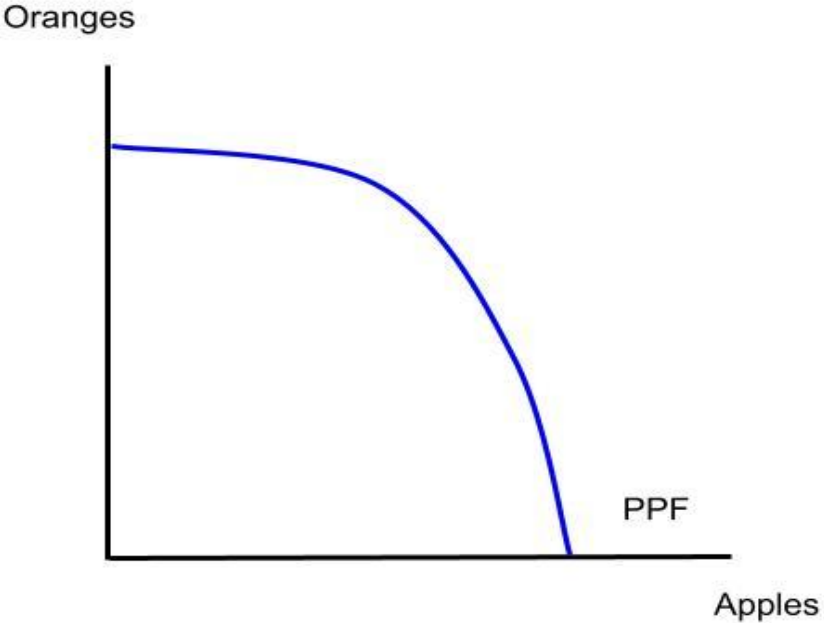
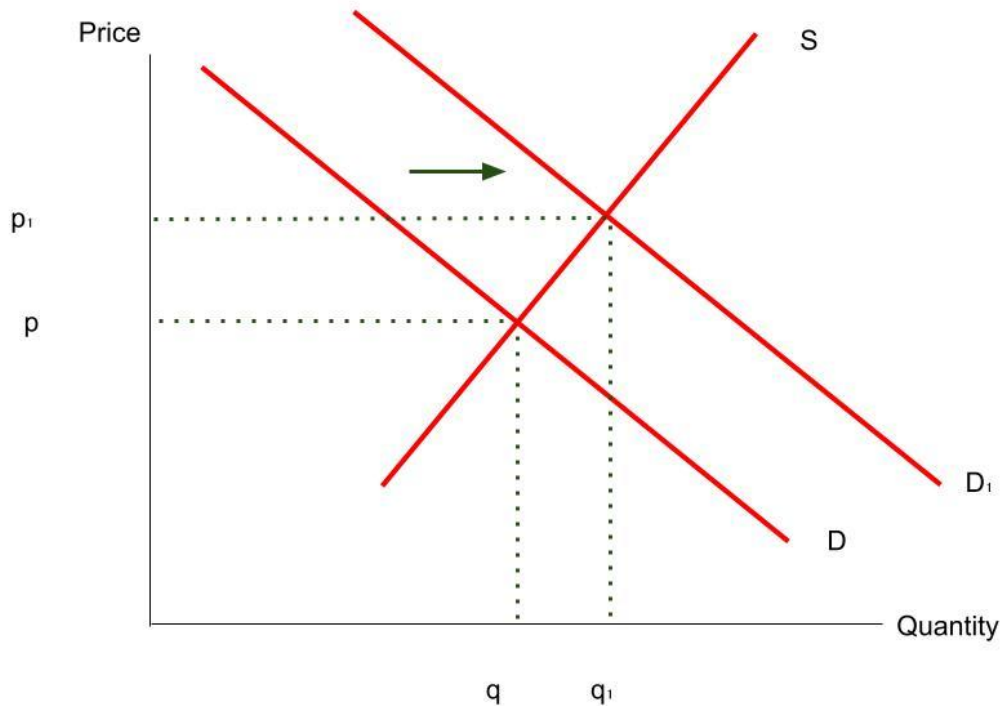


Key Diagrams for Microeconomics: Economics A-level

<u>Diagram</u>	<u>Name</u>
 <p>The diagram is a graph with a vertical axis labeled 'Oranges' and a horizontal axis labeled 'Apples'. A blue curve, representing the Production Possibility Frontier (PPF), starts on the vertical axis and curves downwards to the horizontal axis. The curve is concave to the origin, indicating diminishing marginal returns. The label 'PPF' is placed near the end of the curve on the horizontal axis.</p>	<p><u>PPF (Production possibility frontier)</u></p> <p>Shows the possible production combinations of two goods, that a society can produce.</p> <p>Points on the PPF are productively efficient - they maximise use of available resources.</p> <p>The slope of the PPF represents the opportunity cost of producing one more apple. As more and more apples are produced, producing one more apple requires giving up even more oranges (as apple production runs into diminishing marginal returns / gets progressively more difficult). So opportunity cost increases.</p>

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Supply and demand - demand shift right

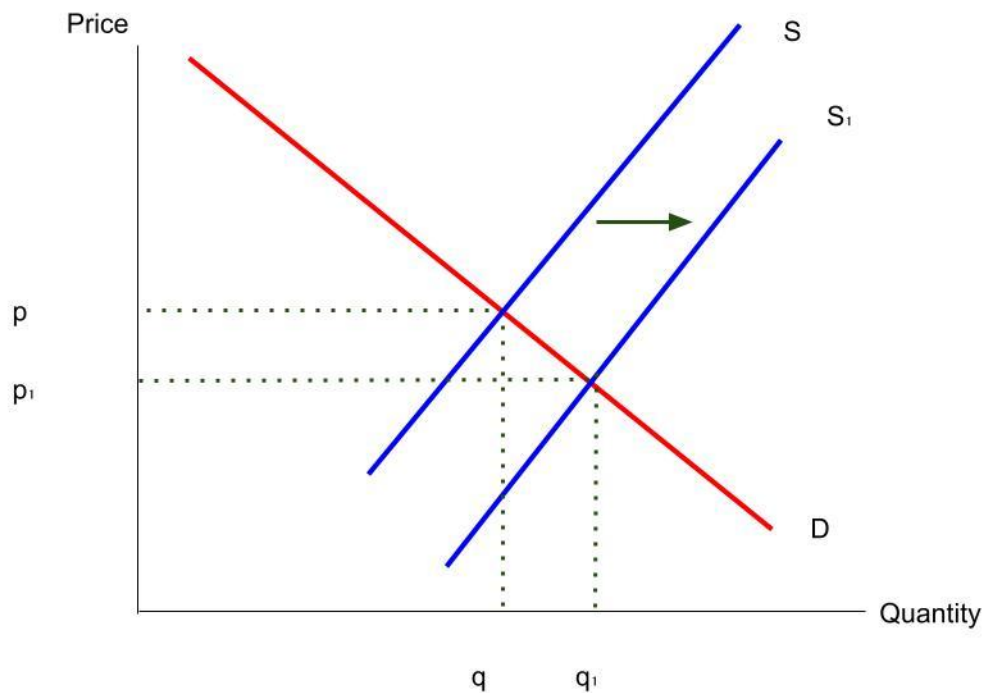
Demand shift right could be caused by:

- 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.
- NOT a fall in the price of the good itself, as this would lead to a MOVEMENT ALONG the demand curve, not a shift.

This results in higher price (from p to p_1) and higher quantity from q to q_1 .

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Supply and demand - supply shift right

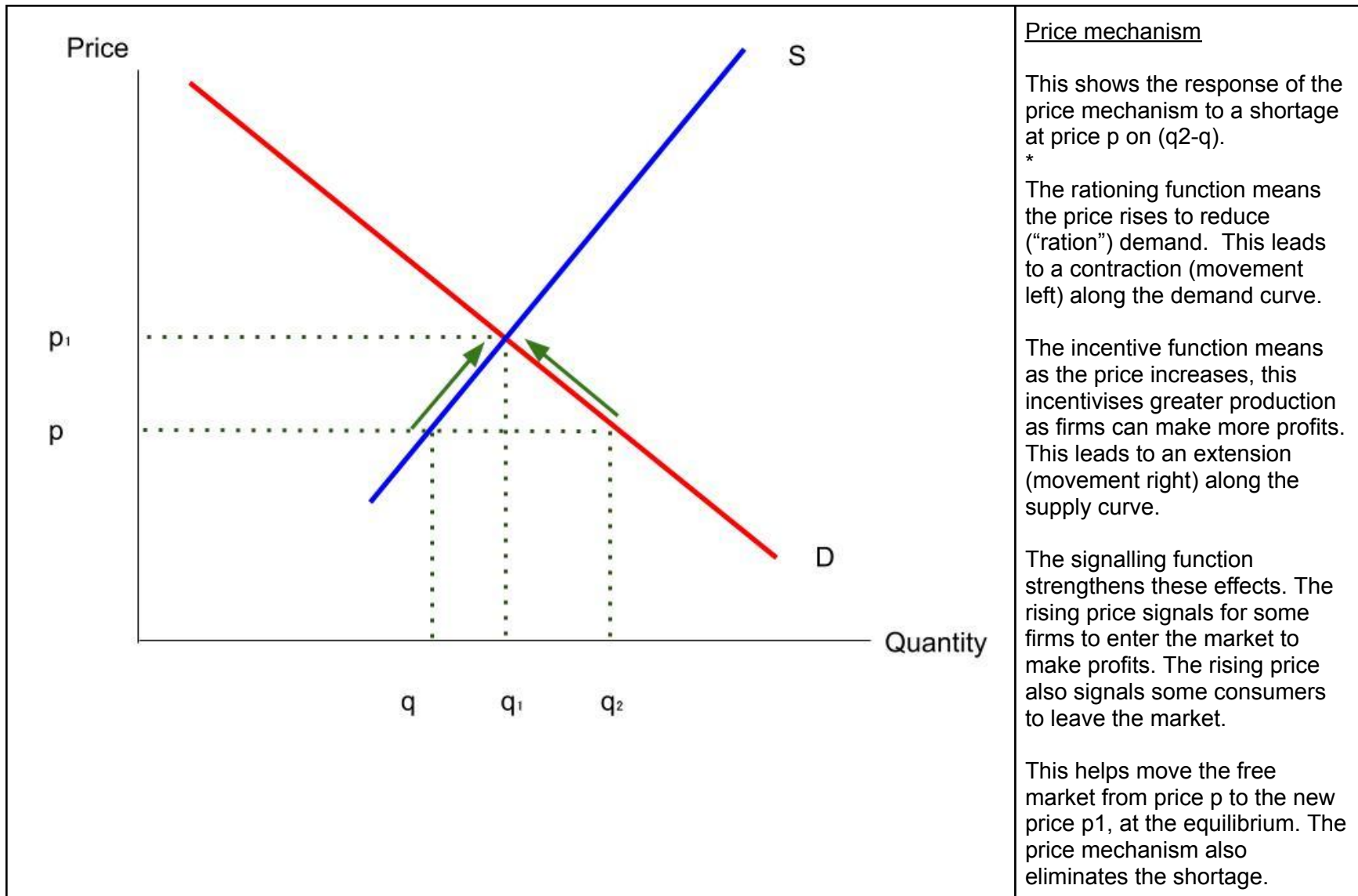
Supply shift right can be caused by:

- 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 to p_1 and increases quantity from q to q_1 .

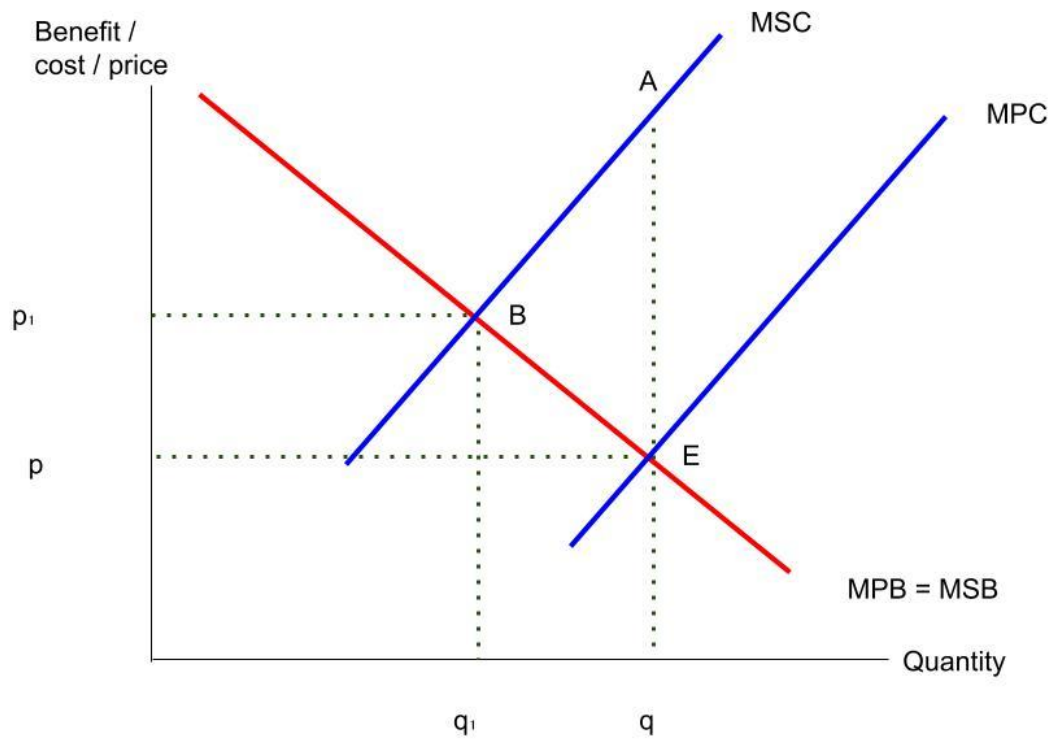
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Negative externality in production

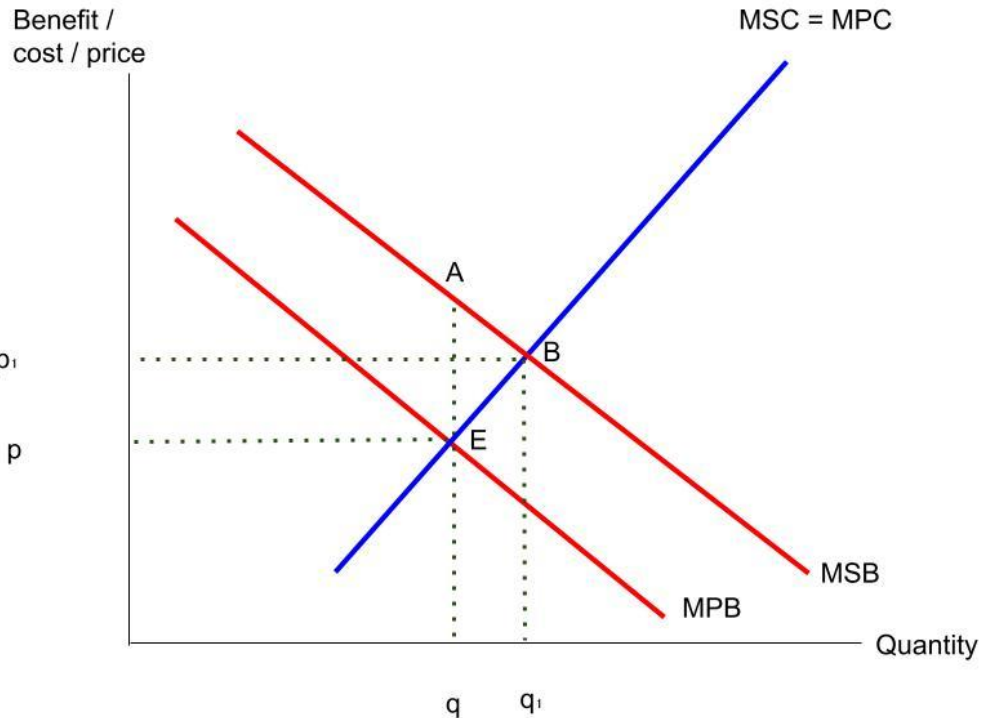
The free market produces where $MPB = MPC$ (it does not account for external costs and benefits). This occurs at point E.

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.

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Positive externality in consumption

Free market outcome
 $MPB = MPC$: E

Socially optimal outcome
 where $MSB = MSC$: B

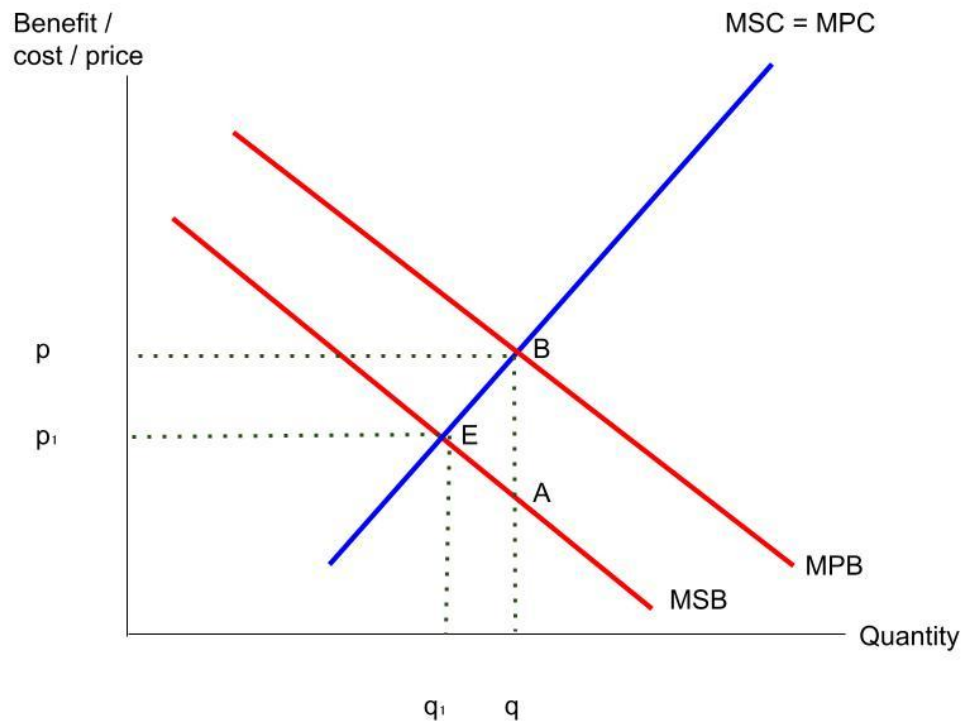
Underconsumption of $q_1 - q$.

Welfare loss ABE.

Example: consuming healthcare benefits the rest of society (healthier, more productive individuals are more productive).

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Negative externality in consumption

Free market outcome
 $MPB = MPC$: B

Socially optimal outcome
 where $MSB = MSC$: E

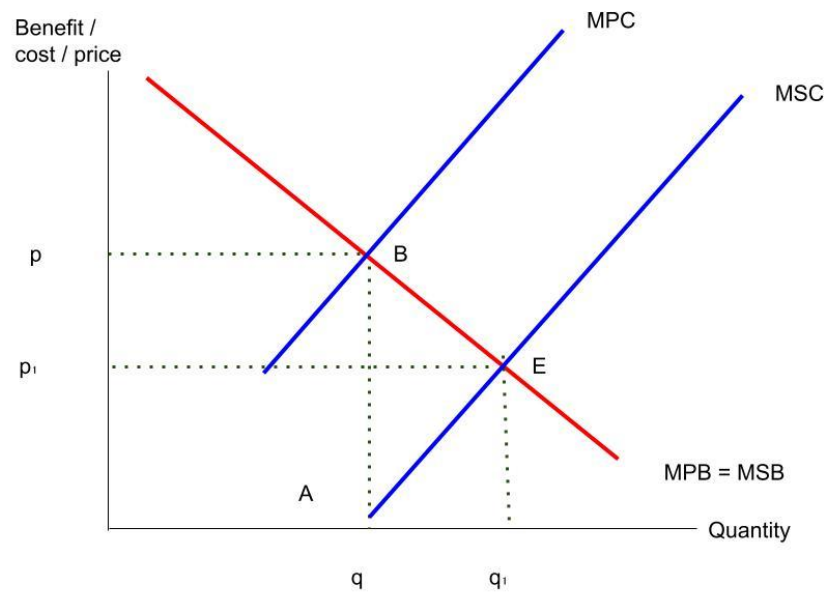
Overconsumption of $q - q_1$.

Welfare loss ABE.

Example: air pollution caused by car consumption of petrol.

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Positive externality in production

Free market outcome
 $MPB = MPC$: B

Socially optimal outcome
 where $MSB = MSC$: E

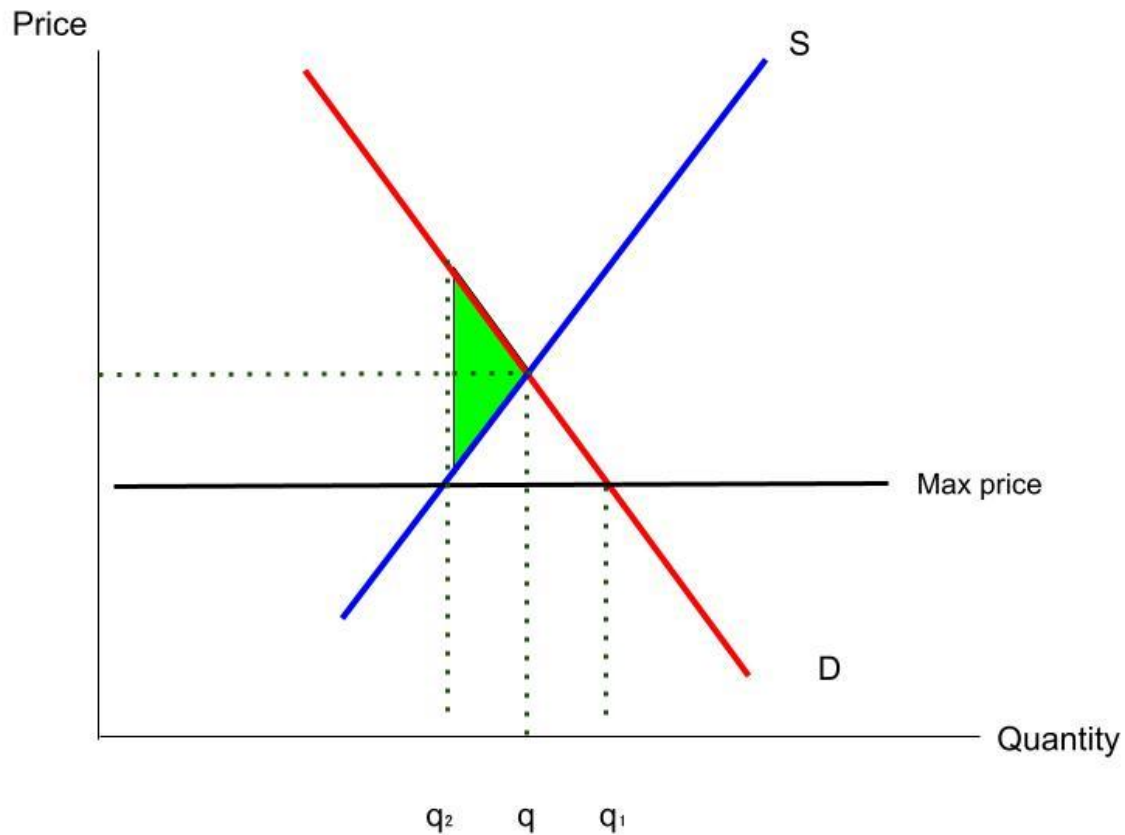
Underproduction of $q_1 - q$.

Welfare loss ABE.

Example: job training benefits other firms who can then hire the already trained workers.

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Maximum price

Max price at p_1 below the free market equilibrium.

Leads to a shortage of $q_1 - q_2$.

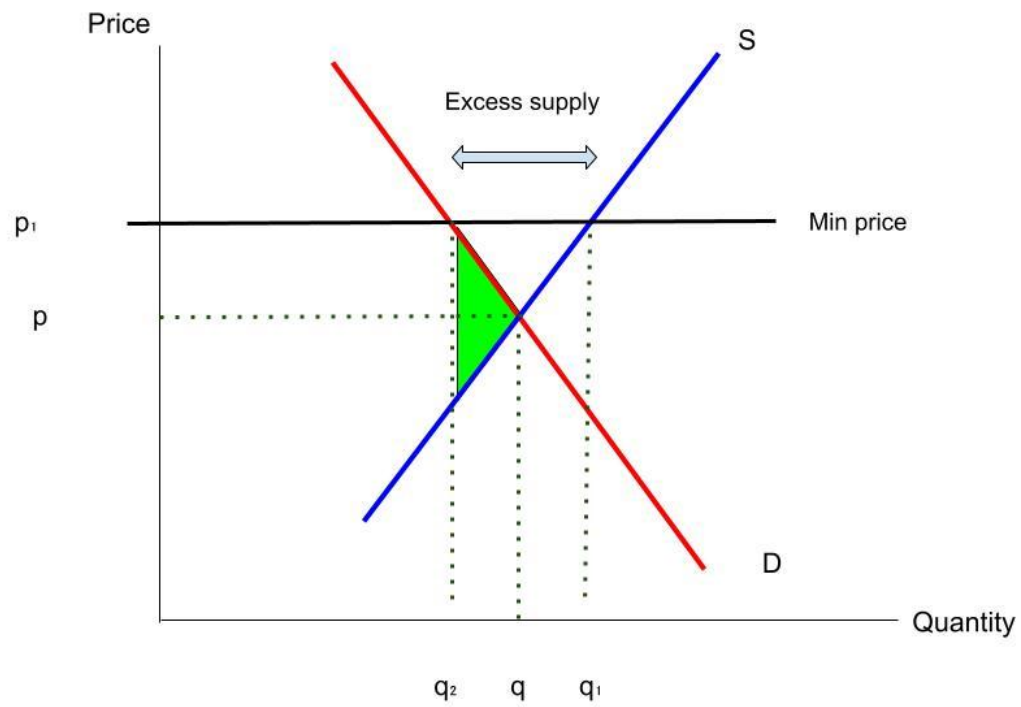
Fall in firm revenue and producer surplus.

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.

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Minimum price

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

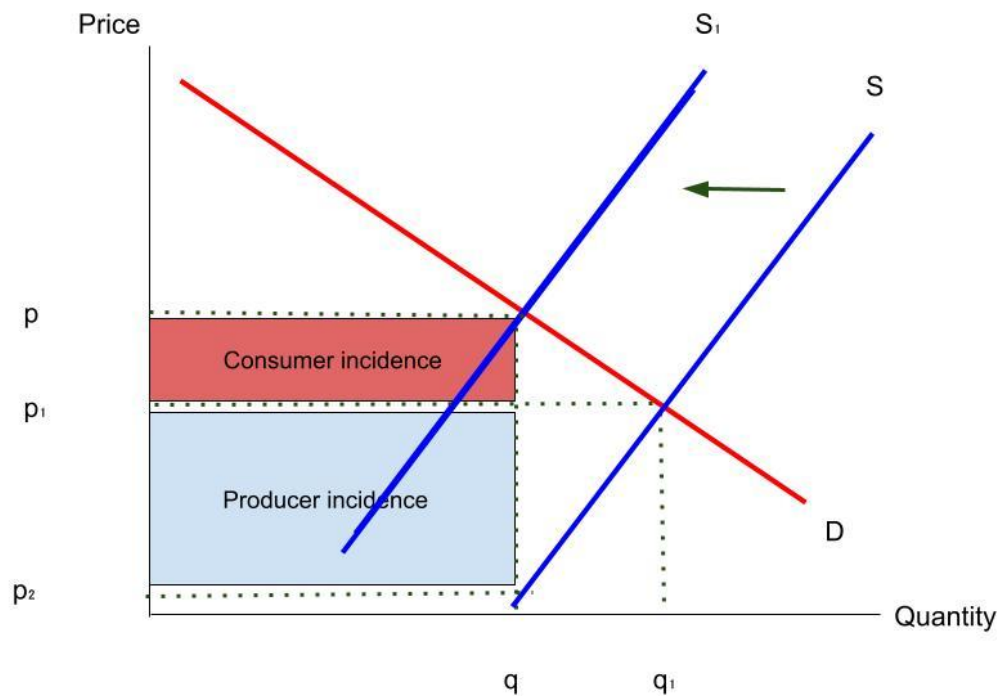
Results in surplus of $q_1 - q_2$.

Leads to welfare loss shown by shaded area.

Example: alcohol minimum unit pricing in Scotland.

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Tax

Tax shifts supply left from S to S₁.

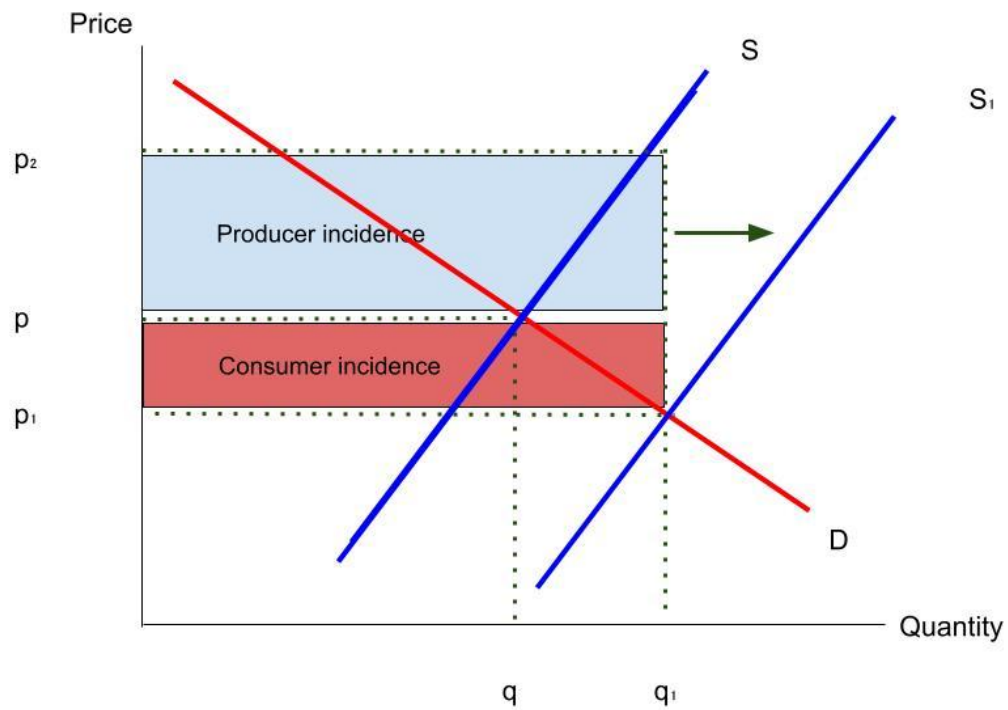
Increases price from p₁ to p and lowers quantity from q₁ to q.

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.

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Subsidy

Subsidy shifts supply right from S to S₁.

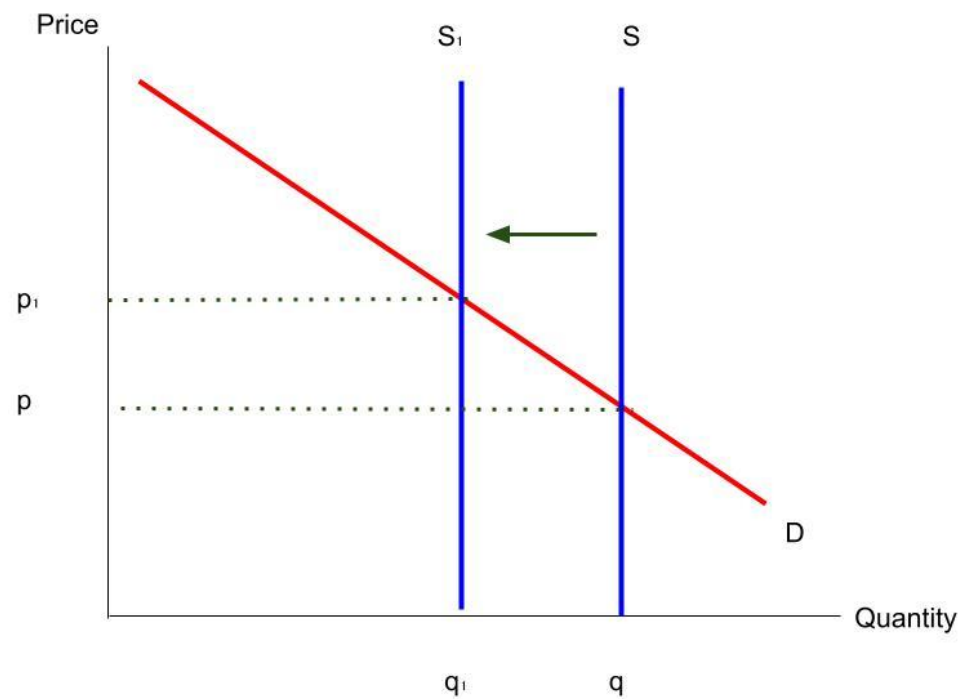
This lowers the price from p to p₁ and increases quantity from q to q₁.

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.

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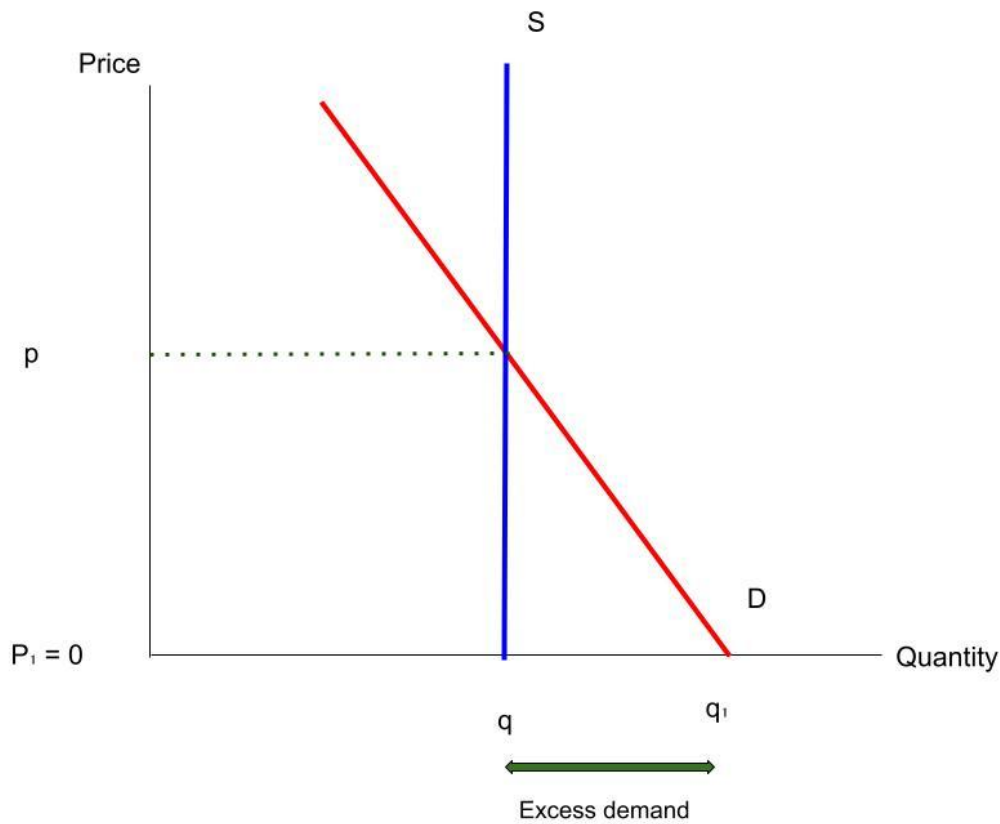
Pollution permits

The supply of permits is set by the government. So it is perfectly 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 permit price from p to p_1 , disincentivising pollution.

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State provision

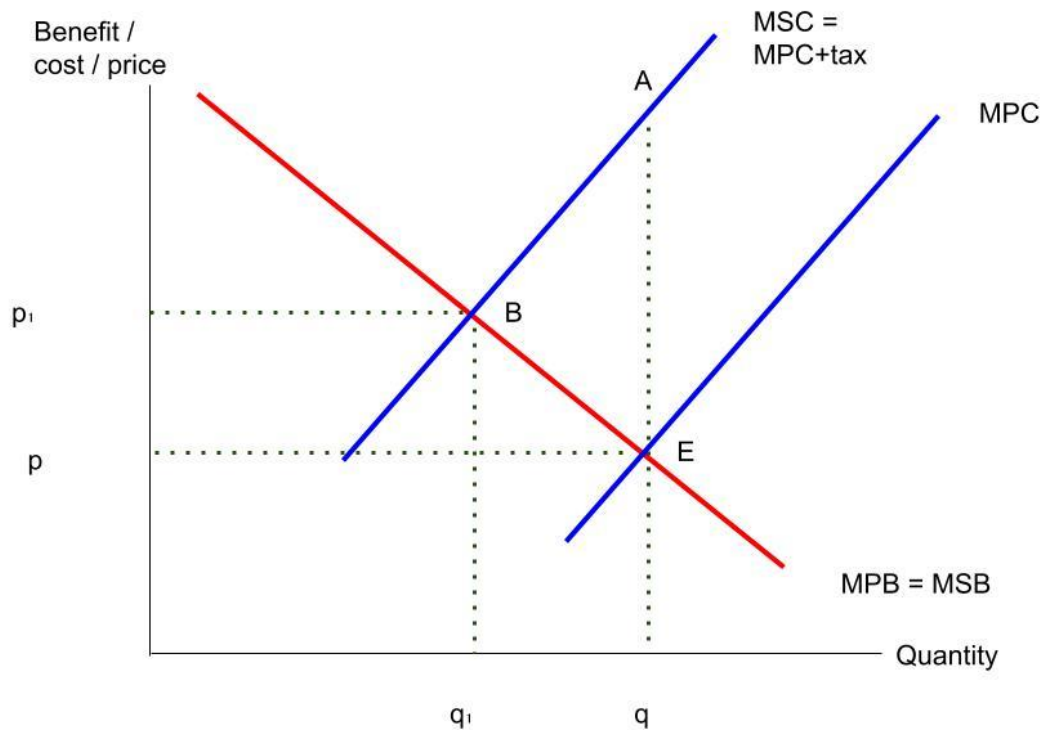
The National Health Service in the UK provides healthcare free at the point of use.

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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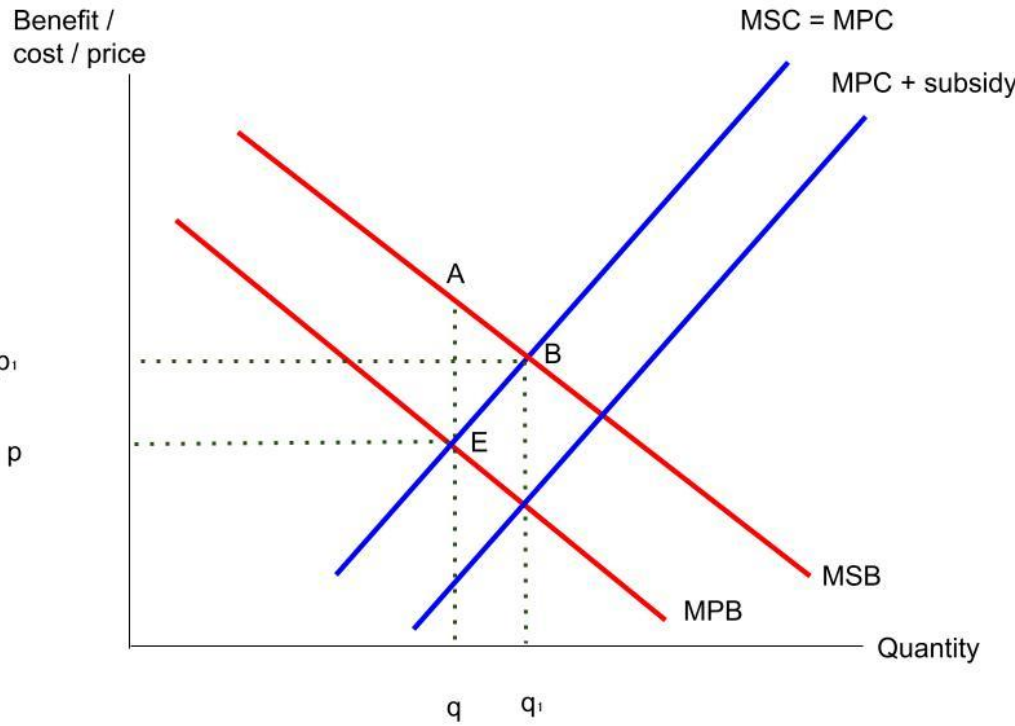
Tax plus externality

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.

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Subsidy plus externality

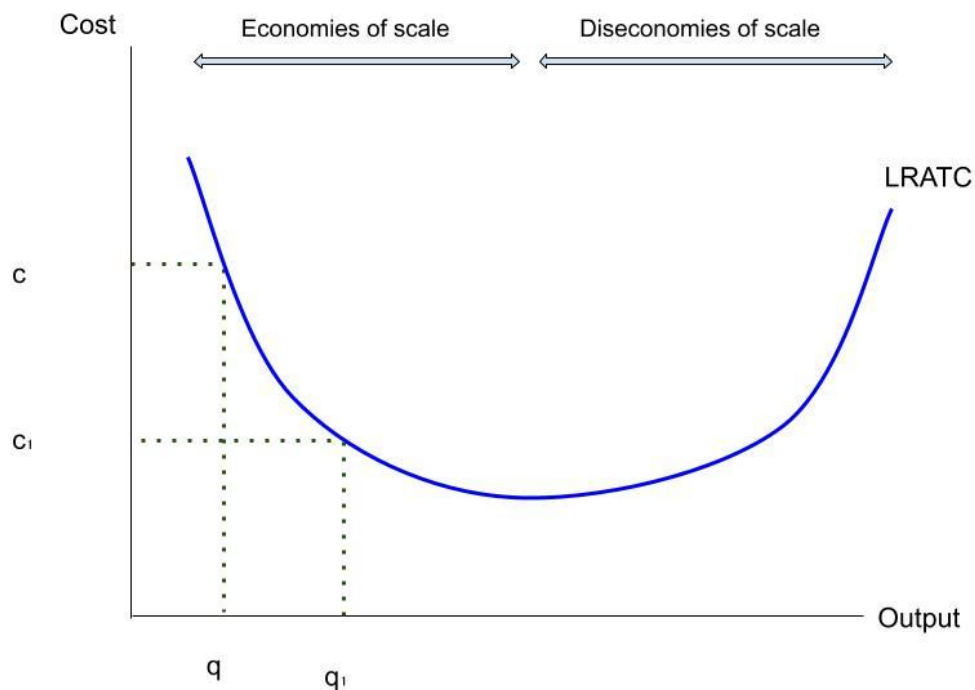
Subsidy shifts the cost curve right from MPC to MPC+subsidy.

This increases quantity from q (free market outcome) to q_1 (socially optimal outcome).

This eliminates the welfare loss ABE.

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LRAC movement along
(internal economies of scale)

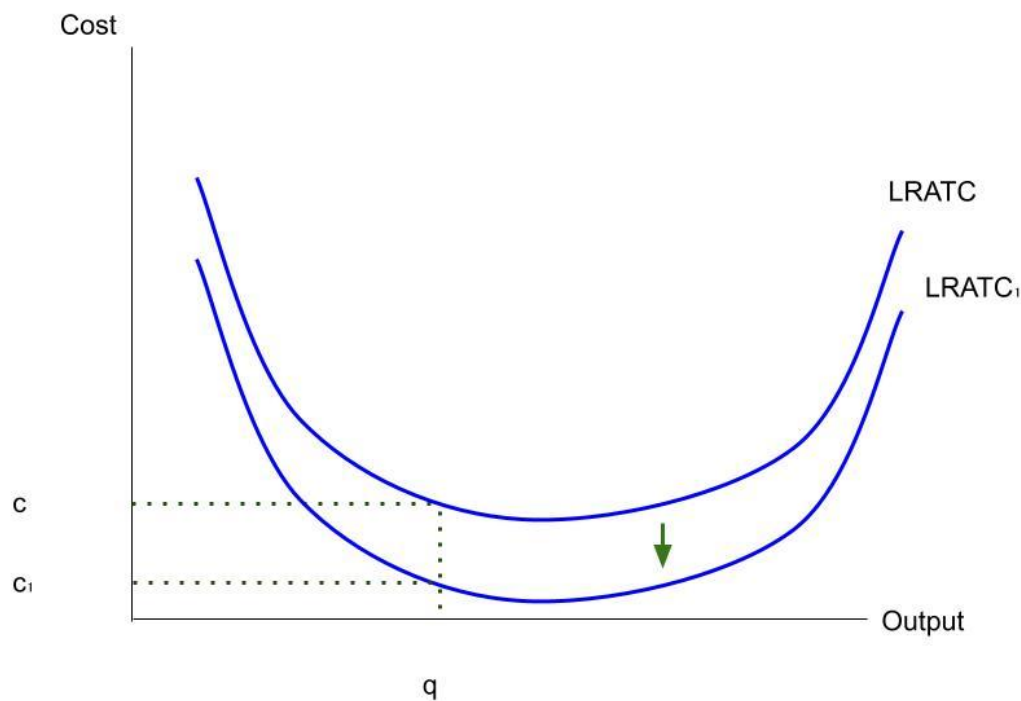
Economies of scale mean a reduction in long-run average cost (from c to c_1) as output increases (from q to q_1).

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.

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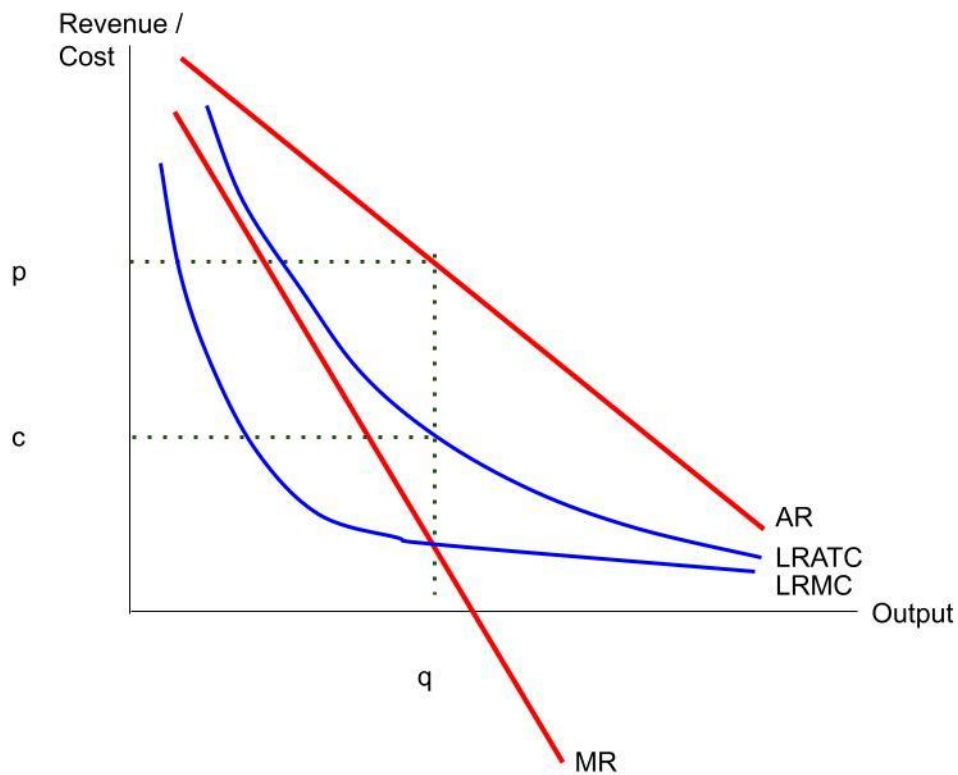
LRAC shift (external economies of scale)

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.

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Natural monopoly with revenues and costs

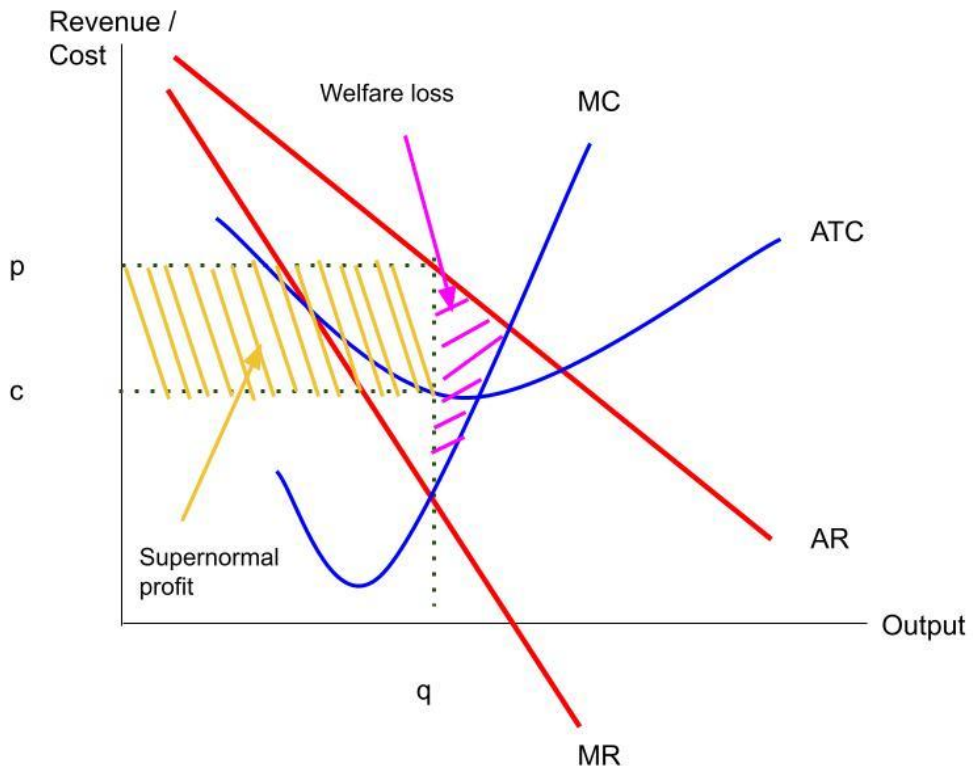
A natural monopoly is a monopoly with significant economies of scale. Hence the LRATC is downward sloping.

The firm produces where $MR = LRMC$ at q . This leads to a price p and supernormal profits of $(p - c)q$.

If the monopoly firm were split into two, the price is likely to be higher than p .

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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 $(p-c)q$.

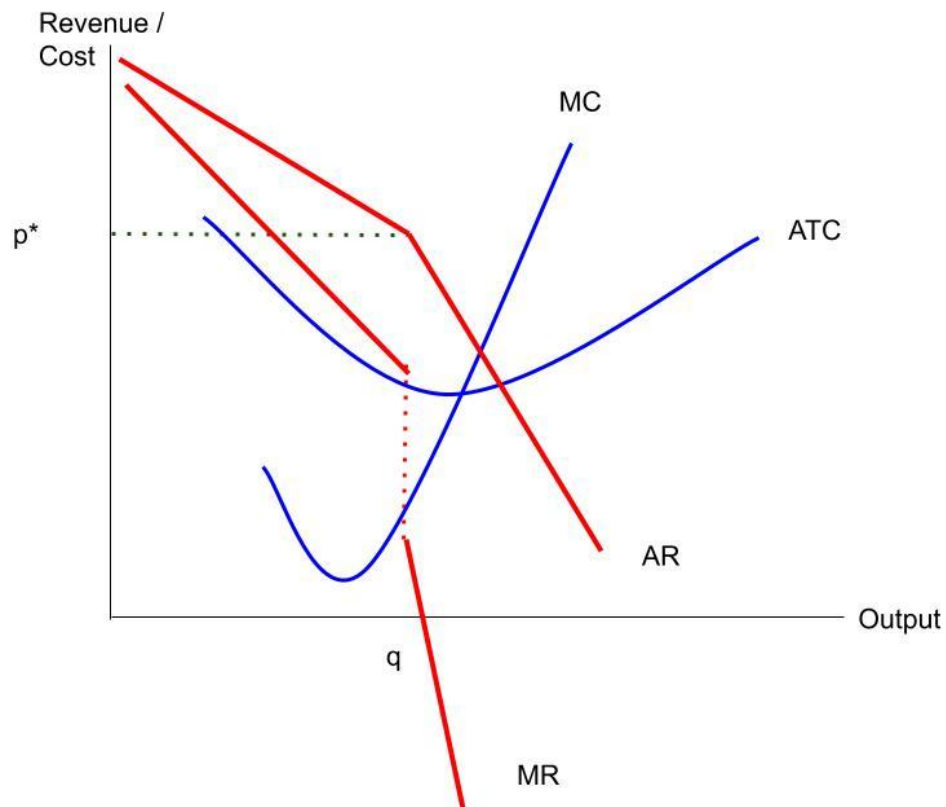
Monopoly leads to underproduction, causing a welfare loss as shaded.

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.

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Oligopoly - kinked demand

The AR or demand curve is “kinked” - it has a bend at price p^* .

If a firm raises its price above p^* , other firms do not follow. So consumers switch to other firms, significantly reducing the demand for the firm that raised the price. So demand is price elastic above p^* . So the rise in price reduces revenue and profit.

If a firm lowers its price below p^* , other firms follow to maintain market share. So consumers do not move between firms, so demand is price inelastic. So revenue falls and profits fall.

To maximise profits, the firm is best to price at p^* . So, kinked demand predicts price stability.

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		Firm B		
		High price	Low price	
Firm A	High price	(4,4)	(1,5)	(1,5) means firm A earns £1 million in profits while firm B gets £5 million in profits.
	Low price	(5,1)	(2,2)	

Oligopoly - game theory

Suppose the industry starts at high price, high price.

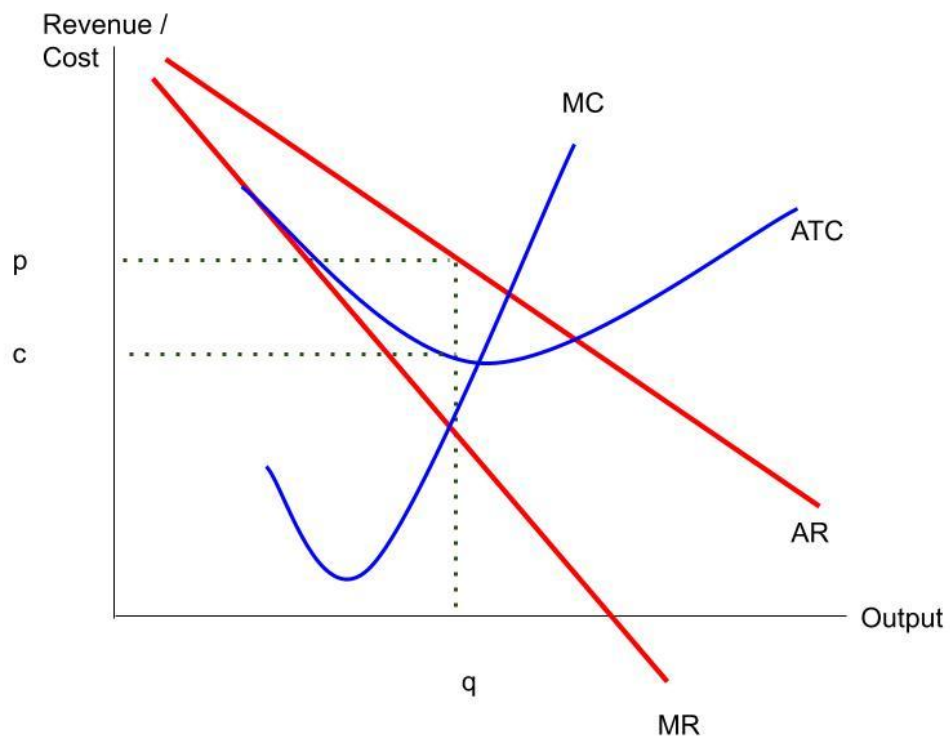
Firm A is incentivised to lower its price, as this increases its profits from 4 to 5 (£ million).

Then from (low price, high price), firm B is incentivised to lower its price, as this increases its profits from 1 to 2.

So the “Nash equilibrium” of the game is low price, low price.

Game theory predicts both firms will lower prices when there is no trust between firms. This is also known as a “price war”.

But if firms can work together or “collude”, they will want to increase their total profits. This occurs when both firms price high and receive £8 million total profits.



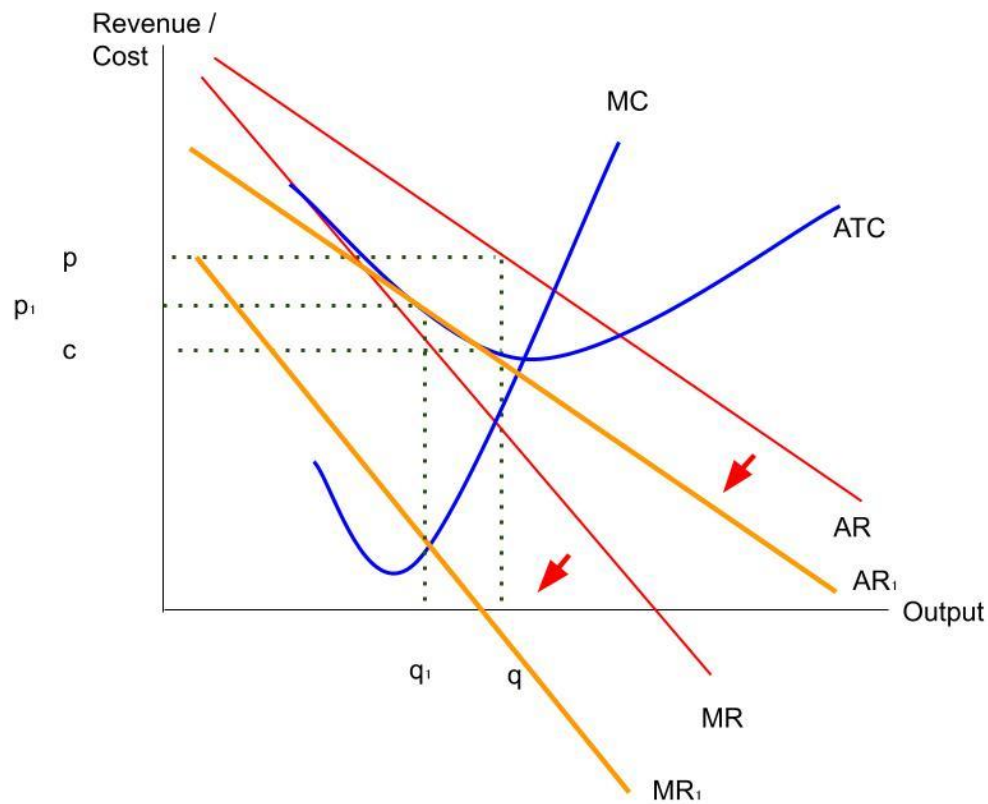
Monopolistic competition - short run

Similar to monopoly but the AR curve is more price elastic (less steep) in monopolistic competition. This is because there are more substitutes.

As a result, the MR is also less steep.

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Monopolistic competition - long run

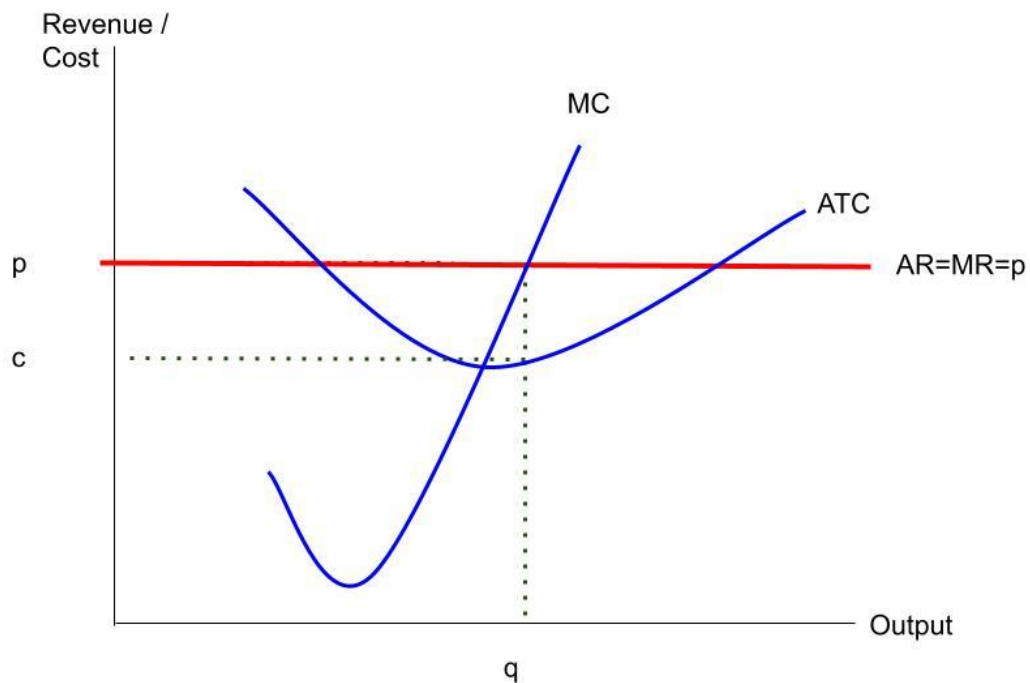
There are low barriers to entry in monopolistic competition.

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 AR_1 and MR to MR_1 .

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 .

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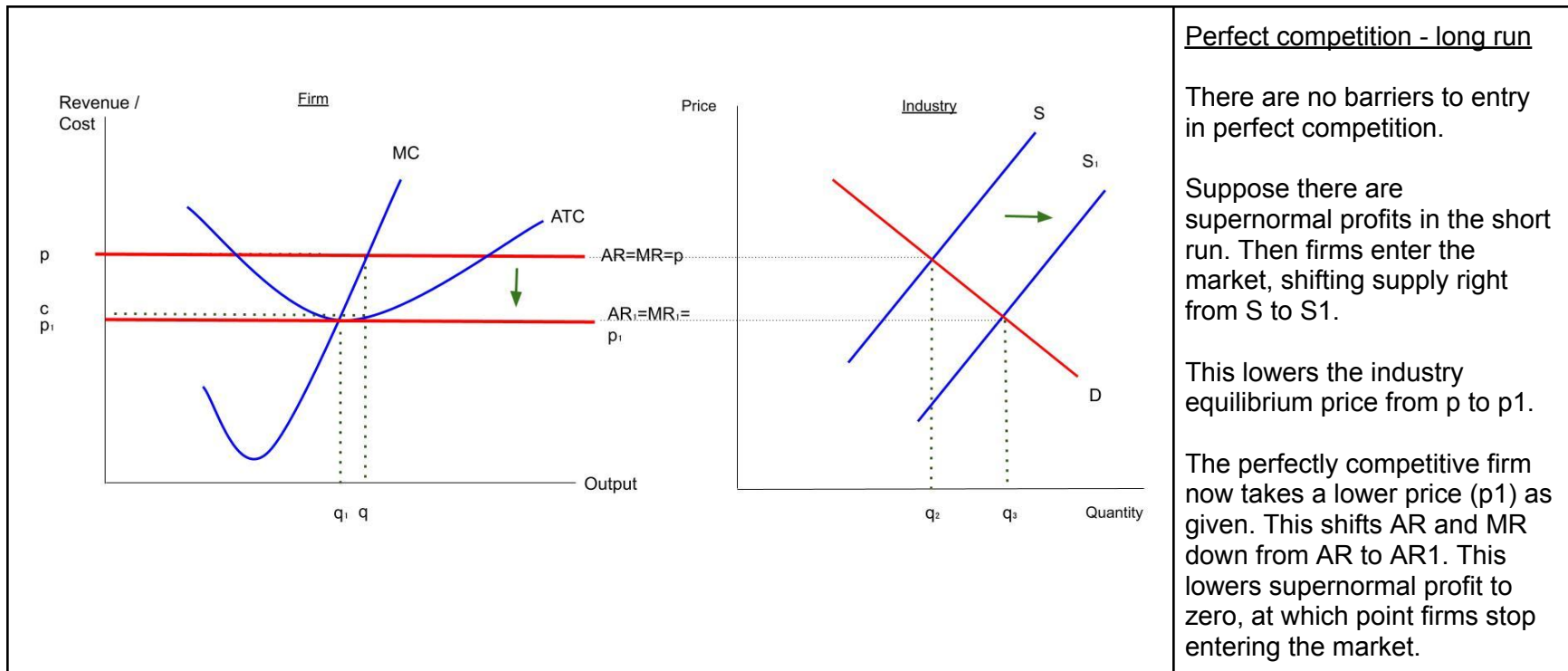
Perfect competition - short run

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 $(p-c)q$.

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Perfect competition - long run

There are no barriers to entry in perfect competition.

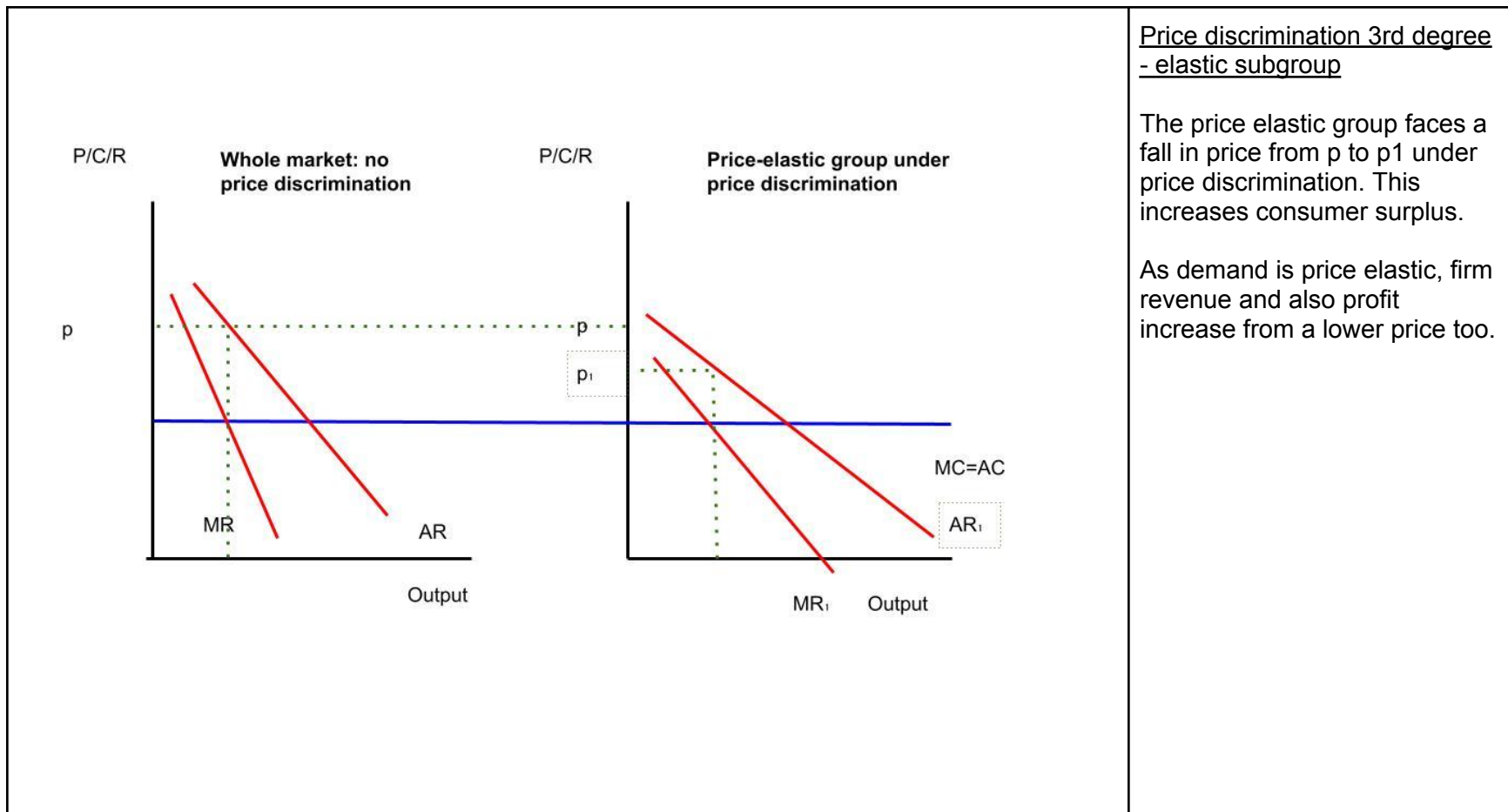
Suppose there are supernormal profits in the short run. Then firms enter the market, shifting supply right from S to S_1 .

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 AR1. This lowers supernormal profit to zero, at which point firms stop entering the market.

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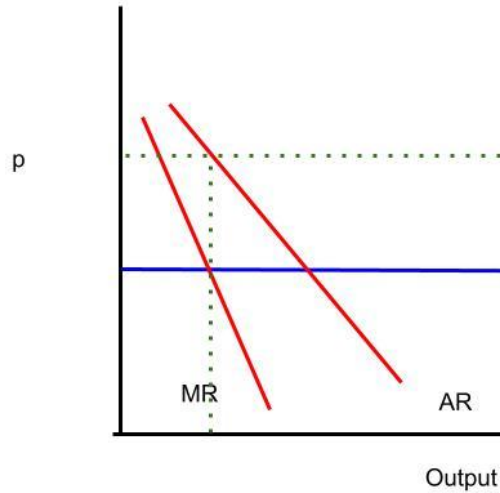


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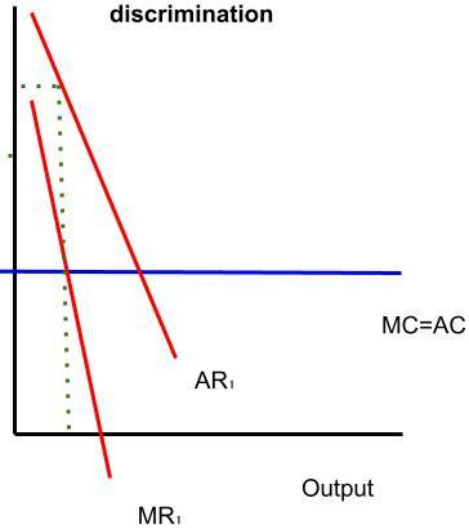
P/C/R

Whole market: no price discrimination



P/C/R

Price-inelastic group under price discrimination



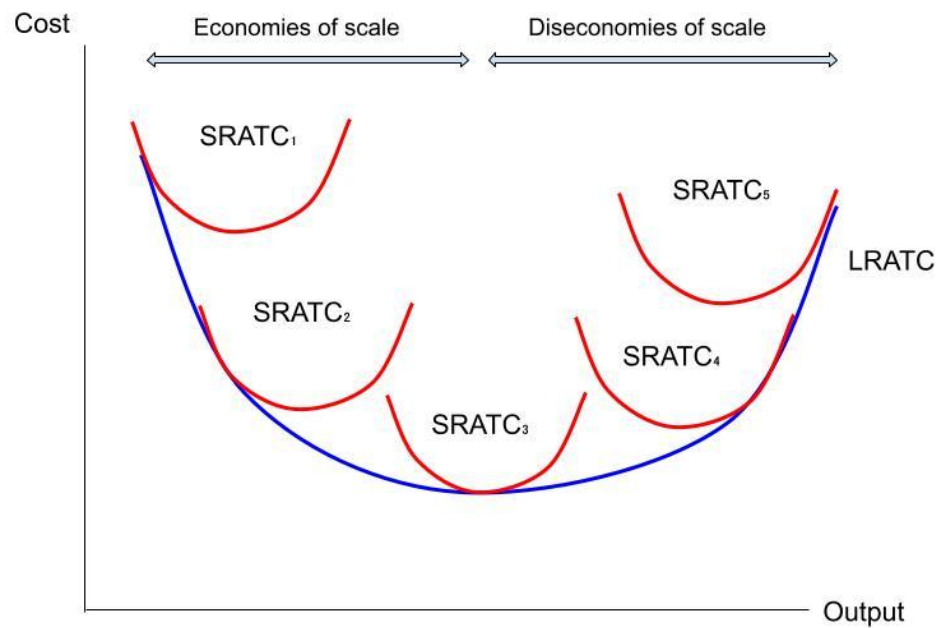
Price discrimination 3rd degree - inelastic subgroup

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.

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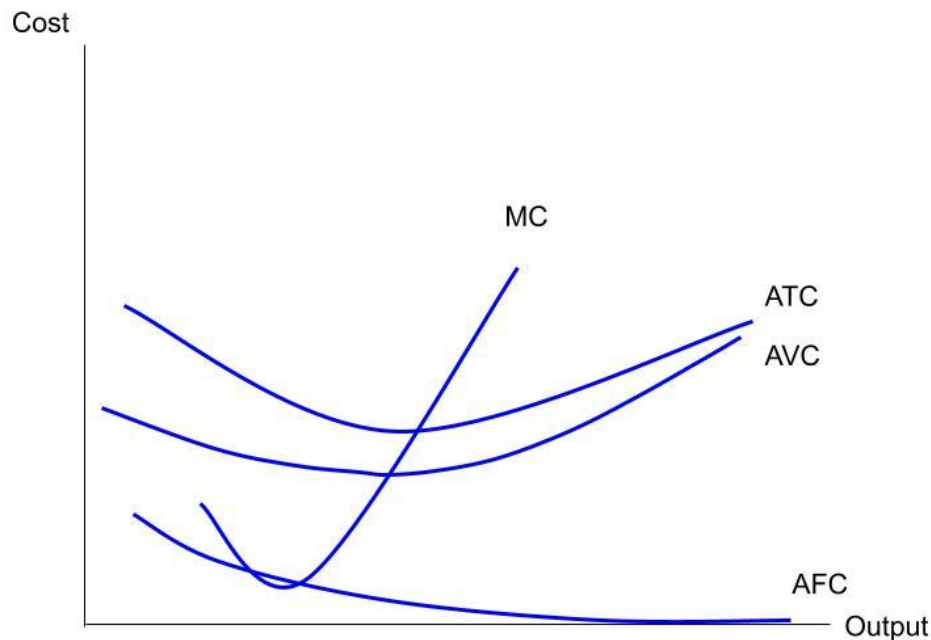
SRATC / LRATC

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.

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ATC/AVC/AFC

AFC = 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.

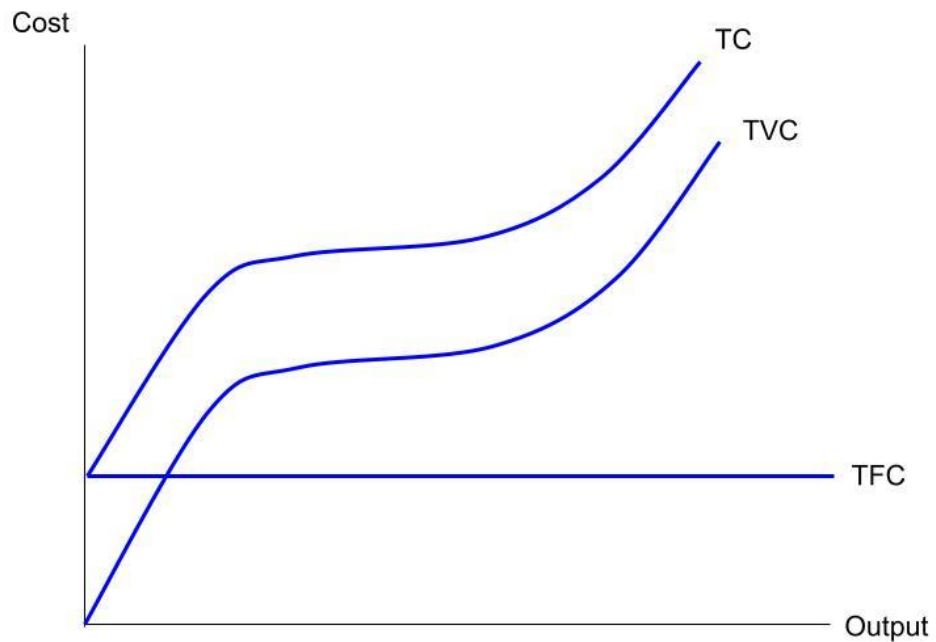
AVC is U-shaped because of diminishing marginal returns at high output levels and increasing marginal returns at low output levels.

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.

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TC/TVC/TFC

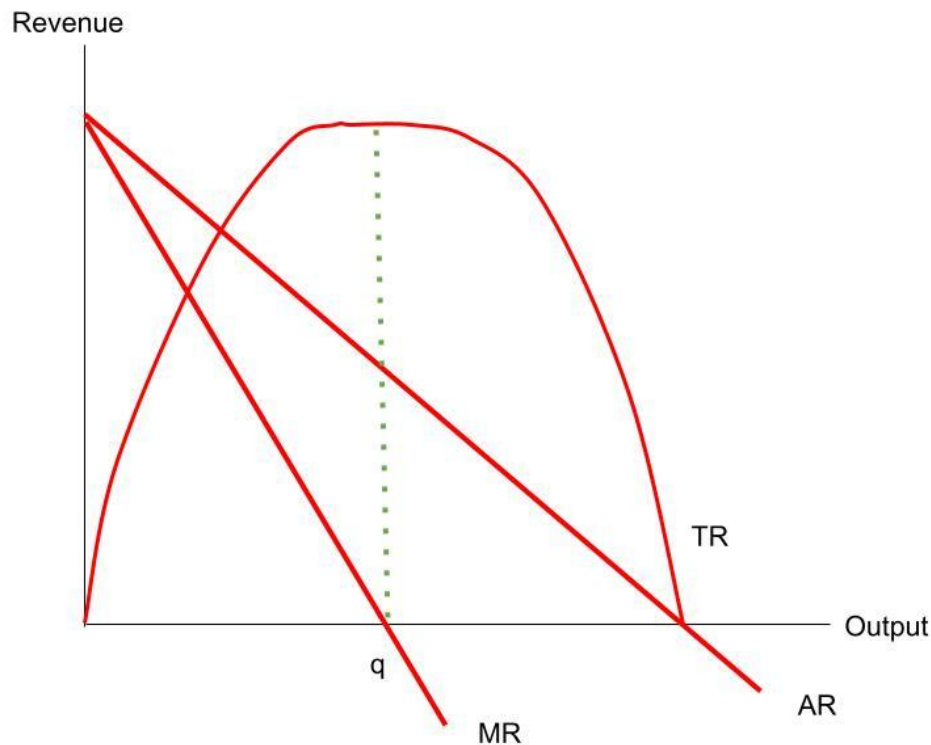
Fixed cost (TFC) does not change with output.

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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MR/AR/TR with price maker

A price maker can change the price set.

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.

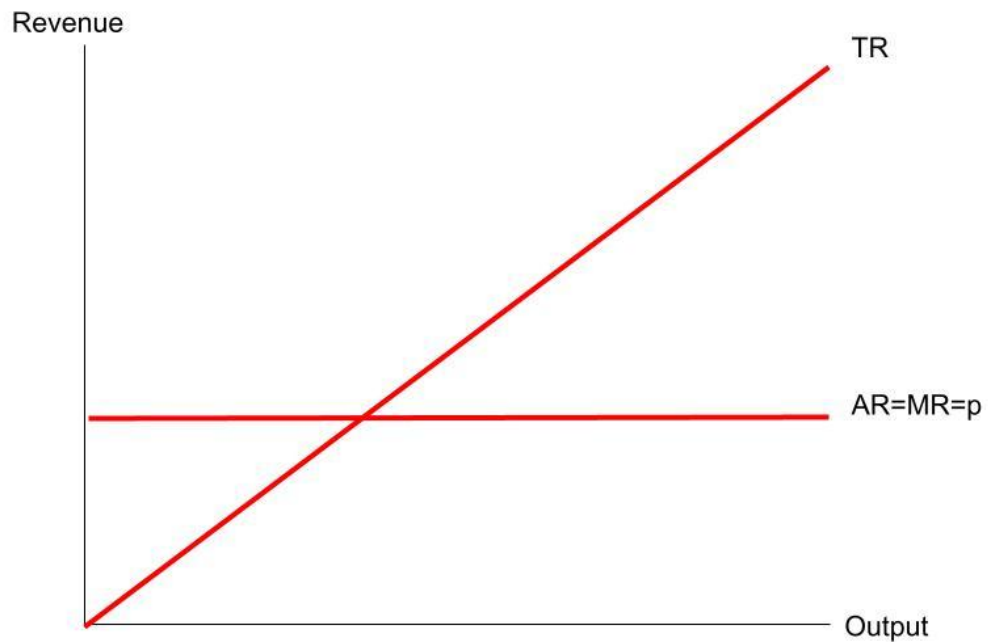
The marginal revenue (revenue change with an extra unit of output) falls more quickly and is twice as steep as AR.

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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MR/AR/TR with price taker

The price is fixed from the point of view of the price taker.

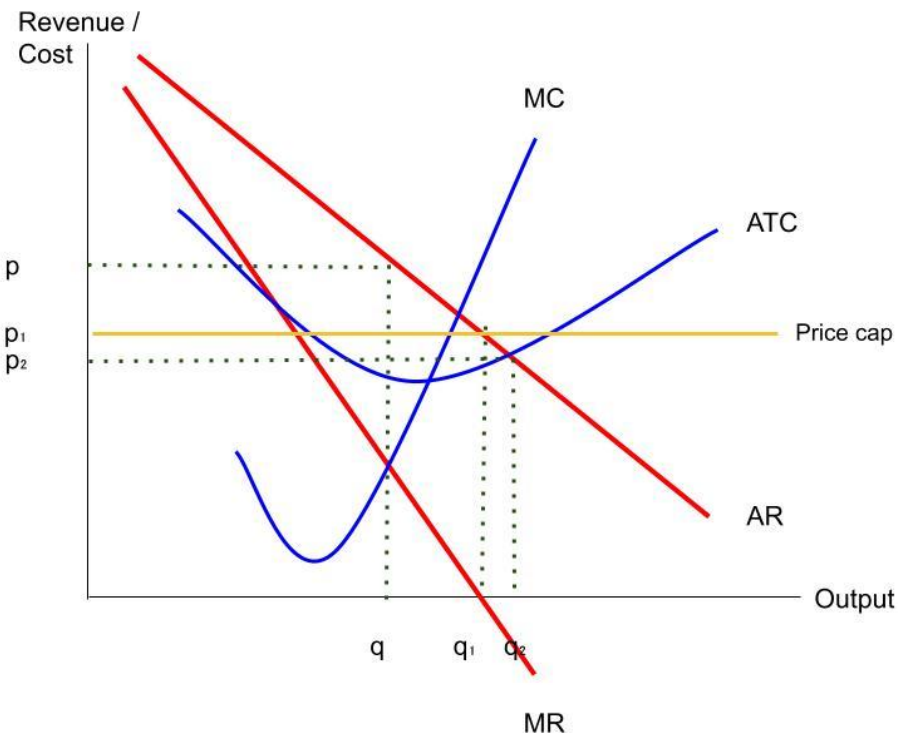
So average revenue (revenue per unit, which is also the price) is also fixed.

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.

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Price cap on cost / revenue diagram

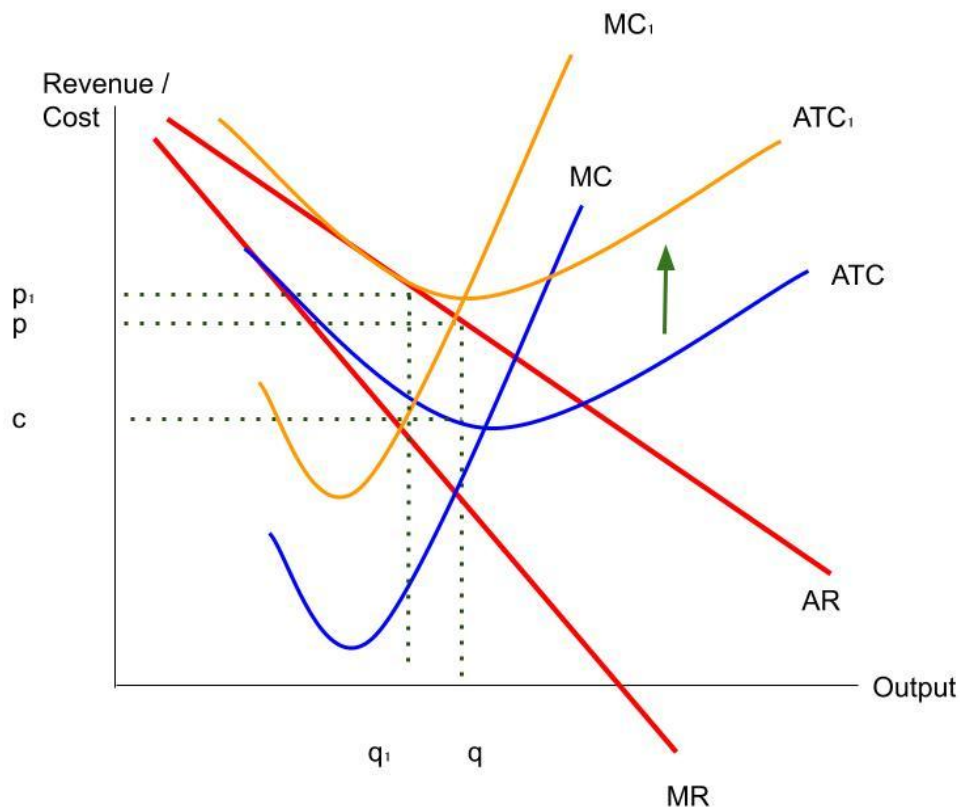
The price cap set at p_1 reduces the price from p (profit-maximising price) to p_1 .

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.

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Increase in firm costs on cost / revenue diagram

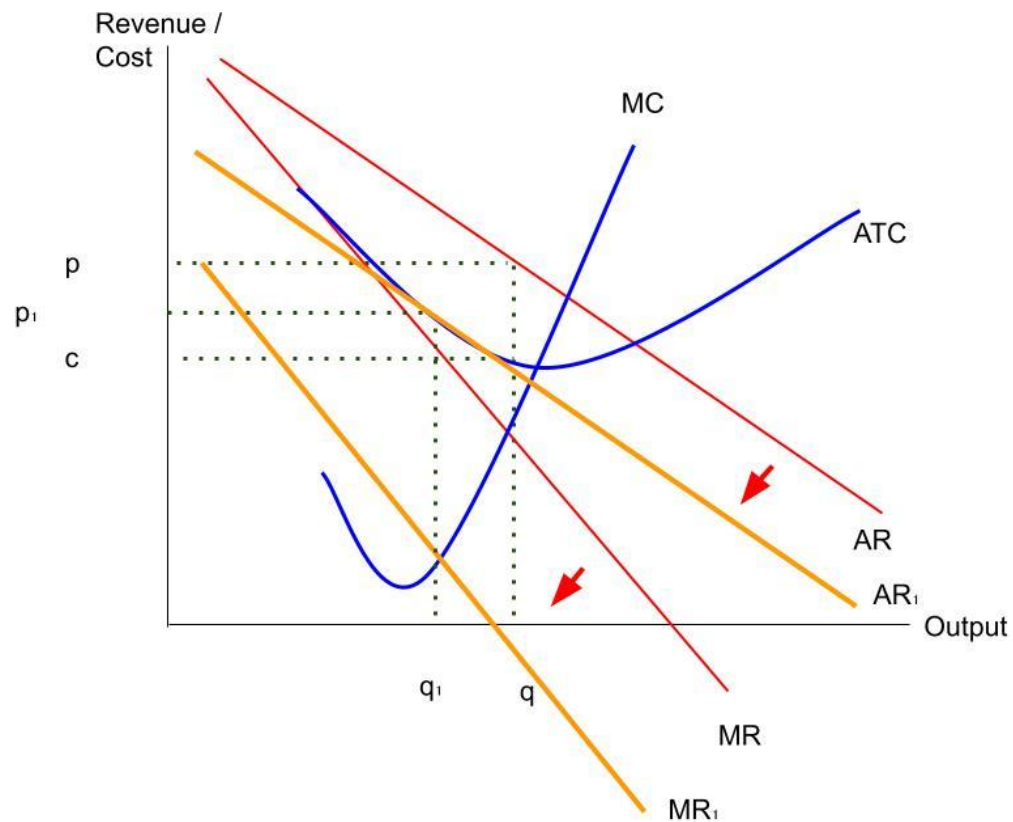
An increase in business costs, e.g. due to government regulation or carbon taxes, shifts MC and ATC. In this case, MC and ATC shift up to MC1 and ATC1.

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.

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Decrease in firm revenue on cost / revenue diagram

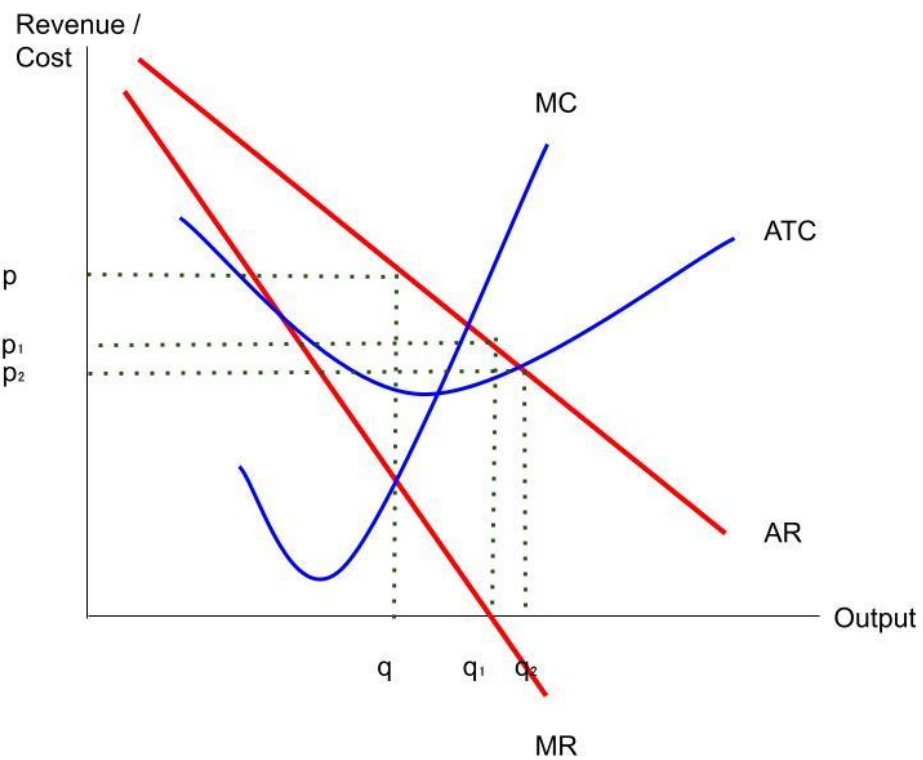
Any factor that reduces demand for an individual firm's products, such as falling real incomes or changes in tastes, shifts AR and MR.

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

This reduces supernormal profit.

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Business objectives

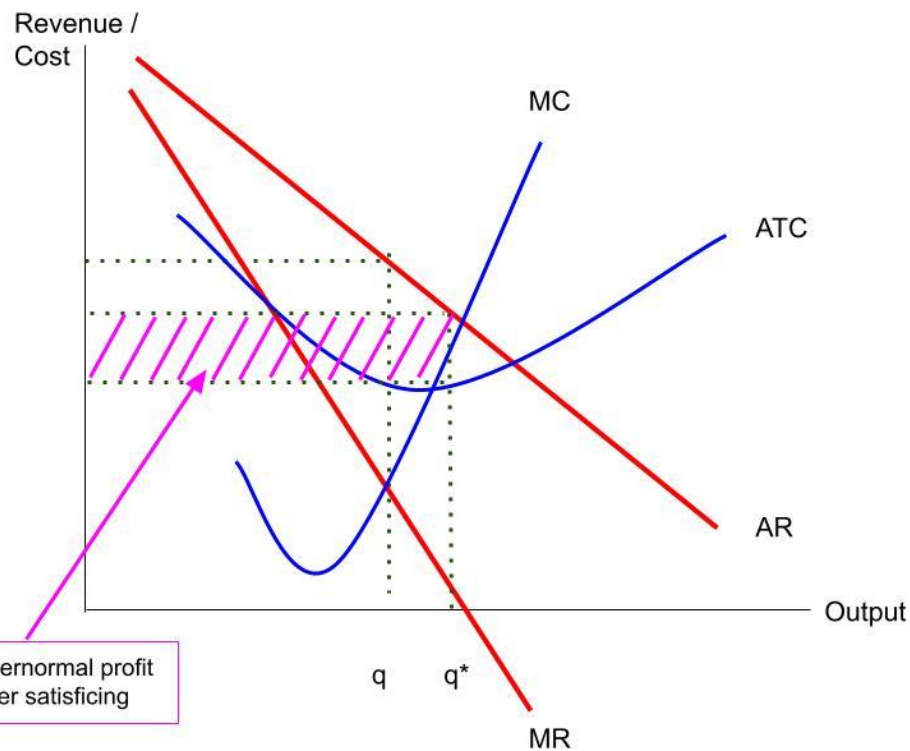
Profit maximisation: $MC=MR$ -
(q, p)

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

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

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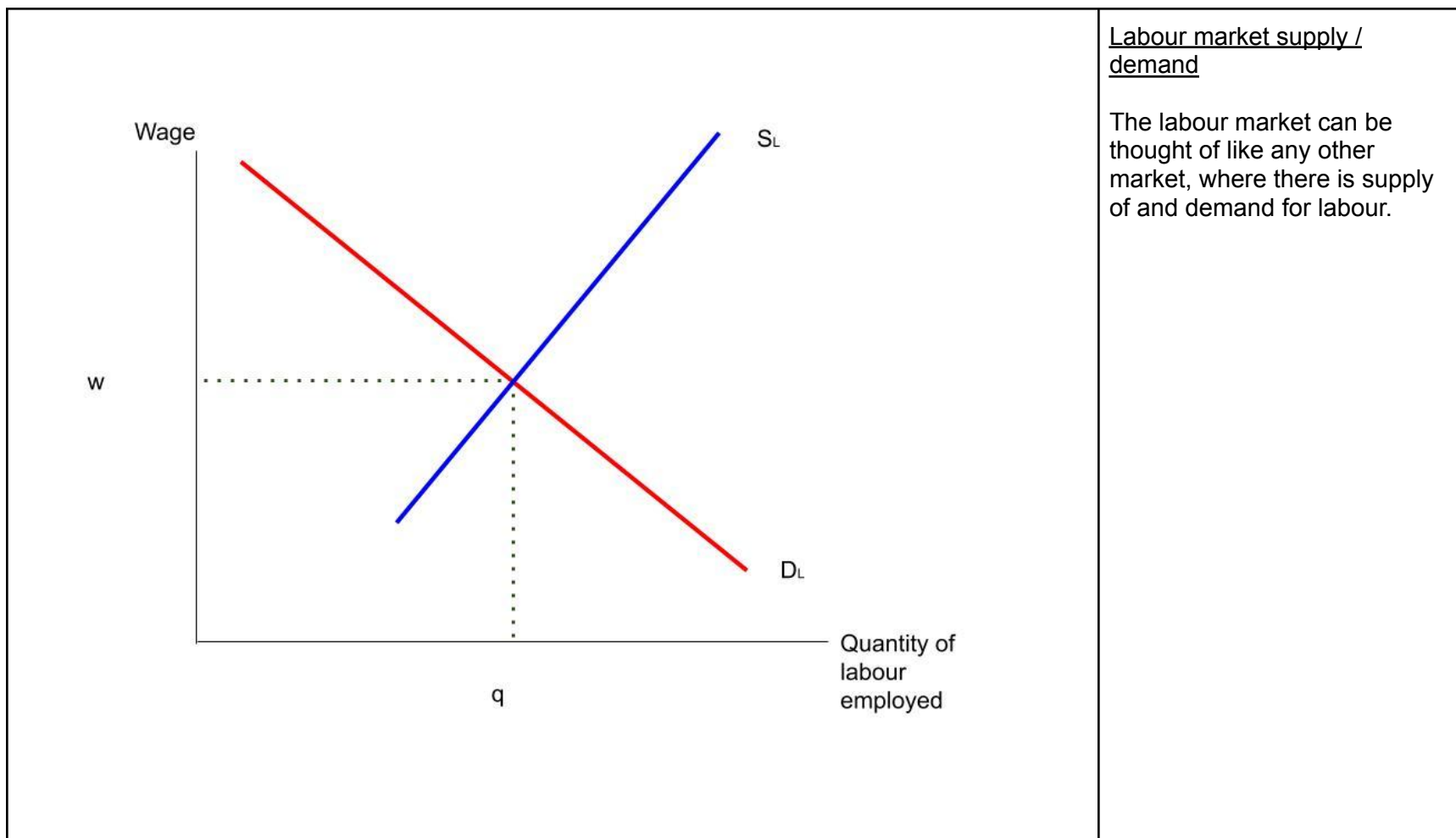
Profit satisficing objective

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.

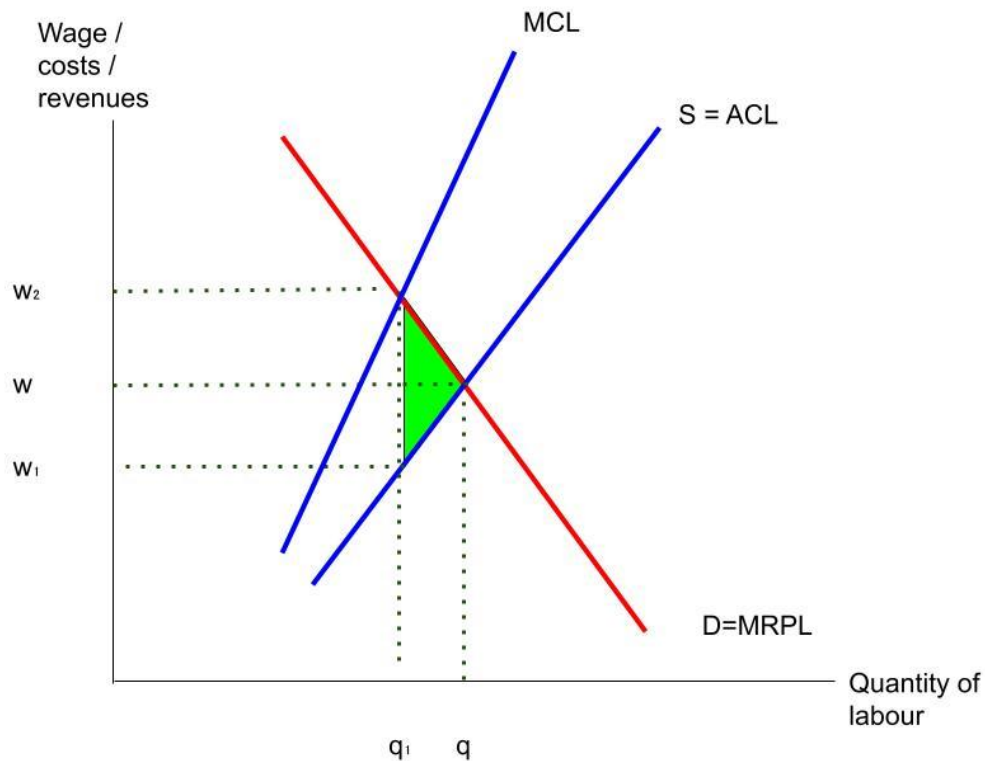
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Labour market monopsony

A perfectly competitive labour market sets wages where supply (ACL) equals demand (MRPL).

But a monopsony is the dominant buyer of a good or service (in this case, the dominant employer of labour).

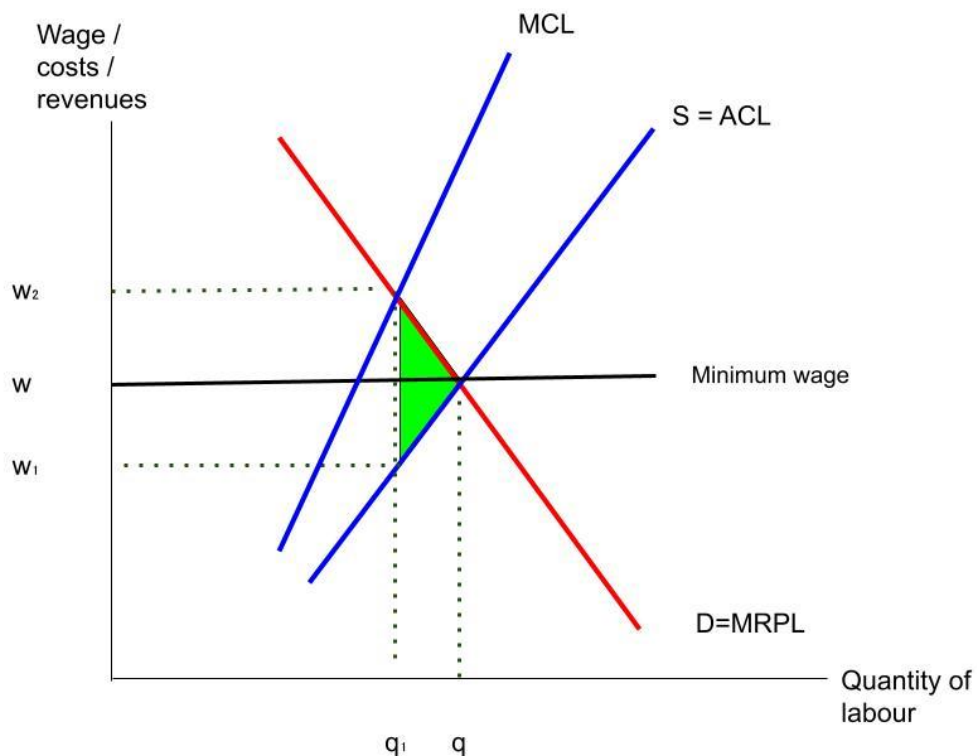
A monopsony maximises profits by setting $MRPL = MCL$. So it employs q_1 workers, below the perfectly competitive employment of q .

The monopsonist sets the wage on the average cost of labour (ACL) curve at w_1 , below the perfectly competitive wage w .

This leads to a welfare loss as shown by the green area.

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Labour market monopsony + minimum wage / trade union wage

A minimum wage at w increases the workers' wages from w_1 to w and employment rises from q_1 to q .

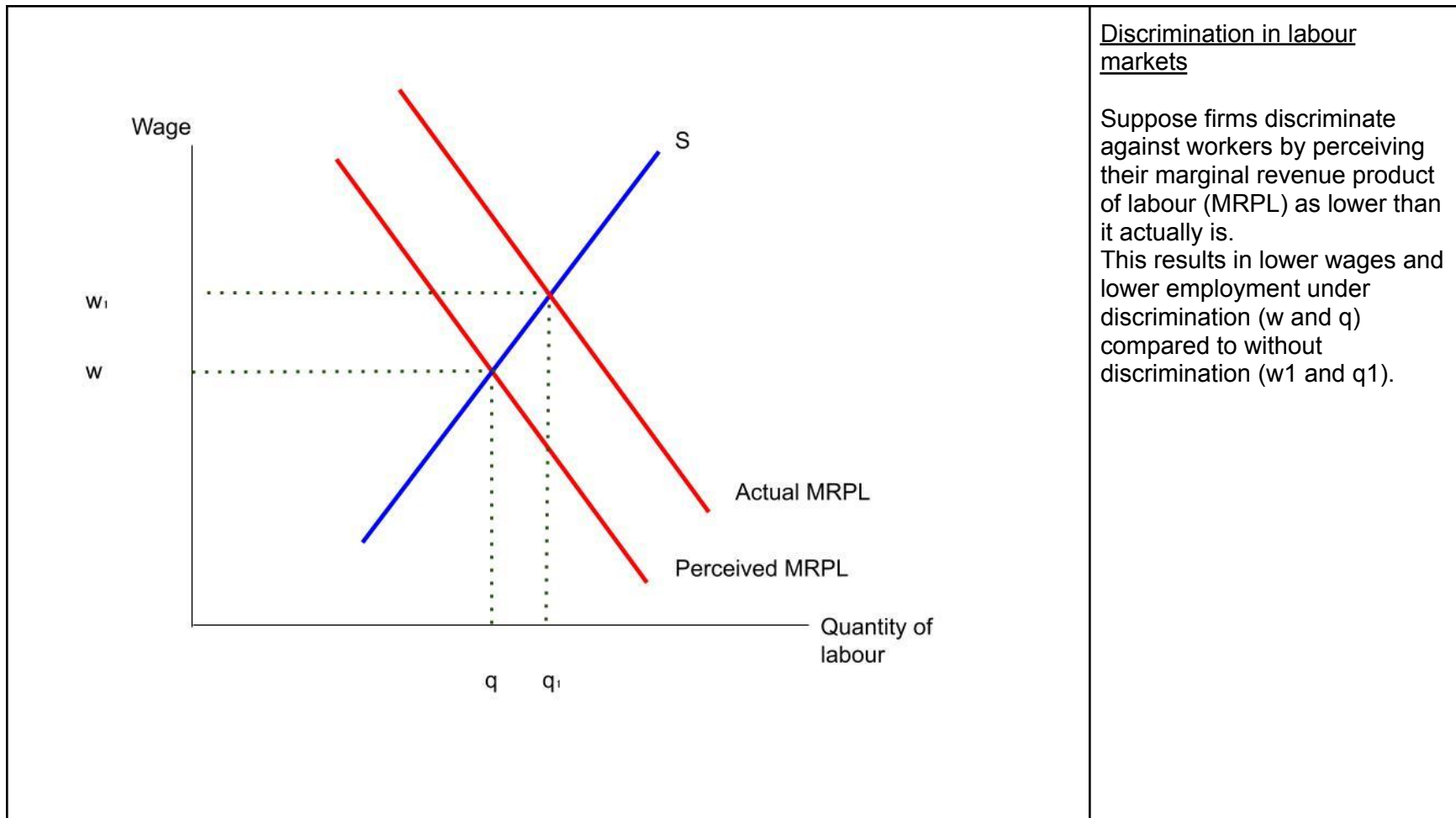
This creates a welfare gain shown by the shaded green area.

In words, the monopsony cannot reduce demand for labour to lower wages and costs (unless it breaks the law by setting wages below the minimum wage).

Trade unions have a similar effect by bargaining for a higher wage.

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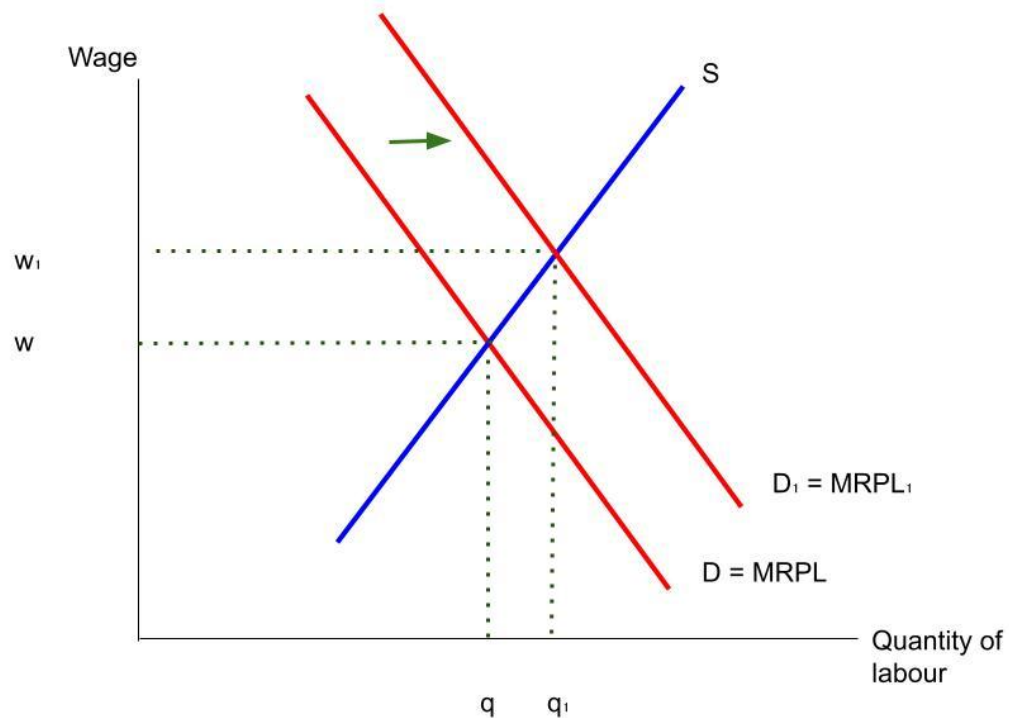


Discrimination in labour markets

Suppose firms discriminate against workers by perceiving their marginal revenue product of labour (MRPL) as lower than it actually is. This results in lower wages and lower employment under discrimination (w and q) compared to without discrimination (w_1 and q_1).

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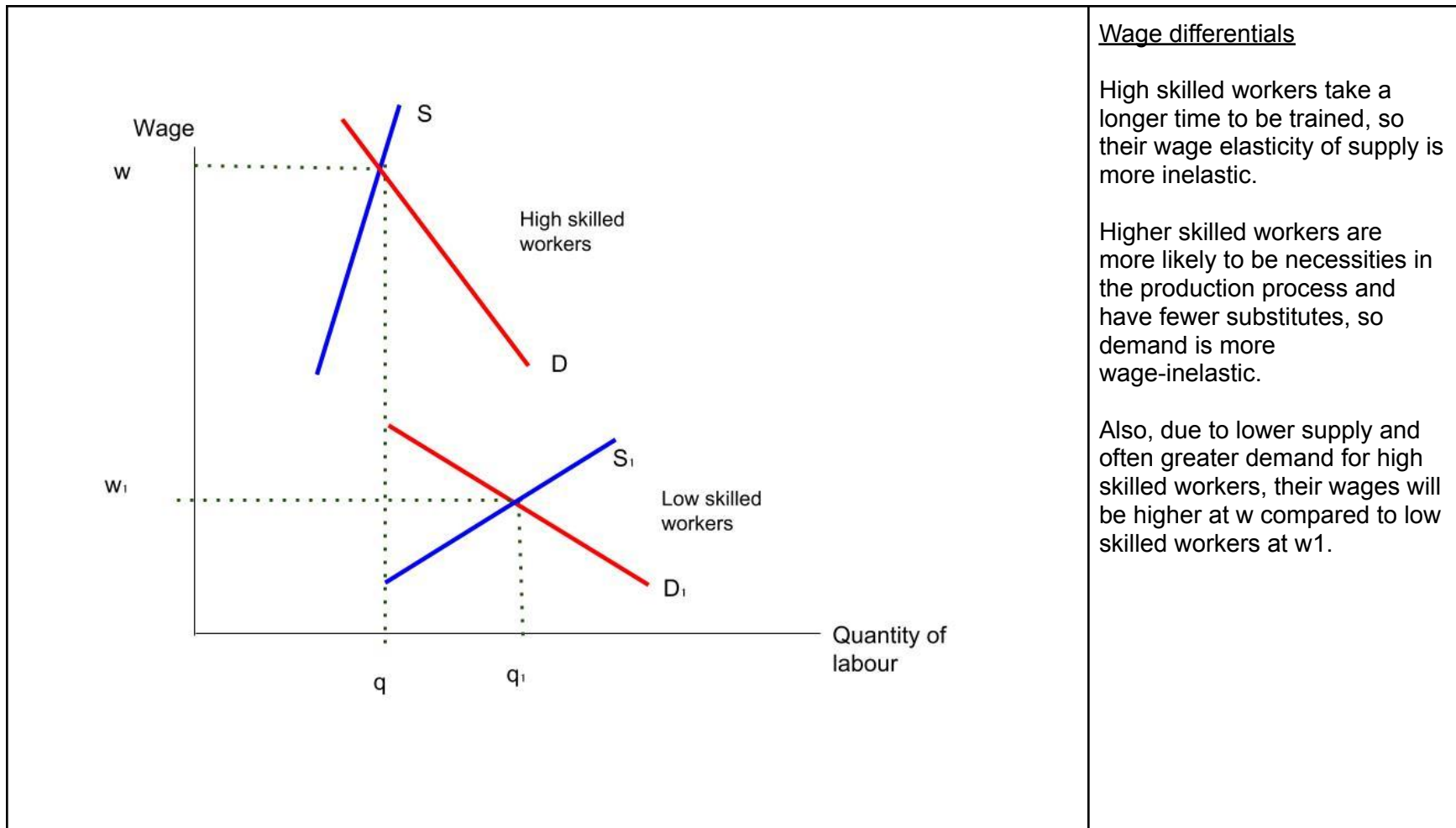
Demand shift right due to change in marginal revenue product (e.g. due to worker training).

More training or education increases the marginal revenue product of labour. So hiring an extra worker offers more benefit to firms in terms of higher revenue.

So firms increase demand for labour, demand shifts from D to D₁. This increases wage from w to w₁ and quantity of labour from q to q₁.

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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 .

How to use paper 1 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?".

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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 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.

When writing 25 markers with 2 analysis points only, you need to extend the diagram analysis. To do so, consider these methods:

- For supply / demand, extend by showing the price mechanism or consumer / producer surplus changes.
- For cost / revenue diagrams, can extend by discussing effects on producers ("PIES: profits, investment, employment/efficiency and shutdown) or consumers (quality and 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.
- For labour market diagrams, consider the worker surplus (the surplus on the supply side) and associated effects on poverty and inequality.

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.

Other diagrams that are not included above, but that you may wish to revise, include (but are not limited to):

- Marginal, average and total product
- Lorenz curve (AQA micro, Edexcel A macro).
- Short run to long run elasticity change e.g. on agriculture market and PES.
- Price elasticities of demand - perf inelastic, perf elastic, elastic, inelastic unitary. Similarly for PES.
- Types of interrelationships between goods - complements, substitutes, joint demand, joint supply etc.
- PED varying along a linear demand curve
- Information gaps eg perceived vs actual MPB.

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- Shutdown points for some exam boards (Edexcel A).
- Contestable market, where the monopoly produces where $AR=ATC$. / comparing monopoly and perfect competition outcomes.
- Second-degree price discrimination / filling up capacity third degree // peak vs off peak pricing.
- First-degree price discrimination
- Perfectly competitive labour market
- Movement along demand or supply.
- Engel curves for some exam boards.
- Note that demand shifts in a supply-demand diagram can be used for adverse selection, moral hazard and behavioural bias / nudge analysis.

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