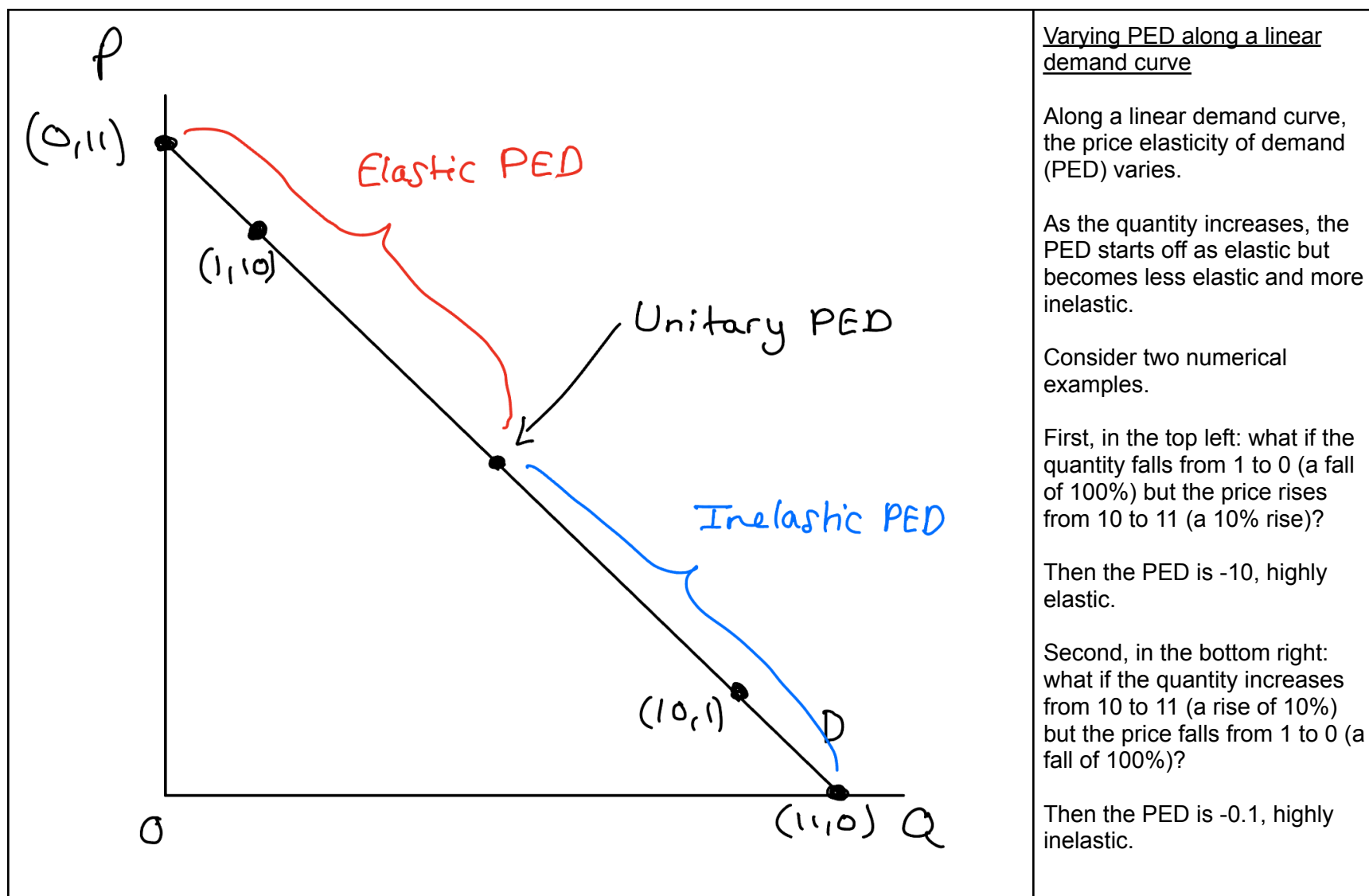
- Means demand is relatively unresponsive to a change in price.
- Shown by a steep demand curve.

Price-elastic demand:

- Means demand is relatively responsive to a change in price.
- Shown by a flatter demand curve.

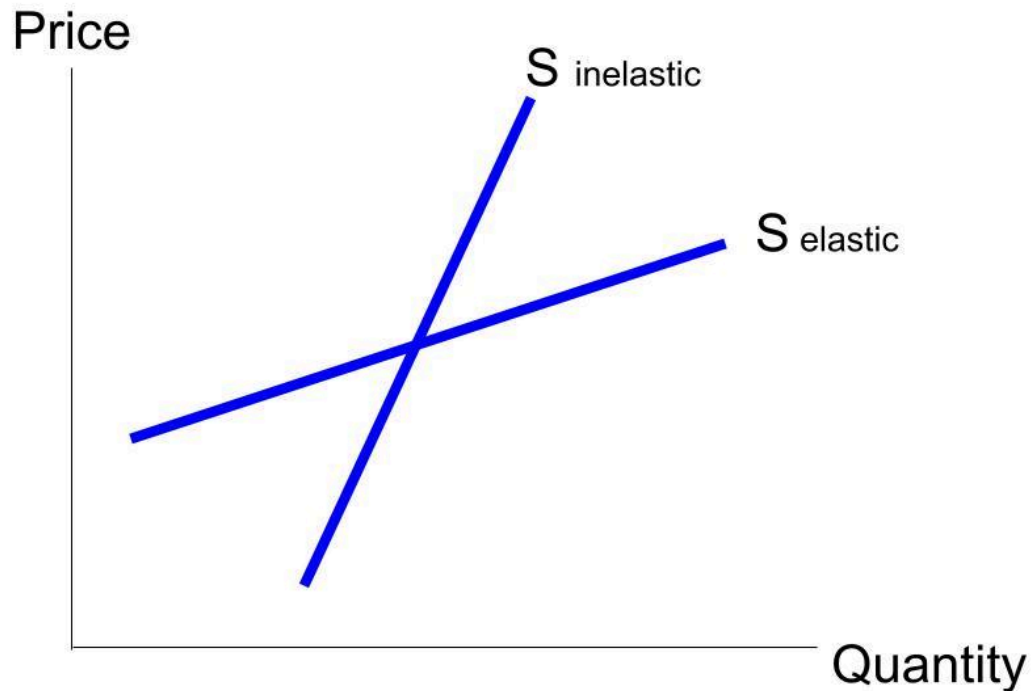
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Different price elasticities of supply

Price elasticity of supply = responsiveness of supply to change in price.

Price-inelastic supply:

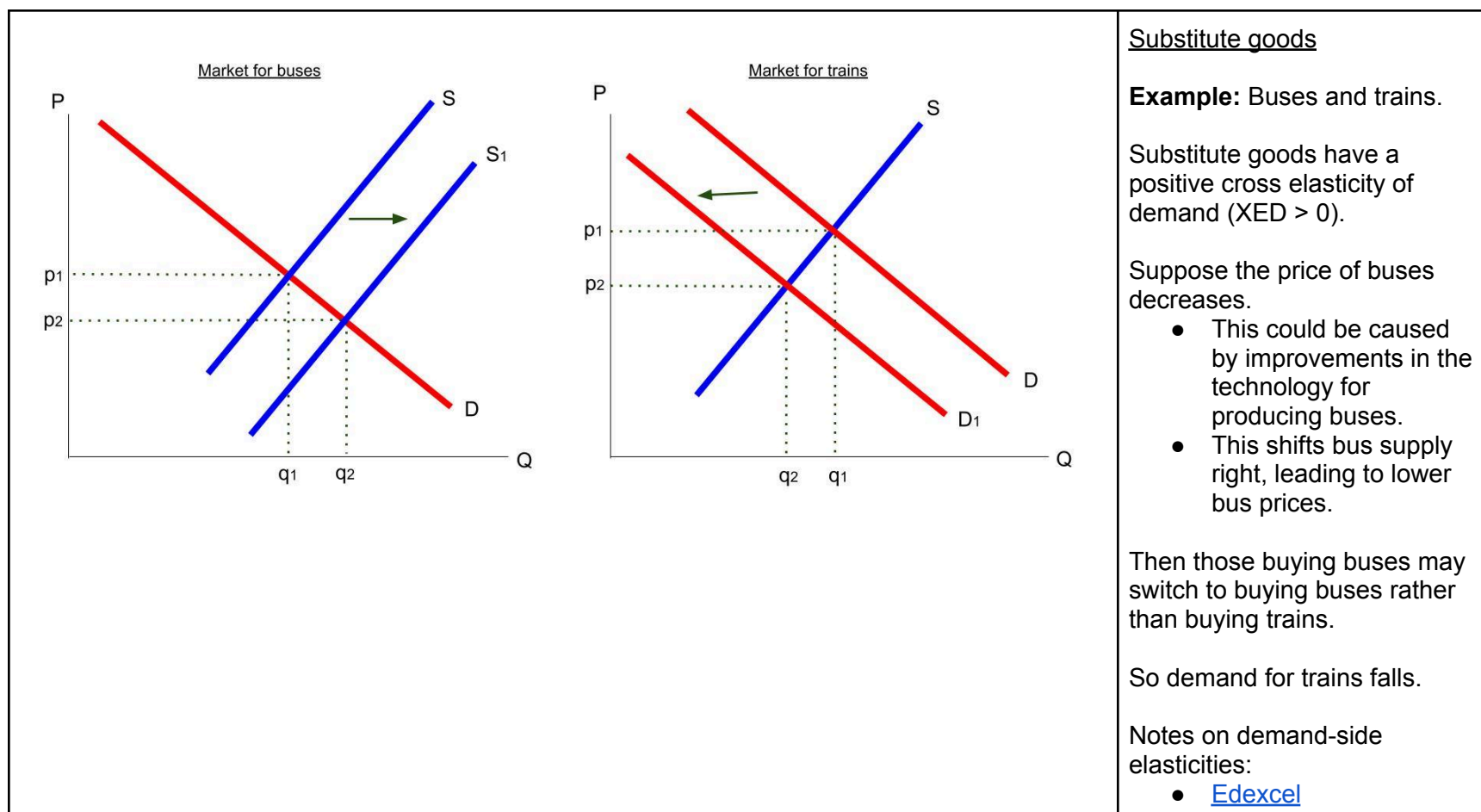
- Means supply is relatively unresponsive to a change in price.
- Shown by a steep supply curve.

Price-elastic supply:

- Means supply is relatively responsive to a change in price.
- Shown by a flatter supply curve.

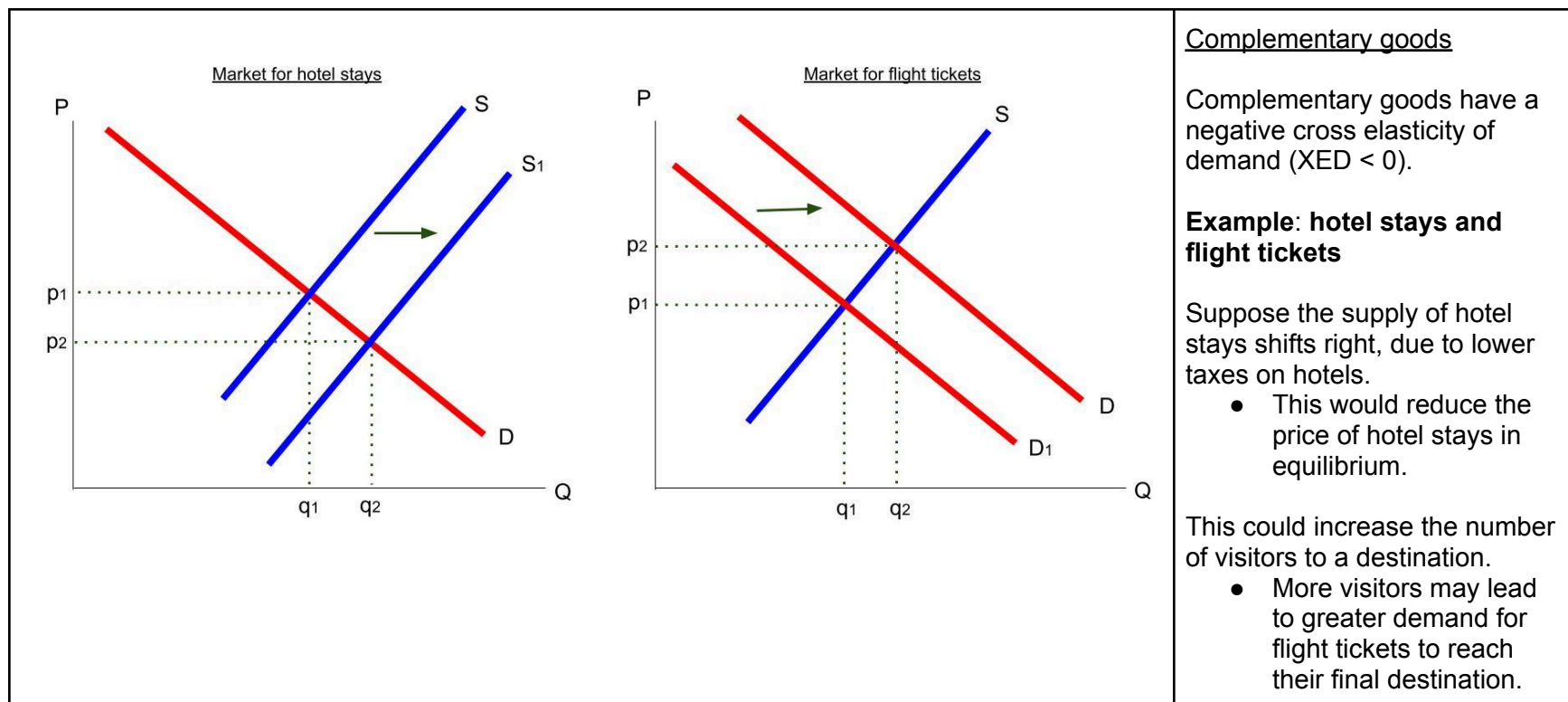
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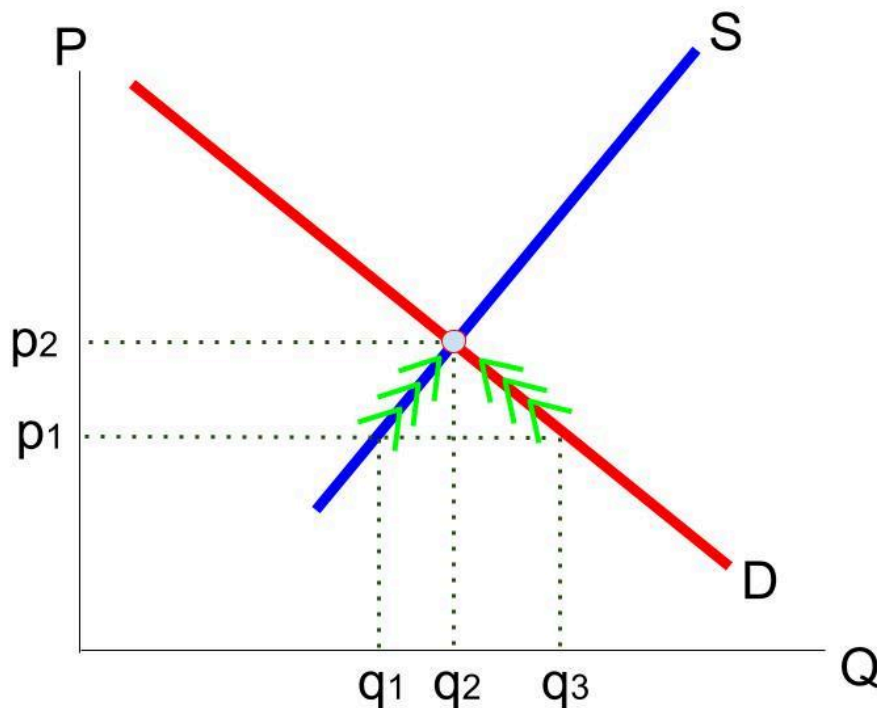
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Price mechanism - response to a shortage

This shows the response of the price mechanism to a shortage at price p_1 of $(q_3 - q_1)$.

The **rationing function** means the price rises to reduce ("ration") demand. This leads to a contraction (movement left) along the demand curve.

The **incentive function** means as the price rises, this incentivises greater production as firms can make more profits. This leads to an extension (movement right) along the supply curve.

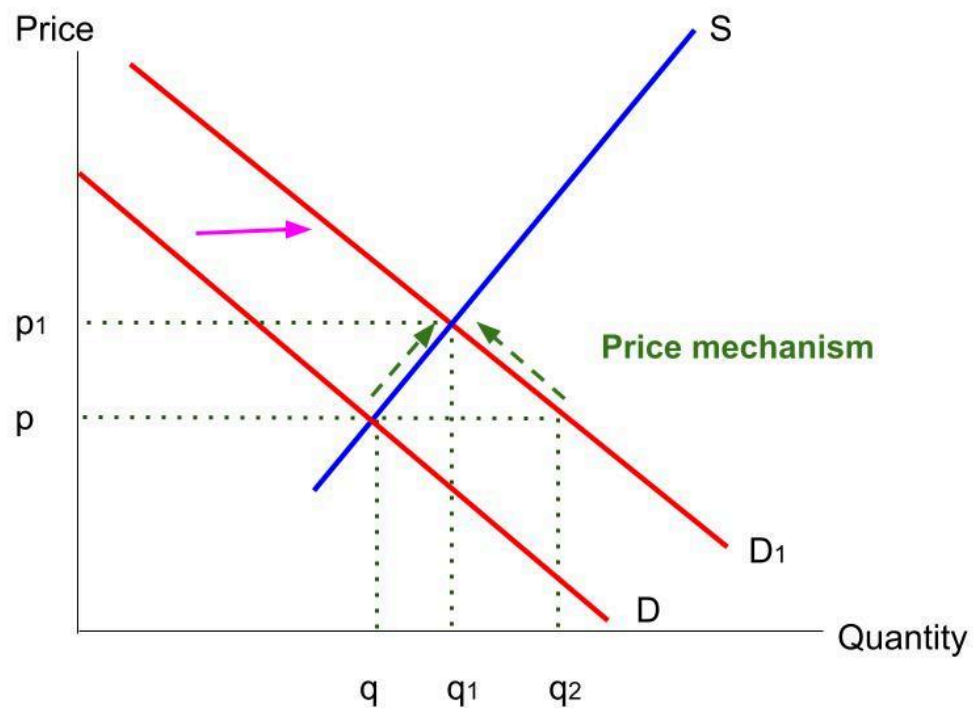
The **signalling function** strengthens these effects. The rising price signals for some firms to enter the market to make profits. The rising price also signals some consumers to leave the market.

This moves the free market from price p_1 to the new price p_2 , at the equilibrium, while eliminating the shortage.

[Price mechanism topic notes](#)

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Price mechanism after a demand shift to the right

The price mechanism can also kick in after a shift in supply or demand.

In this example, suppose demand shifts right from D to D_1 .

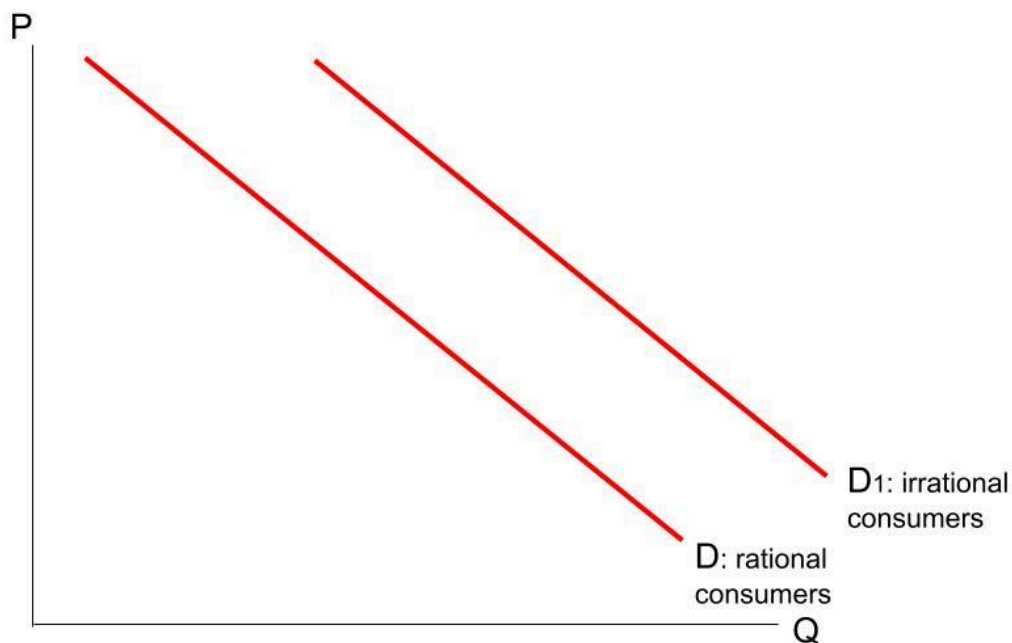
Then, at the original price p , there is excess demand of $q_2 - q$.

To resolve the excess demand, the price mechanism responds in the same way as the previous diagram.

This moves the market to the new equilibrium at (q_1, p_1) .

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Demand curves for rational and irrational consumers

Habitual behaviour may lead some consumers to consume a good out of habit, even if better alternatives emerge.

For example, buying the same brand of breakfast cereal each time you go to the supermarket, even when a better or cheaper alternative appears.

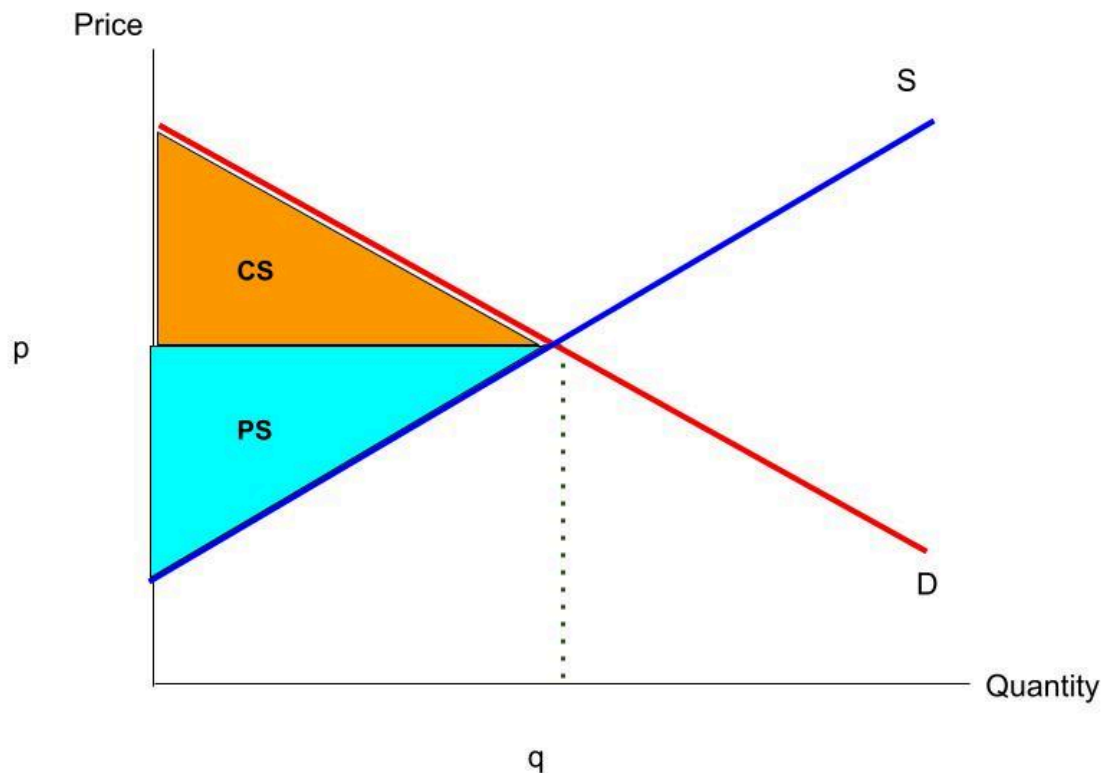
Demand is therefore higher under irrationality than under rationality.

Note this diagram could also be reversed in some cases. For similar reasons, habitual behaviour could lead to underconsumption of new, superior alternatives.

[Notes on irrational consumer behaviour.](#)

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Consumer and producer surplus diagrams

Consumer surplus = difference between what consumers are willing to pay and what consumers actually pay.

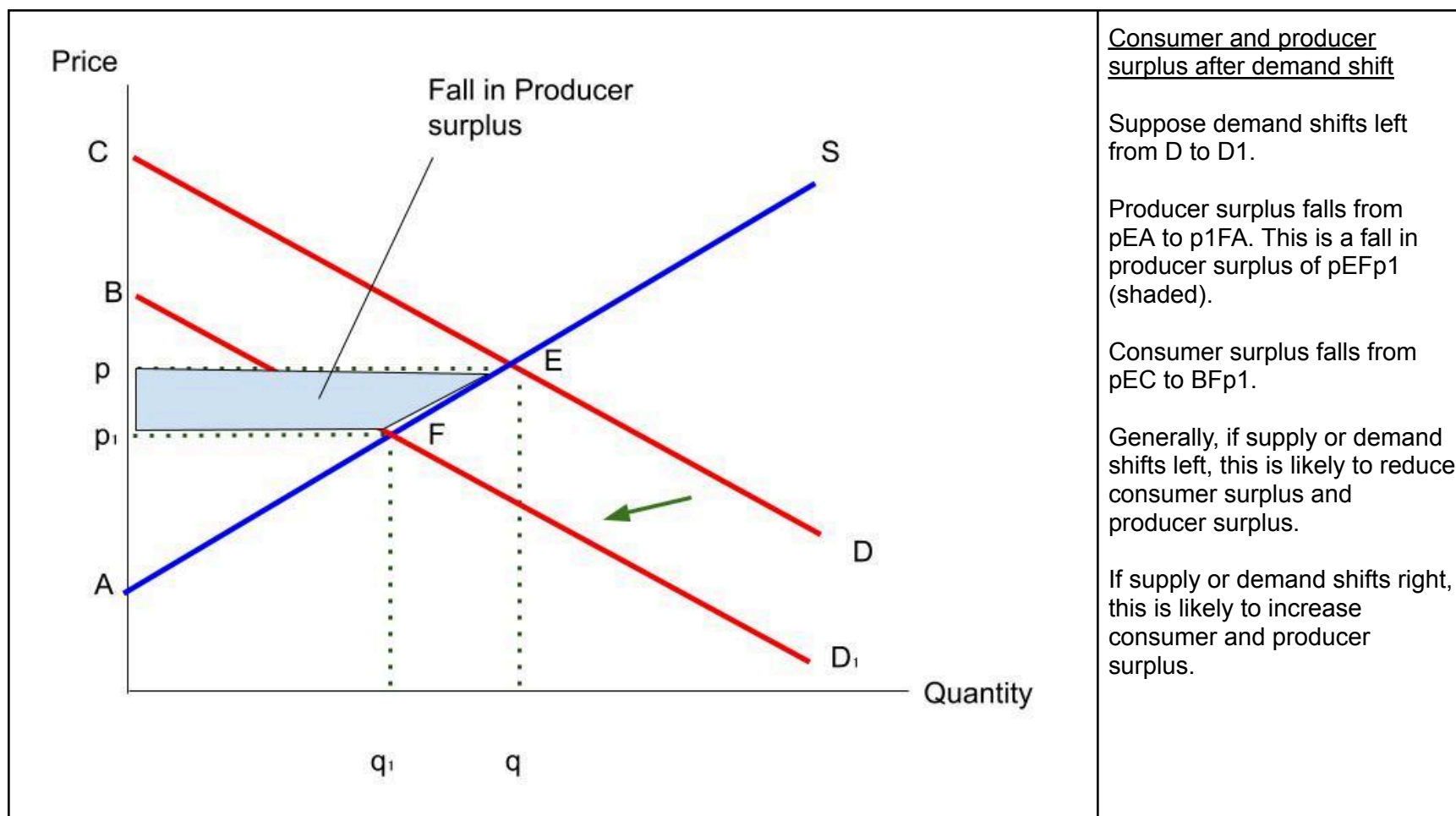
Consumer surplus is shown by the area between the demand curve (what consumers are willing to pay) and the market equilibrium price that consumers actually pay. This is the orange shaded area in the diagram.

Producer surplus = difference between the price at which producers are willing to sell and the price at which producers actually sell.

Producer surplus is shown by the area between the supply curve and the equilibrium price line (blue area)

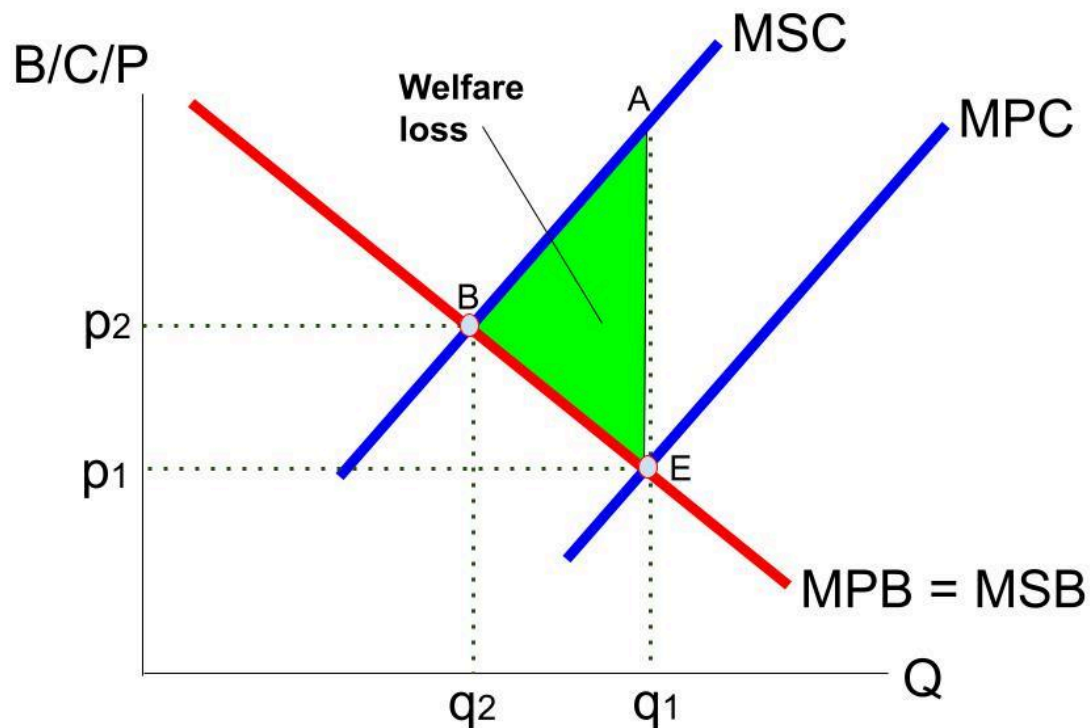
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Negative externality in production

The free market produces where $MPB = MPC$ (it does not account for external costs and benefits). This occurs at point E.

The socially optimal outcome is where $MSC = MSB$. This occurs at point B. This creates a welfare loss due to overproduction of the good. The welfare loss is of size ABE.

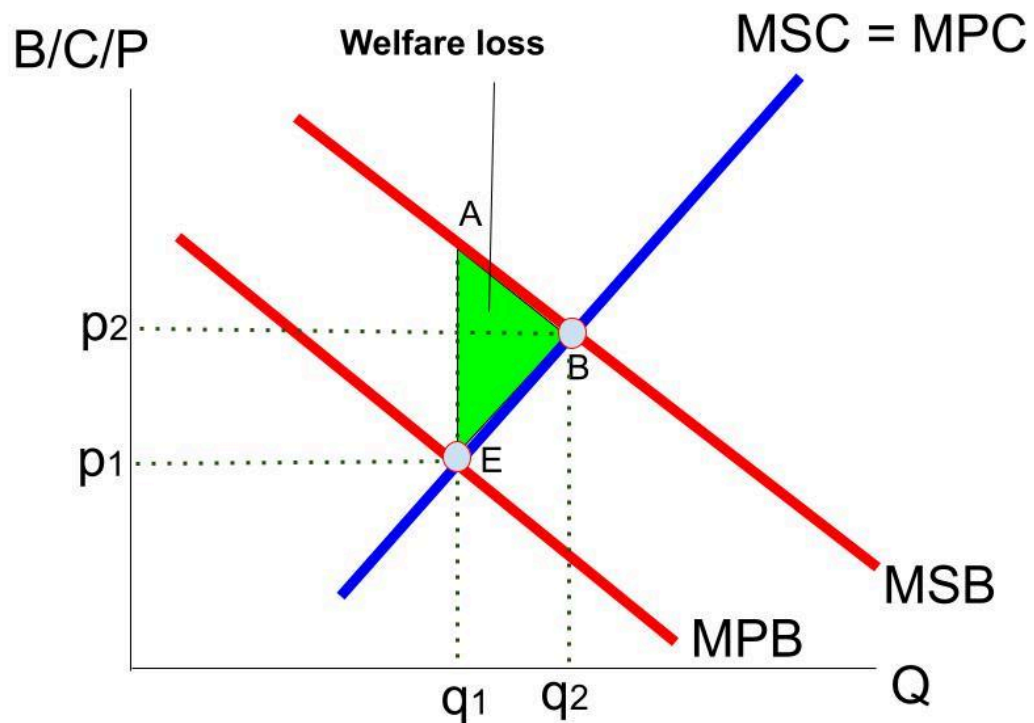
Example: firm pollution of air and water.

Externality topic notes:

- [Edexcel](#)

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Positive externality in consumption

Free market outcome
MPB=MPC: E

Socially optimal outcome
where MSB=MSC: B

Underconsumption of $q_2 - q_1$.

Welfare loss ABE.

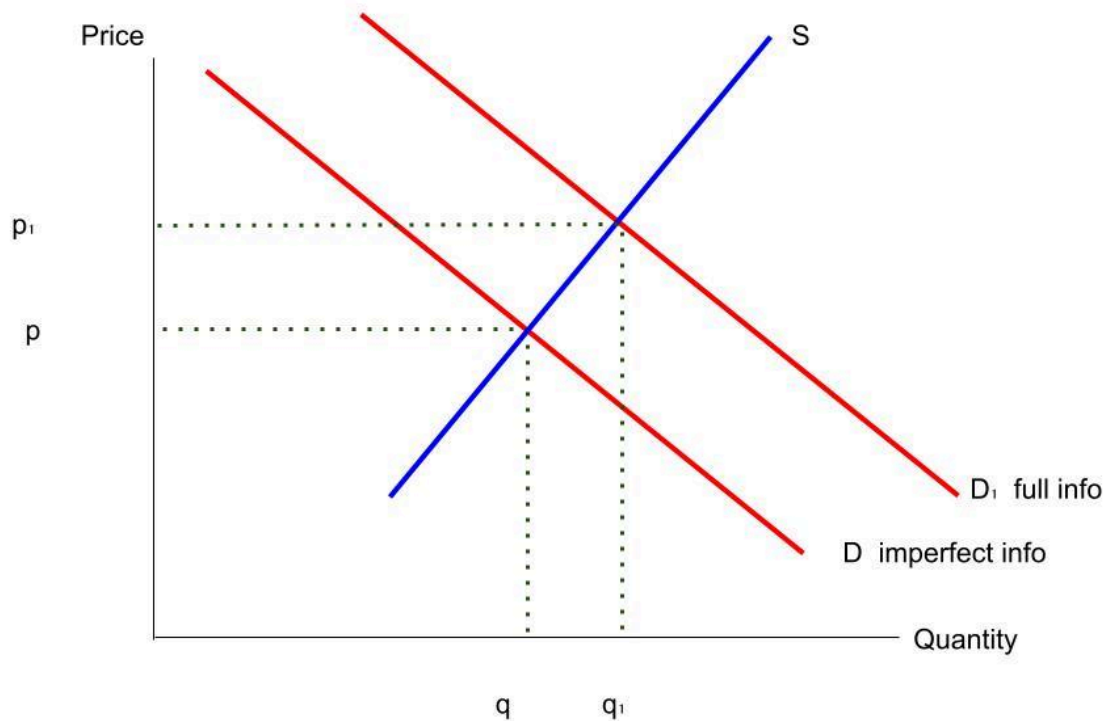
Example: consuming healthcare benefits the rest of society. For instance, healthier, more productive individuals increase firm productivity.

Externality topic notes:

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Information failure - underestimating private benefit

Consumers may lack information about the long-term private benefits of consuming a good. For example, the long-term benefit of accessing healthcare for the consumer's health.

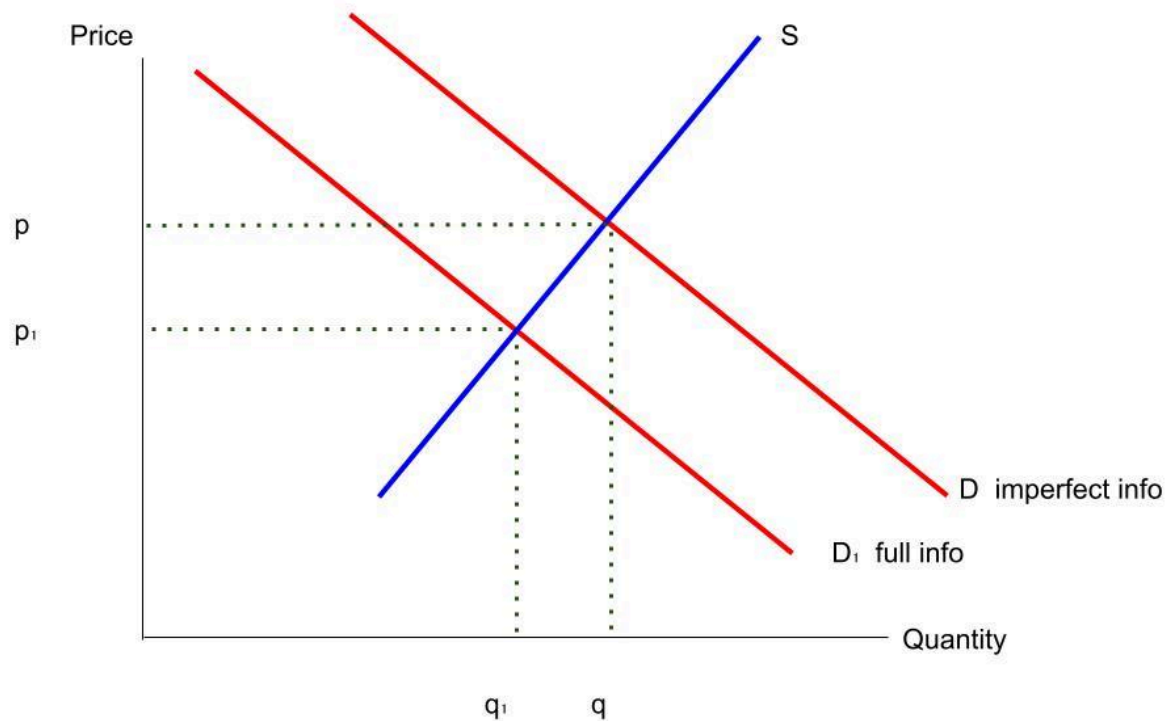
For example, demand may be on the demand curve D , where there is imperfect information. However, under full information, consumers would consume on the higher demand curve $D1$.

This could lead to underconsumption of healthcare of $(q_1 - q)$.

[Notes on information gaps for Edexcel](#)

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Information failure - overestimating private benefit

Consumers may also overestimate the private benefit from consuming the good.

For example, not taking into account the long-term health risks from consuming alcohol.

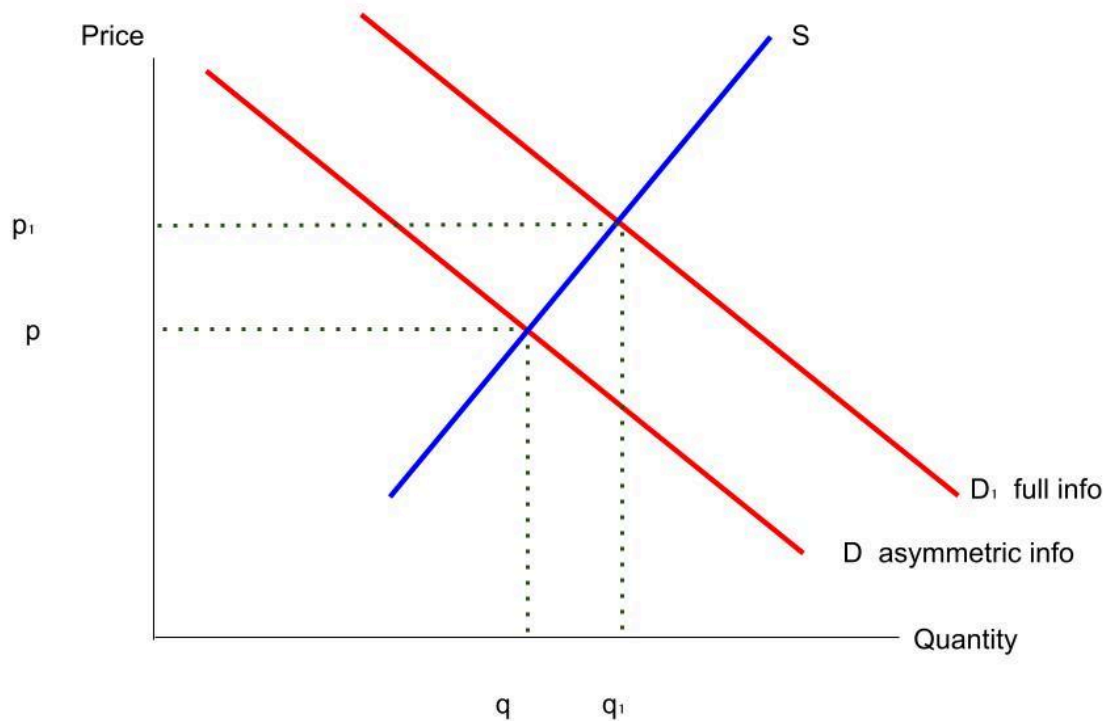
This leads to consumers consuming on the higher demand curve D under imperfect information.

If the consumers had full information, they would consume on the lower demand curve D_1 .

As a result, there is overconsumption of $(q - q_1)$ in the free market.

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Asymmetric information - adverse selection

Sellers may have more information than buyers in the used car market about the quality of used cars. For example, whether the used cars have reliability issues.

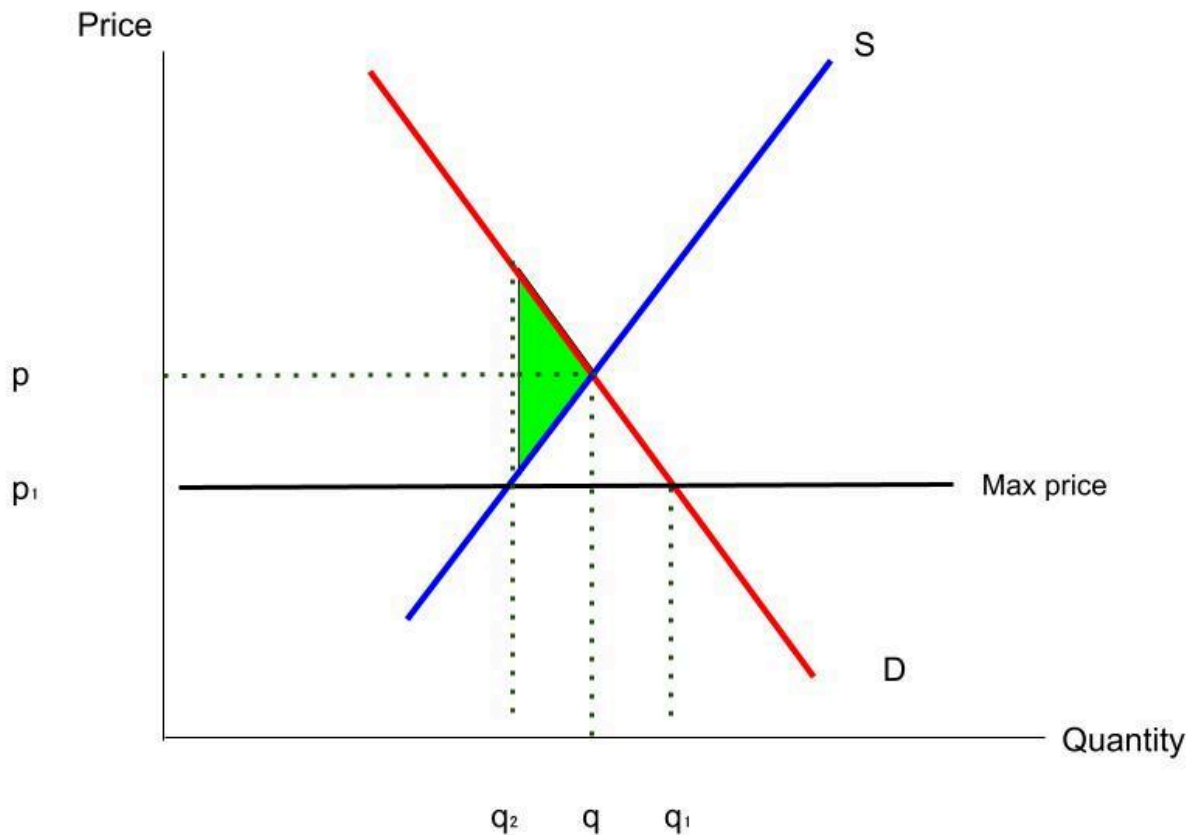
Consider the market for high-quality used cars.

Demand for high-quality used cars is lower under asymmetric information (at D) compared to under full information (at D1).

This is because the probability of the car turning out to be of low quality puts consumers off from buying any type of used car.

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Maximum price

Max price at p_1 below the free market equilibrium.

Leads to a shortage of $q_1 - q_2$.

Fall in firm revenue and producer surplus.

Example: rent controls in Stockholm, Sweden.

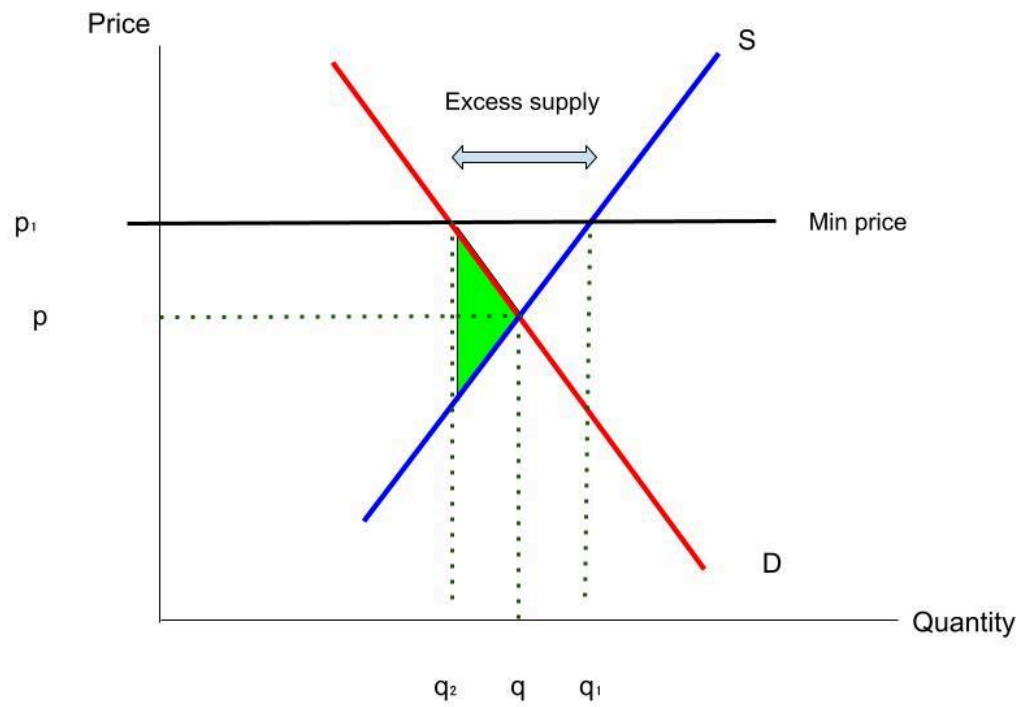
Welfare loss shown by green area: $(q - q_2)$ would be produced by the free market and would deliver a net benefit to consumers and firms. But under the max price, these extra units are not produced.

Maximum price notes:

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Minimum price

Minimum price set at p_1 , above the free market equilibrium price p .

Results in surplus of $q_1 - q_2$.

Leads to welfare loss shown by shaded area.

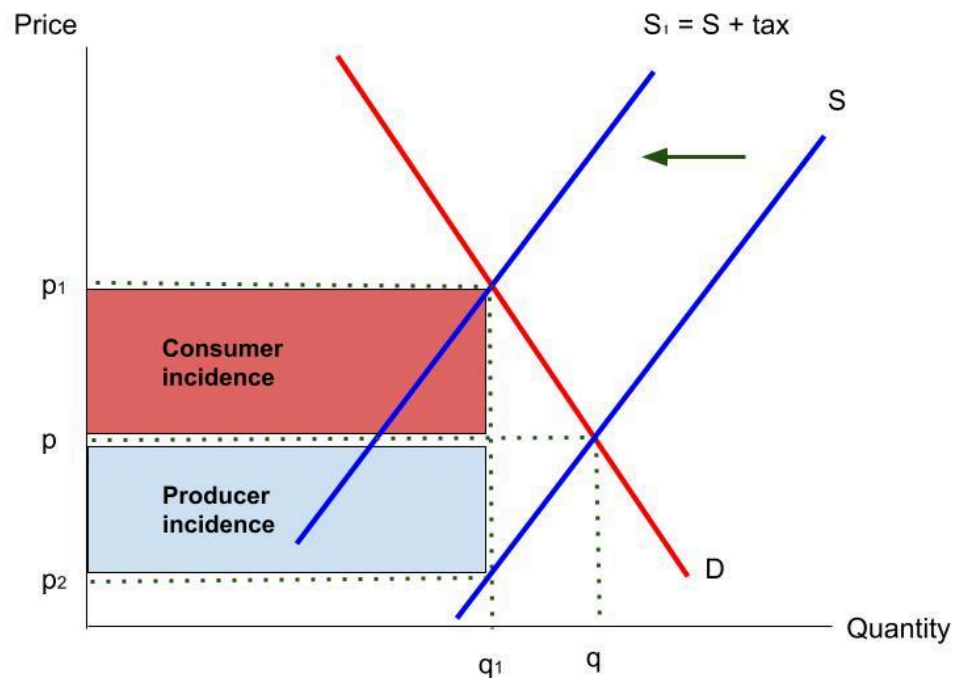
Example: alcohol minimum unit pricing in Scotland.

Minimum price notes:

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Tax

Tax shifts supply left from S to S1.

Increases price from p_1 to p and lowers quantity from q_1 to q .

The consumer incidence is shown by the red area. The producer incidence is shown by the blue area.

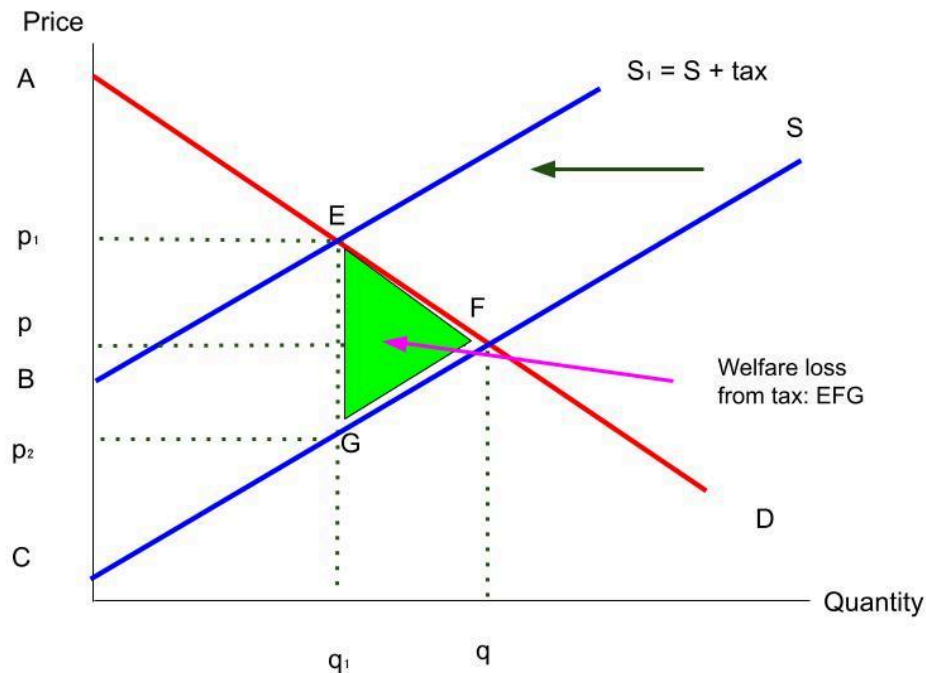
This can be extended to show welfare loss, change in consumer surplus and change in producer surplus.

Tax incidence notes:

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	No tax	With tax	Change due to tax
Consumer surplus	ApF	Ap ₁ E	Falls by p ₁ EFp
Producer surplus	pFC	p ₂ GC	Falls by pFGp ₂
Government tax revenue	none	p ₁ EGp ₂	Rises by p ₁ EGp ₂
Overall welfare change			Falls by EFG

Tax welfare analysis

The tax shifts supply left from S to $S_1 = S + \text{tax}$.

This leads to a fall in quantity from q to q₁ and a rise in price from p to p₁.

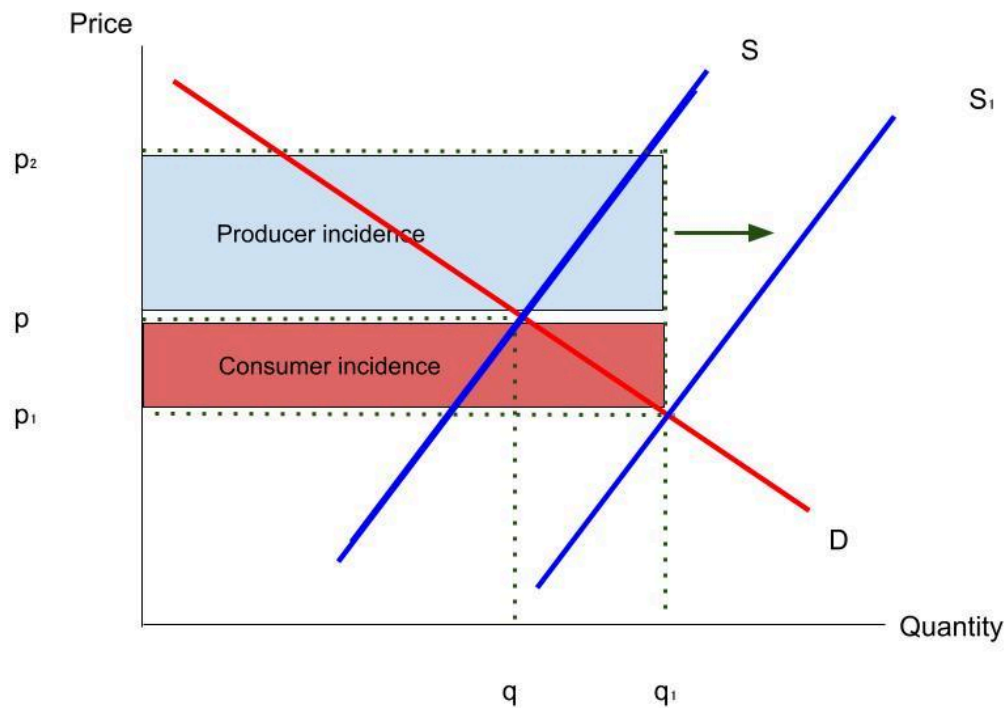
Consumer surplus falls by p₁EFp due to the tax. Producer surplus falls by pFGp₂ due to the tax.

However, the government raises tax revenue of p₁EGp₂ from the tax.

Summing these together, there is an overall welfare loss from the tax of area EFG.

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Subsidy

Subsidy shifts supply right from S to S_1 .

This lowers the price from p to p_1 and increases quantity from q to q_1 .

The consumer incidence is shown by the red area. The producer incidence is shown by the blue area.

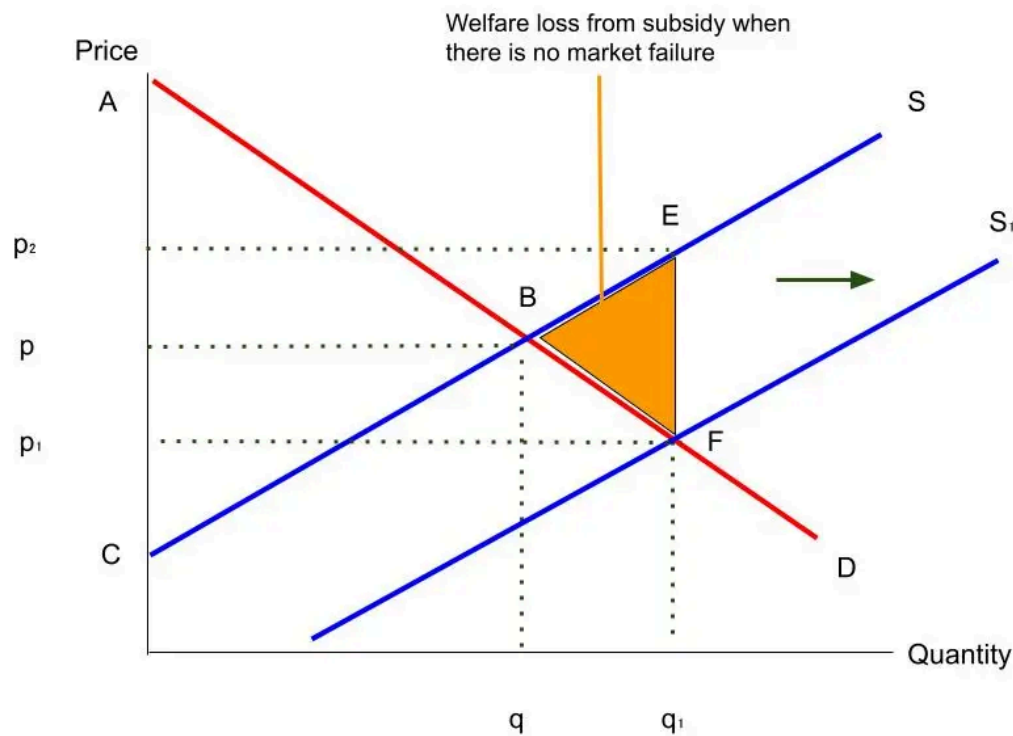
This can be extended to show welfare loss, change in consumer surplus and change in producer surplus.

Subsidy incidence notes:

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Subsidy welfare analysis

The subsidy shifts supply right from S to S_1 .

This leads to an increase in consumer surplus from area ABp to AFp_1 . This is an increase of area $pBFp_1$.

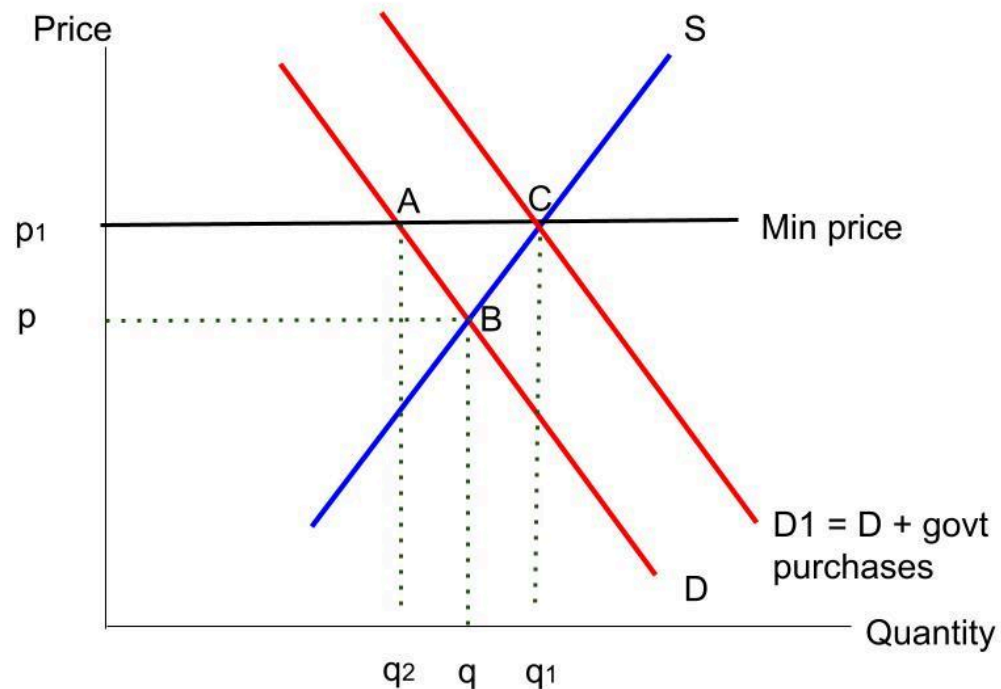
There is also an increase of producer surplus from pBC to p_2EC . This is an increase of area p_2EBp .

However, the subsidy cost to the government is area p_2EFp_1 .

Summing these areas gives an overall welfare loss of area BEF .

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Guaranteed minimum price

A guaranteed minimum price could occur through a combination of a minimum price and the government buying up any excess supply.

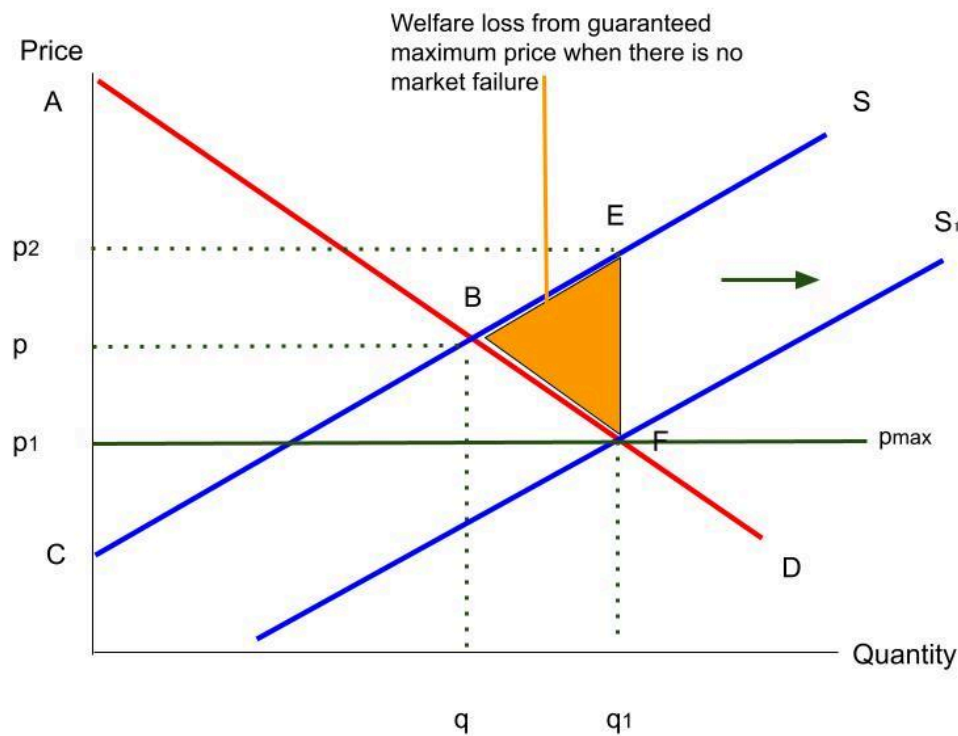
This shifts the demand curve to the right from D to $D1$.

Note this implies that, under the minimum price, the producer surplus increases by area $p1CBp$.

Consumer surplus, where we only count households but not government as consumers, requires using the original demand curve. The guaranteed minimum price reduces this measure of consumer surplus by area $p1ABp$.

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Guaranteed maximum price

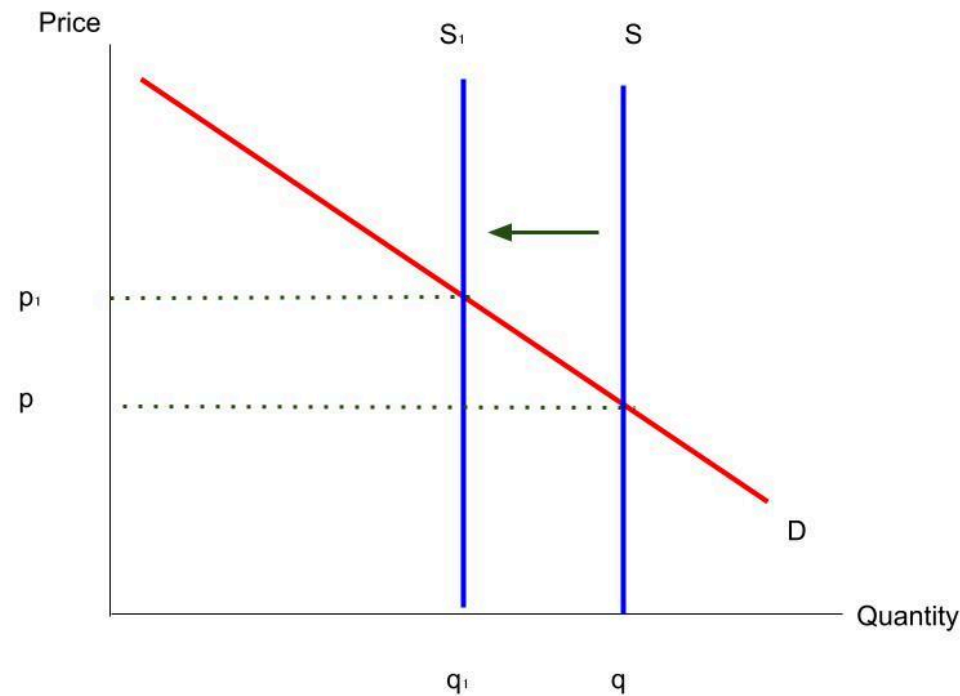
A guaranteed maximum price could occur through a combination of a maximum price with a subsidy.

This aims to eliminate excess demand by guaranteeing that each consumer that wants to buy the good at the maximum price can do so.

As a result, the welfare analysis for a guaranteed maximum price is the same as that for a subsidy (see previous diagram). The welfare loss is area BEF.

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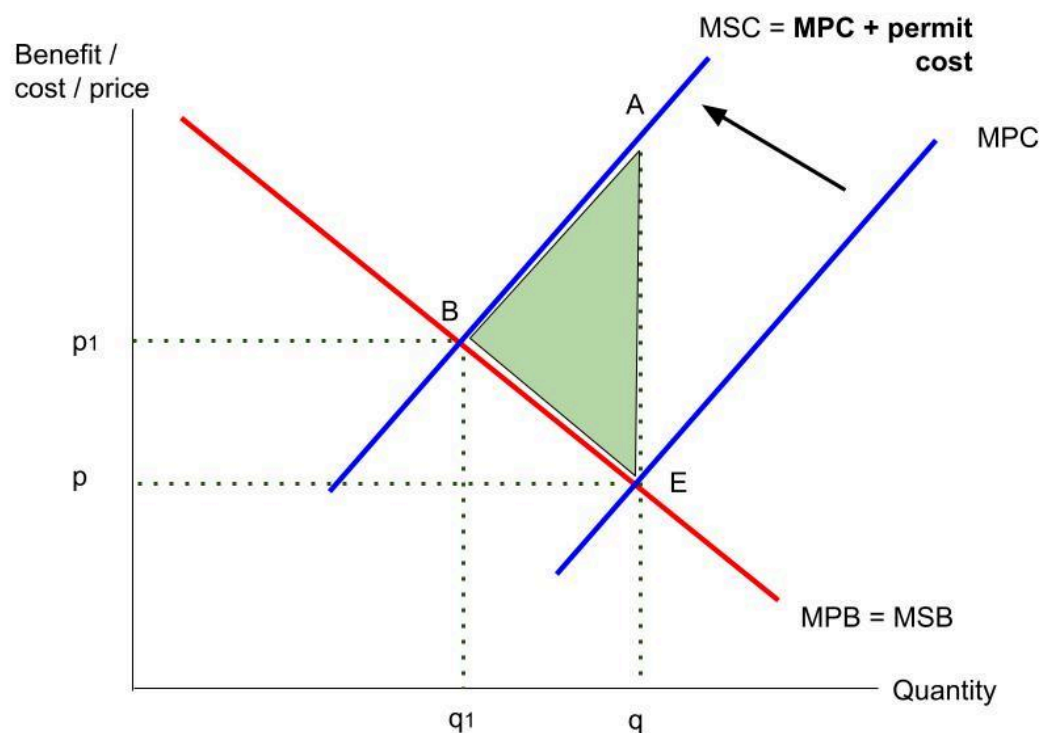
Pollution permits

The supply of permits is set by the government. So permit supply is perfectly price-inelastic.

If the government reduces the number of permits, supply shifts left from S to S_1 . This reduces the number of permits and amount of pollution allowed from q to q_1 . This increases the permit price from p to p_1 , disincentivising pollution.

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Pollution permits - effect on social welfare

Pollution permits impose a cost on firms to pollute.

Particularly where permits are auctioned out, this could increase costs for firms.

This shifts MPC left to MPC + permit cost, which happens to align with MSC.

In other words, the permit system forces the firm to internalise the external cost.

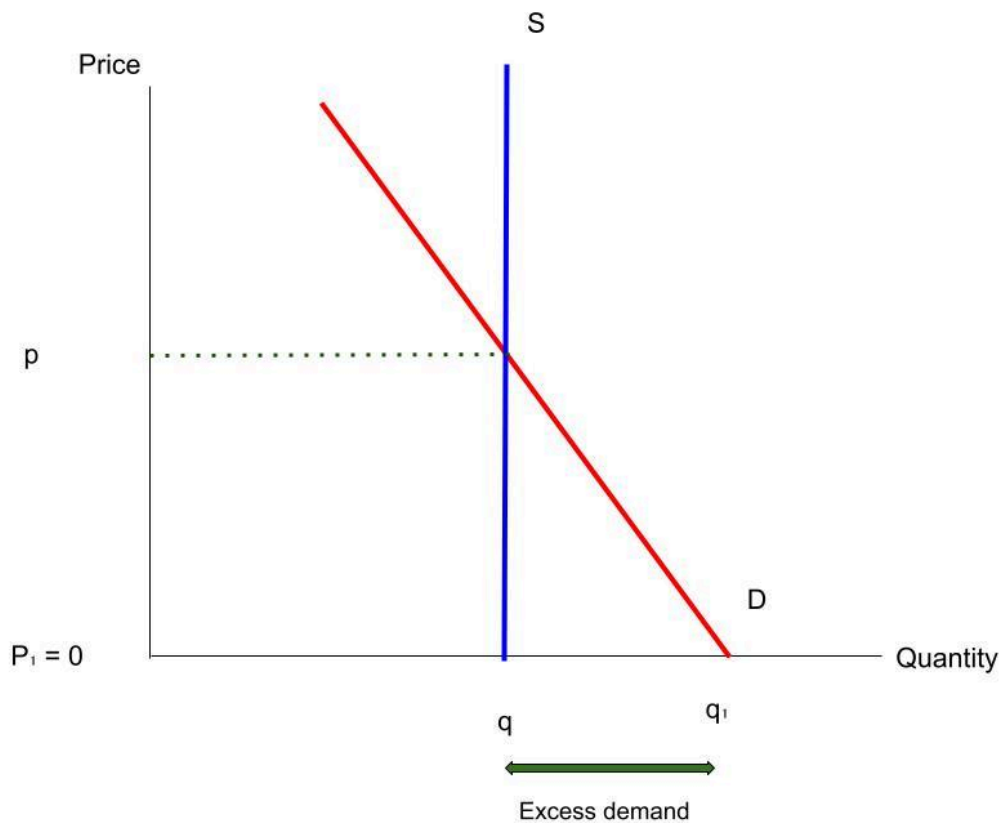
As a result, quantity falls from q (the prior free market outcome where $MPC = MPB$) to q_1 (the new free market outcome where $MPC + \text{permit cost} = MPB$).

Note the final outcome is also the socially optimal outcome where $MSB = MSC$.

[More notes on tradable pollution permits and other policies.](#)

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State provision

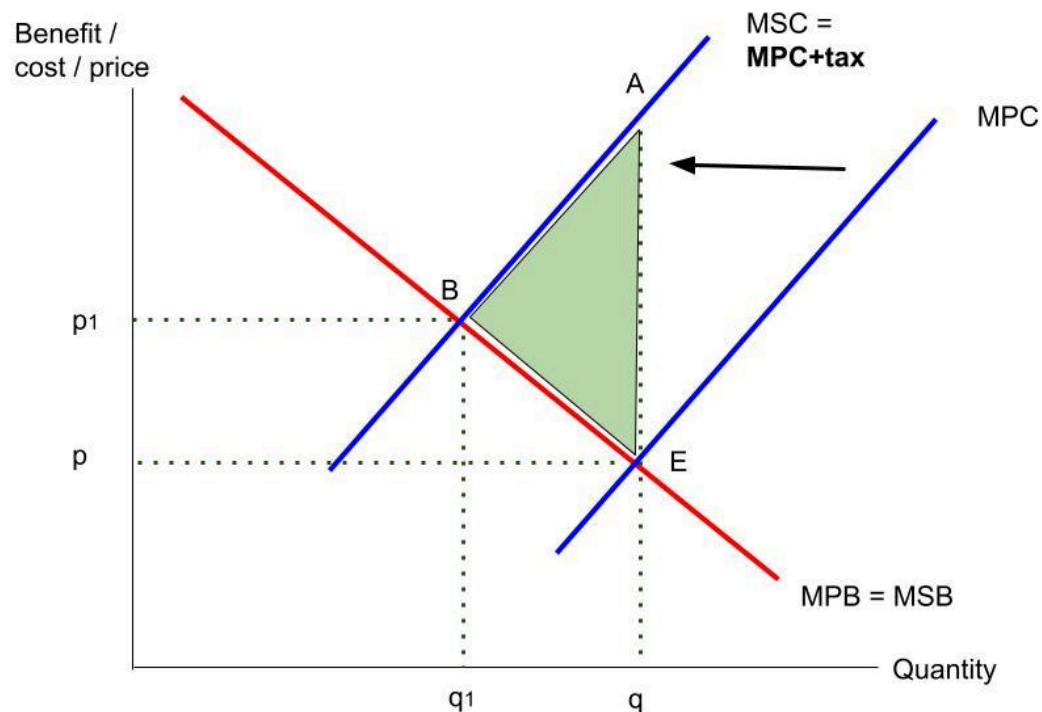
The National Health Service in the UK provides healthcare free at the point of use.

The government determines the level of supply rather than the free market, so the supply does not respond to price.

This is likely to lead to excess demand of $q_1 - q$.

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Tax plus externality

The tax reduces the quantity from q (free market outcome) to q_1 (socially optimal outcome).

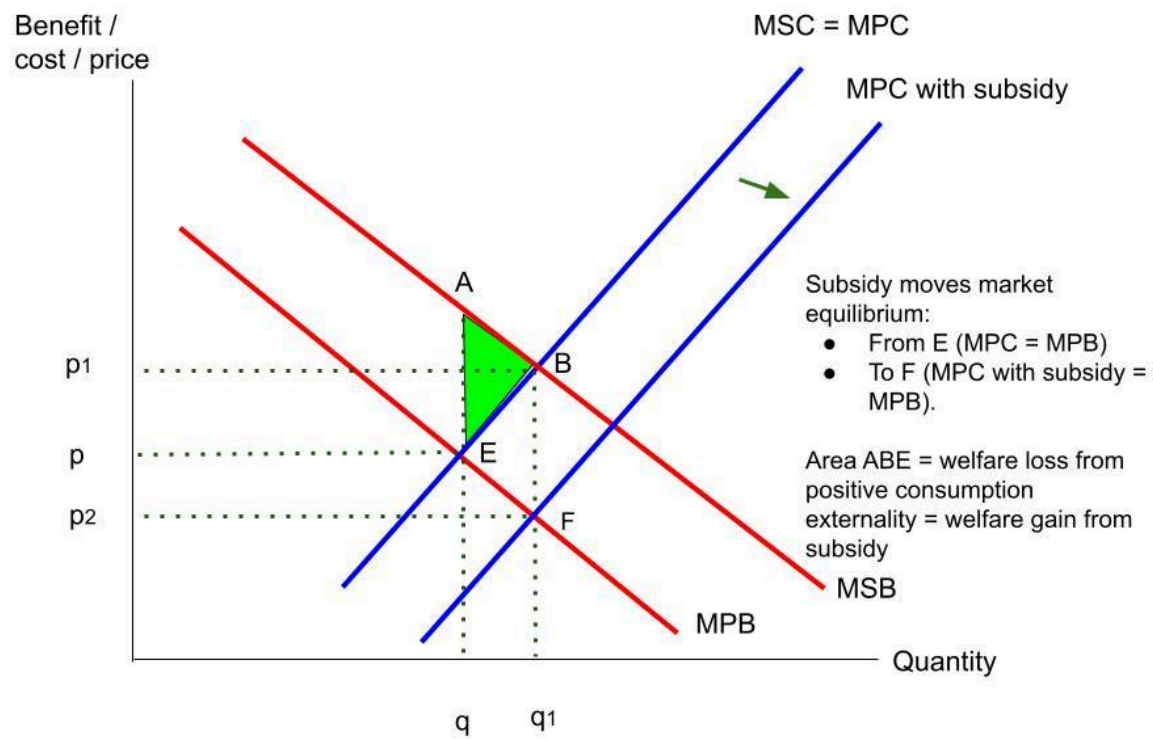
This means firms “internalise” (take into account) the externality, leading to a welfare gain of ABE.

Notes on taxes in the context of market failure:

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Subsidy plus externality

Subsidy shifts the cost curve right from MPC to MPC with subsidy.

This increases quantity from q (free market outcome) to q1 (socially optimal outcome).

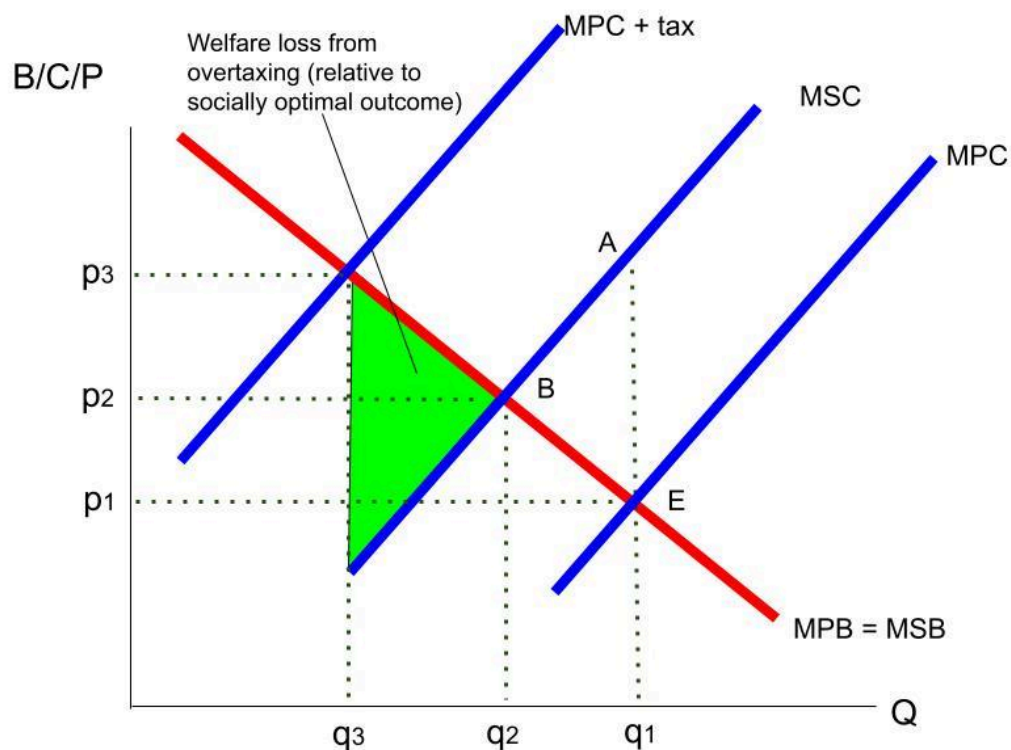
This eliminates the welfare loss ABE.

Notes on subsidies in the context of market failure:

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Government failure from setting tax rate too high

This is a negative production externality diagram from earlier with one extra line: the MPC+tax line.

The tax shifts MPC to the left, but in this case “too” far to the left, to MPC+tax.

Now the market outcome with the tax is where $MPC+tax = MPB$, at quantity q_3 . This is below the socially optimal quantity q_2 where $MSB = MSC$.

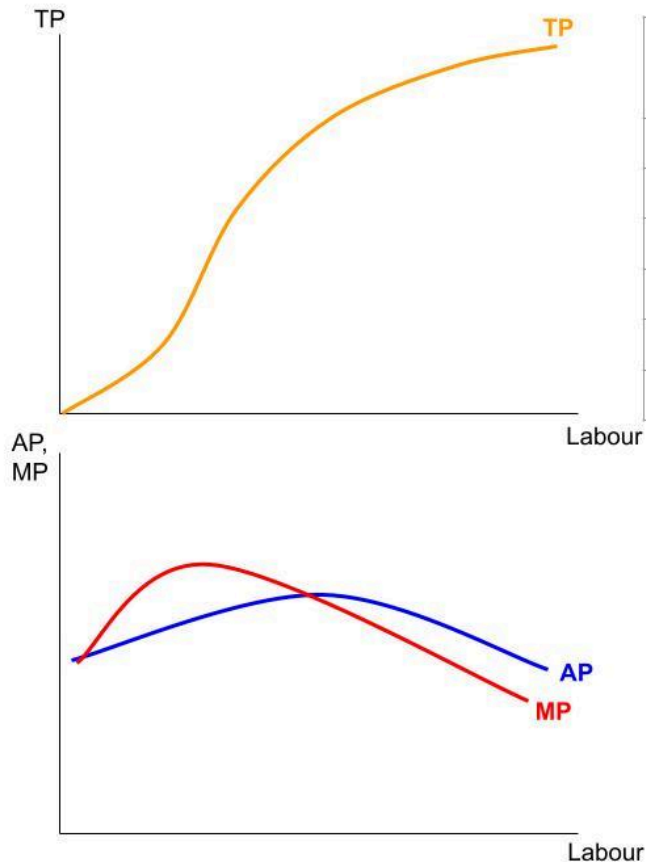
So the tax has reduced the quantity from q_1 to q_3 . This results in a welfare loss of the shaded area (relative to the socially optimal outcome).

Note to show government failure, you could also use the tax diagram shown earlier with the welfare loss in a supply and demand diagram.

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Theme 3 diagrams



Number of workers	Total product	Average product	Marginal product
0	0		
1	4	4	+4
2	10	5	+6
3	15	5	+5
4	18	4.5	+3
5	20	4	+2

Total, average and marginal product curves

Total product refers to a firm's level of output.

Average product (of labour) = output divided by number of workers.

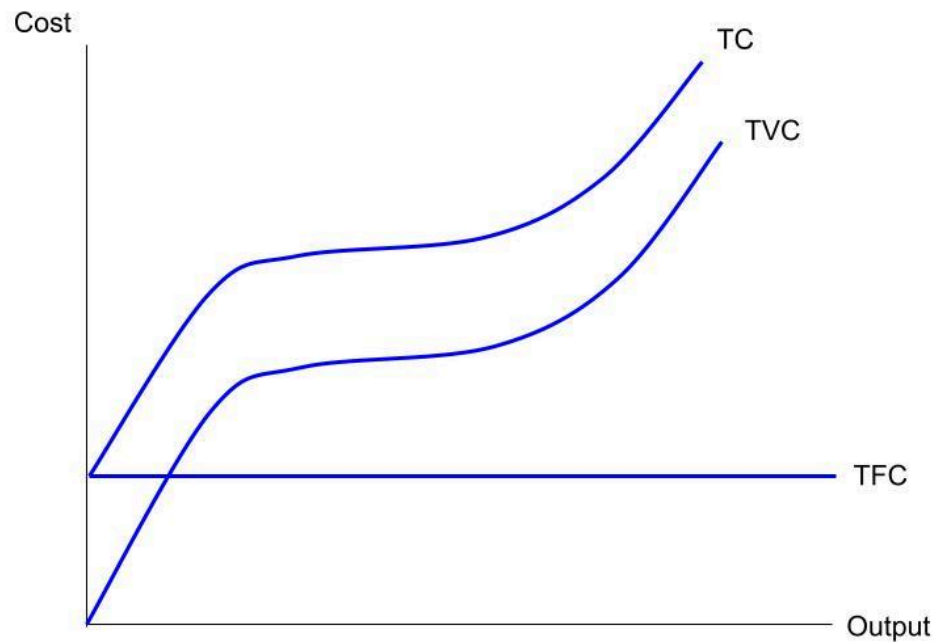
Marginal product (of labour) = change in output from employing one more worker.

For Economics A-Level we assume:

- At output levels above a certain level, there is **diminishing marginal product of labour**. As we increase the number of workers, output increases at a decreasing rate.
- At low levels of output, there is the opposite, increasing marginal product.
- So MP goes up first then decreases, as output rises.

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TC/TVC/TFC

Fixed cost (TFC) does not change with output.

Variable cost (TVC) changes with output. For low output levels, there are increasing marginal returns. At high output levels, there are diminishing marginal returns.

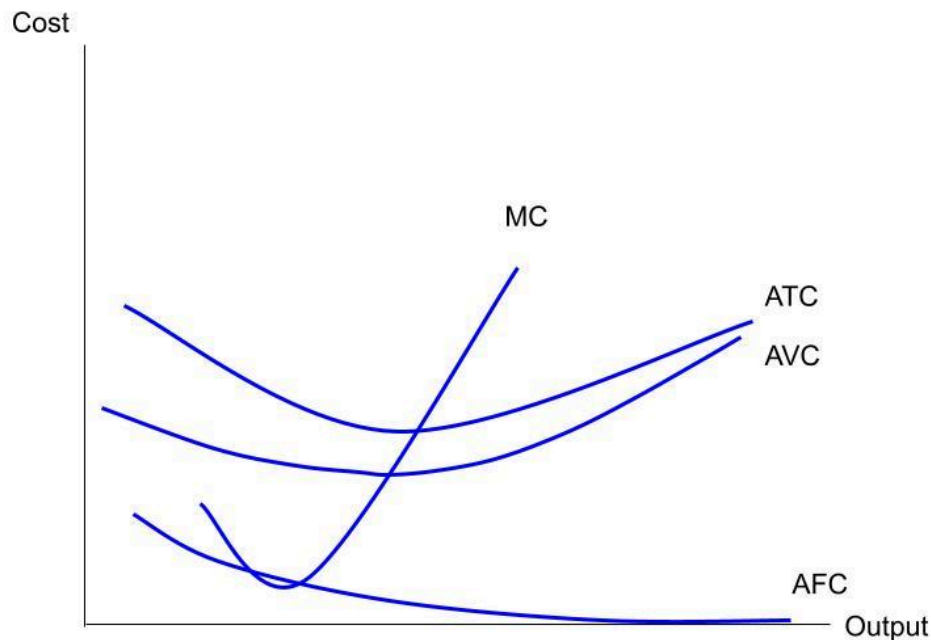
Total cost (TC) is the sum of variable and fixed costs.

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ATC/AVC/AFC

AFC is TFC divided by output.

TFC (fixed cost) stays the same as output changes. So as output rises, the same fixed cost is spread over a larger output base. So AFC falls, approaching zero.

ATC and AVC are U-shaped.

AVC is U-shaped because of diminishing marginal returns at high output levels and increasing marginal returns at low output levels.

ATC is U shaped for similar reasons as AVC, and because the importance of (average) fixed costs diminishes as output increases.

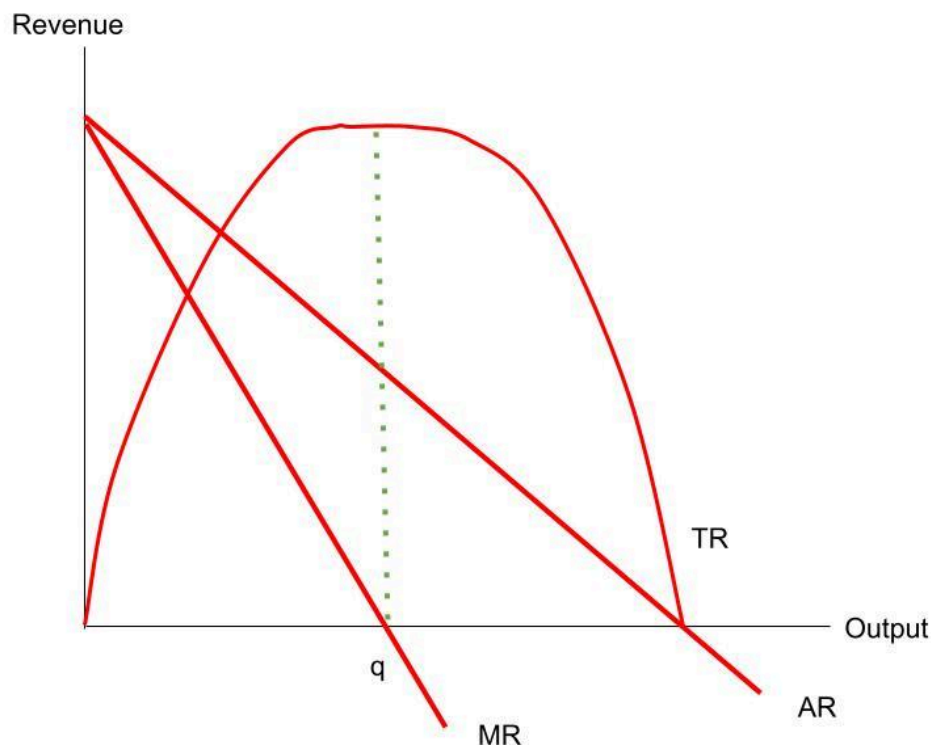
The marginal cost (MC) is shaped like a tick. It passes through the minimum points of the ATC and AVC.

Notes on cost curves:

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MR/AR/TR with price maker

A price maker can influence the market price. In this case, reducing the price has two effects on revenue:

- 1. Increases demand via the law of demand. Increases revenue.
- 2. Reduces the revenue per unit on all previous units.

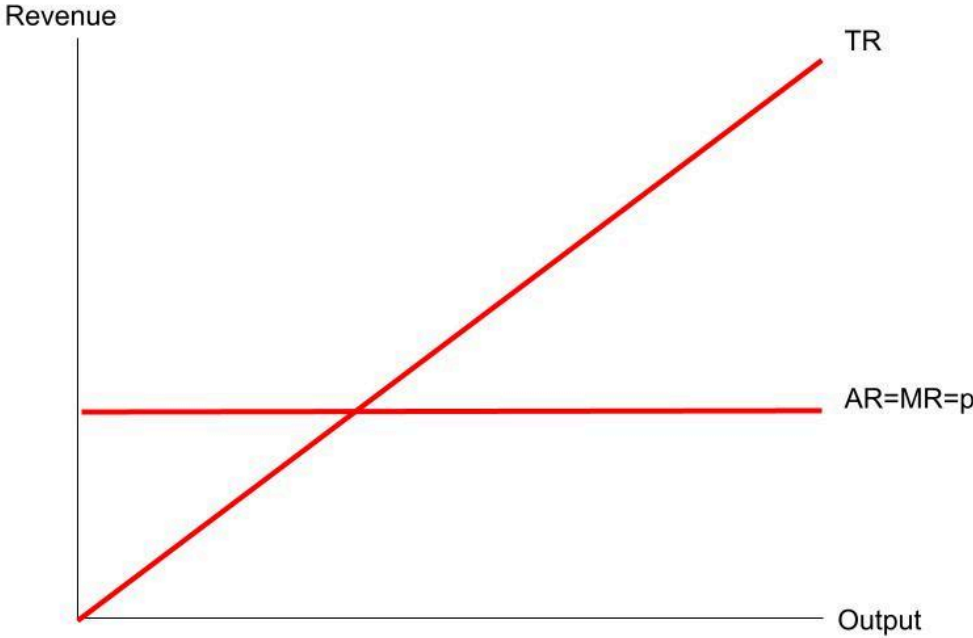
As a result of 2, the average revenue (revenue per unit of output) falls as output increases.

The marginal revenue (revenue change with an extra unit of output) falls more quickly and is twice as steep as AR. This is because as output increases, price (=AR) falls to be able to sell the extra output. But this reduces the revenue on all other units, so MR falls by more than AR.

Total revenue is shaped like an inverted U. At q , total revenue is maximised. This also coincides with where $MR=0$.

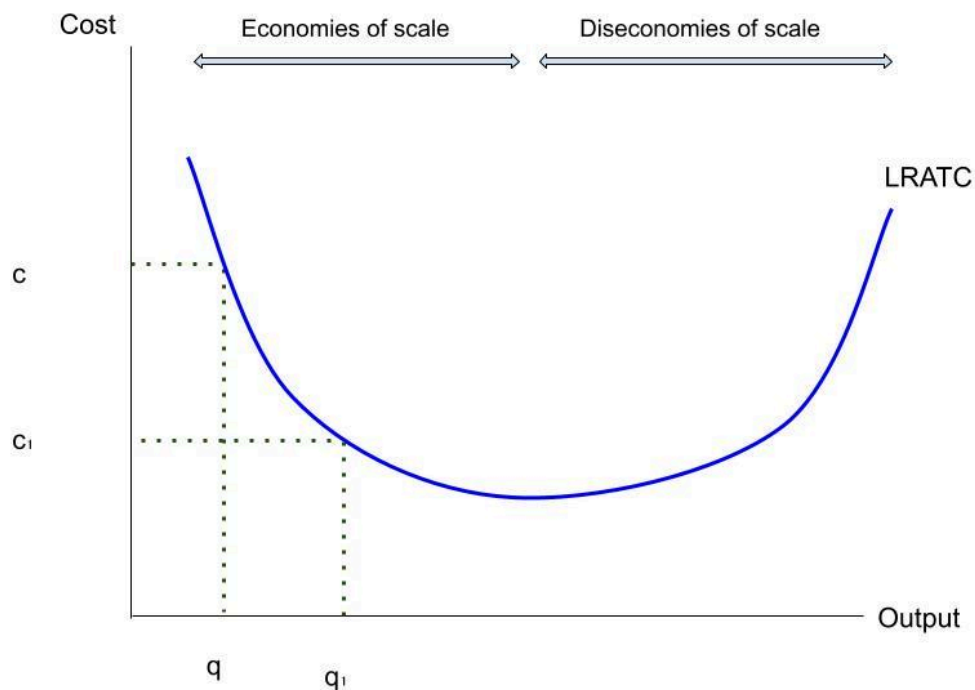
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	Notes on revenue: • Edexcel
 The graph illustrates the relationship between Revenue and Output for a price taker. The vertical axis is labeled 'Revenue' and the horizontal axis is labeled 'Output'. A horizontal line represents Average Revenue (AR) and Marginal Revenue (MR) at a constant price (p). A straight line starting from the origin represents Total Revenue (TR). The TR line intersects the AR line at the point where TR is maximized.	<u>MR/AR/TR with price taker</u> The market price is fixed from the point of view of the price taker. So average revenue (revenue per unit, which is also the price) is also fixed. So is marginal revenue, the extra revenue per unit of output is always just the price. So total revenue increases at a constant rate, as output increases. Notes on revenue: • Edexcel

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LRAC movement along (internal economies of scale)

Economies of scale mean a reduction in long-run average cost (from c to c_1) as output increases (from q to q_1).

For example, firms may have purchasing economies of scale (the ability to bulk buy inputs).

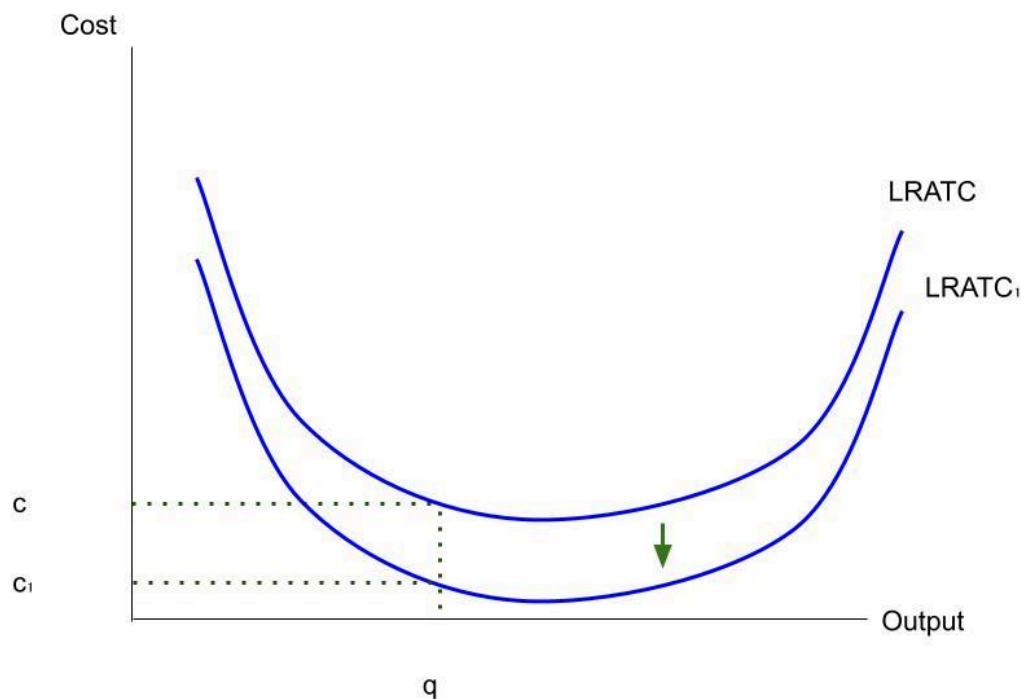
Note that the LRATC increases as output rises (for high output levels). This is where “diseconomies of scale” take place.

Notes on economies of scale:

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LRAC shift (external economies of scale)

External economies of scale occur at the industry level.

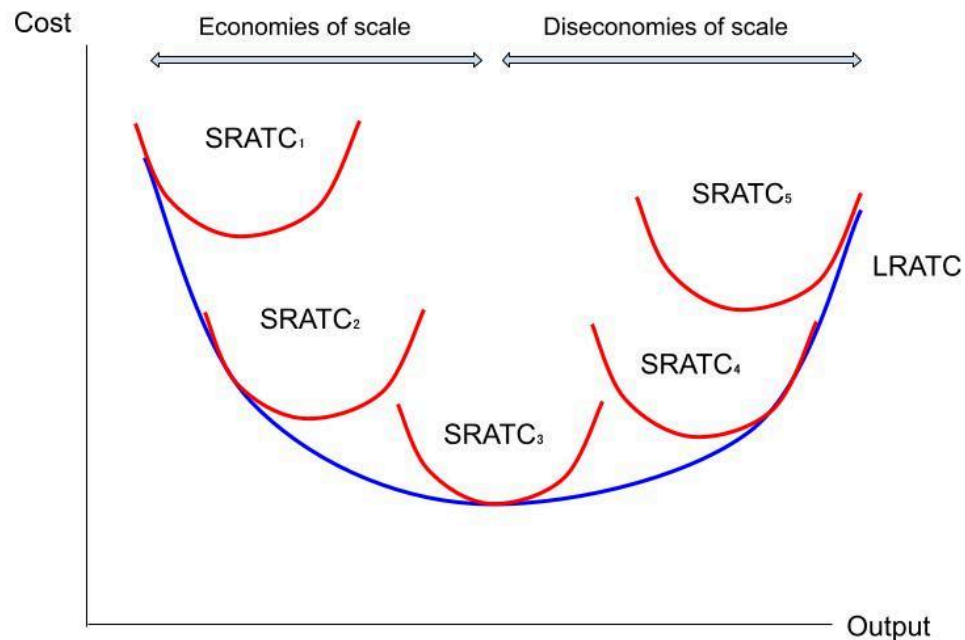
For example, the growth of Silicon Valley, an area in the US with lots of tech companies, makes it easier for other companies to find tech workers and collaborate. This reduces long run average total costs from LRATC to LRATC1.

Notes on economies of scale:

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SRATC / LRATC

In the short run, at least one factor of production is fixed in quantity.

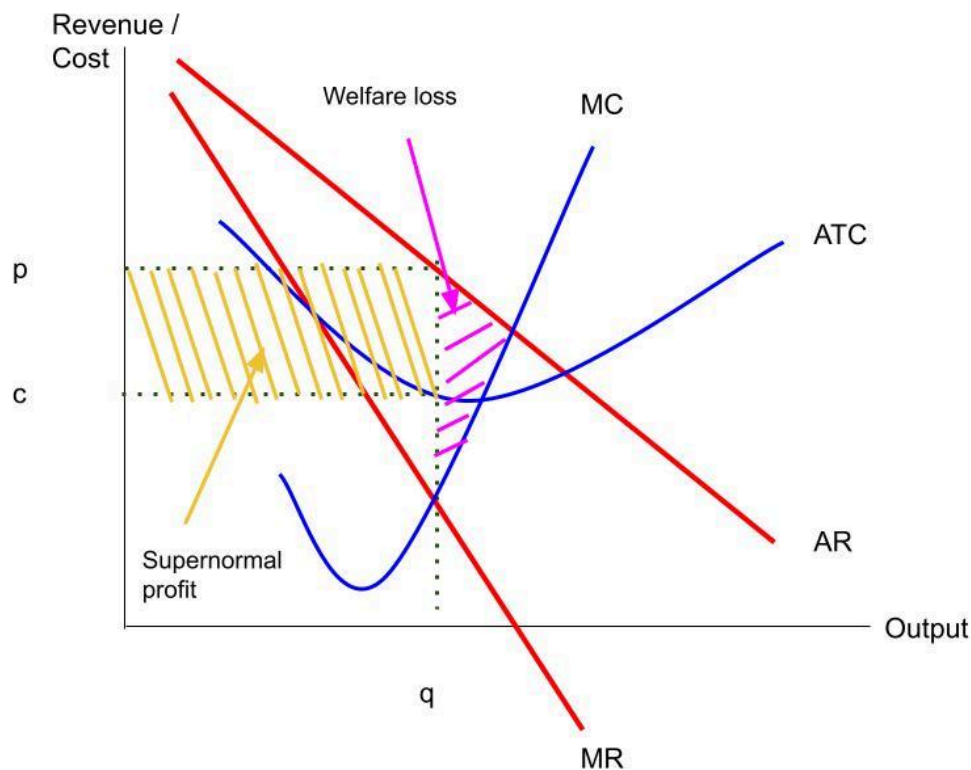
In the long run, all factors of production can be varied in quantity. So in the long run, there are more ways of producing the same good using different input combinations. So long run average costs will be the same or lower than short run average costs.

Notes on cost curves:

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Monopoly

The monopoly produces where $MR=MC$ to maximise profits. This occurs at output level q .

The price is the average revenue at output q . This is p .

Supernormal profits are $(p-c)q$.

Monopoly leads to underproduction, causing a welfare loss as shaded.

Monopoly output q is below the allocatively efficient level of output where $AR=MC$.

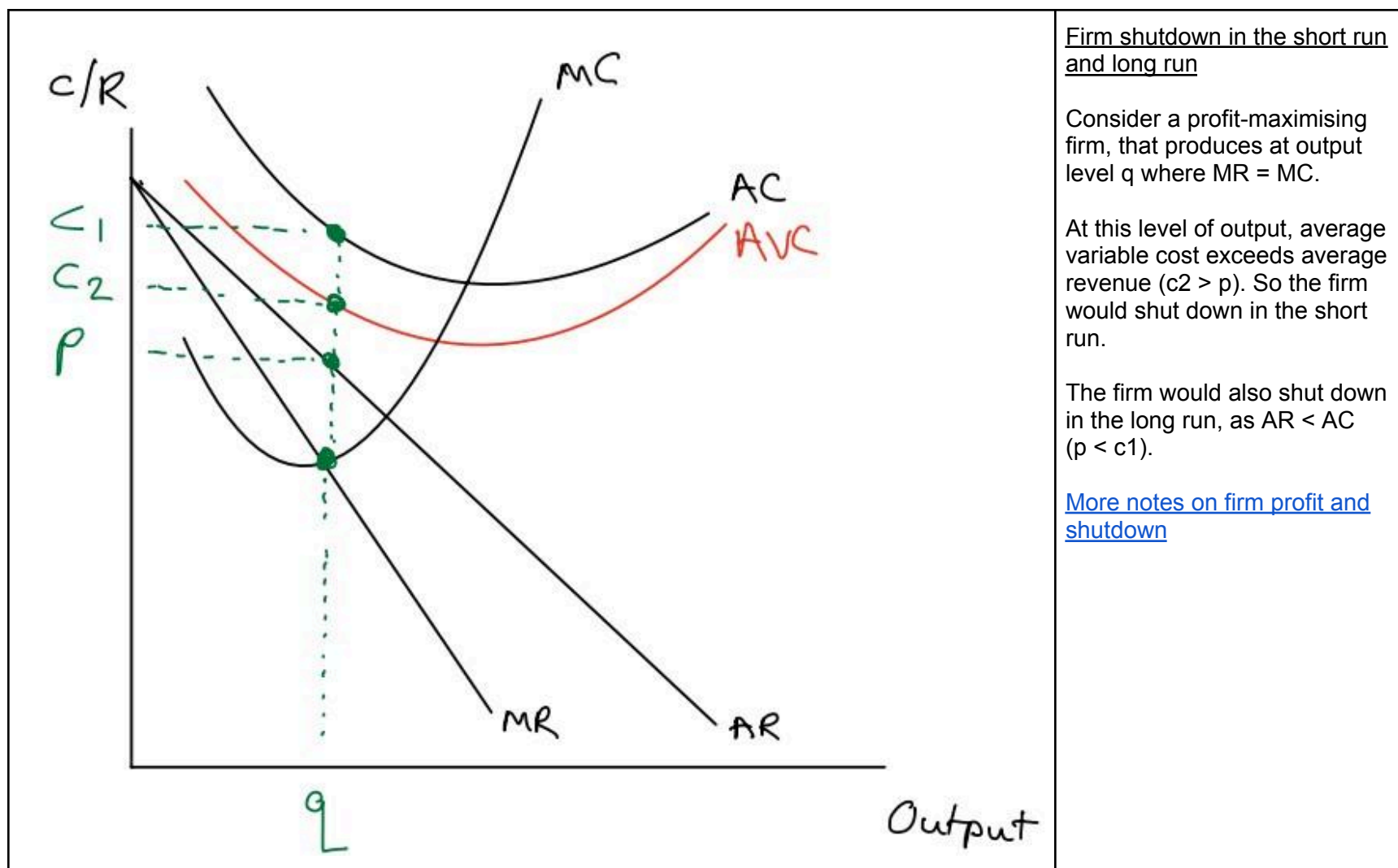
In words, the monopoly holds back supply to raise prices and increase supernormal profits. But this significantly reduces consumer surplus.

Notes on monopoly:

- [Edexcel](https://www.edexcel.com/)

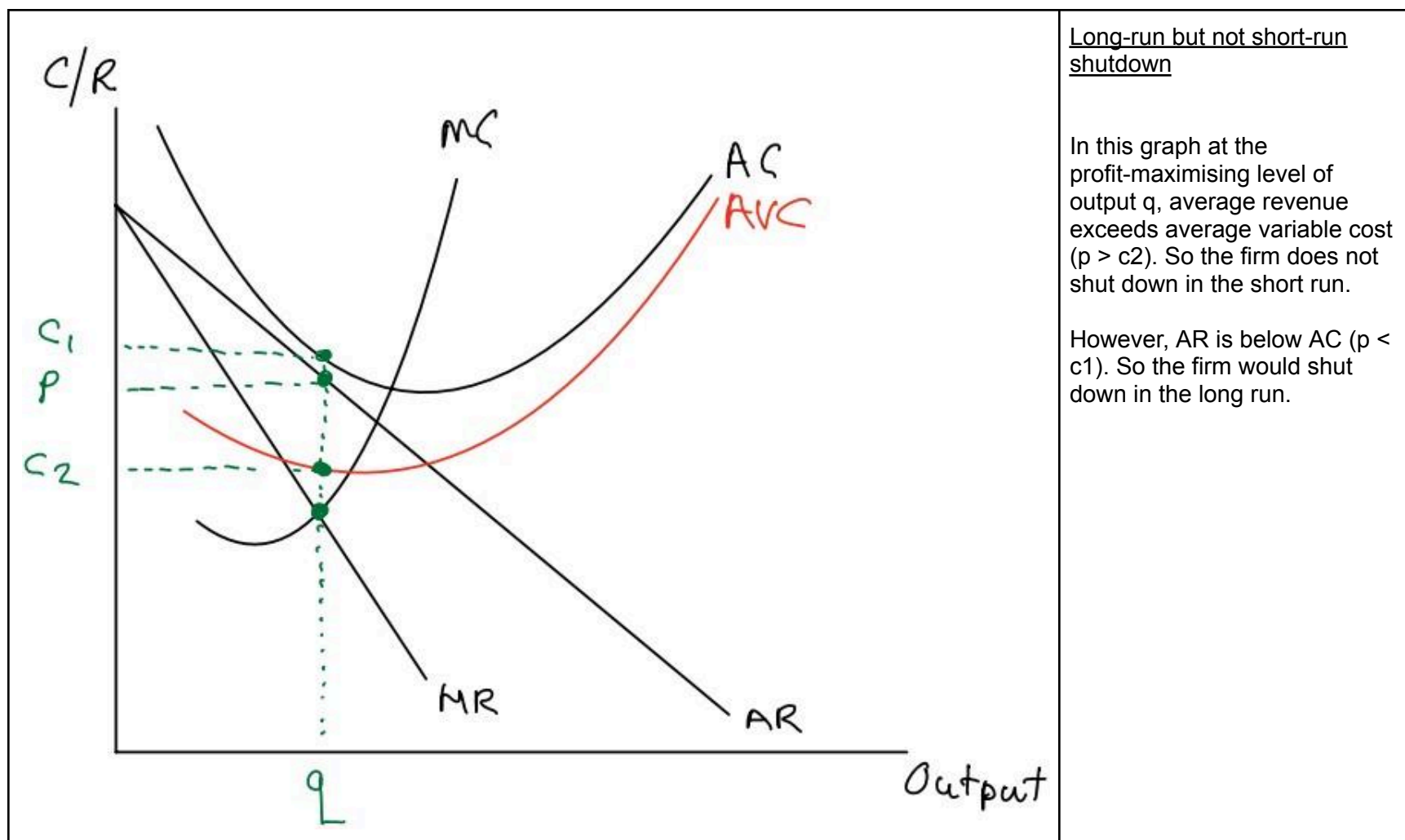
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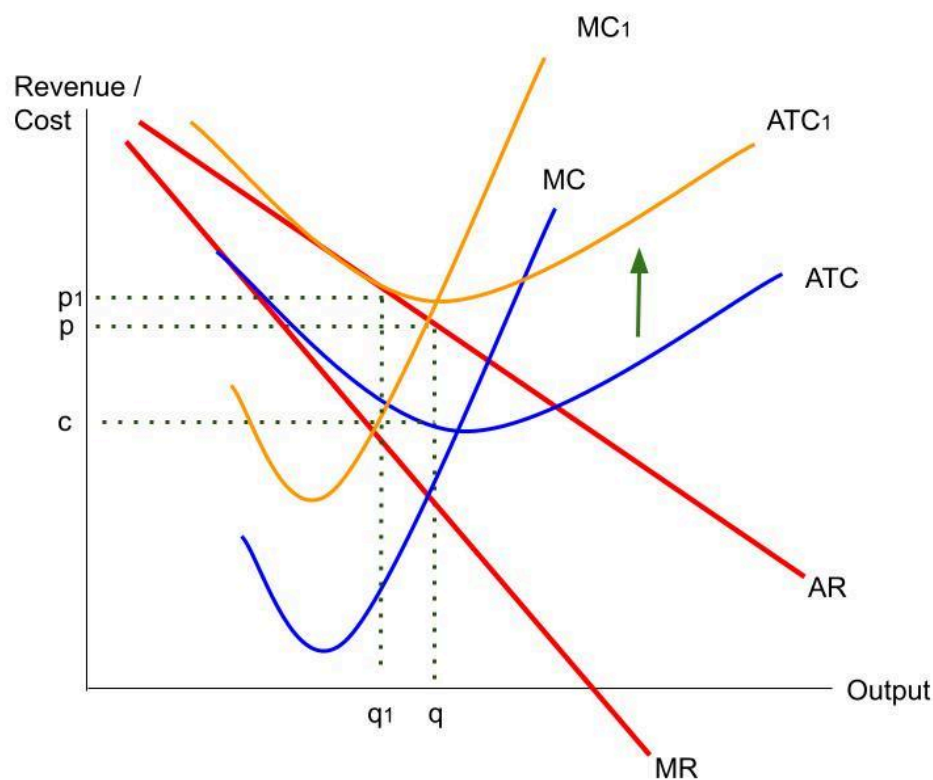
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Increase in firm costs on cost / revenue diagram

An increase in business costs, e.g. due to an increase in labour costs or carbon taxes, shifts MC and ATC. In this case, MC and ATC shift up to MC1 and ATC1.

This increases the price from p to p_1 , reduces the output from q to q_1 .

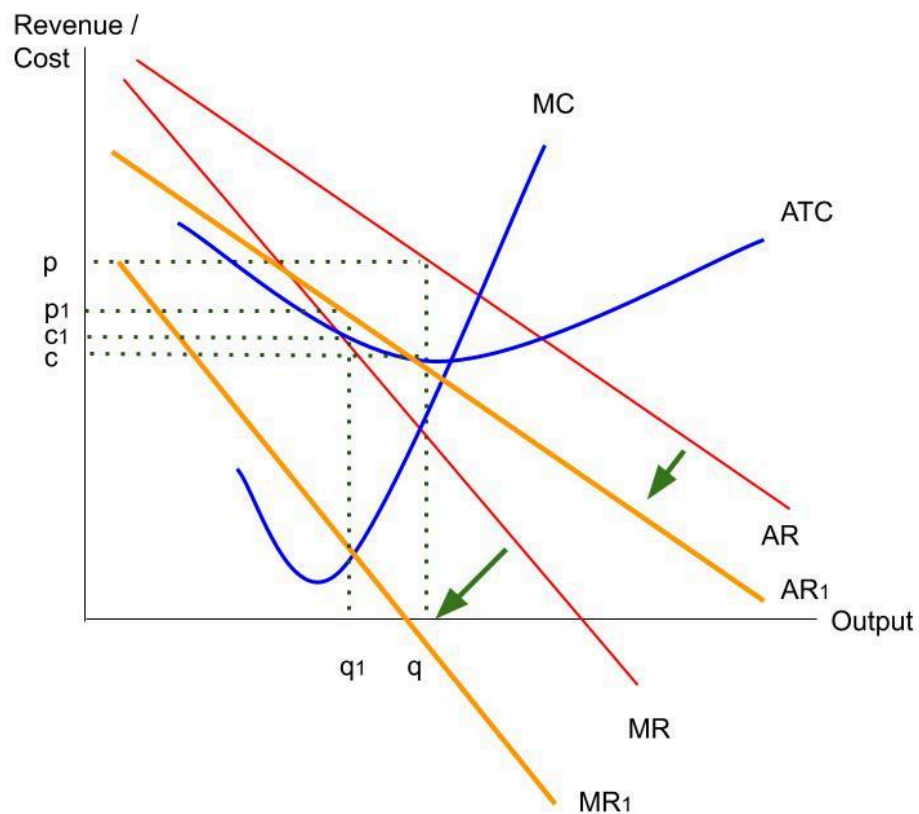
This is likely to reduce the firm's supernormal profit.

Note this diagram assumes that the cost increasing is a variable cost.

If there is an increase in a fixed cost instead, only the ATC curve shifts upwards. Marginal cost is unaffected by changes in fixed cost.

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Decrease in firm revenue on cost / revenue diagram

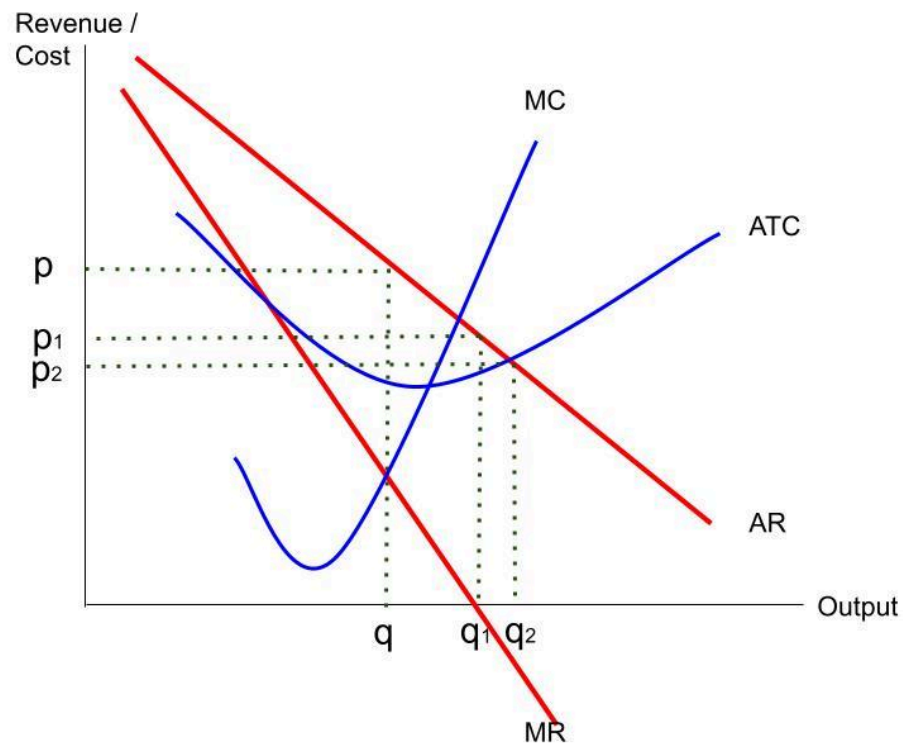
Any factor that reduces demand for an individual firm's products, such as falling real incomes or changes in tastes, shifts AR and MR.

Here AR and MR shift left from AR to AR1 and MR to MR1.

This reduces supernormal profit from $(p-c)q$ to $(p_1-c_1)q_1$.

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Business objectives

Profit maximisation: $MC=MR$ - (q, p)

Revenue maximisation: $MR=0$ - (q_1, p_1) .

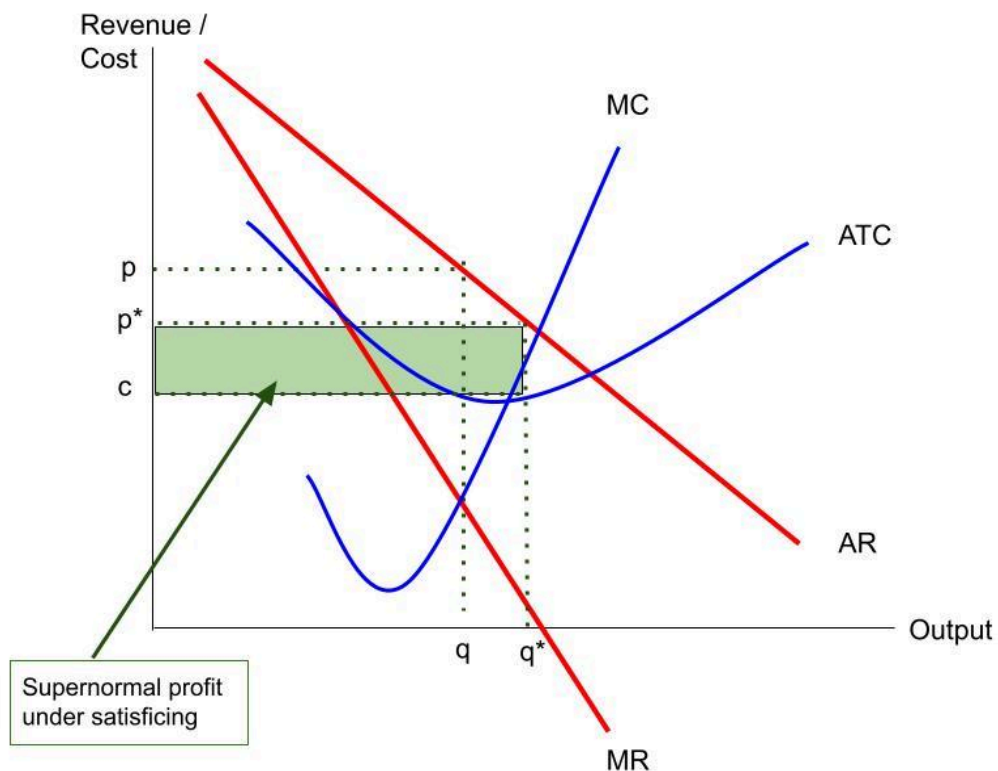
Sales maximisation: $AR=ATC$ - (q_2, p_2)

Notes on business objectives:

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Profit satisficing objective

Profit satisficing means achieving a reasonable amount of supernormal profit, so that efforts can be made to benefit other stakeholders.

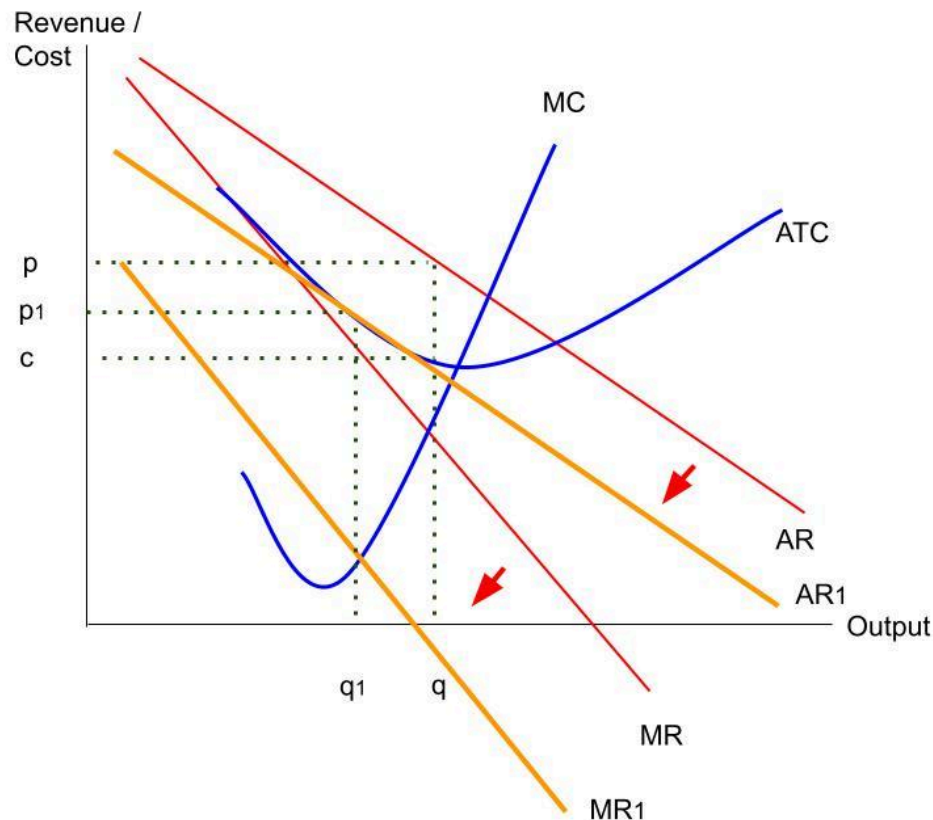
Satisficing at price p^* , below the profit-maximising price of p , leads to supernormal profit shown by the shaded area. This is less supernormal profit than under profit maximisation.

Notes on business objectives:

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Monopolistic competition - long run

There are low barriers to entry in monopolistic competition.

So if there are supernormal profits in the short run, firms enter the market. This reduces the market share of a firm already in the market. So the demand for the individual firm's products falls. So their AR and MR curves shift left from AR to AR1 and MR to MR1.

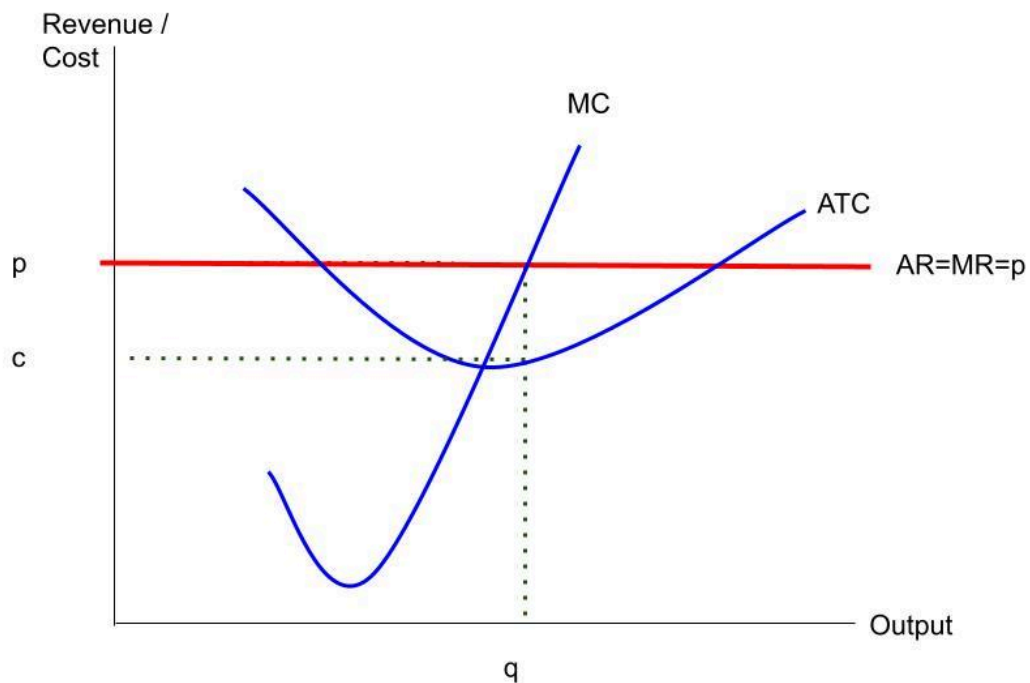
This lowers supernormal profit to zero (at which point, firms stop entering). This lowers output from q to q_1 and price from p to p_1 .

Notes on monopolistic competition:

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Perfect competition - short run

Firms are price takers in perfect competition. So the price (which is also average revenue, AR) is taken as given (fixed)

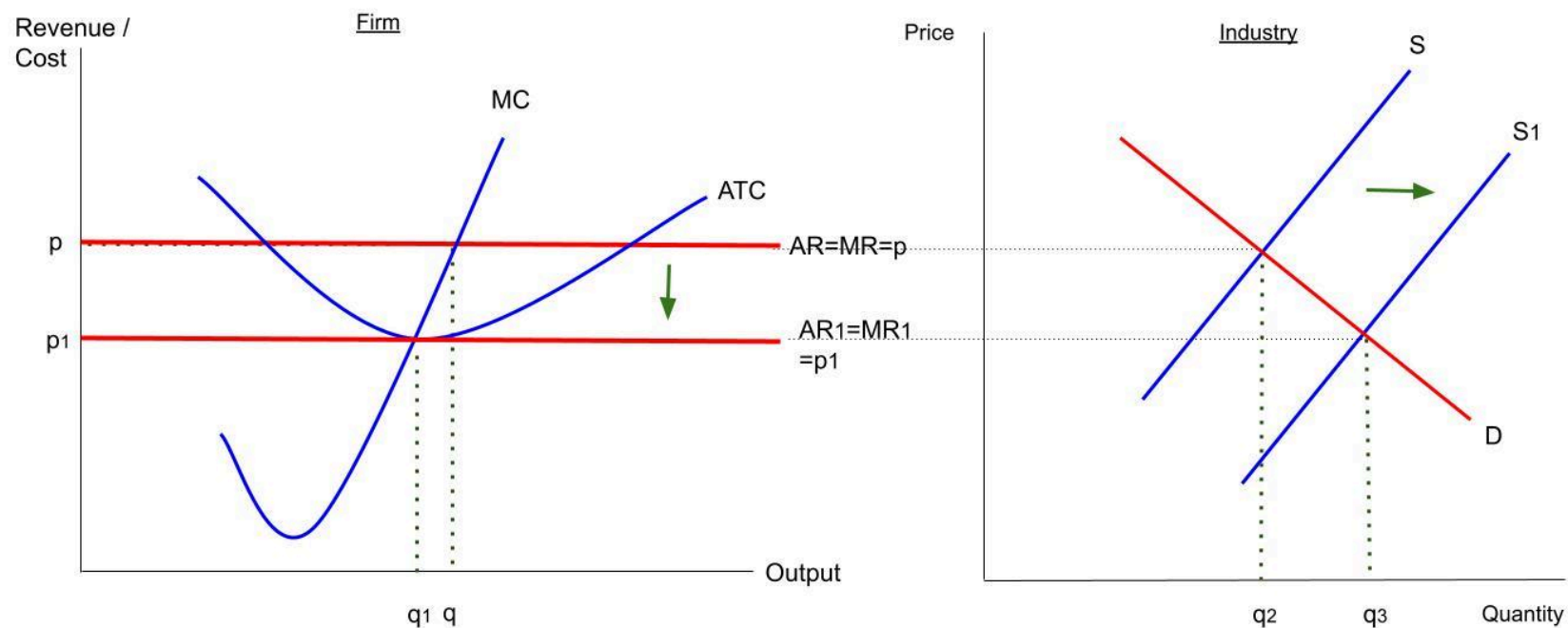
Firms can make supernormal profits in the short run, here supernormal profit is $(p-c)q$.

Notes on perfect competition:

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Perfect competition - long run

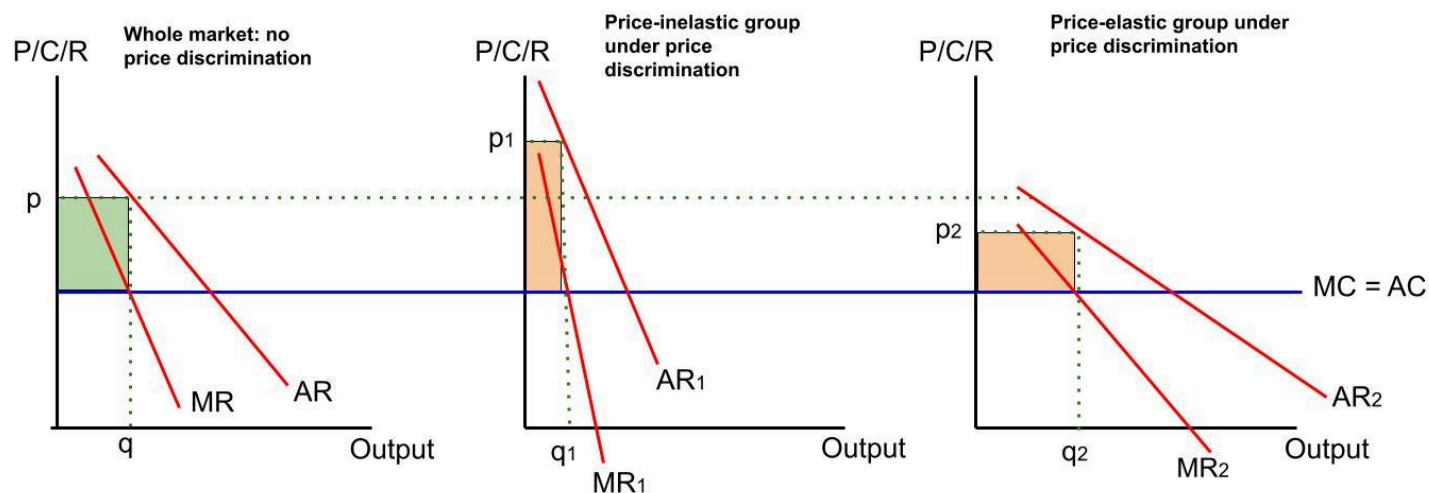
There are no barriers to entry in perfect competition. Suppose there are supernormal profits in the short run. Then firms enter the market, shifting supply right from S to S_1 . This lowers the industry equilibrium price from p to p_1 .

The perfectly competitive firm now takes a lower price (p_1) as given. This shifts AR and MR down from AR to AR_1 . This lowers supernormal profit to zero, at which point firms stop entering the market.

Notes on perfect competition: [Edexcel](#)

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Price discrimination 3rd degree - elastic and inelastic subgroups

The left diagram shows no price discrimination. The middle and right diagram show price discrimination, for the PED inelastic and PED elastic groups respectively.

The price elastic group faces a fall in price from p to p_2 under price discrimination. This increases consumer surplus. As demand is price elastic, firm revenue and also profit increase from a lower price too.

The price inelastic group faces a rise in price from p to p_1 under price discrimination. This reduces consumer surplus. As demand is price inelastic, firm revenue and also profit increase from a higher price too.

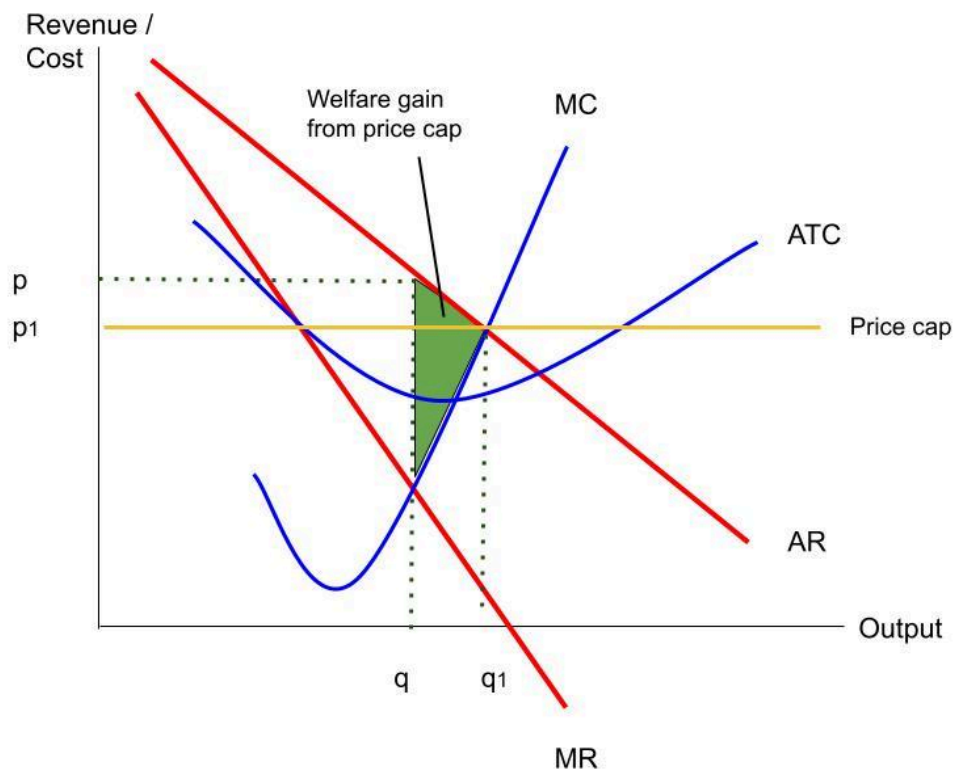
The areas shaded show firm profit. The green area (profit under no price discrimination) is smaller than the sum of profits under price discrimination (both orange areas). This is one way of showing that price discrimination increases profits.

Notes on price discrimination:

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Price cap on cost / revenue diagram

The price cap set at p_1 reduces the price from p (profit-maximising price) to p_1 .

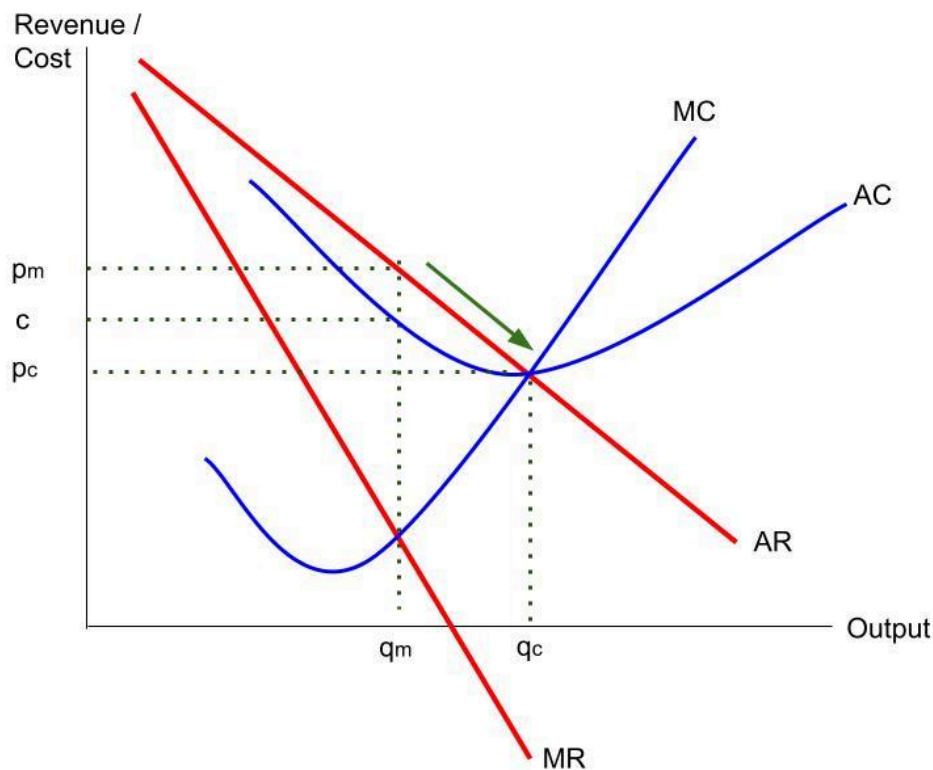
The quantity increases from q to q_1 .

The price cap increases consumer surplus but reduces firm profits. If set at the right level, the price cap can increase social welfare, by reducing the welfare loss associated with monopoly.

The green area shows the welfare gain from the price cap. Here, this is equivalent to the welfare loss from monopoly.

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The effect of competition policy on a monopoly cost-revenue diagram

Without intervention, a profit-maximising monopolist may produce where $MC = MR$. This occurs at output level q_m , leading to price p_m . Supernormal profit is $(p_m - c)q_m$.

Examples of competition policy could include subsidies for small entrants or deregulation to remove barriers to entry.

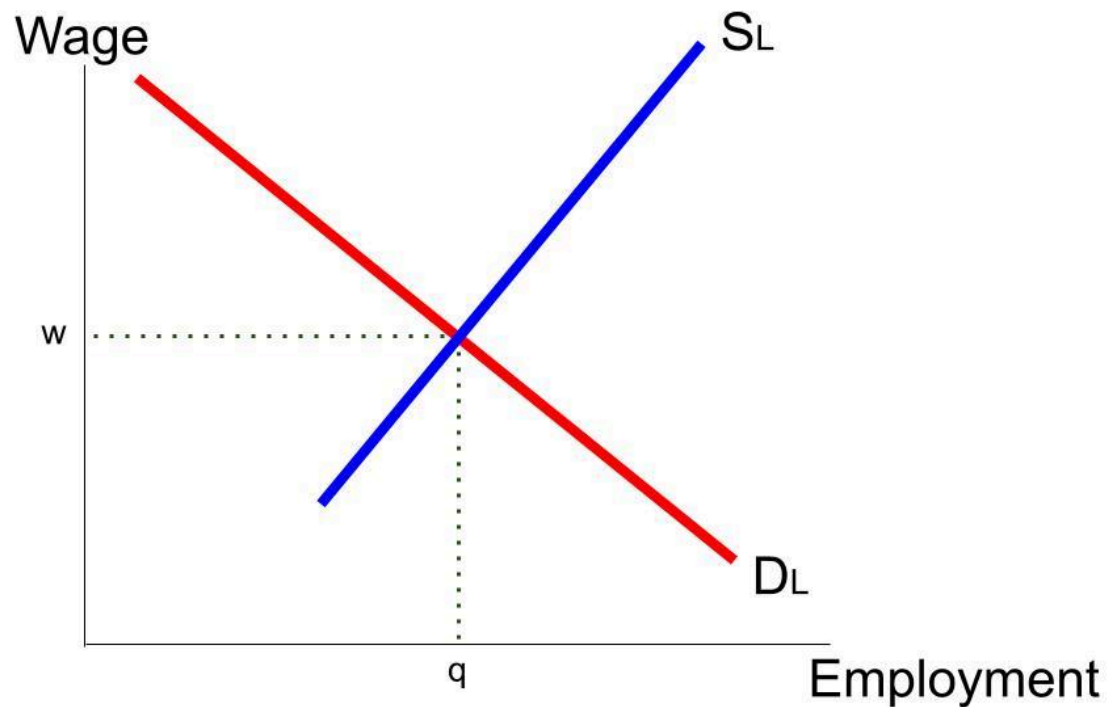
This could make the market more contestable. As a result, the incumbent monopoly may lower the price from p_m to p_c to make normal profit, increasing the output level from q_m to q_c .

This is limit pricing and is designed to discourage other firms from entering.

As drawn, this competitive outcome at (q_c, p_c) is also allocatively efficient ($AR = MC$), increasing social welfare. However, this does not have to be the case.

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Labour market supply / demand

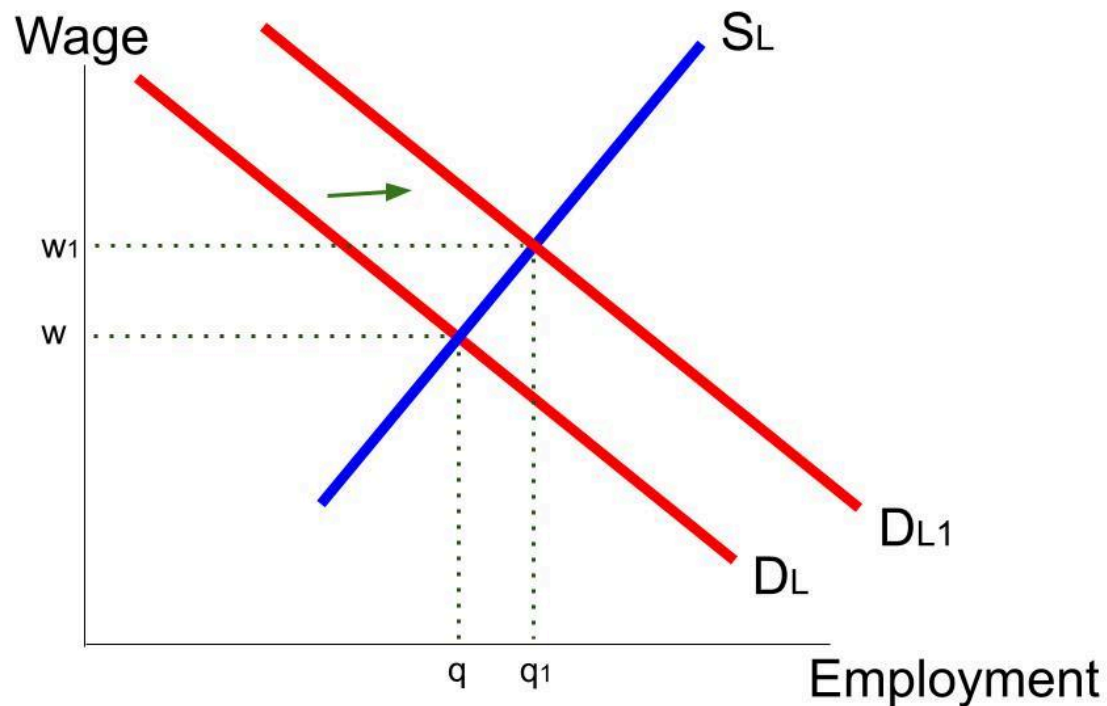
The labour market can be thought of like any other market, where there is supply of and demand for labour.

Notes on labour supply and labour demand:

- [Edexcel labour demand](#)
- [Edexcel labour supply](#)

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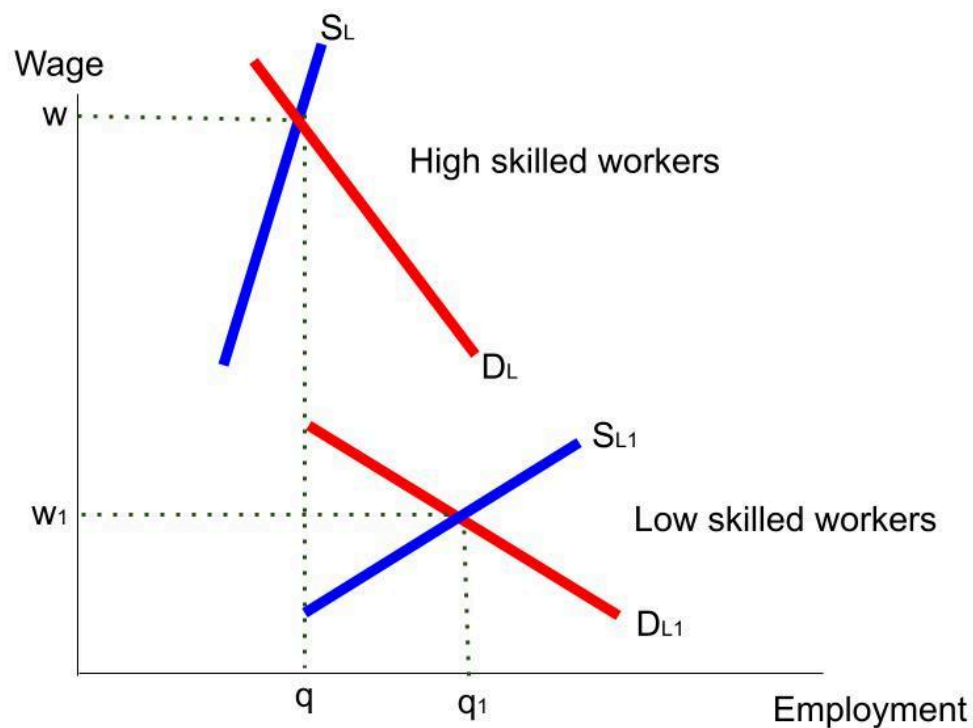
Labour demand shifts right.

More training or education could increase the productivity of workers. So hiring an extra worker offers a higher benefit to firms in terms of higher revenue.

So firms increase demand for labour, demand shifts from D to D_1 . This increases wage from w to w_1 and quantity of labour from q to q_1 .

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Wage differentials

High skilled workers take a longer time to be trained, so their wage elasticity of supply is more inelastic.

Higher skilled workers are more likely to be necessities in the production process and have fewer substitutes, so demand is more wage-inelastic.

Also, due to lower supply and often greater demand for high skilled workers, their wages will be higher at w compared to low skilled workers at w_1 .

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How to use microeconomics diagrams

Use diagrams to make your analysis easier and think of points. If you're unsure what point to make in a 25 marker, ask yourself: "what diagram could I draw here?".

The basics of diagrams - use the acronym SCALE:

- S for shift. Show the shift of curve in your diagram if a shift is needed (it often is)
- C for coordinates. Show the coordinates of any key points.
- A for axes - make sure the axes are labelled (price, quantity for example)
- L for label - label all curves e.g. S and S1.
- E for explanation - describe what happens in the diagram in the text and explain why this happens.

Use this to make sure you don't forget the basics.

High level diagrams can be very helpful for 25 markers.

High level diagram use often involves labelling areas. This could include producer and consumer surplus, revenue for government or firms, welfare loss or gain, the price mechanism and supernormal profit. For example:

- For supply / demand, **extend by showing the price mechanism or consumer / producer surplus changes.**
- For cost / revenue diagrams, **you can show areas such as (changes in) supernormal profit or consumer surplus.**
- For cost and benefit diagrams, can consider further welfare effects. If a tax eliminates a negative externality, maybe the tax revenue can be used to further improve welfare.

These are just examples and there are other ways to do it. This also only applies if you cannot write enough analysis - if you already have enough analysis there is less need to extend further.

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About the author

I am Tom, an economist turned economics tutor. I provide economics resources on tfurber.com and [tutor](#) A-Level Economics students. Read more about me [here](#).

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