
A-level ECONOMICS

Paper 1 Markets and market failure

Tuesday 5 June 2018

Afternoon

Time allowed: 2 hours

Materials

For this paper you must have:

- an AQA 12-page answer book
- a calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Write the information required on the front cover of your answer book.
The **Paper Reference** is 7136/1.
- In **Section A** answer **EITHER** Context 1 **OR** Context 2.
- In **Section B**, answer **ONE** essay.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- There are 40 marks for **Section A** and 40 marks for **Section B**.
- You will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- You are advised to spend 1 hour on **Section A** and 1 hour on **Section B**.

Section A

Answer **EITHER** Context 1 **OR** Context 2.

EITHER

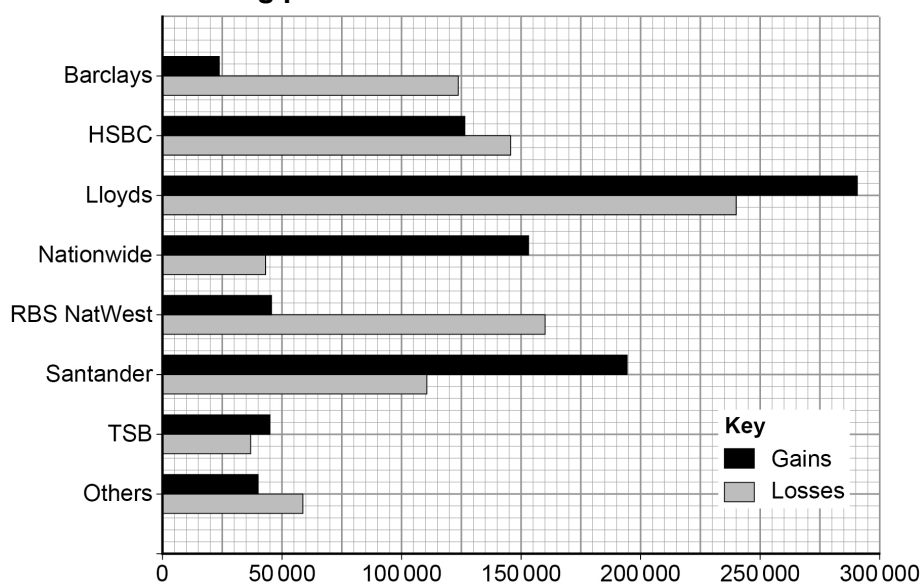
Context 1

Total for this context: 40 marks

Competition in UK Banking

Study **Extracts A, B and C** and then answer **all** parts of Context 1 which follow.

Extract A: Customers switching personal bank accounts in 2016



Source: BACS

Extract B: Gradual change in the UK banking market

There have been 11 separate inquiries into the banking sector in the past 17 years but not much has changed. As in 1999, the Big Four of HSBC, Barclays, RBS NatWest and Lloyds dominate the market with a combined market share of 75%. A 2017 inquiry by the Competition and Markets Authority (CMA) concluded that banks do not feel enough pressure to compete on price or quality, leading some to call for the Big Four to be split into a number of smaller banks. Nevertheless, the personal account market has changed, with an increase in product innovation, suggesting that competition is working. Whilst 'free if in credit' accounts remain dominant, a third of newly opened accounts charge fees in exchange for a premium rate of interest or cashback on purchases.

Last year fewer than 1 million customers (from a total 70 million) switched accounts, though switching rates may not be the best indicator of competition. The market lacks the same prompts to switch as other markets, such as the annual cost of renewing car and house insurance. The personal account market is therefore more static than energy, telecommunications and insurance. Ultimately, consumers do not operate like economists, rationally examining each product in detail and securing the best deal. Some of the stickiness in the market also derives from higher satisfaction rates (91%) than other sectors.

The CMA inquiry is unlikely to worry the Big Four as the most significant proposed reform amounts to little more than a new app to help customers switch accounts. The idea is that people will be more inclined to switch if they have transparency about charges and interest

rates. Greater contestability, with more customers switching and the entry of new players, has improved value for money for all customers, not only switchers. Revenue per active account has fallen by 17% in real terms since 2006, as banks offer higher rewards to keep or win customers. While the new entrants have yet to grow to a significant size, mid-sized providers like Santander have grown their market share. From this perspective, breaking up the Big Four may seem to be too extreme a measure.

25

Source: News reports, August 2017

Extract C: The rise of challenger banks

As the first new high street bank in 150 years, Metro Bank promises to operate distinctively: longer opening times than its rivals, instant debit cards for new account holders and eye-catching initiatives such as in-store dog water bowls. There are plans to grow its branch network from 48 to 110 by 2020. This bucks the UK trend for closing bank branches, more than 8000 of which have disappeared from high streets in the past 25 years. Metro Bank's Chief Executive Officer said of the big banks: "They act like oligopolies are supposed to: they under-invest; under-serve and they take you for granted."

5

Many of the major banks suffer from inefficient, outdated IT infrastructure which limits their ability to reduce prices. They may also suffer from diseconomies of scale, given the size of their workforce and the breadth of their operations. There is ample opportunity for new players to enter the sector.

10

Metro Bank may take years to grab meaningful market share in the UK. Its straightforward business model involves opening new branches, collecting deposits and lending these funds to borrowers. This is safer than the riskier funding methods deployed by the some of the banks that failed during the financial crisis, but is unlikely to generate rapid growth. Even so, its customer focus puts pressure on dominant banks to improve their service.

15

Source: News reports, August 2017

0 1

Using **Extract A**, calculate the ratio of customers gained to customers lost by Nationwide. Give your answer correct to **one** decimal place.

[2 marks]

0 2

Explain how the data in **Extract A** show that the market power of the Big Four banks is weakening against competition from smaller rivals.

[4 marks]

0 3

Extract C (lines 10–11) states that 'There is ample opportunity for new players to enter the sector.'

With the help of a diagram, explain how the lowering of barriers to entry in the banking market might lead to lower prices and a situation in which banks make normal profit.

[9 marks]

0 4

Extract B (lines 4–6) states that 'banks do not feel enough pressure to compete on price or quality, leading some to call for the Big Four to be split into a number of smaller banks.'

Use the extracts and your knowledge of economics to assess the view that the government should intervene further in the banking sector to promote greater competition.

[25 marks]

Turn over ►

Do **NOT** answer Context 2 if you have answered Context 1.

OR

Context 2

Total for this context: 40 marks

Automation and the Labour Market

Study **Extracts D, E and F** and then answer **all** parts of Context 2 which follow.

Extract D: The threat of automation to selected UK industries

Table of figures showing automation in UK industries cannot be reproduced here due to third-party copyright restrictions.

Extract E: The rise of the robots

Workers have always been concerned about their livelihoods being replaced by new technology, but many economists maintain that technology has always ended up creating more jobs than it destroys. Automating tasks increases the demand for workers elsewhere. When weaving was automated in the 18th century workers shifted into operating and maintaining the new machines. Gradually, wages rose in line with productivity. The same pattern can be seen with computerisation. 5

But could this time be different? This time around automation is broader-based as every industry uses computers. During previous waves of automation, workers could switch from one kind of routine work to another; but this time many workers must switch from routine, unskilled jobs to non-routine, skilled jobs to stay ahead of automation. A recent report found that in the US between 1990 and 2007, the addition of each robot into manufacturing industries resulted in the loss, on average, of 6.2 jobs and depressed wages. The report argues that even if overall employment and wages recover, there will be losers in the process, and it will take a very long time for these communities to recover. The market economy is not going to create the jobs by itself for those workers who are most affected by the change. 10 15

Others argue that producers need a profitable market to sell to, and such markets only exist if consumers earn enough to purchase their goods and services. If robots replaced all workers, thereby creating mass unemployment, where would demand come from?

Source: News reports, 2017

Extract F: Policy responses

Robots are no different from earlier technologies in that they are capital goods which can enrich those who own them. Bill Gates, the founder of Microsoft, has suggested a robot tax, which has since become widely debated. Larry Summers, former US Treasury Secretary, thinks taxing productivity-enhancing tools like robots or machines makes no economic sense: "Staving off progress is a poor strategy for helping less fortunate workers." 5

The prospect of large rises in unemployment and inequality has led to the suggestion of a Universal Basic Income (UBI). A UBI is a fixed payment to all members of society, regardless of income, which could replace costly welfare and unemployment benefits. It can

also create incentives for individuals to take risks, start businesses, change jobs, return to education or try a new career. Critics point out that getting a cheque from the government may help, but it doesn't provide the fulfilment that comes from employment. 10

A recent report suggested that the government should provide lower-skilled workers with more training to help them manage the changing demand for labour. Another way to deal with sudden unexpected layoffs is for the government to create jobs, primarily in sectors not adequately served by the private sector such as care for the elderly and children, health, education and the arts. 15

Source: News reports, 2017

0 5

Using **Extract D**, calculate the number of transportation and storage jobs at high risk of automation, as a percentage of those who are at high risk across all industries. Give your answer to **two** decimal places.

[2 marks]

0 6

Explain how the data in **Extract D** show that workers employed in routine, repetitive work are at greater risk from automation.

[4 marks]

0 7

Extract E (lines 4–5) claims that workers in the 18th century saw wages rise in line with productivity.

With the help of a diagram, explain how advances in modern technology are likely to lead to rising wages in some industries.

[9 marks]

0 8

Extract E (lines 14–16) states that 'The market economy is not going to create the jobs by itself for those workers who are most affected by the change.'

Extract F (lines 4–5) states that 'taxing productivity-enhancing tools like robots or machines makes no economic sense.'

Use the extracts and your own knowledge of economics to evaluate whether governments should allow markets to respond freely to the opportunities and challenges presented by technological progress, without any state intervention.

[25 marks]

Turn over ►

Section B

Answer **one** essay from this section.

Each essay carries 40 marks.

EITHER**Essay 1**

According to Public Health England, poor air quality is the largest environmental risk to public health in the UK. In particular, diesel cars are estimated to be responsible for 40 000 premature deaths each year. In response, the Government announced in 2017 that it would ban the sale of new petrol and diesel cars by 2040.

0	9
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Explain why the use of petrol and diesel cars may be a source of market failure.

[15 marks]

1	0
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Assess the view that regulation is a better policy for dealing with the problem of air pollution than the allocation of property rights or taxation.

[25 marks]

OR**Essay 2**

The Resolution Foundation estimates that 1% of adults, about 488 000 people, own 14% of the UK's assets – worth about £11 trillion. At the other end of the scale, 15% of adults, about 7.3 million people, either own no assets at all, or are in debt. Meanwhile, income is also unequally distributed, but not to the same extent as wealth.

1	1
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Explain how the Lorenz curve and Gini coefficient may be used to illustrate increasing income inequality in a country.

[15 marks]

1	2
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Assess the view that, in the UK, the consequences of wealth inequality are more damaging than the consequences of income inequality.

[25 marks]

OR

Essay 3

In the United States, corporate profits since 2010 have averaged 9% of GDP, compared to 5% in the 1990s. This is causing concern that the US economy is increasingly dominated by companies with monopoly power.

1	3
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Explain the role of profit in a market economy.

[15 marks]

1	4
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Evaluate the view that a firm making low profits must be inefficiently managed.

[25 marks]

END OF QUESTIONS

There are no questions printed on this page

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J U N 1 8 7 1 3 6 1

Question
number

0 1

Customers gained by Nationwide = 153 000. Customers lost by Nationwide = 43 000.

Ratio = $153\,000 \div 43\,000 = 3.558\dots$

Ratio of customers gained to customers lost = 3.6 : 1

0 2

Market power is the ability of a firm to influence the price and other terms on which it sells, which depends largely on its market share and how close its rivals are as substitutes. Extract A shows the Big Four as a group gained about 485 000 customers in 2016 but lost about 670 000, a net loss of about 185 000.

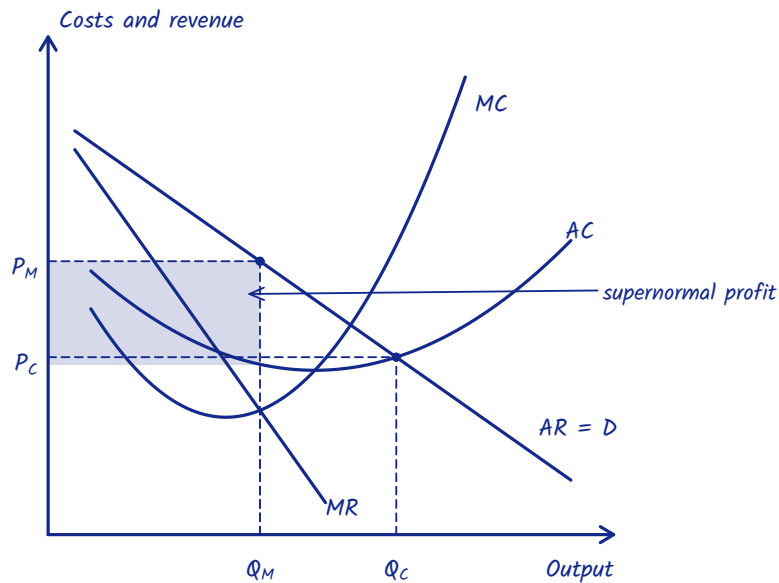
Barclays (net loss about 100 000) and RBS NatWest (net loss about 115 000) were the biggest losers. In contrast, Santander, TSB, Nationwide and others gained about 435 000 and lost only about 253 000, a net gain of about 182 000, with Nationwide (+110 000) and Santander (+83 000) the largest net gainers. Lloyds is the exception, with a net gain of about 50 000.

Because switchers are moving mainly from the Big Four to smaller rivals, the Big Four's market share is falling and customers are showing that close substitutes exist. Demand for each big bank's accounts becomes more price elastic, so the Big Four are less able to offer poor value without losing customers, which shows that their market power is weakening.

0 3

Barriers to entry are obstacles that make it difficult for new firms to enter a market, such as high start-up capital, regulatory licences, an established branch network and customer inertia. If they fall, the market becomes more contestable: entry and exit are easier, so incumbents face the threat of new players such as Metro Bank. Extract C notes that the big banks have outdated IT and may suffer diseconomies of scale, so efficient entrants could undercut them.

Do not write outside the box



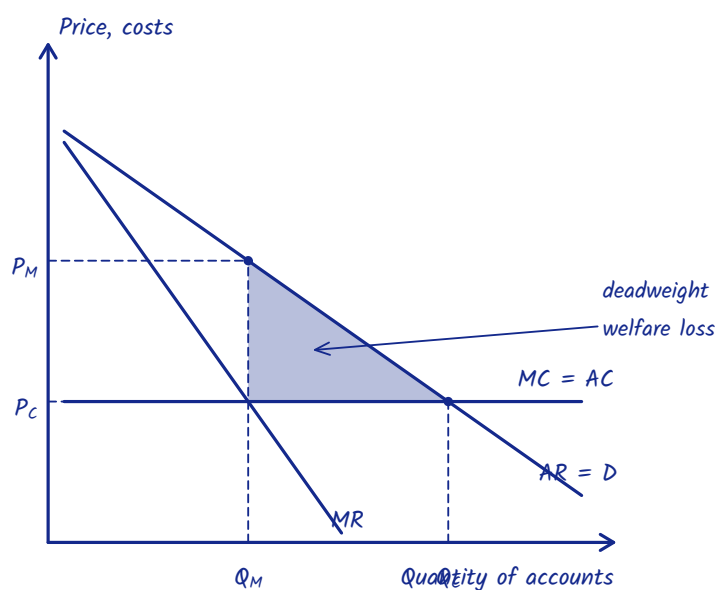
As shown in the diagram, a bank with market power initially profit maximises where $MC = MR$, producing Q_M and charging P_M . Since P_M is above average cost at Q_M , it earns supernormal profit (the shaded area). In a market with high barriers, this profit persists in the long run because no rival can enter to compete it away.

When barriers fall, these supernormal profits act as a signal attracting entrants. Entrants take customers by offering better rates, lower fees or better service, so the demand (AR) for each incumbent's accounts falls and becomes more elastic. Even the threat of hit and run entry disciplines incumbents: to deter entry they lower price towards P_C , where $AR = AC$ at Q_C , so only normal profit is made, the minimum profit needed to keep the bank in the industry. Price falls, output rises and allocative efficiency improves.

There is evidence of this in the extracts: revenue per active account has fallen by 17% in real terms since 2006 as banks offer higher rewards to keep or win customers, and a new switching app should reduce customer inertia, making demand more responsive to price. New players also bring innovation and a focus on customer service, forcing the Big Four to improve quality as well as cut prices. However, normal profit will only be reached if entry is genuinely easy; if inertia remains, some supernormal profit may persist.

Competition exists when firms rival each other for customers on price, quality and innovation. Extract B shows that the UK banking market is a concentrated oligopoly: the Big Four of HSBC, Barclays, RBS NatWest and Lloyds have a combined market share of 75%, the same dominance as in 1999. The CMA concluded in 2017 that banks do not feel enough pressure to compete on price or quality. Further intervention could include breaking up the Big Four, regulating prices or fees, improving information for consumers, and nudge policies to encourage switching.

The case for intervention rests on market failure. In a concentrated market, firms have the market power to set price above marginal cost. As shown in the diagram, a bank maximising profit where $MC = MR$ charges P_M and supplies Q_M , while a competitive market would supply Q_C at P_C . The shaded triangle is a deadweight welfare loss: consumers who value accounts above their cost are not served, and the bank gains supernormal profit at consumers' expense. The Metro Bank chief executive's claim that the big banks 'under-invest, under-serve and take you for granted' suggests productive and dynamic inefficiency too: without competitive pressure there is little incentive to control costs, and Extract C notes inefficient, outdated IT infrastructure and possible diseconomies of scale given the size of their workforces.



There is also a problem of imperfect information and behavioural bias. Fewer than 1 million of 70 million customers switched last year (Extract B). Consumers 'do

not operate like economists', and with no annual renewal prompt, inertia and status quo bias keep them with their bank even if better deals exist. Because the cost of comparing complex charges is high, banks face relatively price inelastic demand and can exploit loyal customers. Barriers to entry are also high: regulatory approval from the Prudential Regulation Authority, large start-up capital, the need for a trusted brand and an expensive branch network. These protect incumbents and make it unlikely that the market corrects itself quickly, which supports intervention.

Breaking up the Big Four would directly reduce concentration and create more rivals, as with the demerger of TSB from Lloyds and the attempted sale by RBS of Williams and Glyn. More firms would reduce the scope for tacit collusion and increase price competition. Information remedies, such as the CMA's switching app, the Current Account Switch Service and price comparison websites, are cheaper and target the root cause: if customers have transparency about charges and interest rates, demand becomes more price elastic and banks must compete.

However, there are strong arguments that further intervention is unnecessary.

Extract B states that the personal account market has changed, with more product innovation, such as accounts paying premium interest or cashback, which suggests competition is working. Greater contestability has already improved value for money for all customers: revenue per active account has fallen by 17% in real terms since 2006. Extract A shows that the Big Four lost a net 185 000 customers in 2016 while smaller banks such as Nationwide and Santander gained, and mid-sized providers like Santander have grown market share. Metro Bank plans to grow from 48 to 110 branches by 2020, and internet and app based challengers have lower costs because they need no branches. Under contestable market theory, it is the threat of entry rather than the number of firms that matters, so prices may already be being pushed towards competitive levels.

Low switching is also not proof of weak competition. Extract B points out that satisfaction rates are 91%, higher than other sectors, so some customers stay because they are content, not because they are exploited. Concentration may also bring benefits: banking has a high minimum efficient scale, with large fixed costs

of IT, regulation and security, so large banks can enjoy economies of scale and pass lower costs on. Splitting them up could raise average costs and reduce financial stability, a key concern after the 2008 crisis when banks such as Northern Rock failed. Supernormal profits can fund the investment in technology that customers increasingly want.

There is also a risk of government failure. Regulators have imperfect information about costs, so price caps may be set too high to help consumers or too low, reducing quality and investment. Eleven inquiries in 17 years with little change (Extract B) suggest intervention has been slow and of limited effect, and break-ups are costly and disruptive. Regulatory capture and unintended consequences, such as banks reintroducing fees elsewhere, are possible. Much of the banking sector is already heavily regulated by the Bank of England, the PRA and the FCA, so extra rules may add compliance costs which themselves become a barrier to entry for small challengers.

In conclusion, there is a case for some further intervention, but it should be targeted rather than drastic. The evidence of falling real revenue per account, growing challengers and innovation suggests that competition is improving, so breaking up the Big Four 'may seem to be too extreme a measure', as Extract B argues. The most persistent problem is consumer inertia and poor information, so low cost measures that make switching easier and charges transparent, together with lowering regulatory barriers for new entrants, are likely to give the greatest benefit with the least risk of government failure. Whether stronger action is needed depends on whether challengers grow to a significant size in the long run; if the Big Four's share stays at 75%, structural remedies would become more justified.

Question
number

0 5

Transportation and storage jobs at high risk = 0.95 million. Jobs at high risk across all industries = 10.4 million.

$$0.95 \div 10.4 \times 100 = 9.1346...\%$$

Answer = 9.13%

0 6

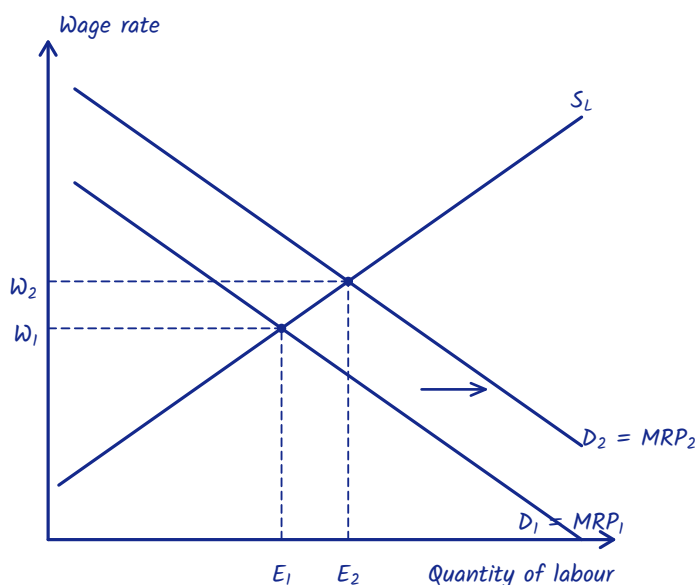
Automation is the replacement of tasks done by workers with machines, robots or computer software. Tasks that are routine and repetitive follow predictable rules, so they are the easiest and cheapest to programme a machine to do, while varied, non-routine tasks requiring judgement, creativity and personal interaction are hard to automate.

Extract D shows that the sectors with the highest proportion of jobs at high risk are water, sewage and waste (62.6%), transport and storage (56.4%) and manufacturing (46.4%). These sectors have a high proportion of workers doing routine, repetitive work such as driving, sorting, loading and assembly line tasks. Wholesale and retail has the largest number of jobs at risk (2.25 million), reflecting routine tasks like checkout operation and stacking shelves. In contrast, the sectors at lowest risk are education (8.5%), human health (17.0%) and professional, scientific and technical activities (25.6%), where work is very varied and involves non-routine skills, such as teaching, caring and problem solving. The clear difference between these sectors shows that the more routine the work, the greater the risk of automation.

0 7

In a competitive labour market, the demand for labour is a derived demand determined by the marginal revenue product (MRP) of labour, where $MRP = \text{marginal physical product (MPP)} \times \text{marginal revenue}$. Firms employ workers up to the point where the wage equals MRP.

Do not write outside the box



Advances in technology, such as computers, robots and new software, are often complements to skilled labour. A worker operating or maintaining a new machine produces more output per hour, so MPP rises. This increases MRP at every level of employment, shifting the demand for labour curve to the right from $D_1 = MRP_1$ to $D_2 = MRP_2$, as shown in the diagram. With an upward sloping supply of labour, the wage rises from w_1 to w_2 and employment from E_1 to E_2 . This is the pattern described in Extract E: as weaving was automated, workers shifted into operating and maintaining the new machines and wages rose in line with productivity.

Technology can also raise wages through other channels. It lowers firms' costs of production, so prices fall and the quantity of output demanded rises, which increases the derived demand for workers in that industry, especially if demand for the product is price elastic. It creates new products and industries, such as app development and data analysis, where the supply of workers with the right skills is inelastic in the short run, so increases in demand lead to large rises in wages.

Higher productivity also raises firms' profits, and where workers have bargaining power, for example through trade unions, part of this is shared as higher pay.

These rises are likely only in some industries: where technology complements labour rather than replacing it. Where machines are substitutes for routine work, MRP of those workers and demand for them may fall instead.

Technological progress is the development of new products and processes, such as robots, artificial intelligence and self-service machines, which increase productivity.

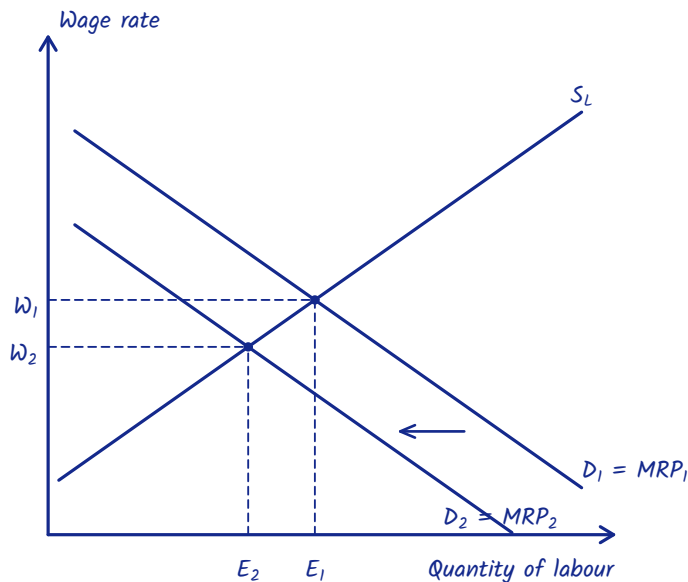
The question is whether the free market, guided by the price mechanism, will reallocate labour and capital efficiently, or whether market failure justifies government intervention.

The case for leaving markets free is strong. The price mechanism signals where resources are needed: as automation lowers costs, prices fall, real incomes rise and new demand appears elsewhere. Extract E explains that many economists believe technology has always created more jobs than it destroys, as with weaving in the 18th century and later computerisation. Because human wants are unlimited, the basic economic problem of scarcity is not solved by robots; workers released from routine jobs can produce other goods and services. Firms will also only automate where it is profitable, and as Extract E argues, producers need consumers who earn enough to buy their output, so mass unemployment would be self-defeating. Dynamic efficiency from automation increases output, lowers costs and improves quality, raising living standards.

Intervention also risks government failure. A robot tax, suggested by Bill Gates in Extract F, would raise the cost of capital, slow the adoption of productivity-enhancing technology and could push investment to other countries. As Larry Summers argues, 'staving off progress is a poor strategy for helping less fortunate workers'. Governments have imperfect information about which jobs will disappear in such a fast-moving area, so retraining schemes may teach the wrong skills, and job creation schemes could crowd out private sector activity and be costly for taxpayers. A Universal Basic Income would be extremely expensive and, by paying everyone regardless of income, could reduce the incentive to work.

However, there are serious market failures. Labour markets are imperfect: workers face occupational immobility, because the skills needed for non-routine, skilled jobs take years to learn, and geographical immobility, because new jobs may be in different regions and housing costs are high. Extract E notes that this time many workers must switch from routine, unskilled jobs to non-routine, skilled jobs, unlike in previous waves. As the diagram shows, automation reduces the MRP of routine

workers, shifting demand for their labour left from D_1 to D_2 , so wages fall from w_1 to w_2 and employment from E_1 to E_2 . The US evidence that each robot led to the loss of 6.2 jobs and depressed wages supports this.



Extract D suggests the risks are concentrated: transport and storage (56.4%), water and waste (62.6%) and manufacturing (46.4%) have large shares of jobs at high risk, and these are often concentrated in particular regions. This creates structural unemployment, regional decline and rising inequality, while the gains go to the owners of capital, since robots 'can enrich those who own them' (Extract F). Inequality is a source of market failure on equity grounds, and long-term unemployment has negative externalities such as poorer health, crime and the loss of skills. Extract E warns that it will take a very long time for communities to recover and that the market economy will not create jobs by itself for those most affected.

This suggests intervention should support adjustment rather than stop progress. Training for lower-skilled workers, as in Extract F, corrects the under-provision of education and training caused by imperfect information and the fact that firms fear training workers who may leave. This improves occupational mobility and increases the supply of skilled labour, helping workers benefit from rising wages in skilled jobs. Government job creation in areas the private sector underprovides, such as care, health and education, fits with the fact that these are the sectors least at risk of automation. A UBI could give security and encourage risk taking, though

critics note it does not give the fulfilment of work.

In conclusion, governments should not leave markets entirely free, but nor should they try to slow technological progress, for example through a robot tax, since the long-run gains in productivity and living standards are large. The best approach is to allow the price mechanism to drive innovation while intervening to correct labour market immobility and to protect the losers, through training, regional support and a good benefit system. How much intervention is needed depends on the speed of change: if automation is gradual, markets may adjust as in the past, but if it is rapid and broad-based, as Extract E suggests, the costs of short-run structural unemployment are likely to be too high to leave to the market alone.

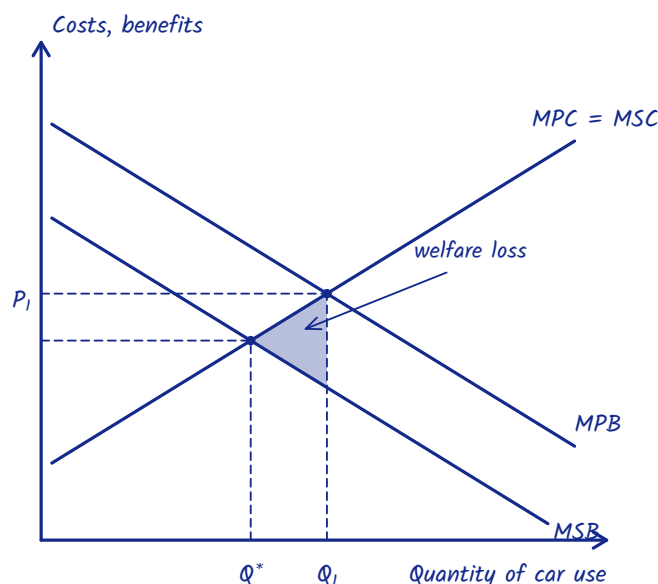
Market failure occurs when the price mechanism fails to allocate resources

efficiently, so that the free market outcome does not maximise economic welfare.

The use of petrol and diesel cars is a classic example because it creates negative externalities: costs imposed on third parties that are not reflected in the price paid by the driver.

When a motorist decides whether to drive, they consider only their private benefit, the marginal private benefit (MPB), and their private costs such as fuel, insurance and wear. However, driving generates external costs. Air pollution from exhaust fumes, particularly nitrogen dioxide and particulates from diesel engines, damages the health of people who breathe it; Public Health England estimates diesel cars are responsible for 40 000 premature deaths each year. There is also noise pollution, congestion, which raises journey times and costs for other road users, a higher risk of accidents, and carbon dioxide emissions which contribute to global warming.

Because of these negative consumption externalities, the marginal social benefit (MSB) of driving is less than the MPB, where $MSB = MPB$ minus the marginal external cost. As shown in the diagram, the free market reaches equilibrium where $MPB = MPC$, at Q_1 and P_1 . The socially optimal level is where $MSB = MSC$, at Q^* . As $Q_1 > Q^*$, cars are over-consumed: for each unit between Q^* and Q_1 , the cost to society exceeds the benefit. The shaded triangle shows the resulting deadweight welfare loss, so resources are misallocated and the market fails.



Driving can also be analysed as a negative production externality where firms use petrol vehicles, for example lorries and delivery vans, so that MSC is greater than MPC ; the result is the same, over-production relative to the social optimum.

A further source of market failure is information failure. Drivers may not know the full harm their emissions cause, so they underestimate the cost of driving. Diesel cars were long thought of as cleaner than petrol cars because they emit less carbon dioxide, and governments even encouraged them through lower tax, yet they emit more harmful nitrogen oxides and particulates. The Volkswagen emissions scandal showed that manufacturers could hide true emissions from consumers, an example of asymmetric information.

In addition, clean air is a public good: it is non-excludable and non-rival, so no one has property rights over it and no market exists to charge polluters for the damage. Without intervention, the external costs are ignored. Congested roads can also be seen as a common resource, overused because no individual driver pays for the delay they cause to others.

This explains why governments intervene, for example through fuel duty, vehicle excise duty linked to emissions, the London congestion charge and Ultra Low Emission Zone, emissions standards, licences and speed limits, and the planned ban on the sale of new petrol and diesel cars by 2040. These aim to make drivers internalise the external cost and move consumption towards Q^* .

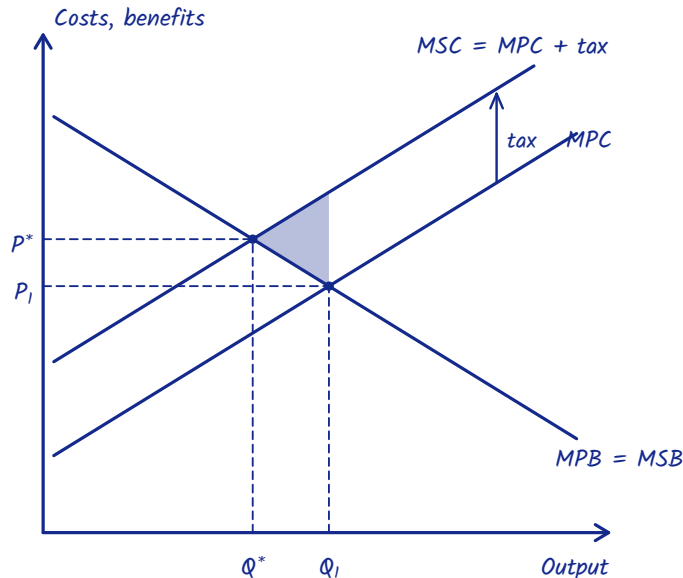
Air pollution comes mainly from road vehicles, energy production, factories and shipping. It causes localised health problems and smog, acid rain and, through greenhouse gases, global warming. It is a negative externality: polluters do not pay the full social cost, so MSC exceeds MPC and output is above the social optimum. Three possible solutions are regulation, taxation and the allocation of property rights.

Regulation means rules backed by law, such as emissions limits on cars (the Euro standards), bans on burning coal in smokeless zones, minimum fuel standards and the planned ban on new petrol and diesel cars by 2040. Its advantages are that it is simple to understand, can be introduced quickly, and gives certainty about the outcome: if a pollutant is extremely harmful, an outright ban guarantees it is reduced, whereas a tax only makes it more expensive. The Clean Air Act 1956 was very effective in ending London's smogs. Regulation also works when demand is price inelastic, where a tax would have little effect on quantity.

However, regulation is a blunt instrument. It usually imposes the same limit on all firms regardless of their costs of reducing pollution, so the reduction is not achieved at the lowest cost and is economically inefficient. It provides no incentive to cut pollution below the legal limit, so there is little dynamic incentive to innovate. It requires costly monitoring and enforcement, and firms may cheat, as the Volkswagen scandal showed when diesel cars were programmed to pass emissions tests. Regulations can also become out of date and be influenced by lobbying and rent-seeking behaviour.

Taxation, such as a Pigouvian tax equal to the marginal external cost, makes the polluter pay. As shown in the diagram, a tax shifts MPC up to MSC, so the market moves from Q_1 to the socially optimal Q^* , and the welfare loss is removed.

Examples include fuel duty, vehicle excise duty linked to CO_2 emissions, air passenger duty and the climate change levy. Taxes are market-based: each polluter cuts emissions until the cost of doing so equals the tax, so pollution is reduced at the lowest total cost. They give a continuing incentive to innovate, and raise revenue that can fund clean public transport or offset other taxes.



Taxes have drawbacks. It is very difficult to value the marginal external cost of pollution in money terms, so the tax may be set at the wrong level, a form of government failure. Demand for fuel is price inelastic in the short run, so a tax may raise revenue without much reduction in pollution. Fuel taxes are regressive, taking a larger share of income from poorer households, and are politically unpopular, as shown by the freeze in UK fuel duty since 2011. High taxes in one country may also cause production to relocate abroad.

Allocating property rights deals with the root cause: nobody owns clean air.

According to the Coase theorem, if property rights are clearly defined and transaction costs are low, the parties can bargain to the efficient outcome. In practice this is rarely possible for air pollution, because there are millions of polluters and victims, it is hard to define what 'clean air' is and to identify when a right has been breached, and the costs of negotiating and going to court are huge. The initial allocation of rights is also controversial and affects the distribution of income.

A more practical form of property rights is tradable pollution permits, as in the EU Emissions Trading Scheme and the Californian scheme. The government sets a cap on total emissions, giving certainty over the quantity like regulation, while trading means firms that can cut pollution cheaply do so and sell their permits, so the cut is achieved at least cost like a tax. However, the EU ETS initially issued too many permits, and the carbon price collapsed, so emissions were barely

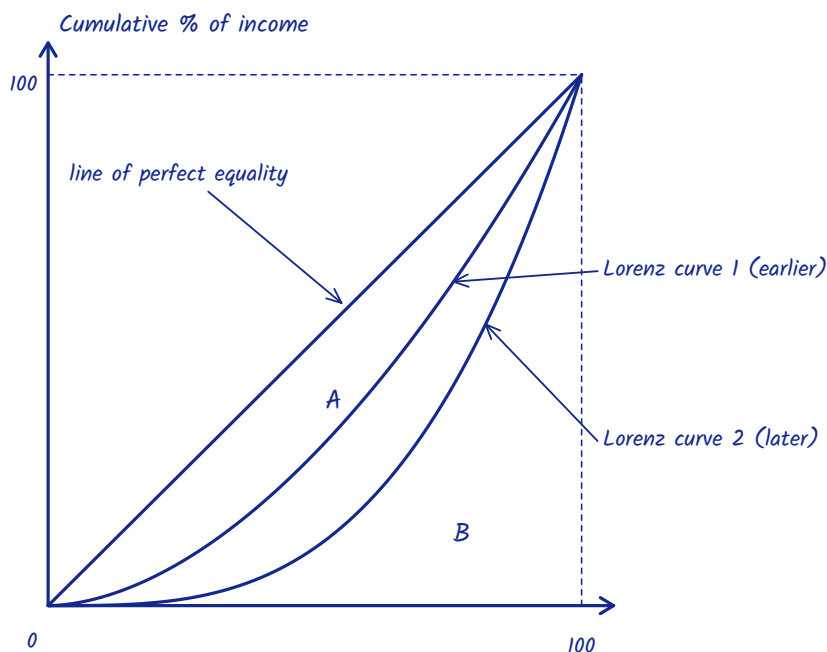
reduced; the scheme only became effective after reform. Permits also suit large stationary polluters such as power stations better than millions of individual car drivers.

Which policy is better depends on the type of pollution. For local, highly toxic pollutants, such as nitrogen dioxide near schools, regulation and bans are better, because certainty matters more than efficiency. For widespread pollution with many sources, such as CO₂, taxes and tradable permits are likely to be more efficient. Because global warming is an international problem, any single country's policy has limited effect; coordinated global action through agreements is needed whichever instrument is chosen.

In conclusion, regulation is not always better. It is the best policy when the harm is severe, the pollutant can be easily measured and quick, certain results are needed, which is why the ban on new petrol and diesel cars may be justified for urban air quality. However, in general, market-based approaches such as taxation and tradable permits achieve reductions at lower cost and encourage innovation, while pure property rights are rarely workable for air pollution. In practice a combination of policies, together with better information for consumers, is likely to be most effective, with the mix depending on the pollutant, the price elasticity of demand and the government's ability to value external costs.

Income inequality refers to how unevenly income is distributed between individuals or households in an economy. The Lorenz curve and the Gini coefficient are the main tools used to measure and illustrate it.

A Lorenz curve plots the cumulative percentage of households, ranked from poorest to richest, on the horizontal axis against the cumulative percentage of national income they receive on the vertical axis. If income were perfectly equally distributed, the poorest 10% would receive 10% of income, the poorest 50% would receive 50%, and so on, so the curve would lie along the 45 degree line of perfect equality. If one household received all income, the curve would run along the horizontal axis and then up the right-hand vertical axis, which represents perfect inequality. In reality the curve lies between these extremes and bows below the line of equality, because the poorest households receive a smaller share of income than their share of the population.



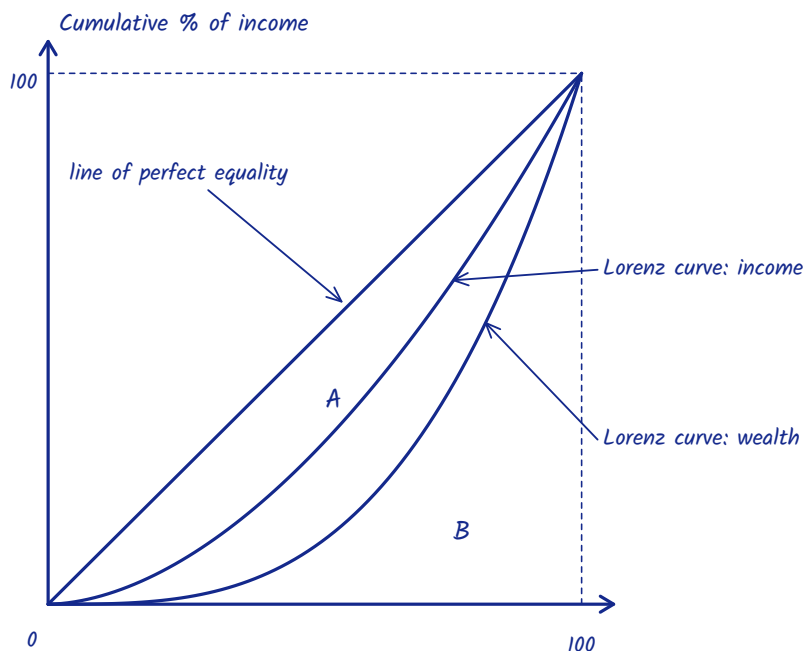
The further the Lorenz curve bows away from the line of equality, the greater the inequality. As shown in the diagram, if Lorenz curve 1 shows the distribution in an earlier year and Lorenz curve 2 the distribution in a later year, the shift outwards means income inequality has increased. For example, on curve 1 the poorest 50% of households might receive 30% of income, but on curve 2 they receive only 15%, so the richest 50% now receive 85% of income rather than 70%.

The Gini coefficient turns the Lorenz curve into a single number. It is the ratio of the area between the line of equality and the Lorenz curve (area A) to the total area under the line of equality (area A + B): $Gini = A \div (A + B)$. It ranges from 0, perfect equality, where the Lorenz curve lies on the line of equality and $A = 0$, to 1, perfect inequality, where $B = 0$. It is sometimes expressed as a percentage, from 0 to 100.

As inequality increases and the Lorenz curve moves further from the line of equality, area A gets larger and area B smaller, so the Gini coefficient rises. For example, a rise from 0.30 to 0.35 shows increasing inequality. The UK's Gini coefficient for disposable income rose sharply during the 1980s, from about 0.26 to about 0.34, showing a large increase in income inequality, and it has stayed at around this level since.

The two measures are useful because they summarise the whole distribution and allow comparisons over time and between countries, for example the UK has a higher Gini than Scandinavian countries but lower than the USA. They can also be calculated for original income and for disposable income, showing how far taxes and benefits reduce inequality. However, they have limitations. Two Lorenz curves can cross, giving the same Gini coefficient for different distributions, so a single number may hide whether inequality has increased at the bottom or the top. The Gini coefficient also does not show the cause of inequality, and it depends on whether income is measured before or after taxes and benefits and per household or per individual. Therefore, to show convincingly that income inequality has increased, economists should look at the change in the Lorenz curve as well as the change in the Gini coefficient.

Income is a flow of money received over a period of time, from wages, rent, interest, dividends and benefits. Wealth is a stock of assets owned at a point in time, such as property, shares, savings and pension funds, which can come from inheritance, gifts and accumulated savings. In the UK, wealth is far more unequally distributed than income: the Resolution Foundation estimates that the richest 1% own 14% of assets, while 15% of adults own no assets or are in debt. The UK's Gini coefficient for wealth is around 0.6, compared with about 0.34 for disposable income, as shown by the Lorenz curve for wealth lying much further from the line of equality.



There are strong reasons why ~~wealth inequality may be~~ ^{wealth inequality is} more damaging. Firstly, wealth generates income through rent, interest and dividends, so wealth inequality causes and reinforces income inequality. Because the return on capital often exceeds the growth of wages, those with assets get richer over time, so inequality tends to widen. Secondly, wealth is passed down through inheritance and gifts, so it creates inequality of opportunity between generations. Wealthy families can afford private education, tutoring, better health care and help with house deposits, which reduces social mobility and means talent is wasted, a source of inefficiency as well as unfairness.

Thirdly, wealth inequality in the UK is largely property wealth. Rising house prices have benefited older home owners while younger people, many with student debt,

struggle to buy and spend a high share of income on rent, often in poor quality housing and having to move frequently. This creates intergenerational inequity. Concentration of wealth can also fuel asset bubbles and property speculation, increasing financial instability, as in the 2008 crisis. Furthermore, wealth gives security and power: people with savings can absorb shocks, take entrepreneurial risks and access high risk, high reward opportunities, while those with no assets or in debt are vulnerable to poverty, including child and pensioner poverty. Wealth is also lightly taxed compared with income, so it is harder for policy to correct. However, the consequences of income inequality are also severe and arguably more immediate. Low income directly determines living standards: households on low incomes struggle to afford food, heating and housing, leading to poverty, poor physical and mental health, lower educational achievement and higher crime. Research such as 'The Spirit Level' suggests that more unequal societies have worse social outcomes across a range of indicators. Income inequality may also reduce aggregate demand and economic growth, because poorer households have a higher marginal propensity to consume than the rich. A sense of unfairness, especially where it reflects discrimination or gender pay gaps, can damage social cohesion and incentives.

It can also be argued that wealth inequality is partly a natural result of the life cycle. Young people have little wealth because they have not yet had time to accumulate savings and pension funds, while older people have more; looking at a snapshot in time overstates lifetime inequality. Much UK wealth is held in pension funds and the home people live in, which does not generate spending power until it is sold, so its consequences may be less damaging than headline figures suggest. Meanwhile, the UK tax and benefit system is designed around income, through progressive income tax, national insurance, tax credits and benefits, so its effects on income inequality are already reduced, whereas inheritance tax and capital gains tax raise relatively little.

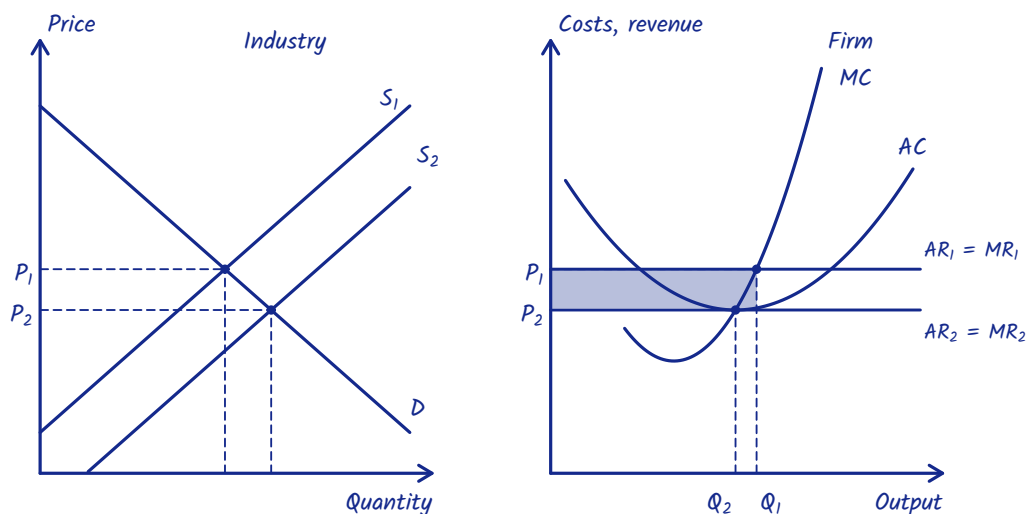
Some inequality of both kinds is inevitable in a market economy and may be desirable, because higher rewards provide incentives to work, train, save and take risks, and supporters of trickle-down economics argue the whole economy benefits.

The problem is not inequality itself but its extent. Many of the consequences are shared, and the two are closely linked: high incomes allow wealth to accumulate, and wealth generates income.

In conclusion, in the UK the consequences of wealth inequality are likely to be more damaging in the long run, because wealth is much more unequally distributed, it compounds over time, it is passed between generations and it reduces social mobility, so it entrenches income inequality too. Income inequality, however, has more immediate effects on poverty and living standards. Which is more damaging depends on the time period considered and on policy: if policies such as reforming inheritance tax, taxing property more fairly and increasing the supply of affordable housing were introduced, the damage from wealth inequality could be reduced. Overall, the two are best seen as mutually reinforcing problems that need to be tackled together.

Profit is the difference between total revenue and total cost. Economists include the opportunity cost of the entrepreneur's capital and time in costs. Normal profit is the minimum level of profit needed to keep a firm in its present market in the long run, earned when total revenue equals total cost ($AR = AC$). Supernormal profit is any profit above normal profit ($AR > AC$). A firm is an organisation that combines factors of production to produce goods and services.

In a market economy, resources are allocated by the price mechanism, and profit plays a central role in this. Firstly, profit acts as a signal. If consumers' preferences change and demand for a good rises, its price rises and firms in that market earn supernormal profit. This signals to other firms that resources are needed in that industry. Secondly, profit provides an incentive: entrepreneurs are motivated by the prospect of profit to start businesses, move resources into that market and produce what consumers want. Where losses are made, firms leave and resources move to more valued uses.



This is shown in the diagram for a perfectly competitive market. An increase in demand raises the price to P_1 , and the firm, a price taker, produces Q_1 where $MC = MR_1$. Since AR is above AC , it makes supernormal profit (the shaded area).

Because there are no barriers to entry, this profit attracts new firms, so industry supply shifts from S_1 to S_2 , and the price falls to P_2 . In the long run, the firm makes only normal profit where $P = \text{minimum } AC$, so resources have been reallocated to meet consumer demand at the lowest cost, achieving allocative and productive efficiency. Profit therefore rations resources between competing uses.

Thirdly, profit rewards enterprise and risk-taking. Starting a business involves the risk of losing money; profit is the reward to the owners and shareholders for bearing this risk. Without the prospect of profit, few people would be willing to take risks, and innovation and enterprise would be reduced.

Fourthly, profit is a source of finance for investment. Retained profits are a cheap source of funds for new capital, research and development and working capital.

Supernormal profit allows firms to invest in new technology and products, improving dynamic efficiency, for example pharmaceutical firms using profits to develop new drugs with large public benefits. In the long run, this raises productivity and economic growth. Profits are also an indicator of a firm's health as a going concern, helping it to borrow from banks or raise funds from shareholders.

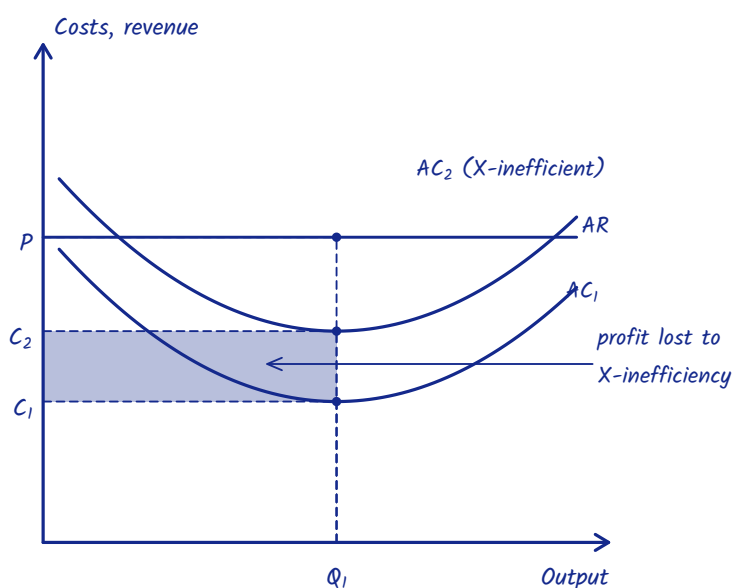
Profit also plays a role in the wider economy. It is a source of income for households, since dividends are paid to shareholders and to pension funds, so many pensioners rely on company profits. It is also an important source of tax revenue for the government through corporation tax, which funds public services. Finally, the threat of losses and the pressure of competition make firms control costs and reduce waste, encouraging productive efficiency.

However, profit does not always lead to an efficient outcome. Where firms have monopoly power, as in the extract about the US where corporate profits have risen to 9% of GDP, high profits may result from barriers to entry rather than efficiency. Prices are set above marginal cost, causing allocative inefficiency and a transfer of welfare from consumers to producers. The signalling role then breaks down because new firms cannot enter. Overall, profit is the engine of a market economy, signalling, rewarding and financing the allocation of resources, but it works best in competitive markets.

A firm is inefficiently managed if it does not minimise its costs for a given level of output, for example because of X-inefficiency (organisational slack, where costs are above the lowest possible), wasted resources or poor decision-making, or if managers fail to respond to what consumers want. Profit is total revenue minus total cost, so for a given revenue, higher costs from poor management will reduce profit. The view in the question suggests low profits are therefore evidence of inefficient management.

There is a good deal of truth in this view. As shown in the diagram, if a firm suffers X-inefficiency, its average cost curve is AC_2 rather than AC_1 . At output Q_1 and price P , cost per unit is C_2 rather than C_1 , so profit falls by the shaded area.

Poor management can lead to overstaffing, poor control of stocks, outdated technology, and diseconomies of scale, as communication and coordination become more difficult in large firms. Managers may pursue their own objectives, such as high salaries and prestige, because of the divorce of ownership from control: shareholders cannot fully monitor managers, a principal-agent problem. In a profit-maximising firm with monopoly power, low profits may therefore well indicate bad management, since a well-run monopolist should be able to make supernormal profit. Several examples of struggling retailers which failed to adapt to online shopping, such as BHS, support the view.



However, low profits do not necessarily mean inefficiency. Market structure is crucial. In highly competitive markets, such as perfect competition or monopolistic

competition, firms can only earn normal profit in the long run, because supernormal profit attracts new entrants. Here a firm must be well run, operating at the lowest possible cost, simply to survive. Likewise, in a highly contestable market, the threat of hit and run entry forces incumbents to keep prices close to average cost, so low profits are a sign of efficiency, and they also benefit consumers through lower prices. In contrast, high profits may reflect monopoly power and barriers to entry rather than good management, as in the US example, where rising profits are causing concern about dominant firms.

Secondly, a firm may not be trying to maximise profit. Managers may follow other objectives, such as sales maximisation, revenue maximisation (where $MR = 0$) or growth in market share. A firm like Amazon made very low profits for many years because it deliberately reinvested to grow and gain economies of scale, which later gave high profits. Firms may also use limit pricing or predatory pricing to deter entry, accepting low profits in the short run. Not-for-profit organisations, social enterprises and nationalised firms may aim to provide a service rather than make profit. Family firms may satisfice, accepting a satisfactory level of profit. In these cases, low profits are a deliberate choice, not a sign of poor management.

Thirdly, some industries are inherently less profitable because of high costs, low demand or intense competition, and some low risk industries offer only low returns. Profits can also fall because of events beyond management control, such as changes in tastes, a recession, rises in the price of raw materials, exchange rate changes, environmental disasters or terrorism; airlines, for example, suffer when fuel prices rise. Government intervention, such as price caps on energy firms, higher taxes or regulation, can also reduce profits even of very efficient firms.

Finally, profit figures can be misleading: some multinational firms use transfer pricing to declare low profits in high tax countries to reduce corporation tax.

The time period also matters. In the short run, a firm may make low profits or even losses while investing heavily in research and development, new technology or expansion; this reflects good management aimed at dynamic efficiency and higher long-run profits. Conversely, a firm may make high profits in the short run by cutting investment, which is poor long-term management.

In conclusion, a firm making low profits may be inefficiently managed, particularly if it is a profit-maximising firm with market power, operating in a profitable industry in which its rivals earn much higher returns. However, it is wrong to say that low profit 'must' mean inefficient management. Whether it does depends on the market structure, the firm's objectives, the time period and external factors. The best way to judge efficiency is to compare the firm's costs and profits with similar firms in the same market over a number of years, rather than looking at the level of profit alone.

Do not write outside the box