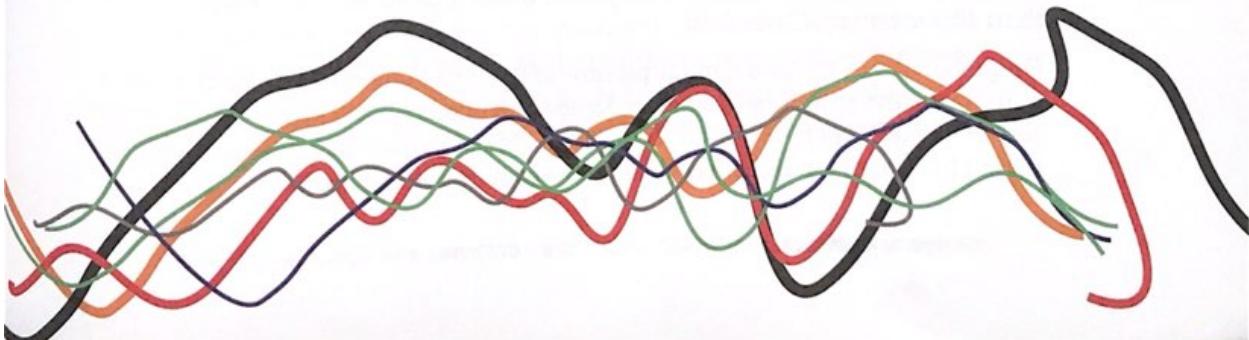


14

Structural Change and Productivity

Chapter concepts

- *structural change and its causes*
- *the effects of structural change*
- *the relationship between economic and structural change*
- *the concept of productivity*
- *the relationship between productivity and economic growth*
- *how recent government policies have promoted productivity and economic growth*
- *the impact of productivity on the achievement of macroeconomic objectives*



Structural change

An economy's 'structure' is best described as the framework of the economic system. The term describes the basic institutions and processes by which production and distribution decisions are undertaken. It includes the ownership of resources; the main economic institutions; the key sectors of the economy; its wealth; and the way the benefits of economic activity are distributed among stakeholders. The term 'structural change' describes the way these characteristics change over time. Consider some examples:

- bank customers used to visit a branch and use paper forms to make transactions (assisted by a 'teller') - now most customers use a computer or smartphone to do their banking;
- renewable sources now supply about 30 per cent of Australia's energy requirements;
- European Union countries have banned the sale of new cars powered by petrol or diesel engines by 2035; and
- the shift towards working-from-home during the pandemic may have long-term implications for the demand for office space in cities.

Each example reflects a change in the preferences of households and/or the production decisions of firms. Continuous changes such as these predict the growth and decline of products, firms, and even whole industries over time.

Most countries have followed a similar path of structural change over the very long term. Agricultural activities dominated economic activity and employed most people during the pre-industrial phase. The transition from an agricultural to an industrial economy was based on the ability to produce surplus food, freeing productive resources for other uses. As nations industrialised, they also urbanised. Manufacturing industries developed to make the products needed by people living in cities. As disposable incomes rose, consumers typically spent a greater share of their income on services (especially accommodation and food services, education and training, health care and social assistance). Service economies generally feature more complex supply chains, leading to growth in the business services sector (e.g. finance, marketing, legal services).

These gradual changes are typically reflected in historical patterns of employment and production in developed countries. As illustrated in figure 14.1, the proportion of the Australian workforce employed in agriculture declined markedly, especially after 1940. Manufacturing's share of employment peaked in the 1950s. The services sector, always the major employer, now employs more than 80 per cent of all workers.

Output shares describe a similar picture to the employment data. At its highest, manufacturing accounted for nearly 25 per cent of output, yet just 5 percent today. Just after the end of World War II, agriculture accounted for 35 percent of total output by value. It now accounts for 2 per cent. Services account for 78 per cent

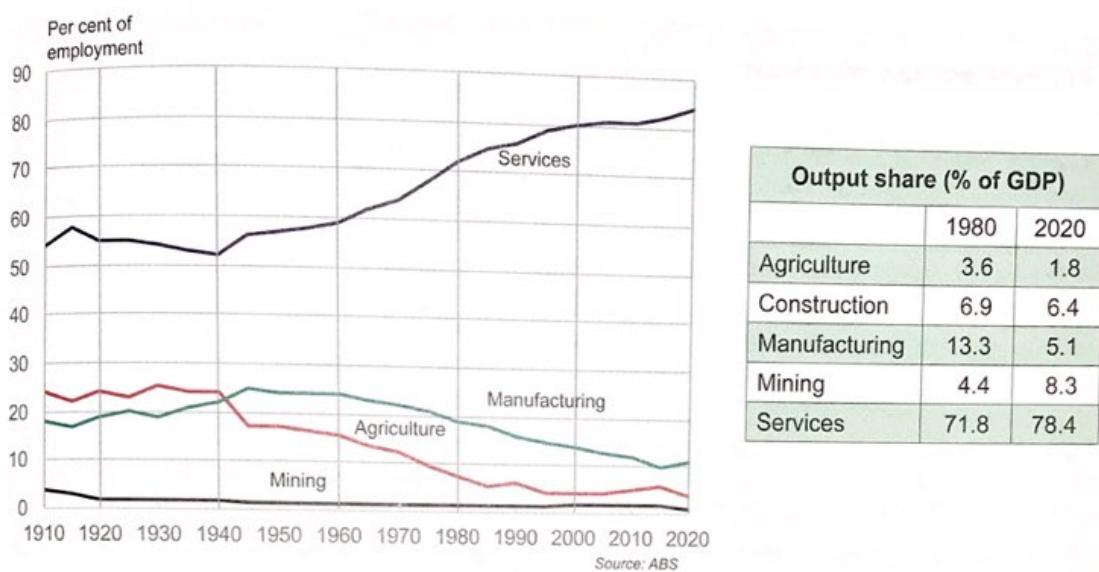


Figure 14.1 Sectoral employment share: 1910 - 2020

of output, up from 50 per cent in 1950. Mining, never a big employer due to its capital-intensive nature, accounts for 8 per cent share of output by value.

The causes of structural change

Structural change basically refers to the change in the distribution of output, income and employment in the economy over time. Many factors can play a role in this transformation:

- during their day-to-day activities, business firms react to the needs of their customers; strive to develop new products and services; invest in new equipment; train employees; develop networks with other firms, and perhaps even conduct research and development. Their objective is to make a profit and develop a competitive advantage over their rivals;
- buyer preferences change in response to technological change and price signals. For example, car buyers from the 1970s to the 2000s wanted improved fuel economy because the real price of fuel increased. In the last twenty years, many Australian households have installed solar energy, incentivised by the potential returns from selling power back in to the grid;
- demographic changes are important drivers of economic trends – the post World War II baby boom caused rapid population increase in the late 1940s and 1950s. Birth and death rates declined in later decades, and higher living standards brought improvements in life expectancy. Many developed economies now have a lower proportion of productive workers to support that aging population.

The business services sector

In Australia, the 'business services' sector now accounts for 25 per cent of gross value added, up from eight per cent in 1960. Business services refers to those businesses that provide assistance to other businesses, the largest ones being 'financial and insurance services', 'professional, scientific and technical services' and 'information, media and telecommunications'. So think of businesses associated with accounting; the law; marketing; ICT; insurance; recruitment; public relations; and leasing – together with new entrants like online publishing; internet service providers; and data centres.

Business services have become increasingly specialised, and often get their work because other firms prefer to 'outsource' tasks which are very knowledge or 'tech' intensive. Outsourcing of non-core activities to the business services sector should lead to a more efficient allocation of activities across the economy (higher productivity) due to specialisation and economies of scale, scope and experience.

Growth in the business services sector has had a significant effect on the labour market, both in terms of the number of people employed (now approximately 20 per cent of the workforce), but also on the types of jobs available and the skills they require.

Understanding which jobs are increasingly in demand and the specific skills they require is important so that the labour force can adapt to the evolving structure of the economy. Most of the jobs in demand in business services are classified as 'non-routine cognitive', which means they require knowledge and training in skills such as critical thinking; persuasion; originality; problem-solving; information analysis and effective writing. Could this be why students are encouraged to stay at school for longer?

- rapid economic growth in Australia's neighbouring countries has increased demand for Australia's traditional commodity exports, and brought more competition to many manufacturing markets. Rising incomes in the region have generated demand for a wide range of Australian services such as tourism; educational; financial; and other professional services;
- Information and communications technology (ICT) is an example of a disruptive influence on the structure of the economy. Since the 1990s, ICT has brought about a revolution in the way people and businesses communicate with each other, and access and process information;
- a wave of globalisation has seen economic activities expand across national boundaries, and markets and economic institutions have become more open, integrated and interdependent. The COVID-19 pandemic and other current geopolitical tensions may slow this trend, as they have exposed the 'fragility' of global supply chains. Many businesses were suddenly unable to rely on the dispersed, just-in-time supply chains they had previously used; and
- changes in attitudes and values are reflected in consumer preferences and production processes, some examples of which are the impact of conservation measures on recycling; smaller family units on the housing market; and concern about climate change (for example, de-carbonising energy and transport).

The impact of structural change

Structural change has positive and negative effects – change is rarely uniformly good (or bad). It also has different impacts on sectors of the economy; geographical areas of the country; and on groups of people within the economy.

Its effects also vary over time. Structural change tends to have positive consequences in the long term, although it usually carries adjustment costs in the short term. To illustrate, the Australian passenger motor vehicle (PMV) industry had five major on-shore producers a decade ago. The industry produced an excellent product, especially after lower import tariffs forced manufacturers to become more efficient and competitive. Changing consumer attitudes and the high Australian dollar in 2011–12 eventually brought the industry's demise, however. The short term impact included loss of jobs in the car plants and their backwards and forwards links (i.e. parts suppliers and vehicle distributorships). In the longer run, many skilled people employed in the PMV sector found new jobs (often better paid) and Australian consumers were able to buy cheaper cars produced overseas – an illustration of the Law of Comparative Advantage.

Commentators bemoaned the 'loss of Australian manufacturing', but this has been offset to some extent by the growth of knowledge-based manufacturing – software and application development; renewable energy; precision medical instruments and bionics. Such companies operate at smaller scale than a car plant, but they can be more adaptable and market-driven. About 20 percent of the goods exported from Australia are classified as 'high-tech', up from 14 per cent in 2007 (World Bank, 2022).

Structural change affects the labour force and employment, because the demand for labour is derived from the demand for goods and services. As figure 14.2 illustrates, employment fell in three sectors of the economy between 2015 and 2022, but grew strongly in others. The National Skills Commission estimates that 90 per cent of new jobs in the next five years will require post-school qualifications, mainly at Certificate III, Diploma and Bachelor degree level. Skills such as persuasion, problem-solving, critical thinking, written expression and originality are increasingly well-regarded in service-based sectors of the economy.

Structural change also has an impact on the way the land resource is used. Competitive forces have changed Australian agriculture, with the proportion of small firms concentrating on supplying local markets declining, and large scale enterprises focusing on international markets increasing.

Structural change and economic growth

Structural change and economic growth are co-related. The same forces that drive structural change are also drivers of growth. Economic growth also drives the process of structural change as higher per capita incomes lead to changing preferences. Australians spend less of their income on food than they did twenty years ago, and more on education, leisure and travel, for example.

Three Australian industries shed employment over the period August 2015 to August 2022. 90 per cent of new jobs in the next five years will require post-school qualifications.

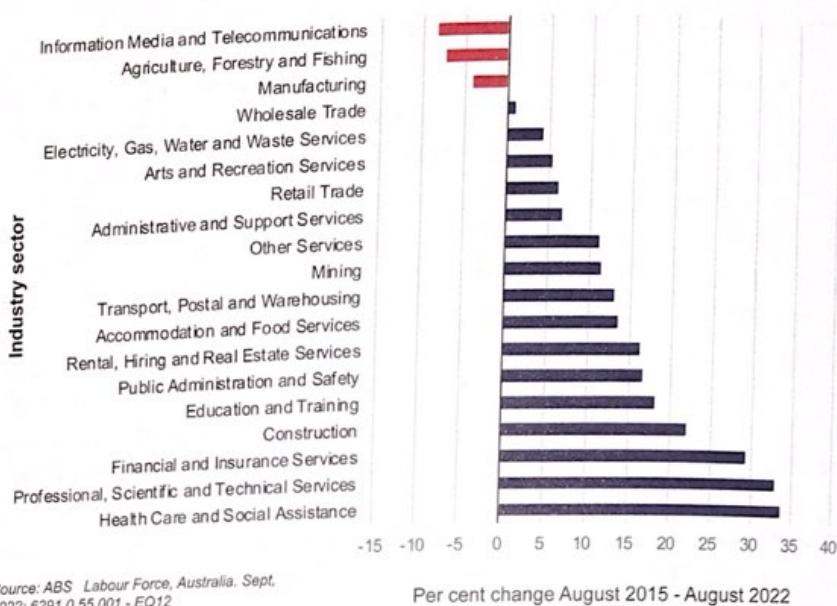


Figure 14.2 Employment change by sector 2015-2022

In the short term, structural change can be disruptive. Workers in declining sectors of the economy find their skills are no longer in demand, and they may face long periods of unemployment unless they retrain. Sometimes, rapid development in one sector (such as the energy and commodity projects in the mining boom) attracts labour and capital resources and rewards them with higher incomes. Other sectors find it difficult to compete, and a two-speed economy can be the result.

It is important to note, however, that the benefits of structural change (including economic growth) eventually outweigh the adjustment costs that come with change. Few people would prefer to give up the gains in their living standards that result from living in a dynamic economy.

Productivity

The second part of the chapter addresses an important issue for the Australian economy – productivity. Productivity refers to the efficiency with which people or firms convert productive resources into outputs of goods and services.

The most common measure of productivity is labour productivity (LP), which refers to the output produced per unit of labour input (usually hours worked). That is:

$$LP = Q/L$$

where LP = labour productivity; Q represents output, and L is the number of hours worked.

Simply put, labour productivity will rise if:

- more output can be produced for a given level of labour input; or
- less labour input is required to produce a given amount of output.

At the firm level, labour productivity is the value of output, divided by total hours worked. At the economy level, the Australian Bureau of Statistics (ABS) uses a measure called Gross Value Added. GVA is the value of output, less intermediate consumption of goods and services used in the production process. Labour productivity is thus calculated by dividing GVA by total hours worked.

Although we headline labour productivity, labour is just one of the inputs in the production process. Tradespeople such as electricians, plumbers and painters use skills developed during their apprenticeship and subsequent on-the-job experience. People in primary production manage crops and animals and increasingly apply sustainability techniques that ensure future viability. Doctors and dentists use highly specialised equipment to diagnose and treat disease, and maintain their knowledge and skills by reading research journals and attending training seminars. Logistics workers use computers and telecommunications equipment to determine the best schedule for the day's pick-ups and deliveries. In other words, the value of output produced during any 'eight hour day' isn't only due to hours worked, but also the stock of capital equipment, knowledge, skills and processes applied by workers.

Labour productivity can be separated into two components:

- capital deepening; and
- multifactor productivity (MFP).

Capital deepening refers to the accumulation of more capital equipment per worker – growth in the ratio of capital to labour (K/L). Over time, new equipment can be expected to embody better technology, so the machinery available is more 'fit-for-purpose'. Compare, for example, the output an office worker can generate with a computer or a typewriter! The number of 'hours worked' by capital is not directly observable, so ABS estimates are based on the stock of equipment used.

'Multi-factor' influences on productivity refer to all the 'other' changes in the quantity and quality of productive inputs not already captured by measures of labour and capital inputs. Such factors include:

- increases in human capital (the knowledge and skills of the workforce);
- research and development (R&D) activity;
- improvements in management practices (for example, inventory management, cost control, human resources management and staff development);
- innovation in products and productive processes; and
- competition in the economy, which promotes the entry of new innovative businesses and the exit of 'unproductive' ones.

Australian productivity performance

Figure 14.3 illustrates Australia's productivity performance between 2000 and 2021. Productivity data is compiled by the ABS using input-output and value-added data. The red line is labour productivity, as defined above: $LP = Q/L$. As discussed, labour productivity has two components – capital deepening (the blue section of the columns) and multifactor productivity (the green part of each column). In 2021, for example, labour productivity rose by 1.1 per cent – 0.9 per cent attributable to capital deepening, and 0.2 per cent attributable to rising MFP. The average annual increase in labour productivity over the whole period was 1.6 per cent. About 60 per cent of this was attributable to capital deepening, and the rest to MFP growth. Note that the contribution of either capital deepening or MFP declined in some years!

As the figure shows, annual productivity data is volatile. Measured productivity will tend to fall when economic growth is soft because output falls but firms tend to hold on to skilled labour because it is expensive to re-hire when the recovery occurs. In periods of strong growth, on the other hand, output rises and firms push harder to meet demand.

Measured productivity often lags its causes – in infrastructure and mining projects, for example, productivity drops when the infrastructure is being built, because inputs of labour and capital are high, but there is no revenue from the sale of output. After commissioning the plant, productivity increases rapidly because output rises and labour input falls. Weather and climate may affect agricultural productivity. During the recent eastern states drought in 2017-2019 (one of the worst on record) pastoral and crop production fell.

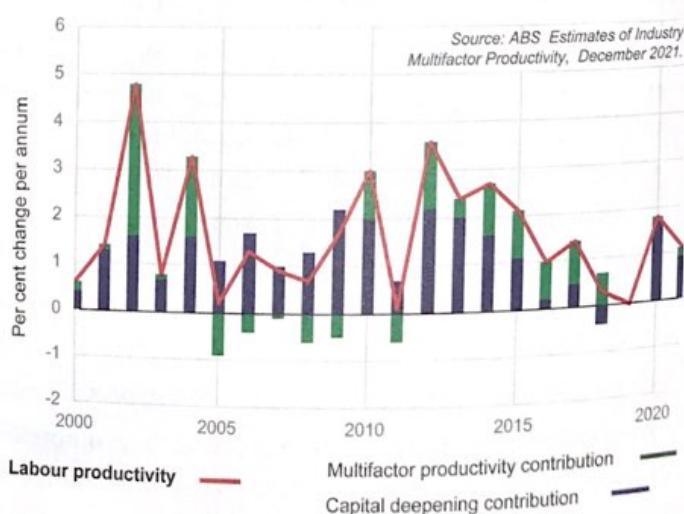
ABS data refers only to the 'market sector' – the education, health and public administration and safety sectors are excluded as many of their inputs and outputs are not sold at market rates.

Figure 14.3 Contributions to productivity growth 2000-2021

LP captures changes in the efficiency of labour due to capital deepening (increases in the ratio of capital to labour) and improvements in the quality of inputs or the efficiency with which they are combined (MFP).

The average increase in labour productivity in Australia over the whole period is 2.1% p.a. Note, however, the slower rate of increase since 2014.

Productivity trends are difficult to measure, and data is often subject to revision.



The 1990s is remembered as a period of booming productivity in Australia, with labour productivity increasing at an average 4 per cent p.a. Explanations for the 1990s productivity boom include:

- the opening of the domestic economy to competition in international markets after trade protection was dismantled;
- the efficiency improvements that information and communications technology (ICT) brought to finance, transport, wholesaling and communications sectors; and
- the dividend from the government's microeconomic reform policies in the 1980s (discussed further below).

Increases in labour productivity slowed in the 2000s. Slower productivity gains would have seen a fall in Australians' disposable income, except the terms of trade rose due to the demand for minerals and higher prices dragged up the value of output. The rise in the exchange rate that accompanied the mining boom also made imported inputs more costly.

Productivity performance improved in the early 2010s, due to strong sales of commodities (the payoff from years of capital deepening in the mining sector), and growth in financial services and construction sectors in response to lower interest rates.

In common with many developed countries, Australia's productivity performance was below par from 2012 to 2019, with MFP rising at an average of 0.8 percent and capital deepening at 1 per cent – meaning labour productivity rose at 1.8 per cent over the whole period. In 2018-19, labour productivity growth was zero.

The causes of the decline are subject to debate, but probably include:

- the continued effect of globalisation on the tradable sector of the economy, exposing it to more competition;
- a slower rate of technical progress and innovation – over time, there are less opportunities to make 'breakthroughs', in which case the rate of return to innovation is lower (either the costs of research are higher, or the revenue that can be earned is lower);
- climate change, because of an increasing frequency of adverse weather events; and
- macroeconomic factors – the effect of slower economic growth after the GFC; a build-up of debt making investors more risk-averse; the increased willingness of households to save; and the inability of low interest rates to stimulate growth, as discussed in chapter 13.

According to the Productivity Commission (2020), most of the slowdown was in the manufacturing; agriculture, fishing and forestry; and electricity, gas, water and waste services sectors.

Why should we care about productivity? A quote from Nobel laureate economist Paul Krugman is often used to highlight its importance:

*"Productivity isn't everything, but in the long run it is almost everything. A country's ability to raise its standard of living over time depends almost entirely on its ability to raise its output per worker" [Krugman, P. (1992) *Age of Diminished Expectations*].*

Individuals perceive their standard of living as a combination of things, such as the ability to buy more goods and services, being able to access more public goods such as medical and education services, and to enjoy more leisure.

Targeting productivity growth is especially important in the light of recent trends and events in Australia:

- population growth has been low. Recall from chapter 11 that potential economic growth in any year is determined by population growth, workforce participation, and productivity growth. Over the last decade, average population growth has been about 1.6 per cent, and dipped to just 0.1 per cent in the first year of the pandemic. Lower population growth means a smaller base for economic growth in future years, so improving Australia's productivity is critical.
- The economy's Gross Value Added (GVA) rose by just 1.4 per cent over the three years 2019–2022 (it was negative in 2020 due to COVID). Australia has the 12th highest average income in the OECD, but ranks 5th in terms of hours worked per capita!
- Australia's standard of living has been supported for many years by the level of demand for our export commodities. Australians have enjoyed a 40 per cent increase in GDP per capita over two decades, but about one-third of that was due to the strong terms of trade that resulted from the mining boom. It is necessary to boost productivity to compensate for any possible downturn in the demand for Australian commodities, or the prices for which they trade.

Productivity is a means to an end – the way for advanced western economies to achieve a higher standard of living and prosperity. Over time and across countries, higher productivity is reliably associated with higher wages, higher consumption levels (see figure 14.4) and improved wealth indicators, such as health.

The drivers of productivity

So how is productivity growth achieved? In general terms, a number of 'drivers' underpin the ability to do more with less in the long term:

- investment in physical capital and infrastructure – machinery, equipment, buildings, communication and transport. Investment implies capital deepening – more capital equipment per worker;

Number of hours or work needed to purchase ...			
	1901	2000	2020
Rent 3 bed home	22	14	12
Bicycle	520	18	7
Number of minutes of work needed to purchase ...			
Rump steak	143	42	38
Antibiotics	*	18	9
Bread (loaf)	20	8	6

Source: Productivity Commission: What is Productivity?

Figure 14.4 The labour cost of goods

Productivity growth has been the primary driver of increasing living standards for Australians. Over the period 1900 to 2020, labour productivity rose by a factor of eight (Productivity Commission). This suggests a worker can produce as much in one hour in 2020 as they could in a whole working day at the time of Federation in 1901. Increased labour efficiency is a result of the application of more capital equipment and more 'knowledge' (MFP) in the production process.

- investment in human capital through education and training is a key driver of productivity because it increases workers' skill sets - their ability to use capital equipment, to be creative, to solve problems, and to implement innovations;
- research and development (R&D), invention and innovation – searching for and applying new technologies and ideas. There are three types of innovation: product, process and organisational, referring respectively to innovations in the nature of products and services; innovations in productive methods and processes; and the implementation of new methods in a firm's business practices, workplace organisation and relations with other firms in their supply chain;
- enterprise (management and entrepreneurship) combines other factors of production and is a crucial determinant of a firm's ability to become more efficient and deliver better service, recognise opportunities and adapt to market change improve operations;
- competition creates incentives to innovate and ensures that resources are allocated to the most efficient firms; and
- at economy-wide level, economic stability and institutional and social capability create a fundamental base for progress.

We should remember that the private sector dominates the economy – it is responsible for about three-quarters of the goods and services produced in Australia. For private firms, both small and large, the profit motive and the forces of competition are the main drivers of the innovations and investment that will lead to higher productivity. Firms strive to deliver better products to buyers at lower cost. Achieving this delivers the owners of capital (business owners and shareholders) higher profits. Firms that cannot continue to improve productivity will eventually become less competitive and exit the market, freeing resources for more productive use.

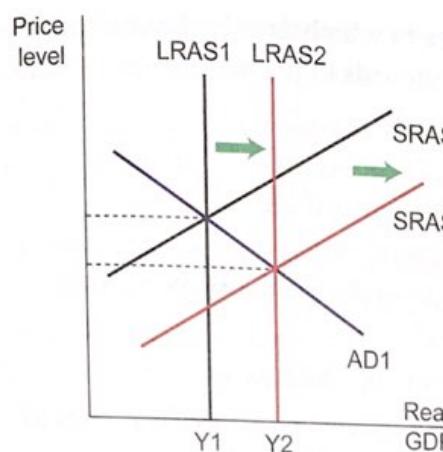
There are two reasons why investment in capital drives productivity. Capital equipment can be thought of as productive hardware used by labour to produce goods and services. One source of productivity over many years has been the increase in the stock of capital per worker (capital deepening). There are also improvements in capital quality, which refers to increasing the productive efficiency of capital items through specialisation and better technology. The term technology applies as much to ideas and methods as it does to physical equipment. When technological change is incorporated in some tangible way (i.e. we can see the improvement in quality or operability) it is known as embodied technological change. But technological change is often less tangible – an innovative production process or marketing plan, for example. This is called disembodied technological change.

A significant factor influencing productivity at firm level is better management. This can include responding to changes in the market; developing the firm's work force; better use of ICT; attracting and retaining high quality people; and even promoting employee participation in decision making. The firm's 'corporate culture' is a significant driver of productivity. Culture is the pattern of behaving, feeling, thinking, and believing that ties all the individual elements of a firm together. Productivity and happiness tend to co-exist!

All of the above focus on delivering economic value – the ability to produce goods and services that satisfy consumer wants, at a price that covers the costs of production. In other words, households and firms share value created. Achieving this goal is not easy, however. Only about 40 per cent of Australian businesses make an attempt to measure their productivity – perhaps because it is a complex thing to measure, or because it has the potential for unpleasant and disruptive changes necessary to improve it!

Productivity and macroeconomic objectives

We would all like to see higher living standards and prosperity over time – improved value for money in the goods we buy; better access to services such as health care and education; more time for leisure; better environmental outcomes; more welfare support for disadvantaged people; and so on. Figure 14.5 uses the aggregate demand / aggregate supply framework to model the impact of improved productivity on economic growth. Rising productivity increases the capacity of the economy to produce goods and services, and /or lowers business costs. The model represents these as rightward shifts in both the short and long run aggregate supply curves, so the potential real output of the economy increases from Y_1 to Y_2 . Other things being equal, productivity lead to higher rewards for labour (higher wages) business (profits) and government (taxes), so the AD curve would also be expected to shift to the right. The model suggests that a rightward shift of the aggregate supply curves will contribute to lower inflation, but this depends on how much the aggregate demand curve shifts as a result of the higher output and incomes that rising productivity delivered.



Increased productivity drives both the long run (LRAS) and short run aggregate supply curves (SRAS) to the right. The potential real output of the economy rises from Y_1 to Y_2 . Note that increased efficiency reduces costs, so there is less upward pressure on the price level – other things being equal, rising productivity constrains inflation.

Figure 14.5 The macroeconomic impact of higher productivity

The concepts of productivity and efficiency are linked. Productivity growth is a measure of productive or technical efficiency – the ability to produce more output from a given unit of input. Alternatively, technical efficiency can be measured by the cost-effectiveness of an input.

Productivity is also related to improvements in allocative efficiency. The most efficient allocation of resources from society's point of view occurs when resources are allocated to their 'most valued uses' – those having the least opportunity cost. If all resources were allocated to their 'best use', output would be maximised. Interestingly, this suggests one way to increase productivity in Australia would be to shift labour out of low productivity sectors into mining!

A third interpretation of efficiency is dynamic efficiency – the ability of the economy to adapt to change over time, to innovate, to conduct research and development and to take advantage of new opportunities as they arise. Dynamic efficiency and economic growth are clearly related.

The notion of efficiency applies to firms, industries and the economy as a whole. A government white paper, "Australia in the Asian Century" (2012), suggested that Australia's real income per person could rise to about \$73,000 by 2025 if productivity performance between 2012 and 2025 is about 0.5 percentage points higher than the 'business as usual' case. This would place Australia's GDP per person in the world's top 10, up from 13th out of 180 countries in 2011.

Productivity policy

In developed economies, governments are responsible for about a quarter of all output, providing public services, maintaining public institutions and building associated infrastructure. The development of public infrastructure is an important part of capital deepening. Government activity also influences MFP through the regulatory environment, redistribution of income and wealth, social and environmental policy and providing opportunities for people to participate

fully in society and work (recent examples of which are the National Disability Insurance Scheme (NDIS) and national standards in pre-school education).

Governments also influence productivity growth through policies and regulations that affect private sector investment and the functioning of markets. Government policy can help raise Australia's productivity performance if it:

- increases the incentives for the owners or managers of enterprises to make productivity-enhancing changes to the products they produce, or the way in which they are produced;
- reduces barriers to productivity-enhancing change; or,
- facilitates the movement of factors of production from existing uses to ones in which they can be combined in more productive ways.

These are examples of what is sometimes called 'supply-side' economic policy - policies that help to drive the long run potential output and income.

The Productivity Commission has an important advisory role to government that reports on:

- the productivity and economic performance of the economy;
- reducing unnecessary regulation;
- encouraging the development of efficient and internationally competitive Australian industries; and
- facilitating adjustment to structural change.

The next sections provide a summary of some of the developments and policies applied in recent years to promote productivity and economic growth in the Australian context.

The labour market and workplace relations

This is a controversial area, because there are ethical and community norms about the way in which a country treats its workers. Stakeholders (unions, government and business) have argued for thirty years about how to 'reform' the labour market to adapt to changes in the economy and the need for Australia to be competitive with the rest of the world. They often have quite polarised views about industrial relations matters. One perspective holds that the labour market should be relatively free of regulation to allow wages and conditions to change as market circumstances change. Alternatively, a free labour market could be regarded as potentially damaging for worker conditions and fair treatment.

For much of its history, Australia's labour market was highly regulated, with pay rates and conditions determined governed by industrial 'awards' (minimum pay regulations). The Prices and Incomes Accord of the late 1980s began the reform of wage-setting principles by tying wage rises to improvements in productivity and increased workplace efficiency. This led to a 'decentralisation' of the labour market and the onset of collective and enterprise bargaining.

In 2005, Workchoices legislation pushed the balance a little towards employers, loosening unfair dismissal laws, making it more difficult for workers to take strike action and reducing the influence of trade unions (by, for example, making it more difficult for union officials to enter work sites). In 2009, a Labor government replaced Workchoices with the Fair Work Act. The Fair Work Commission's functions include the setting and varying industrial awards, fixing the minimum wage, resolving disputes, approving enterprise agreements, and hearing claims for unfair dismissal. The Fair Work Act covers about 70 per cent of the workforce. It has a stronger emphasis on enterprise-based bargaining, underpinned by a National Employment Standards 'safety net' of minimum conditions covering conditions such as maximum number of hours in the working week; requests for flexible working arrangements; annual leave; long service leave; and notice of termination.

The Fair Work Commission notes that its decisions can contribute to developing high performing workplaces and engaged employees. Workplace engagement is associated with a 'happier', more productive workplace and improved company performance. Workers who have the opportunity to use their skills, and who are motivated to do so, perform at a higher level than those who do not.

The labour market has become more fragmented in the last decade, as labour hire has increased; young workers are less attached to work that leads to a career; and a sizeable 'gig' economy has emerged where many workers are now contractors rather than employees. Work attachment is more likely to be short term in nature, with less access to benefits such as leave that feature in traditional full-time jobs.

Over the last ten years, the proportion of private sector employees covered by awards has increased, but enterprise agreement (EA) coverage has fallen. Union membership has declined over the long term – from 25 per cent to 15 per cent of employees, so workers are not as well represented as they were in the past. It is a fact that labour's share of gross national income (GNI) has fallen since 2004 (estimates ranging between four and six per cent). Wages have not risen at the same rate as productivity. Whilst this is good for business competitiveness and employment, this fall in income share has raised questions about how wages are determined and how they should be increasing to help cover the cost of living.

Taxation reform

A well-designed tax system raises revenue while recognising the core principles of:

Awards are legally enforceable determinations made by federal or state industrial tribunals that set the terms of employment (pay and/or conditions), for workers in a particular industry or occupation.

Collective or enterprise agreements set the terms of employment (pay and/or conditions) for a group of employees in an enterprise or organisation. These agreements are usually registered with an industrial tribunal or authority.

Most modern awards do not deal with issues relating to working from home, as many workers did due to COVID-19. To facilitate workplace flexibility, the FWC prepared a model Flexibility Schedule for potential inclusion in appropriate modern awards.

- equity - the burden of tax is fair (vertically and horizontally);
- efficiency - the costs of tax collection are minimised; and
- simplicity - the system should be easy to understand and comply with.

A number of taxation reforms have taken place since the mid-1980s. The tax base was broadened with the introduction of a Capital Gains Tax on real (i.e. after inflation) gains made on the sale of assets (e.g. shares, investment property, business goodwill etc). The Goods and Services Tax (GST), introduced in 2000, was another broadening measure that added ten per cent to the purchase of goods and services (although not all categories). The tax system was simplified with the introduction of the PAYG (Pay As You Go) system and taxpayer self-assessment. Changes to tax brackets improved vertical equity (fairness across income levels) and addressed bracket creep (taxpayers being pushed into higher tax brackets as their income increased).

Treasury research from 2015 suggests Australia is relatively reliant on direct taxes (income and corporate tax) and less on consumption taxes compared to OECD and Asian economies.

Structural changes in recent years have raised a number of challenges for the tax system, examples being:

- the aging population means a lower proportion of working age people, reducing the tax revenue base;
- the growth of on-line transactions with overseas vendors may reduce GST revenue;
- business is now more mobile and can operate from overseas to benefit from lower corporate tax rates;
- the value of a business used to lie in its products, land and machinery. Intangibles such as patents, copyrights, brands, and trademarks are now important components of business value, but they are difficult to tax because it is hard to value and measure income created by those assets;
- new ways of transmitting payment, such as cryptocurrencies, are anonymous; and
- compliance complexity (for example the taxation of trusts)

These changes make it difficult to identify who should pay a tax; potentially reduce the revenue that the tax system can raise; and challenge the important role of the tax system in sharing the benefits of economic activity in an inclusive and fair manner.

The most recent significant review of the tax system was the 2008 'Henry Review', which recommended:

- concentrating revenue raising on four efficient tax bases: personal

income; business income; private consumption; and economic rents from natural resources and land, with other taxes to be abolished unless they had a specific purpose (e.g. tax on tobacco);

- configuring taxes and welfare transfers to support productivity, participation and growth;
- establishing an equitable, transparent and simplified personal income tax featuring a higher tax-free threshold (around \$25,000), only two tax brackets, and a simplification of, deductions and offsets;
- increasing the efficiency of land and resource taxation; and
- a more open, understandable and responsive tax system.

Both Labor and Liberal governments have done little, however, to implement the recommendations of the Henry Review. Achieving tax reform is difficult – it is politically hard, and the process is not well understood by the general populace. The need for reform is pressing – the government budget will be in deficit for some time due to COVID-19, yet tax revenue is declining.

Trade liberalisation

A significant driver of productivity in a small economy such as Australia is its degree of openness to the outside world – the willingness to trade goods, services and ideas with other countries (refer to chapter 3). An open economy generates productivity gains because trade gives access to markets and spurs competition, innovation, and specialisation.

For many years, Australia used artificial protection methods such as subsidies, tariffs and quotas to protect domestic producers from overseas competition. As we saw in chapter two, protection transfers welfare from consumers to producers, limiting consumer choice and reinforcing inefficient operations.

Trade liberalisation measures introduced over the last thirty years mean Australia is now one of the least protectionist countries in the world. Businesses have been forced to become more efficient to compete with imports, and to become more export focused. Australia has gradually increased its trade focus (the proportion of GDP accounted for by exports and imports) and has become a stronger competitor in world markets by developing new sources of competitive advantage (e.g. the export of education services).

Since 2020, however, geopolitical tensions and the COVID-19 pandemic have disrupted the movement of people, resources and products. This may force many firms to adjust their supply chains to increase the proportion of local inputs.

Infrastructure policy

The term infrastructure generally refers to the underlying structures that support society and the economy. Some of these are 'hard infrastructure' – roads, water supply; electrical grids; ports; and telecommunications. Others are institutional

Infrastructure Australia - examples of priority list projects			
Region	Project name	Problem/category	Time frame*
National	Inland rail - Melbourne to Brisbane	Demand for freight movement to triple by 2050, but current rail transit times are slow, and much of the road route is single lane, double carriageway.	5–10 years
National	Electric vehicle (EV) fast charging network	Establishing a network of fast-charging stations will help to overcome the 'access to charging facilities' barrier to EV adoption.	0–5 years
WA	Perth airport second runway	Passenger throughput expected to double by 2040, with FIFO worker and international hub growth.	5–10 years
WA	Perth water security	Need to address challenges from climate change and aging assets that could lead to rising water bills, and lead to declining service quality and reliability.	0–5 years

Source: Infrastructure Australia, 2022. A full list (about 170 projects) can be found at the Infrastructure Australia web site. Time frame refers to development and evaluation of a business case

or 'soft' infrastructure – the social security, education and health systems being good examples. Infrastructure is the basis of a productive economy. Effective transport systems, for example, enable people to get to work! Electricity powers the machines they use when they get there.

In 2017, an Infrastructure Australia audit sought submissions from governments, stakeholder groups and the community about Australia's infrastructure needs up until 2030. The result was a 'Priority List' including nearly 100 potential 'nation-shaping' projects worth around \$55 billion. The 2022 update to this list included projects such as motorways to relieve traffic congestion in cities; bridge, rail and road programs to improve connectivity between regions; land purchases required for future transport corridors; and a number of water security initiatives.

The majority of projects will be funded by the various levels of government, with others funded by 'alliance funding' and public-private partnerships (PPP) – about ten per cent of all projects. In a PPP, a private provider constructs the project (often a road, railway or airport) and operates or maintains it to specified standards, paid for over time by revenue in the form of charges paid by the users, such as toll-roads or landing fees. PPPs enjoy a good reputation in Australia for delivering projects on time and within budget, possibly because the private sector has incentives to manage projects profitably.

Education and training policy

The knowledge, skills, competencies and attributes embodied in people are described in economics as human capital. There is a strong association between the stock of human capital and productivity for individuals, their workplaces and the economy as a whole. Human capital is developed by formal learning (attaining a certificate or qualification); informal learning (on-the-job training, work experience, mentoring); skills development in association with new technology; and the application of management and leadership skills to foster improvement over time.

There is a positive relationship between formal training and firm performance. Economic theory suggests that firms train employees if the return on their investment is higher than the costs of doing so. Training is likely to bring positive externalities to the firm, such as the ability of the firm to absorb new technology and expertise. Learning also has additional economy-wide benefits relating to health, lower crime rates, better parenting and social participation.

Evidence on formal learning and productivity suggests that additional years of education increase earnings, with higher returns for more specific skills. University graduates can earn \$800,000 more than school-leavers over the course of their working lives! Two thirds of Australian have a post-school qualification, and about 60 per cent of the 15-24 years age group are enrolled in post-school study. The post-school education sector in Australia is very fragmented, which is a problem for consistent educational standards that equip graduates for a job. In 1995, Australia implemented an Australian Qualifications Framework (AQF) which has 10 qualification levels (from Certificate-1 to PhD) that describe what a student can achieve in terms of knowledge, skills and generic skills. The value of the framework, from a productivity perspective, is that it establishes and communicates standards benchmarks across the education and training sector.

In the schools sector, international tests suggest student results in mathematics and literacy have declined over the past decade, so government policy has tried to promote STEM (science, technology, engineering and mathematics) subjects; developed a national curriculum to try to promote consistency across states; and used NAPLAN tests to measure the progress of student achievement in schools across the country.

There has also been more focus on 'bottom-up' strategies to improve education outcomes, such as the establishment of a national education evidence-base to evaluate and communicate information about what works best to improve student learning in schools. The Productivity Commission also recommended the increased use of 'value-added' measures of school performance.

In 2022, the draft report of Review of the National School Reform Agreement (NSRA), a program started in 2018 to implement national reforms to lift education outcomes, found that increased funding to education over the period has had little impact on student outcomes.

Research and innovation

Research and development (R&D) and innovation are regarded as important levers in creating a more competitive economy. The direct benefits of R&D and innovation include new or improved products and services, increased sales revenue, reduction in the costs of production, gaining an advantage over competitors, and improved customer service. There are also considerable indirect benefits (spillovers or externalities), including a greater stock of human capital, creativity and sustainability, which make it appropriate for the government to support research and innovative activity.

Economists identify three categories of research:

- basic research (also called pure or fundamental research) which researches fundamental aspects of a field of knowledge without specific applications or products in mind. This type of research is more likely to be undertaken by universities or public sector bodies like CSIRO, funded from the public purse.
- applied research, which looks at the practical applications of knowledge such as developing new products and processes; and
- experimental development, which describes research into new products and services for the market.

Innovation is distinct from R&D. Innovation is the implementation of a new or significantly improved product (good or service), process, new marketing method or a new organisational method in business practices or workplace organisation. Fifty-two per cent of business firms classified themselves as 'innovation active' in 2021, many in collaboration with other firms or partners. Historically, Australian firms are more likely to modify or adapt products or processes that already exist, although the sidebar notes some significant inventions (note that invention and innovation are not the same thing!).

Business expenditure on R&D (BERD) in 2020-21 was about 0.9 per cent of GDP (against the OECD average of 1.67 per cent), but firms in the services sector spend more on R&D than their overseas counterparts. The top three fields of research were information and computing technology; engineering and bioengineering and clinical sciences. The main sectors were ICT, manufacturing and commercial services. Small firms are not as active in R&D as large firms, but they do undertake innovation to improve day-to-day service delivery;

As a result, Australian innovation policy has moved to providing greater support to small business and services innovation in digital technologies (including software and apps), reconfigured business models, branding and marketing, and new staff capabilities.

Innovation is often incremental in nature, but a series of small improvements often leads to significant change over time. Innovation used to be regarded as something internal to companies, but is now recognised as a more open activity where businesses take deliberate steps to learn from their customers and their competitors ('open innovation').

Famous Australian inventions and innovations:

- stump-jump plough (1875)
- combine harvester (1882)
- electric drill (1889)
- surf lifesaving reel (1906)
- Vegemite (1922)
- electronic pacemaker (1926)
- Zinc Cream (1940)
- Hills Hoist (1945)
- School of the Air (1951)
- rotary lawn mower (Victa, 1952)
- black box flight recorder (1958)
- ultrasound scanner (1961)
- wine cask (1965)
- cochlear implant (bionic ear, 1978)
- Racecam (1979)
- the winged keel (1983)
- baby capsule (1984)
- spray-on-skin (1992)
- WiFi (1993)
- bionic eye (2009)

Source: IP Australia

Clearly, the government cannot mandate innovation, but has a range of programs that encourage ‘an innovative mindset’ and support innovative businesses with advice and tax incentives.

Deregulation and competition policy

An interesting story relating to growth and productivity in recent years has been Australia’s transition from a ‘protected’ economy to a ‘competitive’ one. Beginning in the late 1970s, governments introduced a range of measures, collectively known as microeconomic reforms (MER) to reduce institutional and regulatory impediments to a more productive and efficient economy.

The Australian Competition and Consumer Commission (ACCC) administers the Competition and Consumer Act 2010 (previously known as the Trade Practices Act (1974). Essentially, the objectives of the Act are to:

- maintain and promote competition;
- protect the interests and safety of consumers, and support fair trading in markets affecting consumers and small business;
- promote the economically efficient operation of infrastructure; and
- undertake studies to support competition, consumer and regulatory outcomes.

Australia’s third review into competition policy (the Harper Review, 2015) noted that many of Australia’s markets have few participants with large market shares, and that challenges such as increasing competition from global markets, disruptive innovation, demographic changes and future work skills needing to be recognised. The review developed a number of competition principles:

- that markets should work in the long-term interests of consumers;
- to foster diversity, choice and responsiveness in government services;
- to encourage innovation, entrepreneurship and the entry of new competitors;
- to promote efficient use of infrastructure and natural resources; and
- to establish clear, predictable, and reliable competition laws.

The bulk of the Harper Report recommendations were passed as amendments to the Competition and Consumer Act in 2018 .

Recent examples of ACCC competition studies/inquiries include:

- an electricity market monitoring inquiry (ongoing until 2025)
- the 2020 report into bargaining power imbalances in the supply chains for perishable agricultural products; and
- an inquiry into regional mobile telecommunications infrastructure (ongoing until 2023).

Worksheet - structural change

Answer the following questions that refer to the first section of the chapter.

1. Define structural change.
2. Give three examples of structural change.
3. Outline the general pattern of structural change that occurs as a country develops.
4. Explain why the manufacturing sector accounts for less output as economic development proceeds.
5. Give two examples of 'price signals' and explain how they would cause changes in patterns of demand or supply.
6. Provide one example each of positive and negative impacts of structural change.
7. Outline the impact of structural change on economic growth.

Worksheet - productivity

Answer the following questions that refer to the second section of the chapter.

1. Define the term productivity.
2. Define labour productivity. Convert your definition into an 'equation', with a numerator and denominator.
3. Explain the meaning of multifactor productivity.
4. What factors explain the higher than average rate of increase in productivity in Australia in the 1990s?
5. Give three reasons to explain slower productivity growth in the last decade.
6. Suggest how two of the following could reduce productivity: low capacity utilisation; drought; government 'red tape'; transport congestion; lack of R&D; poor management.
7. What are the key drivers of productivity?
8. How important are day-to-day business activities in developing a more productive economy?
9. Explain the role of management in improving productivity.
10. Use an AD/AS model to explain the impact of improved productivity on the Australian economy.
11. List three examples of government policy measures implemented in the last ten years to improve productivity and economic growth.

Types of productivity

Bob is a painter employed by a decorating company. The firm invests in a new type of roller which it is claimed will hold more paint, allowing the painter to finish work more quickly. The roller costs \$200. Tests show Bob can get 20% faster at painting ceilings, for which the firm charges \$120 per hour. Using the roller requires some new skills, so Bob attends a half day training course which teaches him the appropriate skills. Bob's employer promotes its service heavily to prospective users, increasing its market share.

1. Define the term productivity.
2. Explain how capital deepening has contributed to higher productivity at firm level in this example.
3. Describe the 'residual' (or quality) factors that would have contributed to higher productivity in the decorating company.
4. Explain which type of productivity measure - labour or multifactor - would be easiest to calculate.
5. Describe the potential role of management in the promotion of labour productivity.

Structural change and employment

Refer to the data table to answer the questions below.

	Changes in sectoral shares in employment, 1990 - 2020				
	Share of total employment (%)				Change in share (%)
	1990	2000	2010	2020	1990-2020
Agriculture, Forestry, Fishing	5.4	4.9	3.2	2.5	
Mining	1.3	0.9	1.6	1.9	
Manufacturing	14.6	12.1	9.0	7.1	
Electricity Gas Water & Waste Services	1.5	0.9	1.2	1.1	
Construction	7.7	7.8	9.0	9.1	
Wholesale Trade	5.5	4.5	3.9	3.0	
Accommodation & Food Services	5.7	6.8	6.8	7.2	
Transport, Postal & Warehousing	5.4	5.0	5.1	5.0	
Information, Media & Telecommunications	2.3	2.5	1.9	1.6	
Financial and Insurance Services	4.6	3.8	3.7	3.6	
Rental, Hiring & Real Estate Services	1.7	1.6	1.7	1.7	
Professional, Scientific & Technical Services	4.7	6.5	7.8	8.9	
Administrative & Support Services	2.1	3.5	3.4	3.4	
Public Administration & Safety	5.6	5.4	6.3	6.4	
Education & Training	6.8	7.1	7.7	8.6	
Healthcare & Social Assistance	8.1	9.3	10.9	13.8	
Arts and Recreation Services	1.3	1.6	1.8	1.9	
Other Services	4.6	4.6	4.1	3.8	

Trend data

Source: ABS 6291.00.5.003 Labour Force Australia Detailed Quarterly (Table 4)

Questions

1. In terms of employment share, which were the three largest sectors of the Australian economy in 1990? Calculate the change in sector share over the period.
2. Which sectors exhibit growth, in terms of employment share? Which exhibit decline?
3. To what extent does the pattern shown in this data concur with the three 'stylised structural change facts' discussed in the section on structural change?
4. The volume and value of agricultural output actually rose many times during this period. Explain how output could have risen when employment shares fell.
5. Explain how this information could impact on the following economic decisions: the educational choices of young people; policy about the protection of local manufacturers; the provision of public infrastructure; and individuals intending to start a business.
6. Research: Access the 'My Next Move' section of the o.net database (see <https://www.mynextmove.org>). Browse the career types to determine the requirements of a several jobs of interest, and the 'job outlook' for that occupation (note – the o.net database refers to the United States labour market).

Multiple choice questions

Choose the best alternative answer to each of the following questions.

Structural change is an on-going process in the economy. It is explained by

1. Structural change is an on-going process in the economy. It is explained by
 - a. patterns of demand changing over time as new products emerge to replace old ones.
 - b. invention and innovation bringing new technologies to productive methods.
 - c. management seeking more efficient ways of producing good and services.
 - d. all of the above.
2. Which of the following best describes the general pattern of structural change of economies as they develop?
 - a. The growth in urban population increases the demand for food, so the proportion of employment in the agricultural sector rises.
 - b. Manufacturing dominates agriculture, then services dominate manufacturing.
 - c. Manufacturing industry declines when a country is able to produce surplus food.
 - d. The service sector overtakes the manufacturing sector as the dominant sector.
3. The formula that best describes labour productivity at firm level is
 - a. labour productivity = Output volume / input volume.
 - b. labour productivity = Cost of inputs / labour hours worked.
 - c. labour productivity = Output volume / labour hours worked.
 - d. labour productivity = Output increase / labour hours increase
4. Multifactor productivity is best described as:
 - a. the contribution of capital deepening to increased output value.
 - b. the amount of output produced per hour worked.
 - c. the contribution to output growth made by factors unrelated to the quantity of labour and capital equipment.
 - d. the contribution to output growth made by investments in human and physical capital.
5. In 2021, labour productivity increased 1.1% and multifactor productivity increased by 0.8%. Hence, the contribution of capital deepening to labour productivity was:
 - a. -0.3%.
 - b. zero.
 - c. 0.3%.
 - d. 1.9%.
6. Technical efficiency is best defined as:
 - a. minimising the opportunity cost of resource use.
 - b. employing current technology to improve productivity.
 - c. allocating resources according to consumer preferences.
 - d. producing at the minimum average cost level of output.
7. Recently, Australian innovation policy has moved toward:
 - a. increasing BERD through subsidies.
 - b. increasing the amount of research and development (R&D) that takes place in universities.
 - c. supporting innovation in small businesses.
 - d. encouraging business participation in applied research
8. Rising productivity would be expected to result in:
 - a. higher levels of structural unemployment.
 - b. an increase in the economy's potential output.
 - c. pressure on the price level as business costs rise.
 - d. lower levels of aggregate demand.