

## Chapter 4: Production, costs and revenue

### Application of economics in the real world

#### Application of economics in the real world 4.1: The UK's productivity puzzle

- 1 According to the Free Dictionary, a flexible labour market is one in which employees are willing to work flexible hours, to retrain for new skills, to relocate geographically in order to find work, and to accept performance-related pay. A flexible labour market usually also requires employment laws that allow for the easy hiring and firing of employees. Pro-free-market economists argue that the power of trade unions must be reduced to create the conditions in which labour markets are flexible.
- 2 According to ONS estimates published in January 2023, output per worker for the whole UK economy for the period 2000–21 was as shown in Table AERW4.1.

**Table AERW4.1** UK productivity, 2000–21 (2019 = 100)

2000	85.0
2001	85.9
2002	87.4
2003	89.8
2004	90.9
2005	92.3
2006	93.8
2007	95.3
2008	94.9
2009	93.3
2010	95.2
2011	96.0
2012	95.7
2013	95.6
2014	96.0
2015	96.7
2016	97.5
2017	98.9
2018	99.7
2019	100.0
2020	100.0
2021	101.1

The figures published by the ONS in January 2023 show that labour productivity grew by approximately 16.1% over the 22-year period starting in 2000, or 0.73% a year. This was a very slow rate of growth compared to similar advanced developed economies, which has been nicknamed the UK's 'productivity puzzle'.

- 3 According to the Investopedia website, a race to the bottom is ‘a situation where a company, state or nation attempts to undercut the competition’s prices by sacrificing quality standards or worker safety, defying regulations, or paying low wages. A race to the bottom can also occur among regions. The term “race to the bottom” is used to characterise competition that has crossed ethical lines and could be destructive for the parties involved.’

According to the Citizens Advice Bureau, while the vast majority of employers try hard to meet their legal obligations to their workforce, there are still far too many unscrupulous or rogue employers (and employment agencies) prepared to flout the law and so profit from exploitation. As a result, many tens of thousands of the most vulnerable workers in the UK economy — including many low-paid migrant workers from the expanded European Union and elsewhere — are failing to benefit from the UK government’s policy programme since 1997 to establish a framework of decent standards in the workplace. And they are not the only losers. The activity of their deliberately exploitative employers — including, in some cases, the non-payment of tax and national insurance — puts good employers at a competitive disadvantage, eventually forcing some to cut corners themselves or risk going out of business. And, when they do so, even more workers lose out.

In this way, ‘rogue employers’ drive down wage rates and conditions of work, and force good employers to go out of business or to drop their standards also, thereby promoting a ‘race to the bottom’ in labour markets.

- 4 According to the International Labour Organisation, labour productivity (output per worker) is important for the following reasons.
- First, it drives economic growth — a highly productive economy means that we are able to produce more goods or services with the same amount of resource, or produce the same level of goods and services with less resources.
  - Second, labour productivity affects everyone. For firms and employers, increased productivity brings higher profit and opportunity for more investment. For workers, increased productivity can translate to higher wages and better working conditions. For governments, increased productivity results in higher tax revenues, and is the main engine of economic growth.

## Application of economics in the real world 4.2: Japanese manufacturing methods and labour productivity

- 1 The main change in methods of production in car manufacturing mentioned in the passage is the adoption of the Toyota Production System (TPS), first developed in the 1950s by the Toyota car company. Central to TPS is ‘lean manufacturing’, or using less of each input: less labour, less machinery, less space, less time in designing products. Whereas mass production concentrates on reducing defects to a tolerable level, lean production seeks to eliminate all defects. If something goes wrong, the whole assembly line stops while the fault is identified and put right.

Lean manufacturing rejects the old idea of making things in huge batches, which requires holding large buffer stocks of materials and components between each stage of the production process. Now each stage of manufacturing performed in the factory is done on demand. The process eliminates waste by making only as much as is wanted at any given time, without the costly piles of work-in-progress that used to litter factory floors. The change has greatly increased labour productivity.

- 2 Craft production is the process of manufacturing by hand. Mass production, also known as flow production or continuous production, is the production of large amounts of standardised products, often on assembly lines. Craft production is labour intensive, whereas mass production is capital intensive.

In the craft manufacturing process, the final product is unique. While the product may be of extremely high quality, the uniqueness can be detrimental as seen in the case of early automobiles.

Womack, Jones and Roos, in their book *The Machine that Changed the World*, detailed that early automobiles were craft produced. Because each vehicle was unique, replacement parts had to be manufactured from scratch or at least customised to fit a specific vehicle. The advent of mass production and standardised, interchangeable parts guaranteed a part's compatibility with a variety of vehicle models.

Mass production has many drawbacks compared to craft production, including that production quality can be lower than with a craft-produced item. For example, in some mass-production automobile manufacturing facilities, craftspeople rework flawed, mass-produced vehicles to give the appearance of a quality product.

As a compromise between the two, lean manufacturing aims to bring back or exceed the quality of craft production and remedy the inefficiency of mass production through the elimination of waste.

- 3 When first developed in Japan in the 1970s, the idea of just in time (JIT) marked a radical new approach to the manufacturing process. It cut waste by supplying parts only as and when the process required them. The old system became known (by contrast) as 'just in case'; inventory was held for every possible eventuality, just in case it came about.

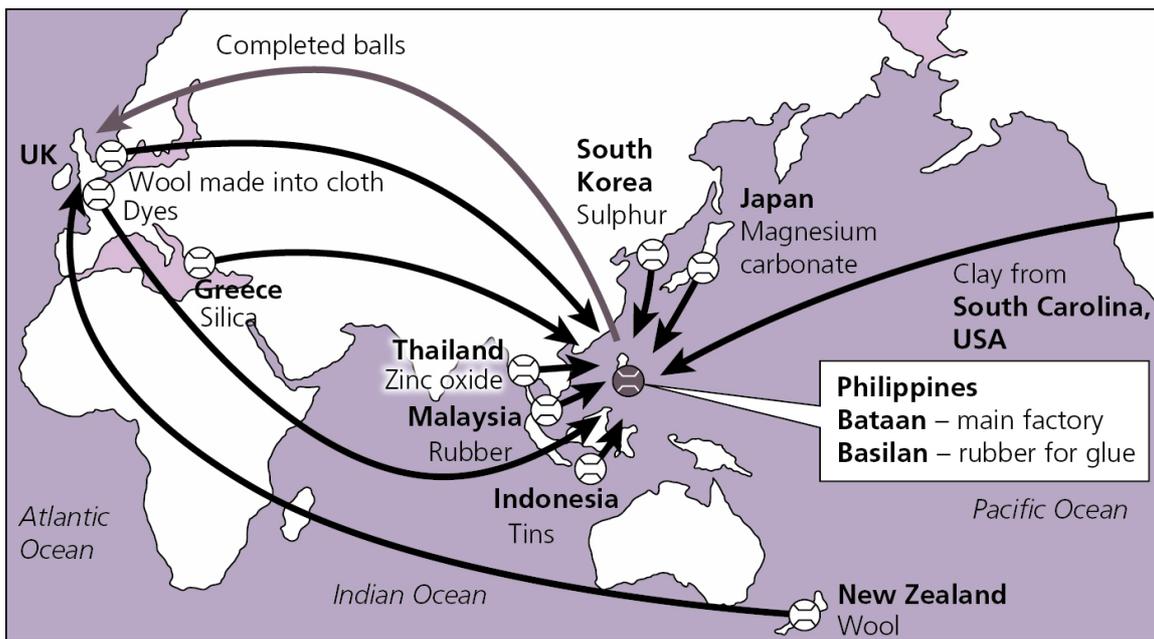
JIT eliminated the need for each stage in the production process to hold buffer stocks, which resulted in huge savings. JIT has other advantages too. It involves the workforce much more directly in controlling their own inventory needs, and it allows a variety of models to be produced on the same assembly line simultaneously. Before its introduction, assembly lines had been able to cope with only one model at a time. To produce another model required closure of the line and expensive retooling.

- 4 Another example of Japanese production methods is 'Muri'. The concept of Muri comes from employees or machines being pushed beyond a certain reasonable limit, to the point where that overburden actually slows down the process. Directly translated as 'totally unreasonable', it is traditionally the first thing that plant managers focus on reducing.

### Application of economics in the real world 4.3: Adam Smith's pin factory

- 1 The division of labour means that different workers perform different tasks in the course of producing a good or service. According to the eighteenth-century classical economist Adam Smith, there are three main reasons why a factory's total output can be increased if workers perform specialist tasks rather than if each worker attempts all the tasks him- or herself. These are as follows:
  - A worker will not need to switch between tasks, so time will be saved.
  - More and better machinery or capital can be employed.
  - The 'practice makes perfect' argument that workers become more efficient or productive at the task they are doing, the greater the time spent on the specialist task. However, this advantage can easily become a disadvantage if it involves 'de-skilling' and the creation of boredom and alienation among workers.
- 2 For the three reasons outlined above, production increases and the average costs of production fall.
- 3 Trade between nations provides many other examples of the global division of labour. Firms located in different countries perform different tasks in the supply chain of a particular good

being assembled and sold to final customers. Figure AERW4.1 shows the international division of labour involved in the production of a Wimbledon tennis ball.



**Figure AERW4.1** International division of labour: a Wimbledon tennis ball

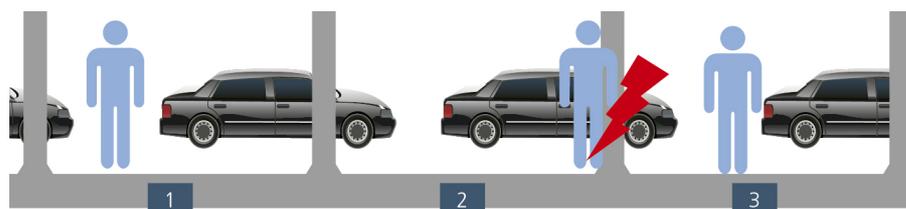
Until the early 2000s, Wimbledon tennis balls were produced by Slazenger near Stoke-on-Trent in the UK. The company then flossed down its British factories and shifted production to the Philippines — a good example of globalisation. A complex supply chain now sees clay shipped from South Carolina in the USA, silica from Greece, magnesium carbonate from Japan, zinc oxide from Thailand, sulphur from South Korea and rubber from Malaysia to Bataan where the rubber is vulcanised — a chemical process for making the rubber more durable.

Wool then travels from New Zealand to Stroud in Gloucestershire, where it is turned into felt and then sent back to Bataan in the Philippines.

- 4 If a firm specialises in a particular task in the production of a final good which is eventually sold on the world market, say an electronic chip which will be assembled into a final computer, it is not constrained by the small size of the market for the computer in the country in which the chip manufacturer is located. The firm may grow very large. On the other hand, because the electronic chip is very cheap to produce, its manufacturer may remain very small, unless it can diversify into producing a wider range of computer components, which it sells to more than one computer manufacturer.

#### Application of economics in the real world 4.4: Are economies of scale now less important in the car industry?

- 1 **Moving assembly line:** Figure AERW4.2 illustrates a moving assembly line in car manufacturing.



**Figure AERW4.2** Moving assembly line in car manufacturing

The key feature is that as cars are assembled, they move along the assembly line from worker 1 to worker 3 and so on, with each worker performing a different task in the assembling process. The red ‘danger’ arrow alongside worker 2 indicates that he has discovered a fault in the car in front of him, which means he will stop the production line for the fault to be rectified.

**Mass production:** Mass production is the manufacture of large quantities of standardised products often using assembly lines or automation technology. Mass production leads to the efficient production of a large number of similar products.

**Market fragmentation:** Market fragmentation relates to the fact that markets are diverse and composed of different market segments, reflecting different needs, wants, responses to marketing messages, and behaviour. These many segments that characterise markets are indicative of the fragmentation of these markets.

**Production runs:** A production run is the number of units of output which a firm produces in a particular time period. Mass production and the use of assembly lines generally mean that lengthy production runs are necessary if low average costs are to be achieved. Economies of scale generally also require long production runs.

**Capital-intensive factories:** A capital-intensive factory is one in which large quantities of capital are combined with relatively little labour to produce a unit of output. The capital–output ratio is high but the labour–output ratio is low. Capital intensity is associated with mass production, long production runs and automation. When these are all present, labour productivity (output per worker) and wage rates are high.

- 2 General Motors (GM) manufactures Vauxhall cars in the UK and in Germany. In an article titled ‘GM learns to exploit its scale’, the magazine *Automotive News* reported in 2016:

*Simplified platforms make global vehicles possible. When General Motors launched the Chevrolet Volt plug-in hybrid in late 2010, it was panned by many as an overpriced, money-losing experiment.*

*Fast-forward five years to last October, when GM surprised industry watchers by disclosing that its Chevy Bolt electric vehicle will arrive late this year with a battery cell cost of at least 40 percent that of the original Volt, dropping the cost from an estimated \$300–\$350 per kilowatt-hour to \$145. GM has fine-tuned the cell chemistry through an expanded partnership with LG Chem while applying its engineering know-how across a half-dozen models.*

*‘Scale is something that’s still lacking in the EV business,’ GM global product development chief Mark Reuss said in an interview last month. ‘But we’ve got it.’*

*In other words, GM used its size and engineering prowess to drive down supply costs and spread innovation across its portfolio. But it’s something GM has done too infrequently in the past, as its Balkanized operations prevented it from reaping the benefits of being one of the world’s largest car companies.*

*The electrification strategy is one example amid mounting evidence that GM, ever the stumbling giant, finally is getting out of its own way, leveraging its size and scale in ways that its competitors probably hoped it never would. It’s spreading more models across a condensed number of improved vehicle platforms. It’s got a new family of small gasoline engines that will account for a quarter of its global sales. It’s locking suppliers into bigger, decade-long contracts spanning two vehicle generations to lower costs and improve quality.*

*Of course, GM is playing catch-up to its biggest rivals in many respects. Volkswagen AG, Toyota Motor Corp. and even Ford Motor Co. are considered further ahead in consolidating global vehicle and engine platforms, a key to improved profitability for global automakers. That lagging position shows in the bottom line: GM’s goal is to push its global operating profit margin to 10 percent by 2020 — a level Toyota hit in fiscal 2015. Still, GM appears to*

*be closing the gap, David Whiston, an analyst at investment research firm Morningstar, wrote in a December report.*

*'It has taken a long time to turn around a company of GM's size,' he wrote. 'But we think it is finally just starting to realize meaningful scale.'*

- 3 Economies of scale give big media companies an advantage when dealing with firms that supply their operations with products and services. When a CBS-owned television station places an order for editing equipment, it may fatten the order by buying similar equipment at a discount price for several other CBS-owned stations at the same time.

Apple's size and the fact that most of Apple's products (e.g. iPhone, iPad) share the same components mean that the company can buy parts such as processing chips and display screens at lower prices due to buying in bulk, benefiting from marketing economies of scale.

In the newspaper industry, new technology has created significant technical economies of scale. Several decades ago, newspapers were printed in Fleet Street and then shipped overnight across the UK for eventual sale to customers. Nowadays an electronic version of a newspaper is sent wirelessly to a regional centre where it is printed. The printed newspaper then travels a much shorter distance to customers. As a further development, subscribers can access the whole newspaper online and read it on their monitors or laptop computers.

4



**Figure AERW4.3** Robots in car assembly

Robots have generally replaced human beings in assembly-line production, e.g. in welding together bodywork components (Figure AERW4.3).

Computers control the way that robots operate the production line.

### Application of economics in the real world 4.5: Super-tankers and volume economies of scale

- 1 The disadvantages of super-tankers include the fact that they can only dock in a limited number of ports and they often cannot take advantage of shipping short cuts, e.g. they are too big to use the Suez and Panama canals. The oil tanker industry could be organised to reduce these disadvantages by building more deep-water ports, by using technologies that allow super-tankers to take on board or discharge oil via flexible pipe lines when anchored offshore, and by investing in smaller tankers capable, first, of taking on board oil first transported by a super-tanker, and second, of using shipping short cuts.
- 2 With many types of capital equipment, costs increase less rapidly than capacity. When a storage tank or boiler is doubled in dimension, its storage capacity increases eightfold. Volume economies are important in industries such as transport, storage and warehousing, as well as in metal and chemical industries where an increase in the scale of plant provides scope for the conservation of heat and energy.
- 3 Volume economies are important in industries such as transport, storage and warehousing.

- 4 If a large super-tanker is wrecked or causes an oil spillage into the sea, wildlife may be killed which adversely affects local fishing and tourism industries. These industries suffer external diseconomies of scale.

## Application of economics in the real world 4.6: The John Lewis economy

- 1 Profit sharing refers to various incentive plans introduced by businesses that provide direct or indirect payments to employees that depend on the business's profitability in addition to employees' regular salary and bonuses. In publicly traded companies these plans typically involve the allocation of shares to employees.

- 2 An advantage is that employee loyalty increases. Profit sharing is a gesture extended by the company to make employees feel that they are also part of the company. Employees who are well taken care of will perform better. Their motivation to work will be higher.

A disadvantage is that the focus of the employee may be on profit rather than on the quality of the goods or services they produce.

- 3 On 4 November 2020, under the headline 'John Lewis Partnership to slash up to 1,500 head office jobs', the Press Association published the following commentary on the state of John Lewis PLC as the retailer continued trading in the middle of the COVID-19 pandemic:

*The John Lewis Partnership (JLP) is to axe up to 1,500 jobs at its head office as it drastically cuts costs across the business. The retail giant, which runs John Lewis department stores and Waitrose supermarkets, has said it will cut the roles by April 2021.*

*It said that the move will help it to save another £50 million as it seeks to secure £300 million in annual savings by 2022. The announcement comes months after it revealed plans to shut eight John Lewis stores with the loss of 1,300 jobs and the closure of four Waitrose stores in a move which hit 124 jobs.*

*In September, the group also told staff they would not receive a bonus for the first time since 1953 after it dived to a £635 million pre-tax loss for the six months to July, following a £470 million write-down on its stores. The partnership said that the latest cuts are part of an efficiency plan designed to 'create an agile and flexible head office' which is closer to customers and frontline staff.*

*Huge changes in shopper behaviour, which have been accelerated by coronavirus, mean the John Lewis website is now responsible for 60% of the chain's sales – up from 30% pre-COVID-19.*

*JLP said it will now be consulting with affected partners about the cuts and will seek to find new roles elsewhere in the company where possible. Sharon White, chairman of the John Lewis Partnership, said: 'Our partnership plan sets a course to create a thriving and sustainable business for the future. To achieve this, we must be agile and able to adapt quickly to the changing needs of our customers. Losing partners is incredibly hard as an employee-owned business. Wherever possible, we will seek to find new roles in the partnership, and we'll provide the best support and retraining opportunities for partners who leave us.'*

- 4 The official title of the business is John Lewis Partnership PLC, which is a misnomer, since it is neither a conventional partnership nor a PLC. Its shares are not on general sale, so it is not a conventional PLC. Its employees are known as partners and they enjoy a degree of profit sharing, but they have no real role in business decision making.

The John Lewis Partnership is one of Europe's largest models of employee ownership and has been operating a form of employee involvement and participation. But it is not what it purports to be. It is not an employee-run company; it is controlled by a trust that has owned virtually all of the shares in the partnership since its formation in 1929.

## Application of economics in the real world 4.7: The impact of the smartphone on Kodak and the traditional camera industry

- 1 Kodak filed for bankruptcy in January 2012 and announced soon after that it would no longer manufacture digital cameras and some other digital imaging products.

On 3 September 2013, Kodak announced that it had emerged from Chapter 11 Bankruptcy Protection as a company focused on serving commercial customers.

On 30 July 2014, Kodak was negotiating with movie studios for an annual movie film order guarantee to preserve the last source of movie film manufacturing in the USA.

In December 2014, Kodak announced its first phone, the Kodak Ektra smartphone made by Bullitt Group. The phone was released on to the market in 2017.

In January 2016, Kodak showed off a prototype of the new Super 8 Camera at the Consumer Electronics Show.

In January 2017, Kodak announced it was bringing back its Ektachrome film.

In May 2017, Kodak released the Ektra smartphone to the US market.

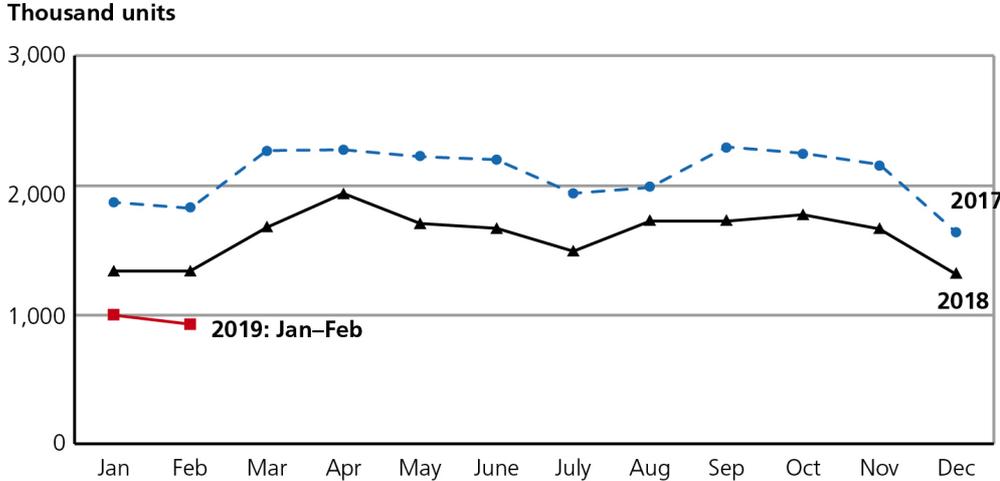
In June 2017, Kodak announced plans to release 7-inch and 10-inch tablets with ARCHOS in Europe.

In January 2018, Kodak announced plans to launch KodakCoin, a photographer-oriented blockchain cryptocurrency.

- 2 Although smartphones had been marketed for several years, they really came to people’s attention with the marketing of the Apple iPhone 1 in 2007. Since then, smartphones have taken over the market for instant cameras. Previously, this market had been dominated by small digital cameras which looked exactly the same as traditional cameras, but with digital technology replacing film which had been used for scores of years beforehand.

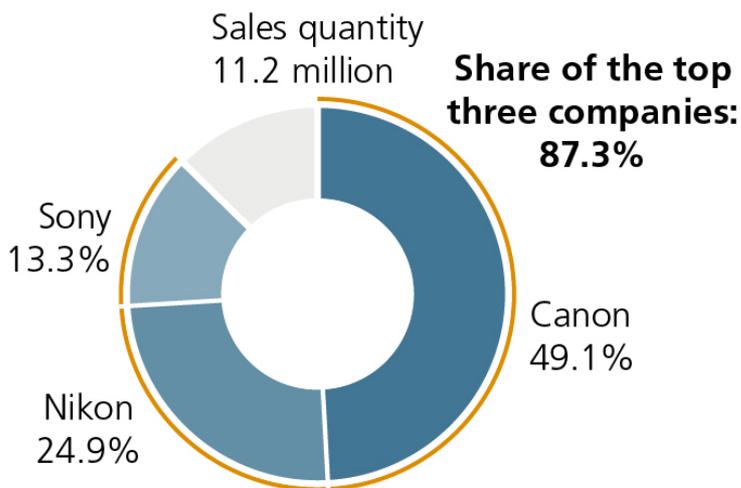
Smartphones are, of course, small digital cameras, but with many other functions as well, most notably their ability to send and receive phone calls. Traditional digital phones still survive, but mostly at the top end of the market with digital single lens reflex (DSLR) cameras. DSLR cameras are now dropping the SLR technology and becoming mirrorless.

- 3 Figure AERW4.4, taken from the *Digital Photography Review*, shows worldwide sales of digital cameras for 2017, 2018 and January and February 2019. It shows sales declining towards the end of each year and in the early months of 2019. The magazine article which accompanies the graph attributes this decline to fierce competition from smartphone sales.



**Figure AERW4.4** Worldwide sales of digital cameras, 2017, 2018 and January and February 2019

Figure AERW4.5 shows the market shares of the three largest Japanese camera manufacturers, Canon, Nikon and Sony, in the worldwide digital camera market in 2018. All other companies (Fuji, Olympus, Panasonic, Ricoh) combined had less than a 13% market share.



Source: Nikkei estimate

**Figure AERW4.5** Market shares of Canon, Nikon and Sony in the world digital camera market, 2018

4 Table AERW4.2 shows global smartphone sales in 2018. What the table does not show is that worldwide sales were in decline, from a total of 1,508 million in 2017 to 1,429.7 million in 2018.

**Table AERW4.2** Global smartphone vendor sales, 2018

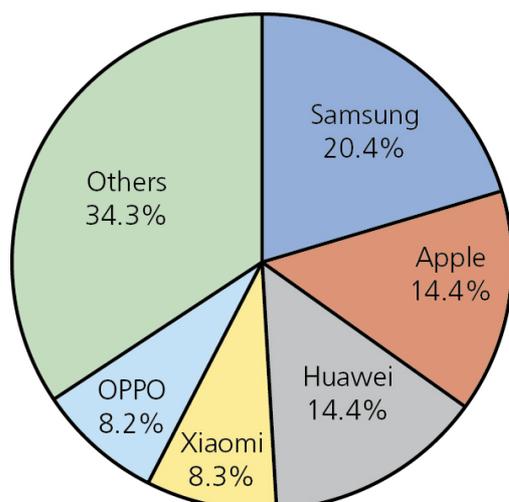
Vendor	Sales (millions of units)
Samsung	291.3
Apple	206.3
Huawei	205.8
Xiaomi	119.3

Table AERW4.3 shows global market shares in 2018.

**Table AERW4.3** Global smartphone market shares (%), 2018

Vendor	Market share (%)
Samsung	20.4
Apple	14.4
Huawei	14.4
Xiaomi	8.3
OPPO	8.2
Others	34.3
<b>Total</b>	<b>100.0</b>

Figure AERW4.6 presents these figures as a pie chart.

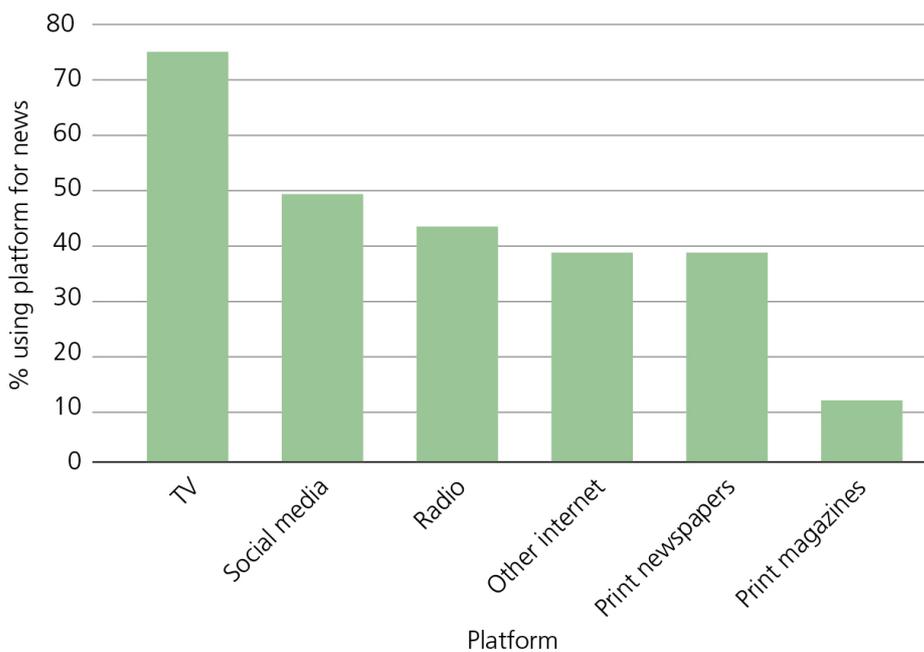


**Figure AERW4.6** Global smartphone market shares, 2018

## Application of economics in the real world 4.8: Apple and creative destruction

- 1 Creative destruction is strongly related to the processes through which technological change and innovation affect the ways in which businesses behave. It describes a process in which economic growth occurs in the economy as a result of innovations creating more economic value than that being destroyed by the decline of the technologies being replaced. Over time, societies that allow creative destruction to operate grow more productive and richer; their citizens benefit from new and better products and higher living standards. Creative destruction is central to the ways in which free-market economies and mixed economies develop and change over time.
- 2 For a recent history of Nokia, access the article ‘Where Nokia went wrong’, at <https://www.newyorker.com/business/currency/where-nokia-went-wrong>.  
For a recent history of Blackberry, access the article ‘Whatever happened to Blackberry? From market leader to intern farm’ by Jeremy Bloom at <https://media.thinknum.com/articles/whatever-happened-to-blackberry-from-market-leader-to-market-joke/>.
- 3 Answers will depend on the industry selected.
- 4 Social networking sites such as Facebook and Twitter which have come to prominence in recent years have become important sources of news for those who subscribe to them. This is especially true for young people who have grown up in the social networking era, many of whom hardly ever read a newspaper, either in print or in its online version.

On 24 July 2019, Charlotte Tobitt published an article titled ‘Half of UK adults now using social media for news, Ofcom survey finds’. You can access this article at: <https://pressgazette.co.uk/half-of-uk-adults-now-using-social-media-for-news-ofcom-survey-finds/>. Included in the article is the bar chart shown in Figure AERW4.7.



**Figure AERW4.7** Use of various media platforms for news, 2019

On 25 January 2017 the *American Business Insider* reported: ‘Social networks like Facebook and Twitter have made consuming news very simple, very easy, and very fast. Unfortunately, the resulting overabundance of information can also make it harder to discern good reporting from outright falsehoods. And so you get the “fake news” situation that’s rocked Facebook in recent months.’

## End-of-chapter questions

- 1 In microeconomic theory, production theory leads into cost theory. For example, the short-run marginal cost curve is derived from the production theory concept of the law of diminishing returns. Similarly, economies of scale, a long-run cost concept, are largely derived from the production theory concept of increasing returns to scale.
- 2 The short run is the time period in which at least one factor of production is held fixed. In the long run, by contrast, all factors of production are variable and none are fixed.
- 3 Marginal and average curves plotted from the same set of data always display the following relationship:
  - when the marginal is greater than the average, the average rises
  - when the marginal is less than the average, the average falls
  - when the marginal equals the average, the average is constant, neither rising nor falling
- 4 The law of diminishing returns states that as a variable factor of production is added to a fixed factor of production, eventually both the marginal returns and then the average returns to the variable factor of production begin to fall.
- 5 The marginal returns to a variable factor of production such as labour relate to the extra output that results from adding one extra unit of labour to a fixed factor of production such as capital in the economic short run. Returns to scale, by contrast, occur in the economic long run, showing extra output when the scale of all the factors of production is changed.
- 6 Internal economies of scale relate to changes in long-run average costs of production resulting from changes in the size or scale of a firm, or of a plant within the firm.

External economies of scale, by contrast, relate to a fall in long-run average costs of production resulting from the growth of the market or industry of which the firm is a part.

- 7 To answer this question, we will start off with the market structure of pure monopoly, defined as one firm only in the market. A pure monopoly's average revenue curve is the industry demand curve, which slopes downward to the right. The monopoly's marginal revenue curve lies below the average revenue curve.

The same is true for all firms in imperfectly competitive markets: for example, in monopolistic competition and oligopoly.

There is, however, the theoretical possibility of a market structure known as perfect competition. In this market structure, each of the very large number of firms in the market passively accepts the ruling market price determined by supply and demand in the market as a whole. The horizontal ruling market price is both the average revenue curve and the marginal revenue curve facing each firm in the market.

- 8 A firm's total profit is its total sales revenue minus its total costs of production.
- 9 Technological change involves changing existing technologies, hopefully for the better, and developing completely new technologies, both to improve existing products and the processes involved in making them, and to develop completely new products and processes.

The term 'technical progress' has two rather different meanings. On the one hand, in a normative or value-judgement context, 'technical progress' implies that technological change is fundamentally about increasing economic welfare and making people happier. But in a narrower sense, unrelated to welfare considerations, 'technical progress' means applying scientific and engineering knowledge, as it develops, to produce goods which are more efficient and work better, regardless of whether these are good for society.

## Test yourself answers

### TEST YOURSELF 4.1

Sir Philip Green (Arcadia Group in retailing), Martha Lane Fox (founded Last.Minute.com in 1998), Karren Brady (football club entrepreneur with Birmingham City and then West Ham United), James Dyson (vacuum cleaners and household electrical goods), Jeff Bezos (Amazon), Elon Musk (Tesla).

### TEST YOURSELF 4.2

Production is the total output that a firm or industry produces in the course of a particular period, e.g. per week or per year. For most purposes, productivity usually means labour productivity, which is output per worker per period of time, e.g. per week.

### TEST YOURSELF 4.3

Students often confuse these two concepts, though they are even more likely to confuse marginal returns with marginal revenue. Marginal returns or marginal product is the addition to total output resulting from the employment of an extra unit of a variable factor of production, such as labour. It is the key concept in short-run production theory. Marginal cost, by contrast, is the addition to total cost resulting from producing an extra unit of output.

### TEST YOURSELF 4.4

Economies of scale are falling long-run average costs of production. They have various causes. Technical economies are the cost savings a firm makes as it grows larger. They result from the increased use of large-scale mechanical processes and machinery. Managerial economies of scale

result from division of labour amongst supervisors in large firms. For example, large-scale manufacturers employ specialists to supervise production systems, manage marketing systems and oversee human resources.

### TEST YOURSELF 4.5

The lowest point on each of the eleven U-shaped *SRATC* curves in Figure 4.12 shows an average cost-minimising output in the economic short run. However, only *SRATC*<sub>5</sub>, *SRATC*<sub>6</sub> and *SRATC*<sub>7</sub> show average cost-minimising outputs in the long run. The explanation for this lies in the difference between the short run and the long run. In the short run, a firm can be constrained by possessing only a limited amount of capital. In the long run, it can increase all its factors of production, including capital, until the lowest possible average costs can be achieved. In Figure 4.13, by contrast, a horizontal *LRAC* curve depicts a situation in which there are no economies or diseconomies of scale. This means that the lowest points on all the *SRATC* curves lying along the *LRAC* curves show a cost-minimising level of output.

### TEST YOURSELF 4.6

The mathematical rule, applied to costs, is:

If  $MC > AC$ ,  $AC$  rise;

If  $MC < AC$ ,  $AC$  fall;

If  $MC = AC$ ,  $AC$  are constant, neither rising nor falling.

Showing the relevant *LRMC* curve on Figures 4.12, 4.13, 4.14 and 4.15:

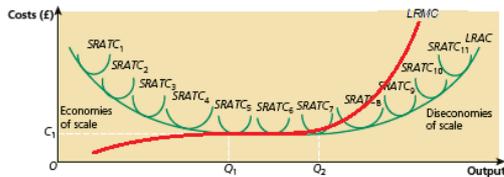


Figure 4.12 A 'three section' long-run average cost curve

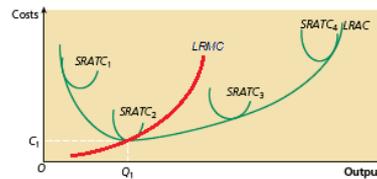


Figure 4.14 An *LRAC* curve showing economies of small-scale production

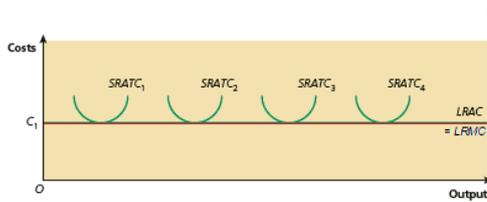


Figure 4.13 Constant long-run average costs

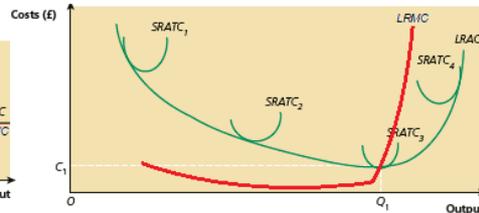


Figure 4.15 An *LRAC* curve showing economies of large-scale production

### TEST YOURSELF 4.7

If the entry of new firms into the market increases price competition within the market, average costs of production are likely to fall, in which case productive efficiency increases. Falling prices also increase consumer welfare.