

## A-level ECONOMICS

### Paper 1 Markets and Market Failure

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Monday 20 May 2019

Morning

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

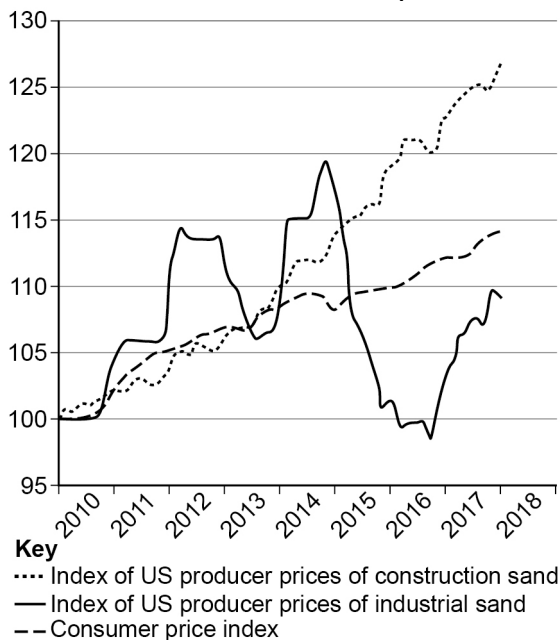
Total for this context: 40 marks

#### The market for sand

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

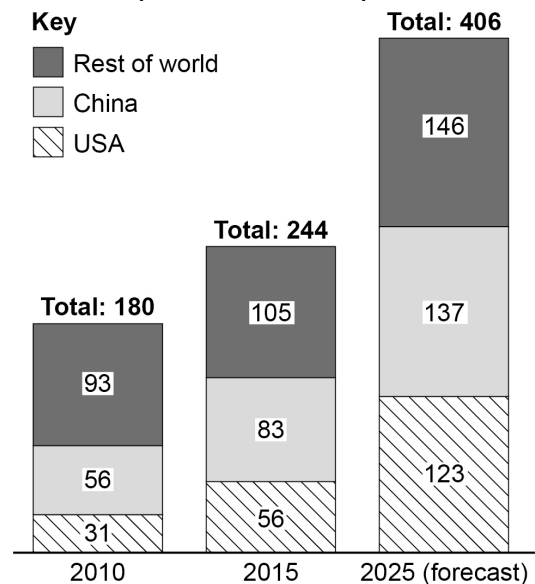
#### Extract A

**Figure 1: Indices of US producer prices for sand, Jan 2010–Jan 2018 (Jan 2010=100)**



Source: Federal Reserve Economic Data, 2018

**Figure 2: Global demand for sand (millions of tons), 2010–2025**



Source: The Freedonia Group/National Post, 2018

#### Extract B: Is the world running out of sand?

Sand is in high demand. Sand accounts for up to 85% of all mining and the global depletion of sand is rapidly exceeding its natural renewal rate. Sand is mostly used in the construction industry to make concrete and asphalt. Chinese demand has risen significantly, reflecting the country's rapid pace of construction: it built 32.3 million houses and 4.5 million kilometres of road between 2011 and 2014. Sand also has industrial uses: it is used to make glass, electronics, and to help extract oil in the fracking industry. While market demand for industrial sand has tracked overall economic growth in the USA, the demand for fracking sand has been as volatile as oil prices.

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Vast quantities of sand are dumped into the sea to reclaim land: Singapore, for example, has expanded its land area by over 20% since the 1960s. Much of this sand originates from Indonesia, where sand miners have completely erased over 20 islands since 2005. The Maldives and Kiribati have used sand to shore up their islands against rising sea levels. The United Nations forecasts that, by 2030, there will be over 40 'megacities', home to more than

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10 million inhabitants (up from 31 in 2016), which means more housing and infrastructure will need to be built. Also, sea levels will continue to rise and so sand will only become more sought after. But why is there a shortage when sand seems so abundant? Desert sand is too smooth, and so cannot be used for most commercial purposes. Australian sand was shipped to a faraway desert to build Dubai's Burj Khalifa tower, made possible by cheaper transportation. Most countries have rules in place about where, and how much, sand can be mined. However, surging demand has sparked a lucrative illegal trade in many rapidly developing countries which is damaging the environment, causing pollution and harming local biodiversity.

Source: News reports, February 2018

### Extract C: The need for international action

There are currently no international conventions to regulate sand extraction, trade and use. Critics argue that the international community needs to treat sand like a resource on a par with clean air, biodiversity and other natural endowments that nations seek to manage for the future.

In the developed world, concerns have led to restrictions on where sand can be mined. In the USA, for example, mining it offshore or near large residential areas is restricted. Regulations are also in place in many developing countries. Indonesia, Malaysia and Cambodia have all placed restrictions on exports, although the rules are not always enforced. There is a particular problem of ineffective enforcement in India, with organised criminal networks ignoring rules and conducting unregulated sand mining.

Substitutes for sand do exist. Mud can be used for land reclamation, straw and wood for building houses, and crushed rock for making concrete. In some rich countries a shift towards these alternative production processes is already under way as sand prices rise. In the UK, sand demand is 25% less than in 2007, and 28% of building materials used in the UK in 2014 had been recycled. Rising prices will eventually also force builders in developing countries to explore alternatives to sand. But without better law enforcement, high sand prices also make illegal mining more profitable.

Source: News reports, February 2018

- |          |          |                                                                                                                                                                                                                                                                                                                                                                        |                   |
|----------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>0</b> | <b>1</b> | Using the data in <b>Extract A</b> (Figure 1), calculate the percentage change in the price of construction sand between January 2014 and January 2018. Give your answer correct to <b>one</b> decimal place.                                                                                                                                                          | <b>[2 marks]</b>  |
| <b>0</b> | <b>2</b> | Explain how the data in <b>Extract A</b> (Figures 1 and 2) show that expansion in the global sand market is leading to prices of construction sand rising in real terms.                                                                                                                                                                                               | <b>[4 marks]</b>  |
| <b>0</b> | <b>3</b> | <p><b>Extract B</b> (line 18) states that the global trade in sand has been 'made possible by cheaper transportation'.</p> <p>With the help of a diagram, explain how cheaper transportation <b>and</b> a construction boom in East Asia have led to growth in the market for sand.</p>                                                                                | <b>[9 marks]</b>  |
| <b>0</b> | <b>4</b> | <p><b>Extract C</b> (lines 14–15) states that 'Rising prices will eventually also force builders in developing countries to explore alternatives to sand.'</p> <p>Use the extracts and your knowledge of economics to assess the view that the increasing scarcity of sand is a problem best solved by market forces, rather than through government intervention.</p> | <b>[25 marks]</b> |

Turn over ►

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

OR

## Context 2

Total for this context: 40 marks

### The British railway system

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

#### Extract D

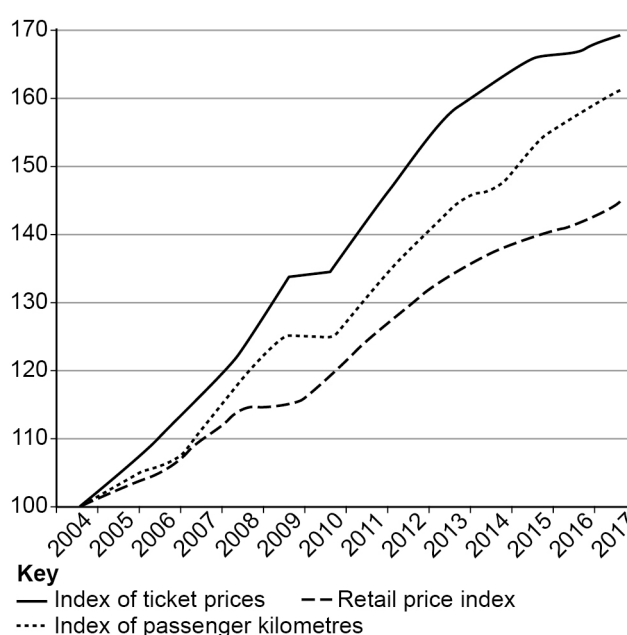
**Figure 3: UK (excluding Northern Ireland) rail industry income, 2010–2016**

| £ millions          | 2010–11       | 2015–16       |
|---------------------|---------------|---------------|
| Passenger income    | 7 588         | 9 160         |
| Government funding  | 6 182         | 6 697         |
| Network Rail income | 2 565         | 2 300         |
| Other income        | 793           | 833           |
| <b>Total</b>        | <b>17 128</b> | <b>18 990</b> |

|                                |     |     |
|--------------------------------|-----|-----|
| Passenger income as % of total | 44% | 48% |
|--------------------------------|-----|-----|

**Figure 4: Indices of UK rail ticket prices and passenger kilometres, 2004–2017 (2004=100)**



Source: Office of Rail and Road, Feb 2017

#### Extract E: Privatisation of British Rail

‘More competition, greater efficiency and a wider choice of services’, proclaimed the 1992 Government white paper that advocated the privatisation of British Rail. Two decades on, passenger journeys have more than doubled from 735 million in 1994–5, to 1.7bn in 2016–17. But how much of this is due to the benefits of privatisation, rather than factors such as increasing urban congestion and a rising population? The UK’s trains and tracks are more intensively used than in any other European market except the Netherlands. Investment is up, at around four times (in real terms) the £1.6bn a year it averaged in the late 1980s. The data on service quality are mixed. The UK performs well in terms of punctuality and reliability, but many journeys are uncomfortable. At peak hours 23% of London commuters have to stand.

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Instead of pushing British Rail into the private sector as a natural monopoly, the Government split it up and sold it in no less than 100 pieces between 1995 and 1997. Privatisation was supposed to unleash efficiencies that would justify the returns private operators demand for their services. However, a recent study shows that the cost of running the UK’s railways is 40% higher than in the rest of Europe. “The train you catch is owned by a bank, leased to a private company, which has a franchise from the Department for Transport to run it on track owned by

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Network Rail, all regulated by another office, and paid for by taxpayers or passengers,” says Prof John Stittle.

Since 1996, government subsidies have almost doubled in real terms. Ticket prices are now 25% higher in real terms than in 1995 and 30% higher than in France, Sweden and Switzerland.

Source: News reports, February 2018

### Extract F: A return to Government ownership?

In May 2018, the Government allowed Virgin and Stagecoach to end their East Coast mainline franchise three years early, after claims they had lost more than £100 million. This has led to accusations that private companies can just walk away whenever profits dry up. When their predecessor, National Express, gave up the East Coast line franchise in 2009, it was renationalised. During the following five years under state control, it increased ticket sales, returned about £1bn to the taxpayer and improved customer satisfaction. Encouraged by this success, the Labour Party has proposed rail renationalisation of the entire UK network. Recent polls suggest almost 75% of the UK population agree, although opponents contend that most of the British public really don't care about who runs the trains; what they care about is reliability, comfort and price.

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Part of the appeal of rail renationalisation comes from the low up-front costs: by taking over operations as franchises expire, the Government would avoid having to spend billions in buying out private companies. The Labour Party's plan involves reversing the splitting up of the service so that customers receive a simplified ticketing system with improved efficiency, although this may impact on dynamic efficiency and innovation.

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Opponents of nationalisation argue that the train operating companies are efficient and not making excessive profits. “Profits are about 3.4% across the industry”, says Mark Smith, a former government regulator. “So if you eliminated all profits overnight you would get a one-off 3.4% cut in fares, which isn't going to set the world on fire.”

Source: News reports, May 2018

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Using the data in **Extract D** (Figure 3), calculate the amount of government funding per £ of passenger income in the UK rail industry for the year 2015–16. Give your answer correct to the nearest penny.

[2 marks]

|   |   |
|---|---|
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Explain how the data in **Extract D** (Figure 4) show that in the UK, between 2004 and 2017, changes in the demand for rail travel contributed to changes in the price of rail travel.

[4 marks]

|   |   |
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**Extract E** (lines 10–11) describes the British railway sector as a ‘natural monopoly’, which was split up into ‘no less than 100 pieces’ when it was privatised.

With the help of a diagram, explain why breaking up a natural monopoly in rail may affect long-run average costs.

[9 marks]

|   |   |
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**Extract F** (lines 9–10) suggests that ‘the British public really don't care about who runs the trains; what they care about is reliability, comfort and price.’

Use the extracts and your knowledge of economics to evaluate the case for renationalising railways in the UK.

[25 marks]

Turn over ►

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**Section B**

Answer **one** essay from this section.

Each essay carries 40 marks.

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**EITHER****Essay 1**

For a long time, supermarkets and other commercial firms have understood the benefits of behavioural economic concepts such as choice architecture and framing. The public sector has been slow off the mark, but at last governments are now taking advantage of the opportunities provided by nudging.

|   |   |
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Explain how rules of thumb and irrationality can affect consumers' demand for goods and services.

**[15 marks]**

|   |   |
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Using examples to illustrate your answer, assess the usefulness of behavioural economic theory compared to traditional economic policies in helping governments to correct market failures

**[25 marks]**

**OR****Essay 2**

Several loss-making retailers including Homebase, House of Fraser and Poundworld have had to decide whether to shut down operations or carry on while making losses. In contrast, the music-streaming firm Spotify was valued at \$27 billion in 2018, despite never having made a profit in any year since it was founded. Spotify has been more focused on expanding market share.

|   |   |
|---|---|
| 1 | 1 |
|---|---|

Explain the factors a profit-maximising firm will take into account when deciding whether to shut down or to carry on operating, both in the short run and in the long run.

**[15 marks]**

|   |   |
|---|---|
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Discuss the validity of the traditional economic assumption that the main objective of firms is to maximise profits.

**[25 marks]**

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**OR**

**Essay 3**

‘Each time the Government imposes a minimum price or wage, the result is almost always excess supply. What matters is the extent to which this is a problem.’

|   |   |
|---|---|
| 1 | 3 |
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Explain how the impact of a minimum price for a good or service is affected by its price elasticity of demand and its price elasticity of supply.

**[15 marks]**

|   |   |
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Discuss the view that a national minimum wage is beneficial for an economy.

**[25 marks]**

**END OF QUESTIONS**

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**There are no questions printed on this page**

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Question  
number

0 1

Jan 2014 index = 110, Jan 2018 index = 127

% change =  $(127 - 110) \div 110 \times 100 = 15.45\%$

= 15.5% (to 1 d.p.)

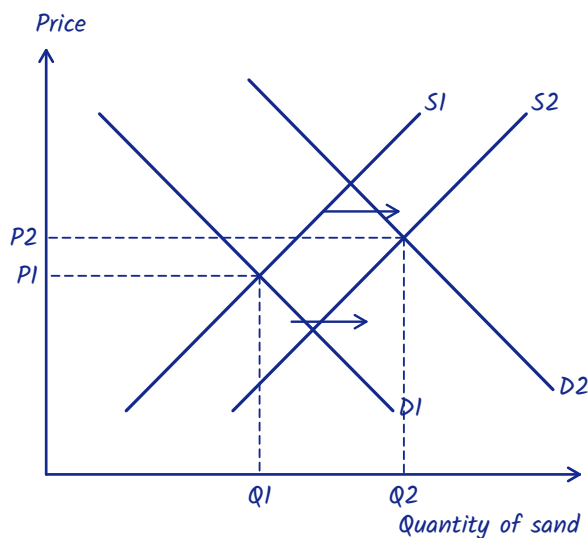
0 2

Figure 2 shows that the global sand market is expanding: global demand rose from 180 million tons in 2010 to 244 million tons in 2015, an increase of about 36% in five years, and is forecast to reach 406 million tons by 2025. China alone rose from 56 to 83 million tons.

A price rises in real terms when it rises faster than the general price level. In Figure 1 the index of US producer prices of construction sand rose from 100 in Jan 2010 to 127 in Jan 2018, a 27% nominal rise, while the consumer price index rose only from 100 to 114 (14%). So construction sand prices rose about 13 percentage points more than inflation, a real increase of roughly 11 to 13%. This is consistent with the expansion causing the rise: as demand shifts to the right faster than supply, excess demand bids up the relative price of sand, and since 2015 construction sand prices have kept rising, in line with the forecast growth in demand in Figure 2.

0 3

The market for sand grows when the equilibrium quantity bought and sold rises. Two forces have combined to cause this, as shown in the diagram.



Cheaper transportation, such as lower bulk shipping costs, reduces the cost of delivering sand to buyers, so producers are willing and able to supply more at every price. Distant sources can now be sold profitably in far-off markets, for example Australian sand shipped to build Dubai's Burj Khalifa and Indonesian sand used to reclaim land in Singapore, creating new opportunities for trade between countries. Supply shifts right from  $S_1$  to  $S_2$ . On its own this would create excess supply at  $P_1$ , pushing price down and extending demand.

At the same time the construction boom in East Asia has increased demand. Sand is a derived demand: it is wanted because it is an input into concrete, asphalt and glass, so when demand for buildings and roads rises, demand for sand rises. China built 32.3 million houses and 4.5 million km of road between 2011 and 2014, and Singapore has expanded its land area by over 20% using reclaimed sand. Figure 2 shows Chinese demand rising from 56 to 83 million tons between 2010 and 2015, forecast to reach 137 million tons by 2025.

Demand shifts right from  $D_1$  to  $D_2$ . On its own this would create excess demand at  $P_1$ , raising price and extending supply.

Combining the two shifts, quantity rises unambiguously from  $Q_1$  to  $Q_2$ , so the market grows. The effect on price depends on the relative size of the shifts. Because the demand shift has been larger, price has risen moderately from  $P_1$  to  $P_2$ , which matches the rise in the construction sand price index to 127. Without cheaper transport the same demand increase would have caused a much larger price rise and a smaller increase in quantity, so cheaper transport has allowed the market to grow without prices rising as much. Growth is likely to continue as the number of megacities rises to over 40 by 2030.

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Scarcity exists when wants exceed the resources available to satisfy them. Extract B states that the depletion of sand is 'rapidly exceeding its natural renewal rate', and Figure 2 forecasts global demand to rise from 244 to 406 million tons between 2015 and 2025. Market forces means leaving the allocation of sand to the price mechanism, the free interaction of demand and supply, whereas government intervention includes regulation, taxes, permits and quotas,

and international agreements.

The case for market forces rests on the three functions of the price mechanism.

Rising demand for a limited supply raises price, as shown by the construction

sand price index rising to 127 by 2018. This signals scarcity, rations sand to the

users who value it most, and creates incentives. Buyers have an incentive to

economise and switch to substitutes: Extract C notes that crushed rock can

replace sand in concrete, mud can be used for land reclamation, and straw and

wood for building houses. Recycling becomes more profitable; in the UK, 28% of

building materials used in 2014 had been recycled and sand demand is 25%

lower than in 2007. Producers have an incentive to invest in new sources and

technology, for example processing desert sand or crushing rock, which increases

supply. Demand for sand is price inelastic in the short run, but as substitutes

develop PED becomes more elastic in the long run, so higher prices will

increasingly cut consumption, exactly as Extract C suggests. Markets also

respond without governments needing detailed information, avoiding the risk of

government failure.

However, the market fails to allocate sand efficiently. Sand mining creates

negative externalities: Extract B says illegal mining is damaging the environment,

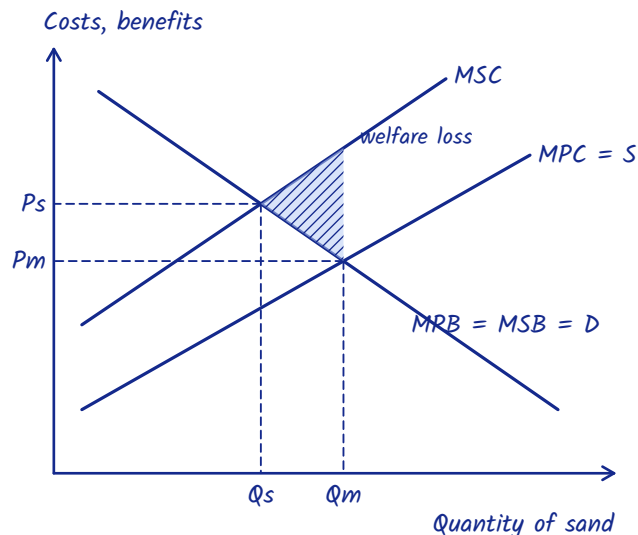
causing pollution and harming local biodiversity, and miners have erased over 20

Indonesian islands since 2005. Dredging also leaves coasts more vulnerable to

rising sea levels and extreme weather, and transporting sand vast distances by

sea adds to emissions. These external costs are borne by third parties and are

not included in the price.



As the diagram shows, the marginal social cost (MSC) of sand lies above the marginal private cost (MPC). The free market produces  $Q_m$  where  $MPC = MSB$  at price  $P_m$ , whereas the social optimum is  $Q_s$  where  $MSC = MSB$  at the higher price  $P_s$ . Too much sand is extracted and the shaded triangle is the welfare loss. The key point is that market prices are too low, so the signals that are supposed to solve the problem understate the true scarcity.

In addition, much sand in rivers, beaches and seabeds is a common access resource: it is rival but non-excludable, and no one has clear property rights.

This creates a tragedy of the commons, where each miner has an incentive to extract as much as possible before others do, so the stock is depleted faster than it renews. Future generations' needs are not reflected in today's price, so market forces alone will tend to act too slowly.

Government intervention can correct these failures. A tax on extraction equal to the marginal external cost would internalise the externality, shifting MPC up to MSC, raising the price to  $P_s$  and reducing extraction to  $Q_s$ , while raising revenue to repair environmental damage. Importantly, this works with market forces, strengthening the incentive to use substitutes and recycle. Regulations already exist: the USA restricts offshore mining and mining near residential areas, and Indonesia, Malaysia and Cambodia have restricted exports. A system of permits or quotas could cap total extraction close to the natural renewal rate while still letting the market allocate the permits efficiently.

Yet intervention risks government failure. Enforcement is weak in many

developing countries: Extract C says rules are not always enforced and organised criminal networks in India ignore them. Taxes and quotas raise prices, and Extract C warns that high prices make illegal mining more profitable, so a black market may grow. Governments lack the information needed to set the tax at exactly the marginal external cost. Because sand is traded globally, restrictions in one country may simply displace mining to another, so international agreement is needed, but there are currently no international conventions, and such agreements are slow to achieve and suffer from free riding. Restricting sand could also harm developing countries building housing for their growing megacities, and countries such as the Maldives and Kiribati that use sand to shore up their islands, where sand has large social benefits.

Overall, whether market forces are best depends on which aspect of the problem we consider. Rising scarcity in the sense of rising cost is handled well by markets: the UK evidence shows that higher prices are already driving substitution and recycling in rich countries. However, the externality and common resource problems will not be solved by the price mechanism, because the price itself is wrong. The time period also matters: in the short run demand is inelastic, so rising prices do little to cut extraction, while damage such as eroded islands is irreversible and cannot wait for the long run. The answer also depends on the country: where institutions are strong, regulation works; where enforcement is weak, regulation alone fails.

In conclusion, I only partly agree with the view. The increasing scarcity of sand is best solved by market forces corrected by government intervention, rather than by either alone. Governments should not cap prices or subsidise sand, so that price signals can encourage substitutes, but they should make prices reflect full social costs through taxes or tradable permits, and above all improve law enforcement and work towards international agreement, since without this, as Extract C says, high prices will simply make illegal mining more profitable.

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Government funding per £ of passenger income =  $\text{£}6697\text{m} \div \text{£}9160\text{m}$   
 = 0.7311...  
 = £0.73 (73p) per £ of passenger income

0 6

Passenger kilometres measure the quantity of rail travel consumed, so the rise in this index from 100 in 2004 to about 161 in 2017 (an increase of 61%) shows that demand for rail travel has increased, shifting the demand curve to the right, for example because of a rising population and urban congestion.

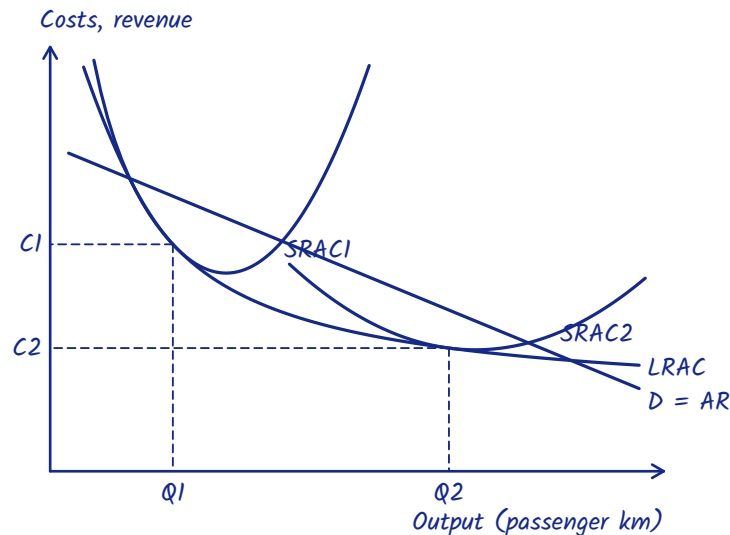
Over the same period the index of ticket prices rose from 100 to about 169, an increase of 69%, faster than the retail price index, which rose to about 145. So fares rose by roughly 24 index points more than general prices, a rise in real terms.

Because rail capacity (track and trains) is limited, supply is relatively inelastic, so a rightward shift in demand creates excess demand at the old fare, giving operators an incentive to raise prices. The two indices rose together, both rising most steeply between 2004 and 2009, which suggests rising demand contributed to the rise in fares, although regulated fare rises linked to the RPI also played a part.

0 7

Long-run average cost (LRAC) is the lowest cost per unit of producing each level of output when all factors of production are variable. A natural monopoly exists when LRAC is still falling over the whole range of output the market demands, so the minimum efficient scale is so large relative to the market that one firm can supply it at a lower average cost than two or more firms. Rail is a natural monopoly because track, signalling, stations and rolling stock involve huge fixed and sunk capital costs, and spreading these over more passenger journeys means average costs keep falling.

Do not write outside the box



Splitting the network into 'no less than 100 pieces' means each firm produces a much smaller output, such as  $Q_1$  rather than  $Q_2$  in the diagram. Each operates on a smaller short-run cost curve ( $SRAC_1$ ) with average cost  $C_1$  rather than  $C_2$ , so economies of scale are lost: technical economies (longer, fuller trains and one network-wide signalling and timetabling system), purchasing economies from bulk-buying rolling stock and energy, and managerial and marketing economies. Fragmentation also adds transaction costs. As Prof Stittle describes, the train is owned by a bank, leased to a company holding a franchise, run on Network Rail's track and regulated by another office, and every contract, interface and profit margin adds cost. Poor coordination between track owner and operators may create diseconomies of scale. This is consistent with Extract E, which reports that UK rail costs are 40% higher than in the rest of Europe. Short franchises also encourage short-term priorities, so operators are reluctant to invest in long-lived capital that would lower LRAC in the long run.

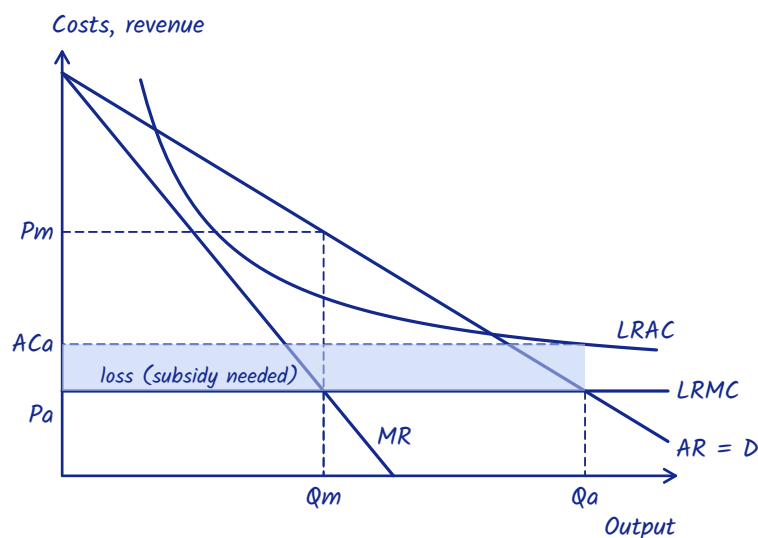
On the other hand, breaking up a monopoly can reduce costs in other ways. Competition for franchises and the profit motive give firms an incentive to cut X-inefficiency, moving actual costs down towards the LRAC curve, and private firms may introduce automation and new technology that raise labour productivity and shift LRAC downwards. The overall effect depends on whether the lost economies of scale outweigh these efficiency gains; the 40% cost gap suggests that in UK rail long-run average costs have risen.

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0 8

Renationalisation means transferring the ownership and operation of the railways from the private sector back to the public sector. British Rail was privatised in 1995 to 1997 in about 100 pieces, and the Labour Party proposes renationalising the whole network by taking over franchises as they expire, as happened with the East Coast line in 2009.

The main economic argument for public ownership is that rail is a natural monopoly, with LRAC falling over the whole range of output because of huge fixed costs. A private monopolist maximises profit where  $MC = MR$ , at  $Q_m$  and  $P_m$  in the diagram, charging a price well above marginal cost, which is allocatively inefficient and leads to underconsumption.



A state-owned railway could instead aim for allocative efficiency by pricing where  $P = MC$ , at  $P_a$  and  $Q_a$ . Because LRAC lies above MC at  $Q_a$ , this would make a loss that must be covered by a subsidy, but it maximises social welfare, and the government already funds the industry heavily (£6697 million in 2015/16, about 73p for every £ of passenger income).

Renationalisation could also reverse fragmentation and lower costs. UK rail costs are 40% higher than in the rest of Europe, and an integrated operator could exploit economies of scale in buying rolling stock and in marketing, coordinate track and train, and offer simplified ticketing, reducing the information failure created by baffling fares (Extract F). Rail also generates positive externalities, such as reduced road congestion, pollution and accidents, so the socially optimal output is greater than the private market would provide; a public operator can

Do not write outside the box

take account of these external benefits and keep socially valuable but unprofitable services.

There is also evidence that the current system nationalises the risks but privatises the rewards. Virgin and Stagecoach were allowed to walk away from the East Coast franchise three years early after losing over £100 million, leaving taxpayers to bear the cost, and subsidies have almost doubled in real terms since 1996. In contrast, during five years of state control the East Coast line increased ticket sales, returned about £1bn to the taxpayer and improved customer satisfaction. The up-front cost is low, because franchises can be taken over as they expire, and around 75% of the public support it. Meanwhile fares are 25% higher in real terms than in 1995 and 30% higher than in France, Sweden and Switzerland, where state-run railways are common.

However, there are strong arguments against. Since privatisation, passenger journeys have more than doubled from 735 million in 1994/95 to 1.7 billion in 2016/17, investment is around four times the £1.6bn a year of the late 1980s in real terms, and the UK performs well on punctuality and reliability. Extract E does warn that much of this growth may be due to congestion and population growth rather than privatisation, but it undermines the claim that private ownership has failed.

Profits are also small. Mark Smith says profits are about 3.4% across the industry, so eliminating them all would give only a one-off 3.4% cut in fares, which would hardly change the price passengers pay. Most importantly, public ownership risks government failure. Without the profit motive and the threat of losing a franchise, a state operator may suffer from X-inefficiency, and Extract F admits that the plan may harm dynamic efficiency and innovation. Investment may be cut when public finances are tight, as in the 1980s, and political interference may lead to decisions made for electoral rather than economic reasons. Also, Network Rail, which owns the track, is already in the public sector, so many problems, such as 23% of London commuters having to stand at peak hours, reflect a lack of capacity rather than private ownership.

Evaluating the case, the quotation is important: passengers care about reliability,

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comfort and price, so ownership matters only insofar as it changes incentives and costs. The evidence suggests the biggest problem is the fragmented structure, which makes UK costs 40% higher, rather than private ownership itself, and integration could in principle be achieved through reformed long-term concessions. The impact on price is likely to be small in the short run because profits are thin, so any fare reductions must come from cost savings and greater subsidy. In the long run the outcome depends on whether a public operator can avoid X-inefficiency and secure stable investment funding.

In conclusion, there is a reasonably strong case for renationalising train operations gradually as franchises expire, because the up-front cost is low, the East Coast experience was positive, and an integrated natural monopoly could cut costs and consider externalities. However, it is not a cure-all: reliability, comfort and price depend mainly on investment in capacity, which requires sustained funding whoever owns the trains, so renationalisation should be combined with an independent regulator and clear performance targets to guard against government failure.

Do not write outside the box

Traditional economic theory assumes that consumers are rational utility maximisers with perfect information, who weigh up the marginal costs and benefits of every choice. Demand therefore depends on price, income, the prices of related goods and tastes, and consumers allocate their income so that the marginal utility per £ spent is equal across goods. Behavioural economics argues that, in reality, consumers act irrationally in systematic and predictable ways, and this affects their demand.

One reason is bounded rationality: consumers have limited information, limited time and limited ability to process information, so they cannot calculate the best choice and instead satisfice, making choices that are good enough. To cope, they use rules of thumb, or heuristics, which are mental shortcuts such as 'buy the brand I bought last time', 'pick the middle-priced option' or 'never spend more than £20 on a present'. People use them because considering all the costs and benefits of every decision would take too long, and many choices involve computational problems, such as comparing hundreds of mobile phone or energy tariffs. Rules of thumb make demand more habitual and brand loyal, so demand becomes less price elastic: consumers do not switch when a rival cuts its price. Firms exploit this, for example by placing a premium option next to a mid-priced one so that the mid-priced one looks like good value, increasing demand for it. Consumers are also subject to biases. Anchoring means judgements are influenced by an initial reference value: a coat labelled 'was £100, now £60' seems a bargain, so demand at £60 is higher than if it had always been priced at £60. Framing has a similar effect: '90% fat free' sells better than '10% fat'. Availability bias means people judge the likelihood of events by how easily examples come to mind, so after a widely reported flood demand for flood insurance rises, and after a plane crash demand for flights falls, even though the true risks are unchanged.

Bounded self-control means that consumers may know what is best for them but fail to act on it, because they place too much weight on the present. As a result, demand for demerit goods such as cigarettes, alcohol and junk food is higher than it would be if consumers were fully rational, while demand for merit

goods such as pensions and exercise is lower: many people pay for gym memberships they rarely use.

Emotional factors and social norms also matter. People are influenced by what others do, so demand for fashion items or bestselling books rises simply because others are buying them, a bandwagon effect that makes demand interdependent. Concerns about fairness can reduce demand for a firm seen to be exploiting customers, for example by raising prices sharply during a shortage. Inertia and default choices mean many consumers stay on their supplier's default energy tariff even when cheaper deals exist, so demand for default products is high and insensitive to price.

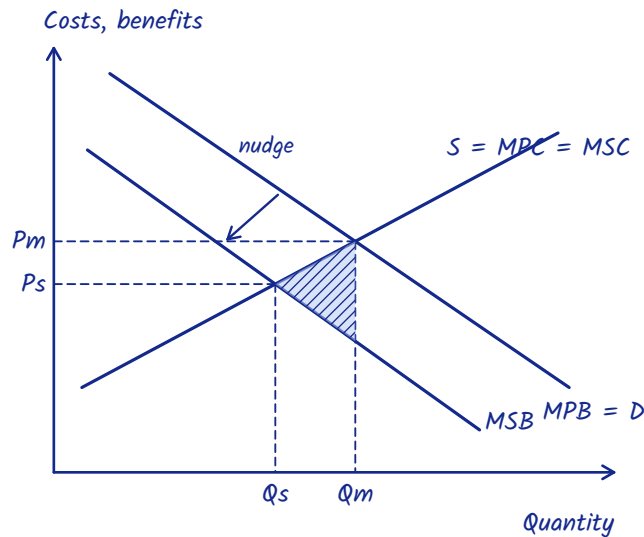
Overall, rules of thumb and irrationality mean that demand may not respond to price and income in the way traditional theory predicts. Demand can be more price inelastic because of habit, loyalty and defaults, it can shift because of framing and anchoring rather than any real change in costs and benefits, and it tends to be too high for demerit goods and too low for merit goods. This is why supermarkets use choice architecture, such as placing sweets near the tills, and why it contributes to market failure.

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Market failure occurs when the free market allocates resources inefficiently, causing a loss of economic welfare, for example through externalities, merit and demerit goods, information failure and public goods. Traditional economic policies, such as indirect taxes, subsidies, maximum and minimum prices, regulation and state provision, assume that people are rational and work mainly by changing incentives. Behavioural economic theory instead recognises that people are boundedly rational, and its policies, called nudges, change the choice architecture, through defaults, framing, social norms and salience, without banning any option or significantly changing incentives. In the UK the Behavioural Insights Team, or Nudge Unit, set up by the Cabinet Office in 2010, has led this work.

Consider a demerit good such as sugary drinks or cigarettes. Because of information failure and bounded self-control, consumers' marginal private benefit

(MPB) exceeds the true marginal social benefit (MSB), so the market produces  $Q_m$  rather than the optimum  $Q_s$ , and the shaded triangle in the diagram is the welfare loss.



A traditional policy such as an indirect tax raises the price and moves consumption towards  $Q_s$ . Taxes are easy to measure, raise revenue that can fund health care, and work through incentives; the UK Soft Drinks Industry Levy of 2018 led many firms to reformulate their drinks to cut sugar. However, demand for addictive goods is price inelastic, so a tax reduces consumption only a little; taxes are regressive, taking a larger share of the incomes of poorer households; high taxes on cigarettes encourage smuggling; and governments lack the information to set the tax at exactly the right level, which may cause government failure. Subsidies for merit goods have a large opportunity cost, and minimum prices, such as Scotland's 50p minimum unit price for alcohol, transfer revenue to retailers.

Behavioural policies tackle the cause of the problem directly. If people overconsume because of irrationality rather than because the price is too low, a nudge can shift the MPB curve towards MSB, as shown by the arrow in the diagram, without a tax. Automatic enrolment into workplace pensions, where saving is the default and workers must opt out, raised participation among eligible employees from around 55% to almost 90%. Nudge Unit letters telling late taxpayers that '9 out of 10 people in your area pay their tax on time' increased on-time payments and brought in millions of pounds at almost no

cost. Other examples include the opt-out system for organ donation, calorie labelling, plain packaging of cigarettes and moving sweets away from tills. These policies are cheap, preserve freedom of choice (libertarian paternalism), are tested by randomised controlled trials so they are evidence based, and are not regressive.

Nevertheless, behavioural policies have limitations. They can be seen as manipulative and paternalistic: who decides what is best for people? Nudged choices may not reflect people's true preferences. The evidence is relatively weak, effects are often small, some results have not been replicated, and effects may fade over time as people get used to the nudge. Most importantly, nudges are much less useful for market failures that do not come from consumer irrationality. A factory that pollutes a river is responding rationally to its private costs, so correcting this negative externality needs a tax, regulation or tradable permits such as the EU Emissions Trading System. Public goods such as national defence need state provision, and monopoly power needs competition policy. Policymakers are themselves subject to biases, so behavioural policies can also lead to government failure.

In practice the two approaches work best together. The 5p charge on single-use plastic bags cut their use in major supermarkets by over 85%, far more than traditional theory would predict from such a small price change, because loss aversion and the framing of a 'charge' made people bring their own bags.

Behavioural insights can therefore make traditional policies more effective.

The usefulness of behavioural theory depends on several factors. First, the type of market failure: it is most useful for information failures and merit and demerit goods caused by bounded rationality, and least useful for externalities caused by firms, public goods and monopoly. Second, cost and effectiveness: nudges are so cheap that even a modest effect gives a high ratio of benefits to costs, whereas taxes and regulation can be more effective but more costly and more distorting. Third, magnitude: for large problems such as climate change or obesity, nudges alone are too weak. Fourth, the time period: nudge effects may fade, while a tax gives a permanent incentive.

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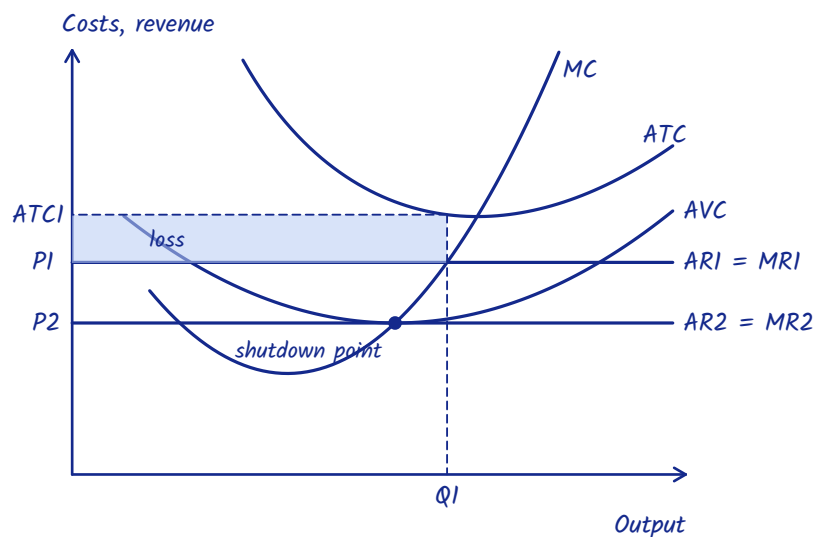
*In conclusion, behavioural economic theory is a useful complement to traditional policies rather than a replacement. It is most useful where market failure arises from consumers' irrationality and where cheap, evidence-based nudges can change behaviour, but traditional policies remain essential where market failure arises from rational agents facing the wrong incentives. Governments get the best results by using behavioural insights to design and frame traditional policies.*

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A profit-maximising firm produces where marginal cost equals marginal revenue ( $MC = MR$ ). Profit is total revenue minus total costs, where costs include normal profit, the minimum profit needed to keep the entrepreneur in this business, which is the opportunity cost of the resources used. A firm makes a loss when total revenue is less than total cost, so average revenue ( $AR$ ) is below average total cost ( $ATC$ ). The short run is the period when at least one factor of production is fixed, so fixed costs must be paid whether or not the firm produces. The long run is the period when all factors are variable and the firm can leave the industry.



In the short run, the key factor is whether revenue covers variable costs. If the firm shuts down it still has to pay its fixed costs, such as rent on leases, so its loss equals total fixed cost. If price is above average variable cost ( $AVC$ ), every unit sold makes a contribution towards fixed costs, so the loss from producing is smaller than the loss from shutting down. In the diagram, at price  $P1$  the firm produces  $Q1$  where  $MC = MR1$ .  $P1$  is below  $ATC$ , so it makes the shaded loss, but it is above  $AVC$ , so it should carry on operating. The shutdown point is at the minimum of  $AVC$ , price  $P2$ : if price falls below this, the firm cannot even cover its variable costs and should shut down immediately.

Loss-making retailers such as Homebase and House of Fraser will continue as long as their sales cover wages, stock and other variable costs.

In the long run all costs are variable, so the firm must cover its total costs including normal profit, which means  $AR$  must be at least equal to  $ATC$  at the

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profit-maximising output. If the firm expects to keep making losses, it will leave the industry. In perfect competition, the exit of loss-making firms shifts industry supply to the left until price rises to the minimum of ATC and the remaining firms earn normal profit.

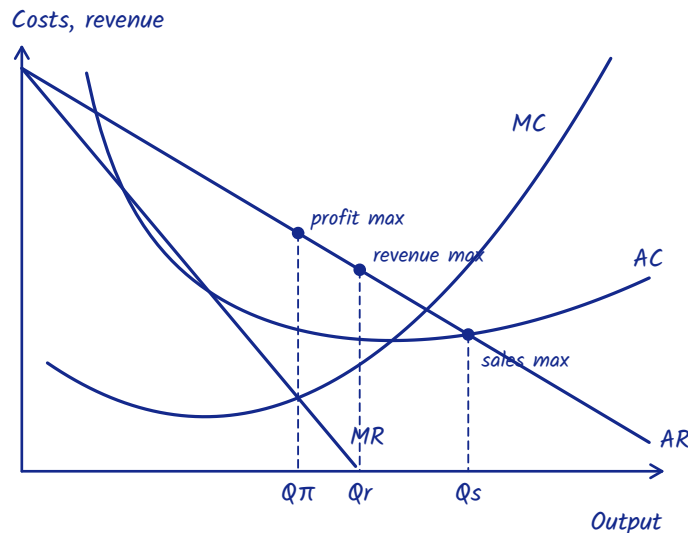
Other factors also matter. Cash flow and finance are vital: even a firm covering its variable costs needs enough cash to pay its bills, so its ability to continue depends on retained profits, affordable credit or new investment. Poundworld collapsed because it ran out of finance. Firms also consider expected future profits rather than current profits. Spotify has made losses every year but was valued at \$27 billion in 2018 because investors expect it to gain market share, benefit from network effects and economies of scale, and earn supernormal profits in the long run once it has monopoly power. Similarly, firms investing heavily in capital, research and development or marketing may accept short-run losses to earn long-run profits.

The business cycle and seasonal demand are also important: a seaside hotel or a car manufacturer in a recession may make temporary losses but continue if demand is expected to recover. Barriers to exit, such as sunk costs, long leases and redundancy payments, mean closure can itself be very costly, encouraging the firm to carry on. A firm with market power may also be able to change its price, cut costs or reposition its product before deciding to close.

In summary, in the short run a profit-maximising firm will carry on as long as AR covers AVC and it has the finance to survive, while in the long run it must cover ATC, including normal profit, unless its losses are an investment in future profits.

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A firm is an organisation that combines factors of production to produce goods and services. Profit is total revenue minus total cost; normal profit is the minimum needed to keep the firm in the industry, and supernormal profit is any profit above this. Traditional theory assumes that firms aim to maximise profit by producing where  $MC = MR$ , shown as output  $Q\pi$  in the diagram.



There are good reasons why profit is usually the main objective. Profit is the reward to entrepreneurs for taking risks, and retained profit is the main and cheapest source of finance for investment. Shareholders, who own the firm, want high dividends and a rising share price, and a firm that fails to make good profits risks a fall in its share price and a takeover by managers who will run it more profitably. In perfectly competitive markets firms have no choice: they earn only normal profit in the long run, so any firm that does not maximise profit will make a loss and be forced out of the industry. Even if managers do not consciously calculate MC and MR, firms that survive are those that behave as if they maximise profit, so the assumption predicts behaviour well.

However, in large public limited companies there is a divorce of ownership from control. Shareholders are the principals, but the managers who run the firm are agents, and because of asymmetric information shareholders cannot fully monitor them. This principal-agent problem allows managers to pursue their own objectives. Baumol argued that managers maximise sales revenue, since their salaries, status and power are linked to the size of the firm. Revenue is maximised where  $MR = 0$  at  $Q_r$ , a higher output and lower price than at  $Q_\pi$ . Alternatively, a firm may maximise sales volume subject to making normal profit, producing where  $AR = AC$  at  $Q_s$ . Managers may also pursue growth through mergers and takeovers to build an empire, even when this reduces shareholder value.

Behavioural theories argue that firms satisfice rather than maximise. A firm is a

coalition of stakeholders, including workers, customers, suppliers, local communities and government, each with different goals. Managers try to earn a satisfactory level of profit to keep shareholders happy while also meeting targets for sales, wages and market share. In addition, firms often do not know their MC and MR curves, so they use rules of thumb such as cost-plus pricing; even a firm that wanted to maximise profit may not be able to.

Many firms also have non-financial objectives. Some pursue corporate social responsibility and environmental goals, such as reducing their carbon footprint or paying suppliers a fair price. Some organisations are not intended to maximise profit at all: the John Lewis Partnership is owned by its employees, co-operatives and mutuals serve their members, charities and social enterprises pursue social aims, and state-owned organisations such as Network Rail aim to provide a public service. In a recession many firms simply aim to survive.

However, many apparent alternatives are consistent with profit maximisation in the long run. Spotify and Amazon have sacrificed short-run profit to grow market share, but their aim is to gain monopoly power and earn large profits later. Limit pricing, where incumbents keep prices low to deter entry, sacrifices short-run profit to protect long-run profit. Corporate social responsibility can improve a firm's brand image, attracting customers and staff, which raises profit. So the assumption is more valid if it is interpreted as long-run rather than short-run profit maximisation.

The validity of the assumption also depends on market structure: firms in competitive markets are forced to maximise profit, while firms with monopoly power have the discretion to pursue other goals. It depends on ownership: owner-managed small firms and firms owned by private equity are strongly profit focused, whereas in large plcs the principal-agent problem is greater, although performance-related pay and share options help to align managers' interests with those of shareholders. It may also be changing over time, as pressure from consumers and investors for environmental and social responsibility pushes firms towards wider objectives.

In conclusion, the assumption that firms maximise profit is not literally true for

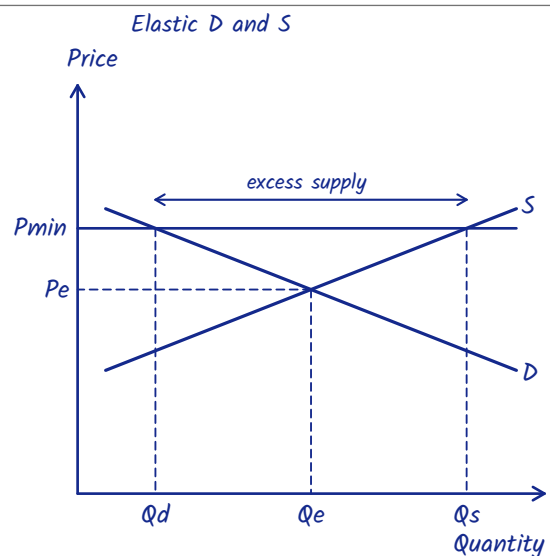
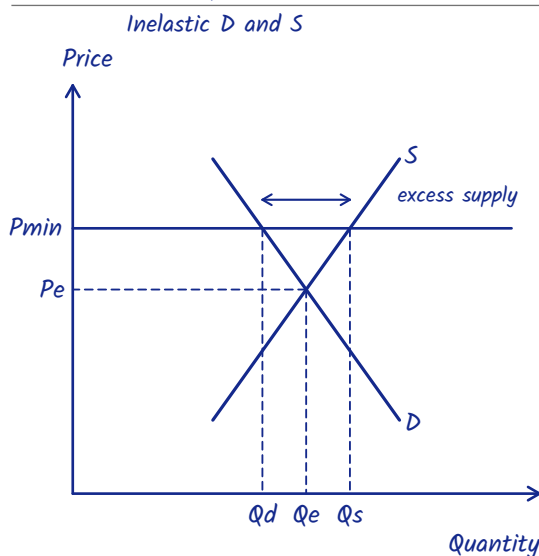
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every firm at every moment, and it is invalid for non-profit organisations.  
However, as a statement of the main objective of most private sector firms in the long run, especially in competitive markets, it remains a reasonable and useful simplifying assumption, because profit is needed for investment and survival and because many other objectives are ultimately a means to long-run profit. It is least valid for large firms with market power where ownership is divorced from control.

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A minimum price is a legally imposed price floor set above the equilibrium price, below which the price is not allowed to fall. Governments introduce minimum prices to raise and stabilise producers' incomes, for example agricultural intervention prices under the EU's Common Agricultural Policy, or to reduce consumption of demerit goods, for example Scotland's minimum unit price for alcohol of 50p per unit.

Price elasticity of demand (PED) measures the responsiveness of quantity demanded to a change in price:  $PED = \% \text{ change in quantity demanded} \div \% \text{ change in price}$ . Demand is elastic if PED is greater than 1 (ignoring the sign) and inelastic if it is less than 1. It depends on the number and closeness of substitutes, whether the good is a necessity or addictive, the proportion of income spent on it and the time period. Price elasticity of supply (PES) =  $\% \text{ change in quantity supplied} \div \% \text{ change in price}$ , and depends on spare capacity, stocks, how easily factors can be switched between uses, perishability and the time period.



A minimum price above equilibrium causes demand to contract. If demand is inelastic, as in the left-hand diagram (for example alcohol for heavy drinkers, or staple foods), quantity demanded falls only a little, from  $Q_e$  to  $Q_d$ , consumers' spending on the good rises and producers' revenue increases. For example, if the minimum price raises the price by 20% and PED is  $-0.3$ , quantity demanded falls by only 6%. So a minimum alcohol price would raise retailers' revenue but do little to cut drinking among dependent drinkers, which may be a government

failure if the aim is to improve health. If demand is elastic, as in the right-hand diagram, the same 20% price rise with PED of  $-2$  would cut quantity demanded by 40%, so the policy is much more effective at reducing consumption, but consumer spending and producers' sales revenue fall.

The minimum price also raises the price producers receive, so supply extends. If supply is elastic, producers can increase output easily, so quantity supplied rises a lot, to  $Q_s$  on the right. If supply is inelastic, as with many agricultural products in the short run, quantity supplied rises only slightly.

Excess supply is the difference between quantity supplied and quantity demanded at the minimum price,  $Q_s - Q_d$ . As the diagrams show, it is smallest when both demand and supply are inelastic and largest when both are elastic. This matters because the surplus has to go somewhere. If the government supports the price by intervention buying, it must buy the surplus at the minimum price, so the cost to taxpayers ( $P_{\min} \times \text{excess supply}$ ) is much greater when PED and PES are elastic, with an opportunity cost and storage costs, as with the EU's 'butter mountains'; the surplus may be destroyed or dumped on world markets.

Without intervention buying, unsold stock may lead producers to sell illegally below the minimum price, creating a black market, and resources are wasted producing goods nobody buys.

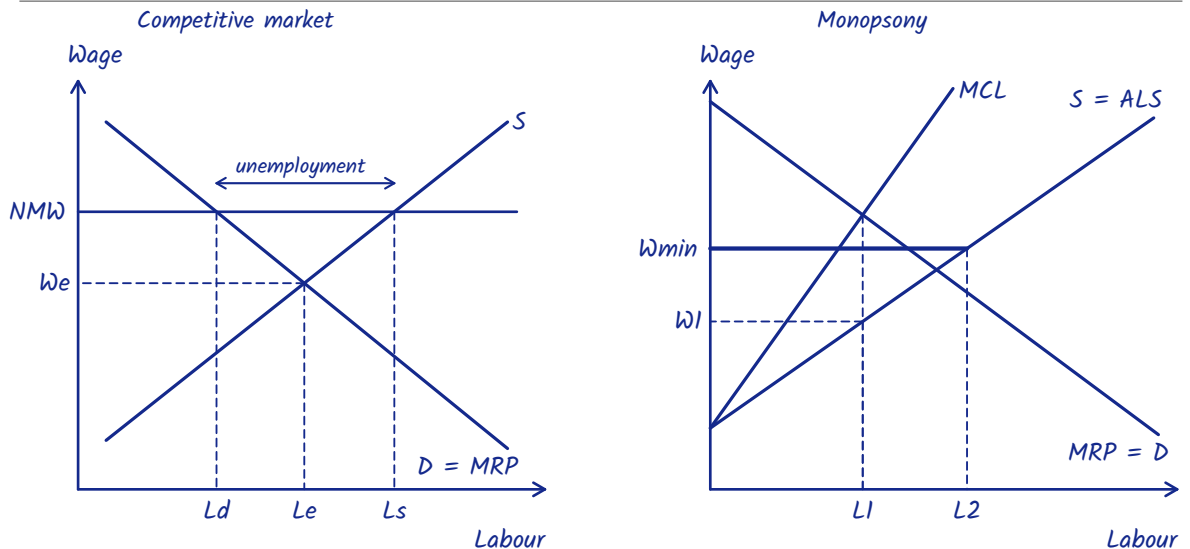
Time also matters, because both PED and PES become more elastic in the long run: consumers find substitutes and producers expand capacity, so the excess supply grows over time and the policy becomes increasingly costly.

In summary, the more inelastic demand and supply are, the smaller the effect of a minimum price on the quantity traded and the smaller the surplus, making it effective at raising producers' incomes but weak at reducing consumption; the more elastic they are, the larger the fall in consumption, the larger the excess supply and the higher the cost of supporting the price.

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A national minimum wage (NMW) is a legal minimum hourly rate of pay that employers must pay workers. The UK introduced it in 1999, and in 2016 added the National Living Wage, a higher rate for workers aged 25 and over (£8.21 an

hour in 2019), with the aim of reaching 60% of median earnings by 2020. The aims are to prevent exploitation of low-paid workers and to reduce in-work poverty and inequality.



In a competitive labour market, shown on the left, the wage is set where the demand for labour (the marginal revenue product, MRP) equals the supply of labour, at  $W_e$  and  $L_e$ . A NMW set above  $W_e$  causes demand for labour to contract to  $L_d$  while supply extends to  $L_s$ , creating unemployment of  $L_s - L_d$ . Workers who keep their jobs are better off, but those who lose them, or never find work, are worse off. This unemployment is likely to be concentrated among young and low-skilled workers from disadvantaged backgrounds, whose MRP is below the minimum wage, which may reinforce existing inequality. Sectors with many low-paid workers, such as care, hospitality and retail, are hit hardest: higher wage costs reduce profits and may cause business failures, or firms cut hours and training. If firms pass on higher costs through higher prices, the poor may lose out as consumers, and at the level of the whole economy higher costs may cause cost-push inflation and reduce international competitiveness.

However, many labour markets are not competitive. In a monopsony, shown on the right, there is a single dominant employer, such as a large care home or supermarket in a small town. To employ more workers it must raise the wage for all of them, so the marginal cost of labour (MCL) lies above the supply curve. It employs  $L_1$  where  $MCL = MRP$  and pays only  $W_1$ , well below the workers' MRP, which is exploitation. A NMW set at  $W_{min}$  makes the MCL

horizontal at  $W_{\min}$ , up to the supply curve, so the firm employs more workers,  $L_2$ , at a higher wage. In this case a NMW raises both wages and employment, correcting a market failure.

There are further benefits. Higher pay can act as an efficiency wage, increasing motivation and reducing labour turnover and recruitment and training costs, which raises productivity. It gives firms an incentive to invest in productivity-enhancing capital and training. A higher wage increases the incentive to work, reducing the unemployment trap and spending on in-work benefits such as tax credits. Low-paid workers have a high marginal propensity to consume, so higher wages boost consumer spending and aggregate demand through the multiplier. A NMW also stops employers using migrant workers to undercut existing workers' wages.

The evidence suggests the costs have been smaller than simple theory predicts. The Low Pay Commission has found little evidence of significant job losses in the UK since 1999, even though the NMW has risen faster than average earnings, and UK employment reached a record high of around 76% in 2019. Card and Krueger found that a higher minimum wage in New Jersey did not reduce fast-food employment. However, other costs remain: administering and enforcing the NMW and prosecuting firms that break the rules, and the fact that it is poorly targeted at poverty, since many low-paid workers are second earners in households that are not poor, and poverty is often caused by too few hours of work rather than a low hourly wage.

Whether a NMW is beneficial depends on several factors. The most important is its level, or 'bite' relative to median earnings: a moderate NMW has small employment effects, but a high bite risks large job losses. Because it is a single national rate, its bite is much higher in low-wage regions, such as the North East, than in London. It depends on the structure of the labour market, competitive or monopsonistic, and on the elasticity of demand for labour, which is inelastic where labour is a small share of costs and hard to replace. It depends on the state of the economy, since in a recession firms are less able to absorb higher costs. Finally, the long run differs from the short run: over

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time demand for labour becomes more elastic as firms automate, for example with self-service checkouts, so job losses may grow.

In conclusion, a national minimum wage is beneficial for an economy when it is set at a moderate level by an independent body such as the Low Pay

Commission, using evidence: it reduces exploitation and in-work poverty, may raise productivity, and in monopsonistic markets can even increase employment.

Beyond a certain bite, however, the costs in unemployment for the least skilled, regional job losses and cost-push inflation are likely to outweigh the benefits, so a NMW should be complemented by policies such as training and targeted benefits rather than relied on alone.

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