



**Australian Government**  
**Productivity Commission**

# Things you can't drop on your feet

## An overview of Australia's services sector productivity

PC PRODUCTIVITY INSIGHTS

APRIL 2021

### Features

Service sector growth is a feature of a maturing economy

Service sector facts and myths

Challenges in measuring productivity in the service sector

Measurement issues in service sector productivity

Improving service sector productivity through digitisation

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### The Productivity Commission

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The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website ([www.pc.gov.au](http://www.pc.gov.au)).

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# Contents

Foreword	v
Key points	1
1 Service sector growth is a feature of a maturing economy	5
2 Service sector facts and myths	15
3 Challenges in measuring productivity in the service sector	23
4 Service sector productivity: evidence and theory	31
5 Improving service sector productivity through digitisation	38
6 Conclusion	43
References	44



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# Foreword

Over the past 70 years the Australian economy has undergone a fundamental shift from agriculture and manufacturing to services. Services now account for about 80 per cent of production and 90 per cent of employment. Although the goods sector, including mining, will continue to be of economic importance, as Australia continues to become a more service-centric economy, long-run wages and national welfare will be increasingly linked to service-sector productivity.

This said, services are not one monolithic industry; the service sector covers a wide range of jobs and outputs, from brick laying to neurosurgery. The Commission's latest series, *Productivity in the service sector*, aims to better understand these industries, their different characteristics, factors affecting their productivity performance and potential implications for policy. The series will delve beyond national aggregates, using industry-sourced data and bespoke analytical approaches. This paper is the series launch — outlining the significance of and issues in service sector productivity, while future papers will be vignettes on subindustries.

Australia's shift towards service production, and away from manufacturing in particular, has raised concerns. These include worries about services dragging on productivity performance and service sector jobs being lower paid or of lower quality. For the most part, these fears are unfounded. Many service sector industries provide jobs that pay as well as or better than manufacturing, with good job security. And the increased prevalence of casual work has been proportionally as large in the goods sector as in the service sector. Several service sector industries — including financial and insurance services and information, media and telecommunications — have also experienced productivity growth that outpaced the goods sector.

The service sector also faces challenges. COVID-19 has caused Australia's first recession in nearly 30 years and parts of the service sector (especially hospitality, accommodation, recreation and retail) have been hit hard. Between 14 March and 11 April 2020, the food and accommodation industry laid off a third of its employees, and the recreation industry shed nearly 30 per cent of its workforce. Though employment has since improved, neither industry has fully recovered and concerns about COVID-19 continue.<sup>1</sup>

While some services industries have performed consistently well over the long run, others have had persistently low productivity growth. For example, administrative support and arts

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<sup>1</sup> As of 12 December 2020, accommodation and food services were 10 per cent below March 14 2020 employment levels, while recreation and the arts were about 5 per cent below. There was a subsequent fall in job numbers in December but the ABS noted that this was similar to falls seen at the same point in the previous year.

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and recreation have both had productivity growth below the market sector average since 1994-95. While this may partly reflect the challenges of measuring productivity in the service sector, it mainly reflects the intrinsic characteristics of many services, such as the need for face-to-face interaction, which limits market size and opportunities for trade, scale and capital deepening.

Technological developments have and will continue to change some of the characteristics of the (historically) slow productivity growth services and increase their resource efficiency. For example, online learning increases access to, and competition within, education as well as increasing the scope for capital deepening and economies of scale. Likewise, digitisation of other services can lower search costs and asymmetries of information, further increasing competitive pressures and allowing greater diffusion of technology between firms. The *Productivity in the service sector* series aims to help identify such instances and where governments may have a role in facilitating this innovation.

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# Productivity in the service sector

## Key points

- The service sector constitutes the bulk of Australia's economy, contributing 79 per cent of value added and 88 per cent of employment.
  - This sector is diverse, encompassing all industries outside of mining, agriculture and manufacturing (the goods sector). This diversity (for example, from cleaning services to medicine) means that different service industries operate in very different ways.
- The rise of the service sector over the past 70 years, and the associated displacement of manufacturing as a share of economic activity, has raised fears of worsening labour market conditions, slower wage growth and slower productivity growth. Such fears are misplaced as:
  - a large service sector is a feature of a mature and prosperous economy. As incomes increase we spend proportionately more on services relative to goods which stimulates output in the service sector, increasing its share of economic activity
  - almost all advanced economies have had rapid growth in their service sector (and relative shrinking of their manufacturing sector). This is the case even for the 'workshop of the world', China, since 2005
  - productivity growth in many service industries (including finance, ICT and transport) has outpaced the goods sector by a significant margin over the past few decades
  - many service industries also have higher wages and total take-home pay than manufacturing, and the rise in casualised employment has been (proportionately) on par with the goods sector.
- However, some parts of the service sector (particularly labour-intensive and face-to-face services) have experienced persistently low growth in productivity and capital investment.
  - Mostly this is due to their 'intrinsic' characteristics — they often need to be delivered in person (relative to goods); and in some instances, their quality is hard for consumers to reliably observe prior to consumption (and equally hard for statistical agencies to capture in data).
  - In the 'non-market' sector, limited competition and a lack of market determined prices weaken incentives to innovate or contain cost growth.
  - Numerous measurement issues that affect the service sector may explain some of the poor performance as there are possible quality changes (potentially positive or negative) not currently captured by productivity statistics.
- The issues affecting the service sector are as diverse as the sector itself. This paper is the first of several studies. Subsequent releases will examine particular service industries, highlighting the unique characteristics influencing their productivity in ways that are not possible using national accounts data alone.

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This paper marks the launch of a new series, *Productivity in the service sector*, looking at individual service industries. The series aims to explore the characteristics that differentiate service industries, how particular industries are performing, and factors playing a role in their productivity performance. There are several reasons the Commission has chosen to report on the factors that affect productivity improvement in the service sector, and to do so industry by industry.

First, the size and importance of the sector justifies attention. Like almost all developed nations, Australia is a service-intensive economy — services employ almost 90 per cent of Australian workers and account for around 80 per cent of GDP.

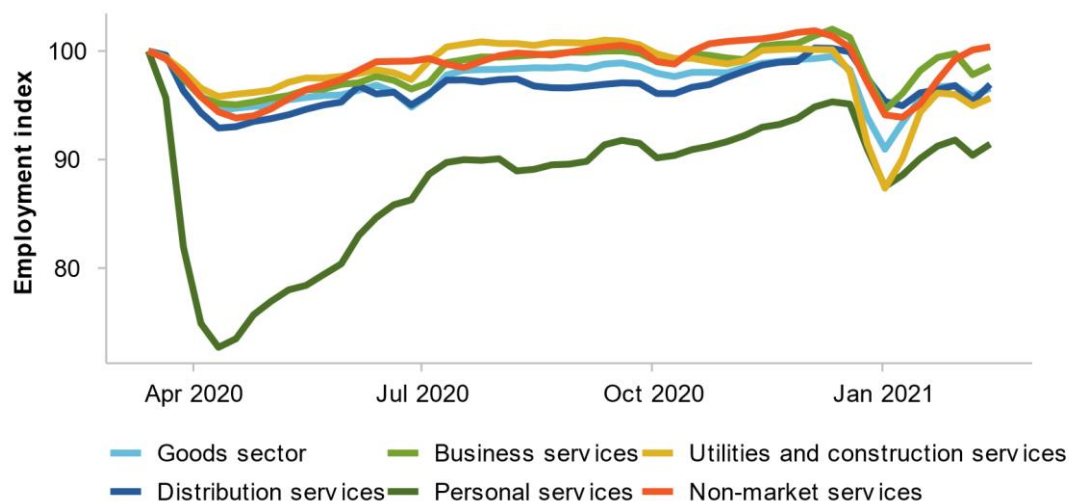
Second, the service sector displays great diversity in the nature of its output and methods of production. Services range from online retail platforms to dentists and accountants, and it does not always make sense to account for them as a group (box 1 and 2). For this reason, deeper analysis at an industry level can shed light on possible drivers of, barriers against and opportunities for service sector innovation. Moreover, there are measurement issues that mean output estimates can sometimes be a misleading indicator of economic activity. These issues tend to be industry specific: the conflation of market risk premiums with genuine value-add in finance, or the rapid obsolescence of old products and creation of new ones in information technology, for example.

Third, the COVID-19 pandemic has been especially difficult for the service sector. Behavioral changes in response to the pandemic along with mandatory closures have reduced face-to-face interactions, greatly increased the tendency to work from home and driven down or prohibited the use of some transport services. This has translated to significantly lower demand for many services, particularly personal services (hospitality, accommodation, and recreation) and retail services. Between March and October 2020, the personal services sector collectively lost over 20 per cent of its workforce and, although it has recovered significantly since, employment remains 12 per cent below pre-COVID levels (figure 1) (ABS 2020d, 2020f). Some of the pandemic-induced changes, such as increased use of food delivery and online healthcare, may become permanent, with significant productivity implications.

Fourth, the differences in industry and regulation structure typically mean an economywide, ‘cookie cutter’ approach to policymaking is not necessarily appropriate for many service industries. Although some policy areas have economy-wide implications (such as industrial relations and taxation), reform of many service sector industries demands a more bespoke approach, requiring detailed knowledge of the industry’s structure and regulatory environment.



Figure 1 **COVID-19 restrictions disproportionately hit personal services**  
Index of total number of employees from March to February 2020  
(100 = March 14)<sup>a</sup>



<sup>a</sup> Recent declines in employment series do not necessarily indicate unexpected systemic job losses. The source ABS data series is not yet trend adjusted and includes quirks of its source administrative data. This year end period likely captures the joint effects of concluding Christmas hires, school holidays, public holidays and lower business activity for some industries.

Sources: ABS (*Labour Force, Australia*, Cat no. 6291.0.55.001, table 4; *Weekly Payroll Jobs and Wages in Australia*, Cat no. 6160.0.55.001, table 3).

## Box 1 What is a service?

There is no agreed definition of services and this partially reflects their great diversity. Traditionally, services were defined as the *residual* sector, an afterthought to primary production and manufacturing. Echoing this traditional understanding, *The Economist* quipped that services are 'products of economic activity that you can't drop on your foot'.

Contemporary definitions of services try to identify their intrinsic characteristics. For example, the 2008 System of National Accounts (SNA) definition of services emphasises their role in changing the conditions of consuming units (for example restaurants provide a dining experience, as well as food) or facilitating exchange (for example supermarkets and stock exchanges).

The following tables summarise how services are defined within the Australian and New Zealand Standard Industrial Classification Divisions system. Throughout this paper, services are aggregated into five categories; distribution, personal, business, utilities/construction and non-market as shown below.

### Goods industries

Industry	Category	Employment ('000)	Value added (\$'000 000)
Mining	Goods	247	202 441
Manufacturing	Goods	862	108 404
Agriculture, forestry and fishing	Goods	363	38 132

### Service industries

Industry	Category	Employment ('000)	Value added (\$'000 000)
Transport, postal and warehousing	Distribution	610	84 144
Information media and telecommunications	Distribution	194	43 403
Retail trade	Distribution	1 244	79 171
Wholesale trade	Distribution	395	70 860
Professional, scientific and technical services	Business	1 114	136 736
Financial and insurance services	Business	489	167 057
Rental, hiring and real estate services	Business	228	54 802
Administrative and support services	Business	395	63 430
Accommodation and food services	Personal	773	39 405
Arts and recreation services	Personal	202	14 810
Other services	Personal	439	32 394
Electricity, gas, water and waste services	Utilities & construction	151	47 204
Construction	Utilities & construction	1 160	137 673
Education and training	Non-market	1 085	93 678
Public administration and safety	Non-market	884	106 521
Health care and social assistance	Non-market	1 765	144 023

Source(s): The Economist (2020); European Commission et al.(2009); ABS (*Australian System of National Accounts, 2019-20*, Cat. no. 5204, table 5; *Labour Force, Australia*, Cat no. 6291.0.55.001, table 4).

## Box 2      **The extent of differentiation in the service sector**

There is no monolithic ‘service sector’ — rather, there is a series of subsectors the economic activity of which varies substantially in terms of type of output, production processes, the occupations of workers and the types of organisational structure. The table below highlights some of the large differences that exist across and within sub-industries under the ‘service sector’ label.

<i>Industry</i>	<i>Gross output measurement</i>	<i>Median number of employees</i>	<i>Median annual sales (\$ million)</i>
Cafes and restaurants	Value of all food, drink and other goods sold at the business	1 to 9	0.2 to 2
Rail freight transport	Fees charged for the transportation of goods	20 to 99	10 to 50
Data processing and web hosting Services	Fees charged to customers for service plus advertising revenue	1 to 9	0.075 to 0.2

*Sources:* BLADE tablebuilder, & Australian system of nation accounts concepts, sources and methods (ABS 2020a).

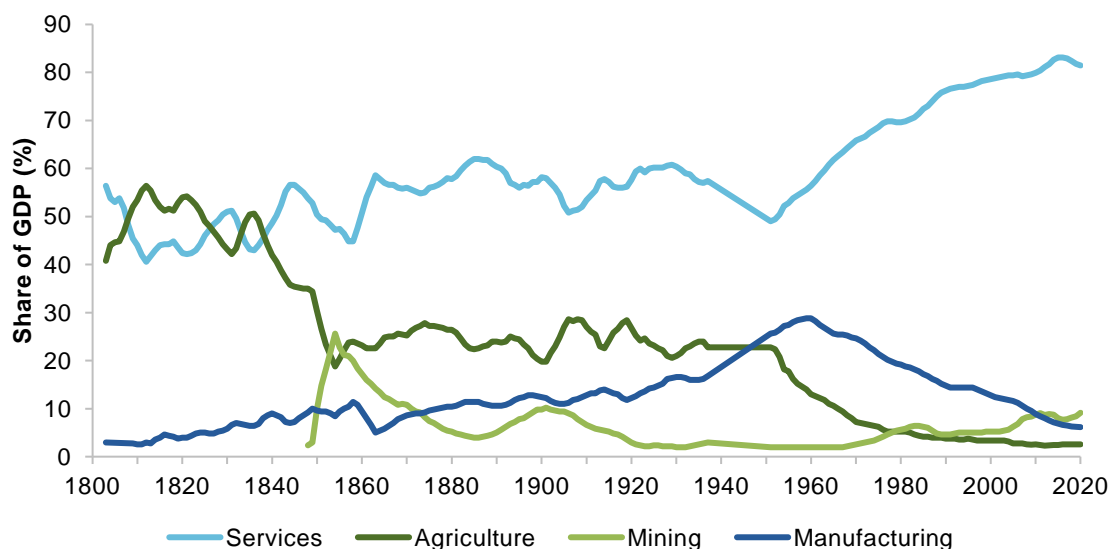
## **1      Service sector growth is a feature of a maturing economy**

The service sector has always been a significant part of the Australian economy, but since about 1950 services have grown as a share of the economy, both in terms of output and employment (figures 2 and 3). Seventy years ago, nearly half the workforce was engaged in primary production or manufacturing, while today the figure is less than 10 per cent.

The same general pattern is evident in other advanced economies, such as the United States and the United Kingdom (figure 4). As economies develop, mining and agriculture tend to shrink and manufacturing eventually peaks before then also contracting, with services then becoming a steadily larger proportion of GDP (Kuznets 1971) (Australia is somewhat unusual with mining increasing its share of the economy, along with services).

**Figure 2** **Although always very large, the service sector has grown rapidly in the past 70 years ...**

Five year centred moving average of the shares of agriculture, mining, manufacturing<sup>a</sup> and services<sup>b</sup> in total GDP from 1801 to 2020

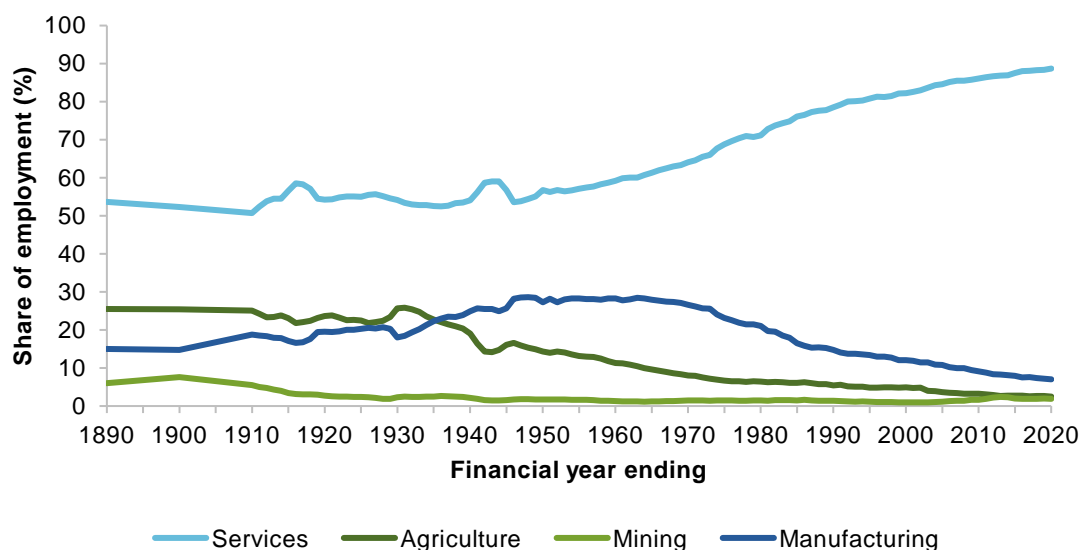


<sup>a</sup> Manufacturing in this chart includes private construction, which elsewhere in the paper is included as part of the service sector. <sup>b</sup> Services are all industries other than agriculture, mining and manufacturing.

Sources: 1801 to 2010: Butlin et al. (2015); 2010 to 2020: ABS (2020a).

**Figure 3** **... and this has occurred to even greater degree in employment**

Shares of agriculture, mining, manufacturing, and services in total employment between 1889-90 and 2019-20

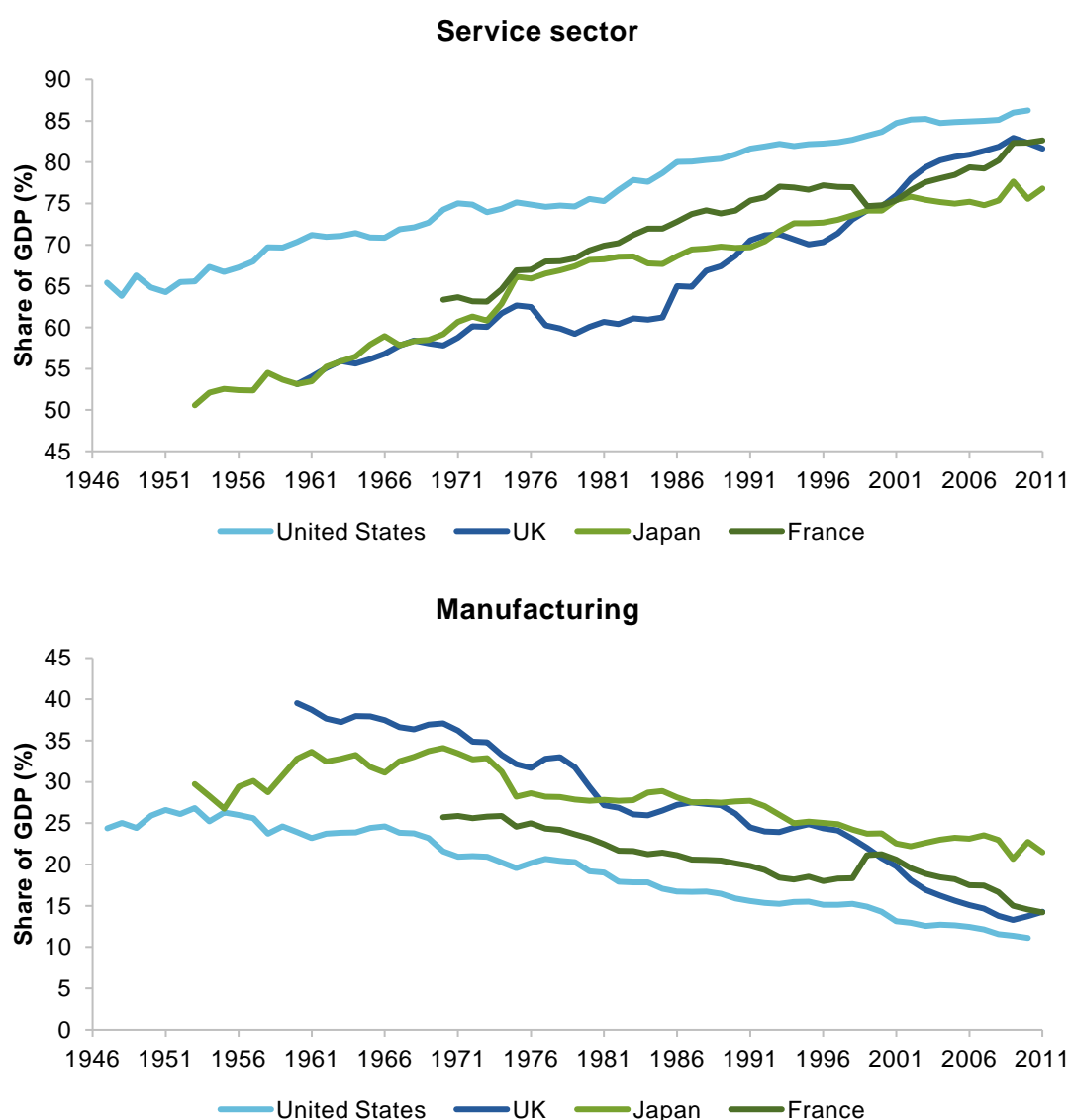


Sources: Commission estimates using, 1890-91 to 1979-80: Withers, Endres & Perry (1985); 1980-81 to 2019-20: ABS (*Labour Account, 2018-19*, Cat. no. 6150.0.55.003, tables 2-20).

The rise of the service sector in advanced economies is often attributed to the rapid industrialisation of East and South East Asia. Indeed, the phrase ‘Made in China’ has become so ubiquitous that China is sometimes referred to as the ‘world’s factory’ (Ghosh 2020). And while the industrialisation of Asia has likely accelerated the rate of structural transformation in the advanced economies, the emerging Asian economies have also experienced growing service sectors. In many of these countries, the manufacturing sector has either peaked or declined as a share of GDP, including in China, since about 2000 (figure 5).

**Figure 4 A large and growing service sector is a key feature of other advanced economies as well**

Service sector<sup>a</sup> gross value added as a proportion of GDP in advanced economies between 1947 and 2011

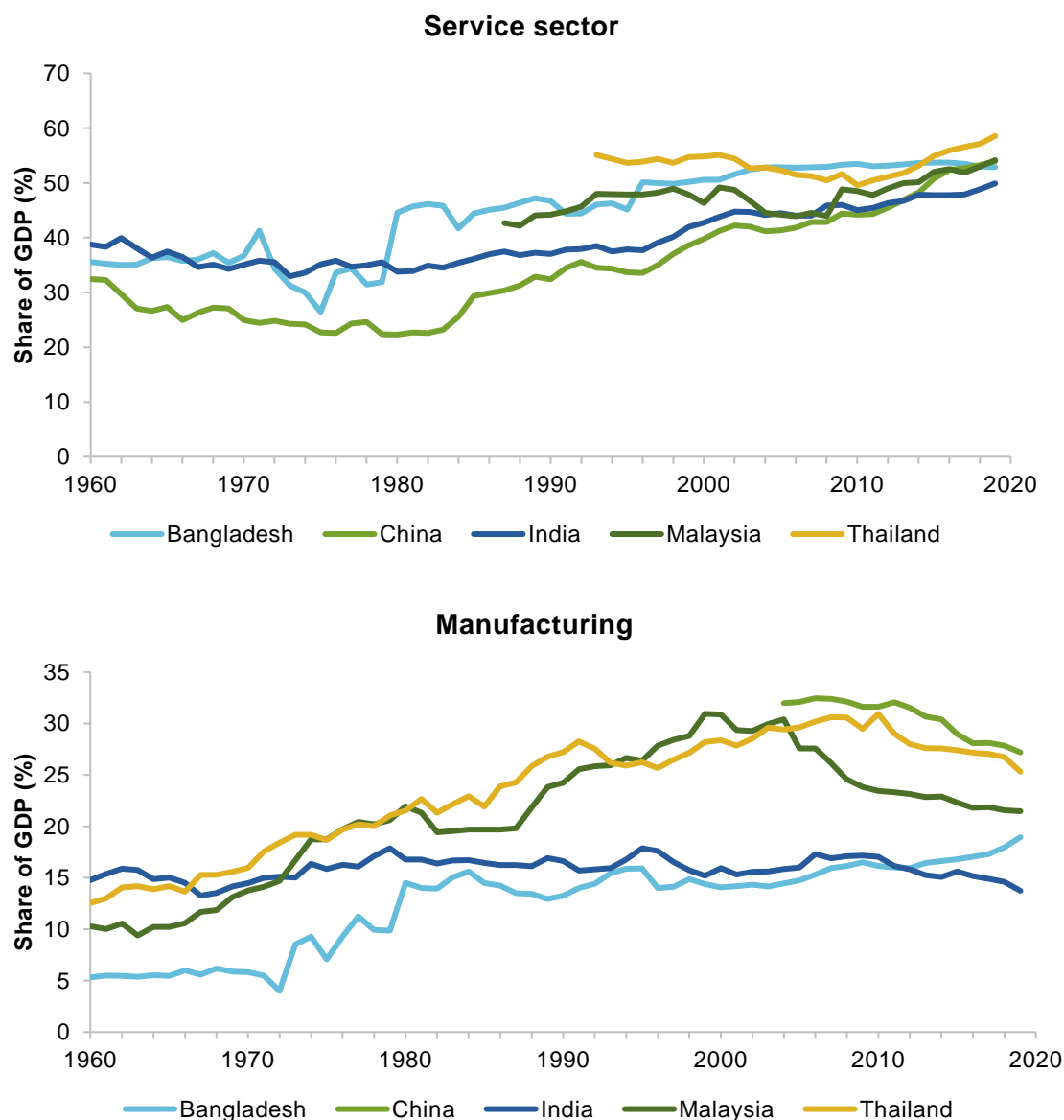


<sup>a</sup> The service sector is defined as all industries other than agriculture, mining and manufacturing.

Source: Timmer, de Vries & de Vries (2015).

**Figure 5 Asian emerging economies have seen a growing service sector and recent declines in the manufacturing share**

Value added shares of the service sector<sup>a</sup> and the manufacturing sector as a proportion of GDP (%) in select Asian economies from 1960 to 2019



<sup>a</sup> Unlike elsewhere in this report, due to data limitations, the service sector excludes utilities and construction.  
Source: World Bank (2020).

In Australia, the increased share of non-market services (in particular health care and social assistance) and business services accounts for almost all the increased size of service sector employment, with a small remainder due to increased personal services employment. Due to changes in industry definitions, industry-level data for the 1960s to early 1990s cannot be compared to more recent data and so these two periods are presented separately below.

Table 1, which breaks down the growth of the service sector from 1963 to 1993, shows that proportionally business and non-market services grew while the shares of distribution services, and utilities and construction fell. Figure 6 shows that in recent decades, the service share of employment has increased significantly while the share of production is only slightly higher. Non-market services appear to have plateaued in terms of their share of production but continue to grow their share of employment, while business services has increased both its share of production and employment in recent decades.

Similar trends have occurred overseas — for example, in the US non-market, business and (to a lesser degree) personal services have increased as a share of the economy, while the shares of other service sector industries have decreased (figure 7).

**Table 1      Most of the increase in the share of the service sector is attributable to non-market and business services ...**

Gross value-added shares of GDP of different aggregations of sectors<sup>a</sup> in the economy in 1963 and 1993

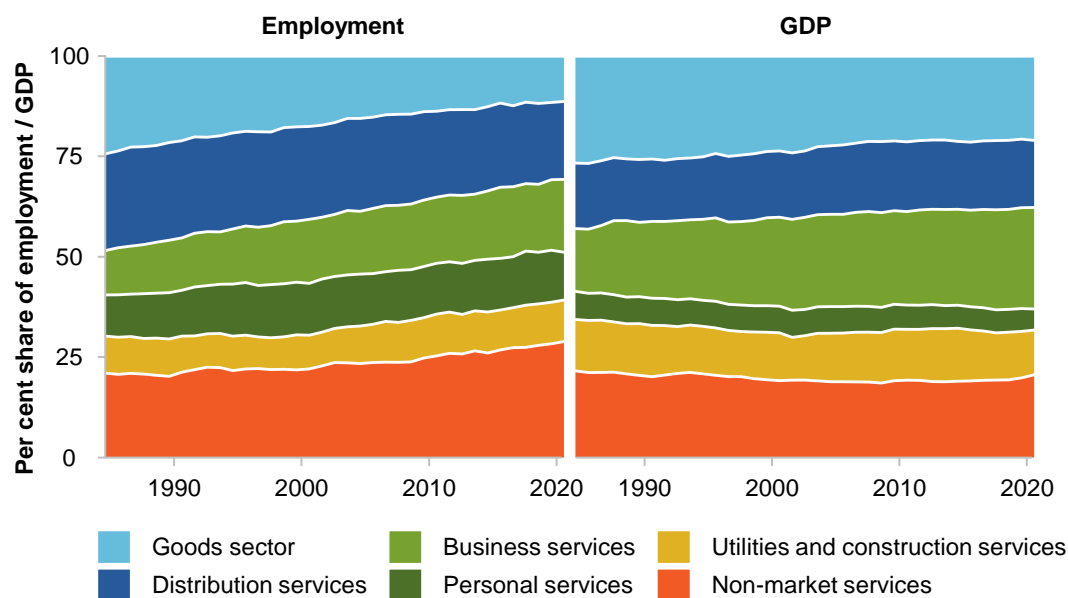
	1963	1993	Change
	%	%	%
Goods sector	38.6	21.6	-43.0
Distribution services	11.2	10.2	-8.9
Utilities and construction	25.6	24.3	-5.0
Business services	6.9	13.3	92.7
Personal services	3.3	4.7	42.4
Non-market services	14.4	25.9	79.9
Services total	61.4	78.4	27.7

<sup>a</sup> Subsector groupings defined in box 1.

Sources: ABS (*Australian National Accounts: National Income, Expenditure and Product, 1992-93*, Cat. No. 5204.0).

Figure 6 ... though this growth has mostly been in business services in recent decades

Service industry share of total employment and GDP<sup>a</sup>



<sup>a</sup> Contribution to GDP is proxied by gross value added and as such does not include the effects of taxation or subsidies.

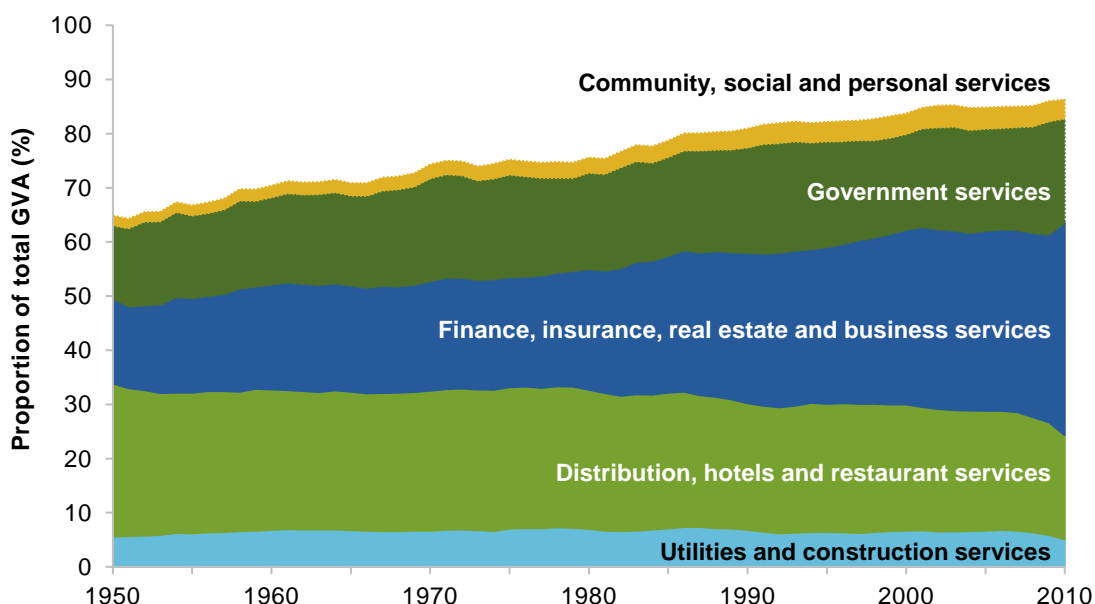
Data sources: ABS (*Labour Account, 2018-19*, Cat. no. 6150.0.55.003, tables 2-20; *Australian System of National Accounts, 2018-19*, Cat. no. 5204.0, table 5).



Figure 7

## Business and non-market services make up the bulk of the increased size of the service sector in the US as well

Shares of different portions of the service sector in the US between 1950 and 2010



<sup>a</sup> Community, social and personal services are: other community, social and personal service activities, activities of private households; Government services are: public administration and defence, education, health and social work; Distribution, and restaurant services are: wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, hotels and restaurants; Utilities and construction services are: construction, electricity, gas and water supply.

Source: Commission estimates based on Timmer & Vries (2015).

## Why has the service sector grown?

Broadly speaking, the enduring structural shift towards services reflects shifting trade patterns, innovation and productivity growth, which change production patterns and business models and generally increase real incomes, combined with consumer preferences. Other factors such as changes in labour supply have also likely played a role.

### Trade-induced structural change

A large part of the growth in the share of services in high-income countries reflects comparative advantage (Blanco et al. 2020; Connolly and Lewis 2010, p. 7). A combination of factors (including falling transport costs, falling tariffs in advanced economies, growth in developing economies and the emergence of many developing economies from near autarky) have intensified global trade (Krugman 1995). As trade barriers were reduced, Australia imported more manufacturing goods (as these are more cheaply produced by countries with an abundant population) and increased its exports of mineral commodities and natural gas, resources that are relatively abundant in Australia. Likewise, Australia has increasingly

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exported education services (via students coming to Australia to study). Trade patterns also reflect the fact that some services are usually delivered in person, making it harder for those services to be delivered from overseas, even if they are labour intensive.

## Higher incomes and consumer preferences

The growth in services worldwide also reflects consumer preferences. Average incomes are growing over time in Australia (as in most developed countries) and once these incomes grow above a certain threshold, consumers tend to spend proportionally more on vacations, time-saving services such as house-cleaning and afterschool care, gyms, allied health, and aged care services. Their consumption of goods (TVs and clothing and sports equipment) also grows, but not at the same rate. If consumers prefer to spend more on services as their incomes grow, then (subject to supply conditions) services will increase as a share of the economy.

Baumol (Baumol 1967) pointed out that this effect of consumer preferences could be greatly amplified if productivity grows faster in manufacturing than in some services. If productivity growth is lagging in certain categories of services, for instance personal services or non-market services, manufactured goods will become comparatively cheaper. If consumers have a strong increase in demand for some of these services as their income increases, but are not very responsive to relative price changes, then the dollar value of demand for those services can remain high or increase despite relatively modest (or absent) productivity growth. A growing share of income would go to services. For example, as the real incomes of a city increase, demand for restaurant meals might explode, while the value share of increasingly productive automated manufacturing might decline.

The evidence on productivity in Australian services will be explored in Section 4, but the overseas evidence largely supports the above reasoning. For example, Nordhaus (2008) found industries with lower productivity growth had faster relative price growth and an increasing share of national output. And Iscan (2010) found that about two thirds of the structural change in the labour force of the United States in the Twentieth Century can be attributed to low productivity growth in services and consumers having a greater preference for services as their incomes grow.

Several other factors have also contributed to the growth of the service sector as a share of the economy:

- a decline in middle skill jobs, particularly in manufacturing production and clerical work (Coelli and Borland 2016) that also increases demand for education services to reskill and upskill
- an ageing population that increases demand for health care and social services (PC 2005, p. XXIX)
- increased prevalence of chronic disease (in part driven by ageing), which further increases demand for health care and social assistance (PC 2017b, pp. 16–19)

- 
- increased participation of women in the workforce accelerating growth in market provision of previously home-produced goods and services (such as child care) (Connolly and Lewis 2010, p. 6; Ngai and Pissarides 2008).

### Services are an important input throughout the economy

Another explanation for the expansion of the service sector is the increased importance of services as an input to the goods sector. Business expenditure on services as an input to the goods sector has been rising almost continuously since 1994-95 (figure 8). This increase in business demand for services has, in part, been driven by increased outsourcing of activities, which causes a reclassification of activities that were once counted as the goods sector — such as cleaning, customer support and accounting/finance. This is supported by Berlingieri (2014) who finds that when accounting for the uses of these services in final demand, about 36 per cent of the growth in service sector employment (and 25 per cent of the fall in manufacturing employment) is due to growth in demand for services as an input by business (in the US between 1948 and 2002). Moreover, 14 percentage points of this rise in employment in services is estimated to be due to increased outsourcing of back-office functions from the goods sector.

Additionally, increasing scale of service production allows for specialisation and subsequent efficiency gains (Sorbe, Gal and Millot 2018). The rise of business services both as a share of the economy and an input into other industries is indicative of this change. Companies are increasingly outsourcing business services such as IT networks, finance, and logistics, allowing the companies providing these services to increase productivity through greater economies of scale and specialisation (and often improving quality in the process). For example, a company might have previously used on-premises servers to manage their ICT storage which not only involves physical capital but also requires a trained staff member to maintain and service that storage space. Now that same company could outsource their storage to a cloud-based storage solution from a company like Amazon Web Services. This removes the need for physical capital and brings the productivity benefits of Amazon's scale to companies of all sizes.

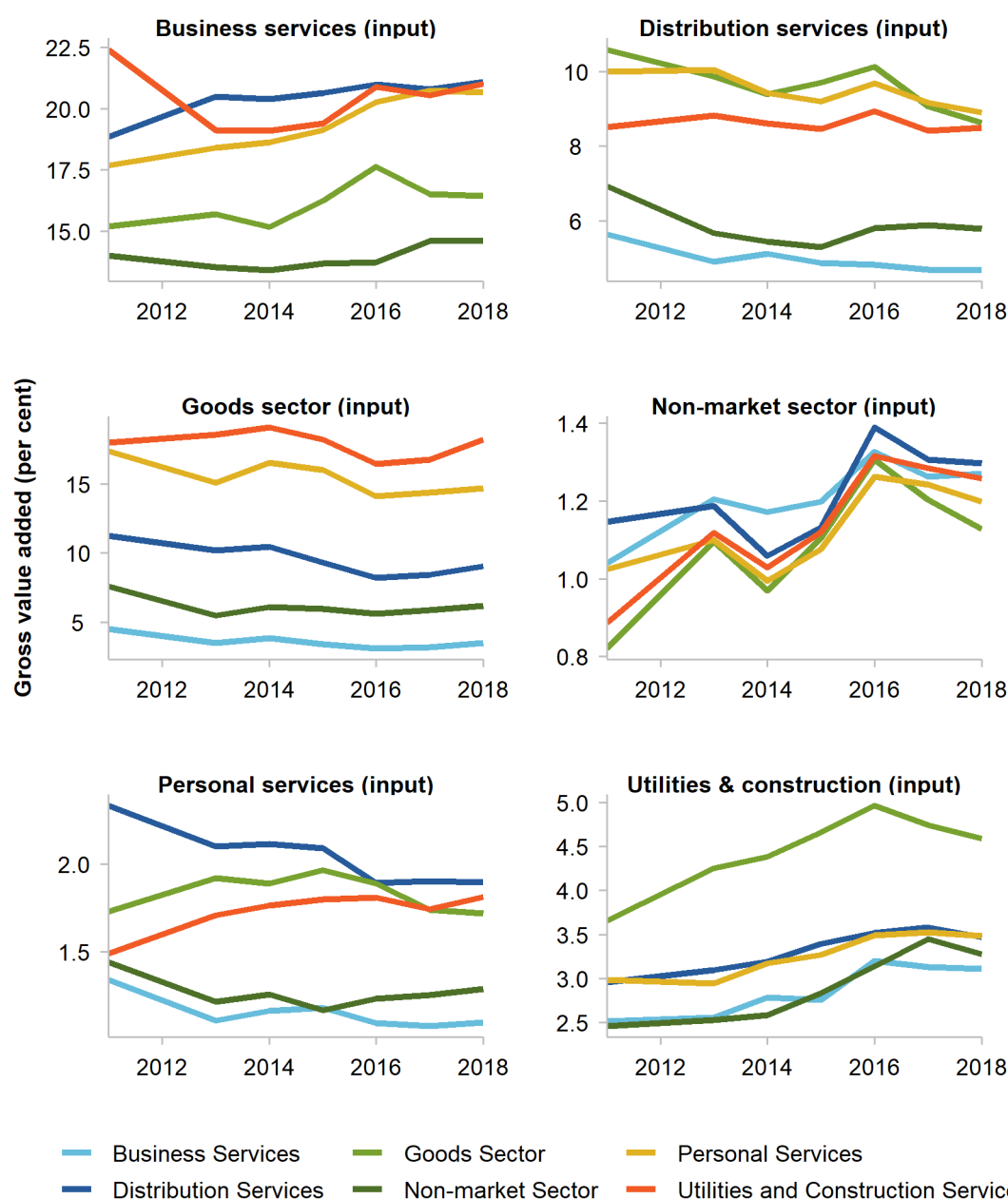
Figure 8 presents the proportion of gross value added required from input sectors to produce one unit of output in an output sector. For example, reading the top left facet of figure 8 shows that, in producing one unit of output, the goods sector (the light green line) outsources over 15 per cent of its production to the business services sector (a value of 15 per cent in 2013 increased to about 17.5 per cent in 2016, before dropping again slightly). This represents a large increase from its almost non-existent role fifty years ago (Heath 2017).

Figure 8 shows that business services are increasing as a share of costs for most industries, while distribution services are decreasing as a share of costs for most industries (the goods sector is a steady share of costs, and the last three categories are a small share of costs). It is important to note that figure 8 does not differentiate price and quantity effects. Therefore, increases in inputs (by value) could be due to increased price of inputs or increased quantity of inputs used; and similarly, decreases in inputs could be due to decreases in price or quantity. A positive interpretation of figure 8 would be that distribution services have

become lower cost because of high productivity growth, whereas the total volume of business services has increased because more firms are outsourcing their distribution. However, the opposite could also be the case. However, the strong productivity performance of distribution services in recent years provide suggestive evidence that the positive interpretation is more likely the case.

**Figure 8 Some services have grown as an input, others have shrunk**

Per cent of gross value added<sup>a</sup> required from input sectors (plot title) to produce on unit of output in output sector (coloured lines within plots)



<sup>a</sup> An application of the 'GVA requirements' matrix from Rayner and Bishop (2013), as applied in Heath (2017).

Source: ABS (*Australian National Accounts: Input-Output Tables, 2010-18*, Cat. no. 5209.0.55.001, table 8).

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## 2 Service sector facts and myths

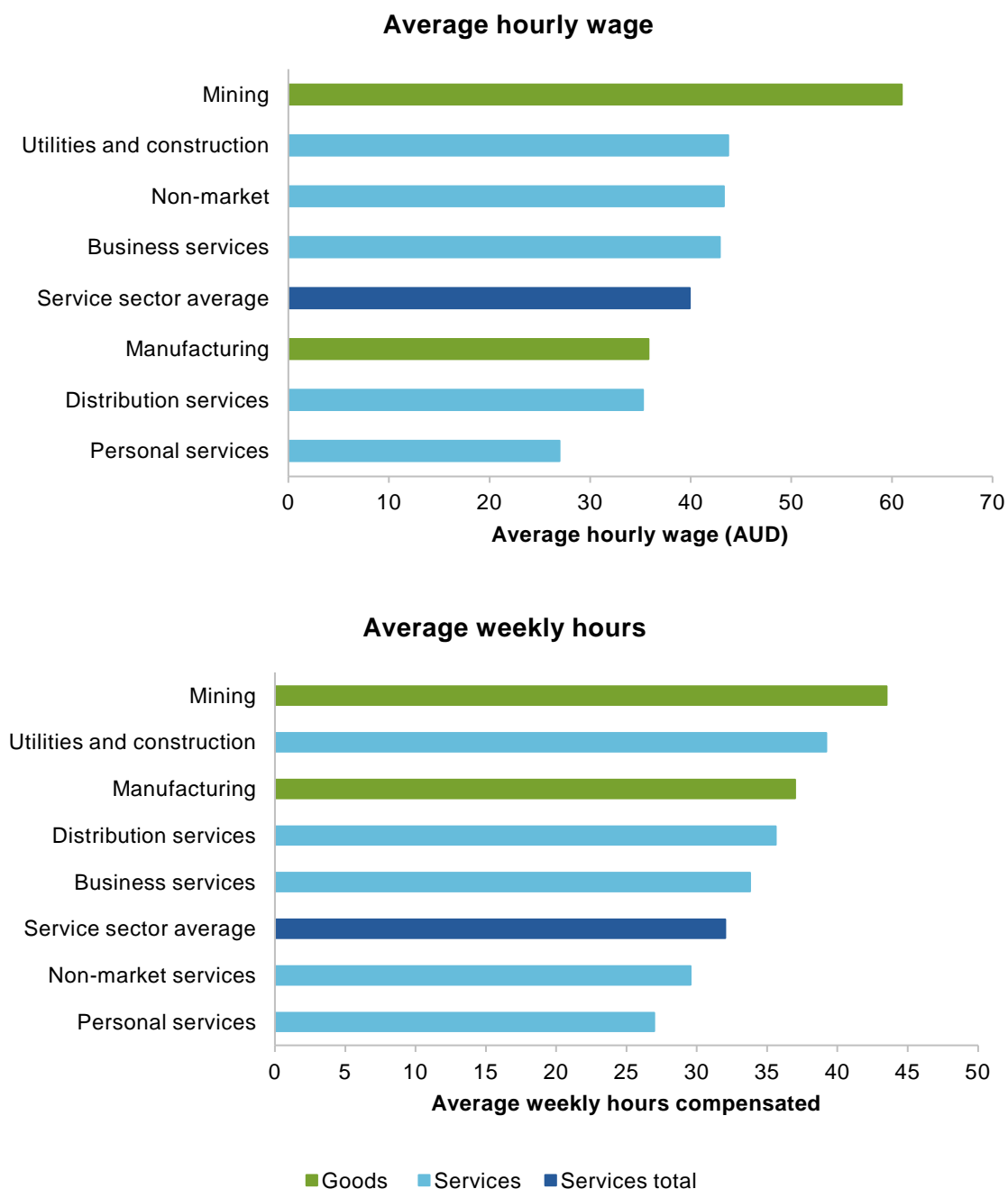
### **Myth: service-sector jobs are ‘lousy jobs’**

Contrary to public perceptions of services providing ‘lousy’ jobs (Burtless 2010), services tend to pay higher wages per hour than their goods sector counterparts, though they typically have fewer compensated hours (figure 9). The net result of these two effects is that average earnings in services is only slightly lower than manufacturing (figure 10), however, as Figure 10 shows, the subcomponents of the service sector are not uniform in this regard. Workers in business, construction and utilities services have higher average earnings than those in manufacturing, whereas those in distribution and personal services earn less. However, there is substantial variation in both average industry wages and hours worked.

Another common concern is that the service sector has contributed to the higher prevalence of casual work. However, as box 3 outlines, while the rate of casual employment has always been higher in services than in manufacturing and mining, the *proportional increase* in casual jobs has been higher in the goods sector.

**Figure 9 Service sector employers tend to earn more per hour but work less relative to manufacturing employees ...**

Average hourly wage (AUD) and average weekly hours<sup>a</sup> compensated for in various<sup>b</sup> service subsectors, mining and manufacturing



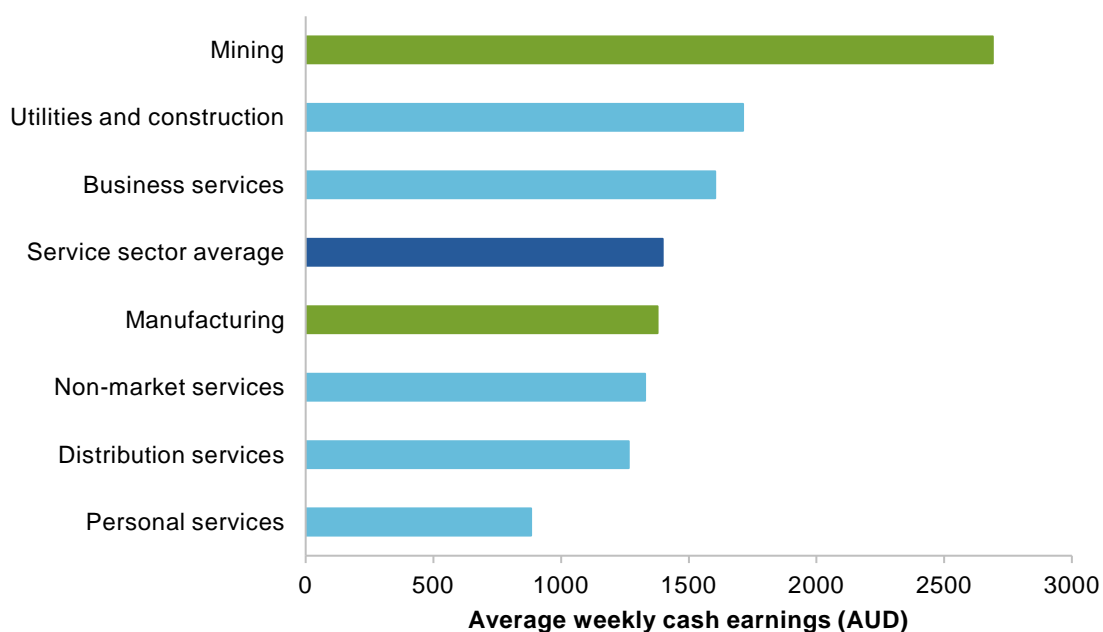
<sup>a</sup> All industries consider only non-managerial employees paid at the adult rate (e.g. excluding apprentices, junior rates of pay etc). <sup>b</sup> Service subsectors were aggregated from industries using the industry share of total employee hours compensated.

Source: Commission estimated based on ABS (*Employee Earnings and Hours, Australia, May 2018*, Cat. no. 6306.0, data cube 1).

Figure 10

**... and the net effect is that, on average, workers earn roughly the same in the average service industry as in manufacturing**

Average total weekly earnings (AUD)<sup>a</sup> compensated for in various<sup>b</sup> service subsectors, mining and manufacturing



<sup>a</sup> Seasonally adjusted estimates of Average weekly total earnings for all employees, as at November 2019

<sup>b</sup> Service subsectors were aggregated from industries using the industry share of total employment.

Source: Commission estimated based on ABS (*Employee Earnings and Hours, Australia, May 2018*, Cat. no. 6306.0, data cube 1).

### Box 3      **The transition to a service-based economy is not the main reason for more casualised work**

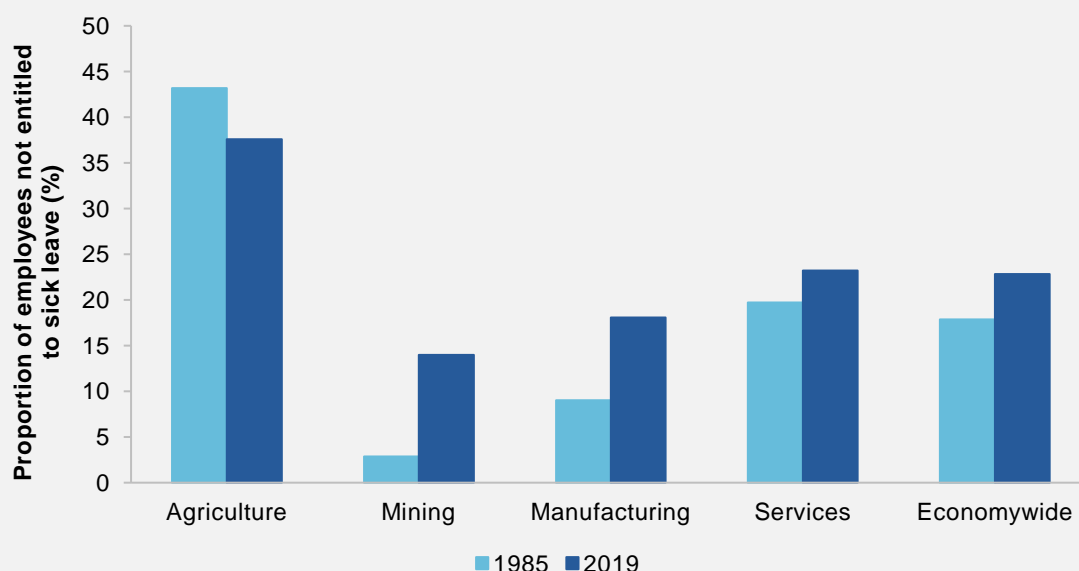
The proportion of workers engaged in casual employment (where access to paid leave is used to define non-casual work) has increased since the early 1980s (though it has been stable since the early 1990s). In 1982, about 13 per cent of employees were casual, while in 2019 the figure was about 24 per cent.

Casualisation can grow either because the industries that use casual labour heavily are growing (labour reallocation *between* industries) or because casual employment is growing in most industries (*within* industry growth). The Commission analysed the industry level data on sick leave entitlements in 1985 and 2019, and found that the *within* industry growth in casualised labour was more important than labour being reallocated *between* industries. Indeed, the rise in the proportion of workers without an entitlement to sick leave within the manufacturing sector is (proportionally) larger than the increase in the service sector. This indicates that factors common to all industries are the main causes of increased casualisation, rather than the mix of industries.

#### **Contributions to casualisation between 1985 and 2019**

	<i>Agriculture</i>	<i>Manufacturing</i>	<i>Mining</i>	<i>Services</i>	<i>Economywide</i>
	p.p.	p.p.	p.p.	p.p.	p.p.
Within	-0.10	0.22	1.19	2.92	4.23
Between	-0.18	-0.04	0.81	0.14	0.73
Total	-0.27	0.18	2.00	3.05	4.96

#### **Proportionally casual work has grown more in manufacturing than in the whole economy**



Source: Commission estimates based on ABS (*Microdata: Characteristics of Employment, August 2019*, Cat. No. 6333.0.00.001; *Weekly Earnings of Employees (Distribution), Australia, Aug 1985*, Cat. no. 6310.0); Gilfillian (2018).

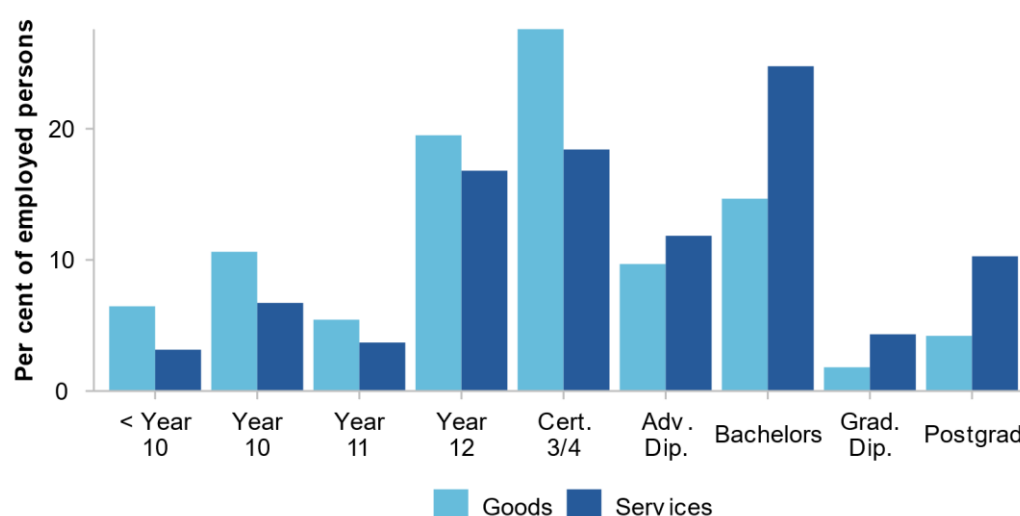


Higher wages in some service subsectors can likely be explained by higher-level human capital requirements of those subsectors' workers. Figure 11 shows that the service sector has higher shares of workers with at least an Advanced Diploma, relative to the goods sector. And this difference has become more pronounced over time (figure 12). From 2014 to 2020, the service sector wage premium (that is the difference in wages) of a bachelor's degree compared to completing year 12 has risen from 57 per cent to 65 per cent (ABS 2020b).

While both the goods and service sectors have increased their share of higher educated workers since 2006, the magnitude of this increase was significantly higher in the service sector. This compounds the effect caused by a shift from a predominately goods producing economy to a predominately service-based economy.

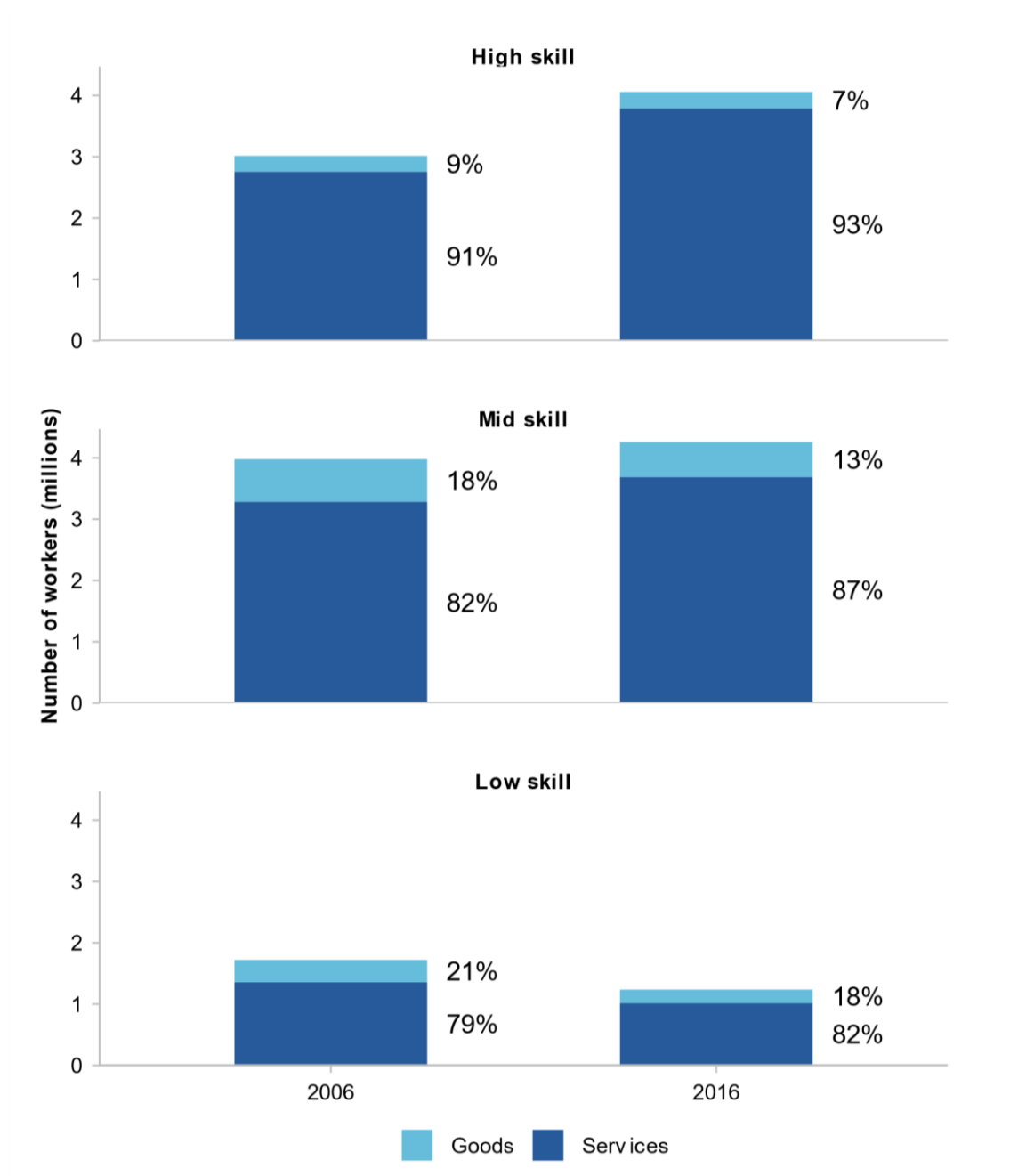
Even were services workers have lower levels of post-school education, there are still opportunities to earn above median wage (figure 13). This could suggest that some service industries provide avenues for on-the-job training as the ABS defines its low-skilled occupations by the level of education in that occupation (other measures of human capital such as on-the-job training and experience are sometimes used as substitutes for formal education but are secondary measures in defining occupation skill levels). There are other explanatory factors, however. It could be that certain skills and experience are scarce and earn higher wages, for example specialised technicians in the utilities industries. It could be a wage premium related to the risk or the demanding nature of the work. Finally, unionisation rates (that are high in construction and utilities industries) may lead to higher wages (Andrews et al. 1998).

**Figure 11 In aggregate, services tend towards higher education levels ...**  
Distribution of workers by highest educational attainment



Source: ABS Tablebuilder (*Microdata: Characteristics of Employment, August 2019*, Cat. No. 6333.0.00.001).

Figure 12 ... and this difference has become more pronounced over time  
Changes in employment by skill level<sup>a</sup> between 2006 and 2016

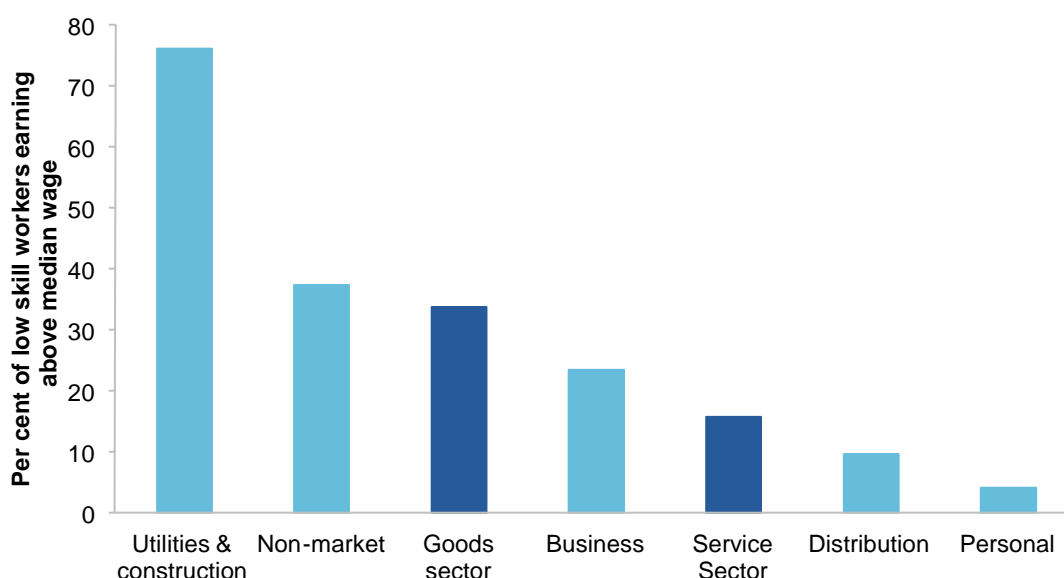


<sup>a</sup> High skill are employees with diploma level or above qualification, mid skill are employees with year 11 to certificate level qualifications and low skill are employees with below year 11 secondary education.

Source: ABS Tablebuilder (*Microdata: Australian Census Longitudinal Dataset*, Cat. No. 2080.0).

Figure 13 **Many low-skilled workers earn above the median wage in some service industries**

Proportion of low skilled<sup>a</sup> workers that earn above the median wage<sup>b</sup> by industry category



<sup>a</sup> Low skilled workers are those who are classified as skill level 5 by the ABS (the lowest rating). <sup>b</sup> The median weekly wage in this dataset was about \$1150.

Source: ABS Tablebuilder (*Microdata: Characteristics of Employment, August 2020*, Cat. No. 6333.0.00.001).

### Fact: market services are clustered in major cities on the coast

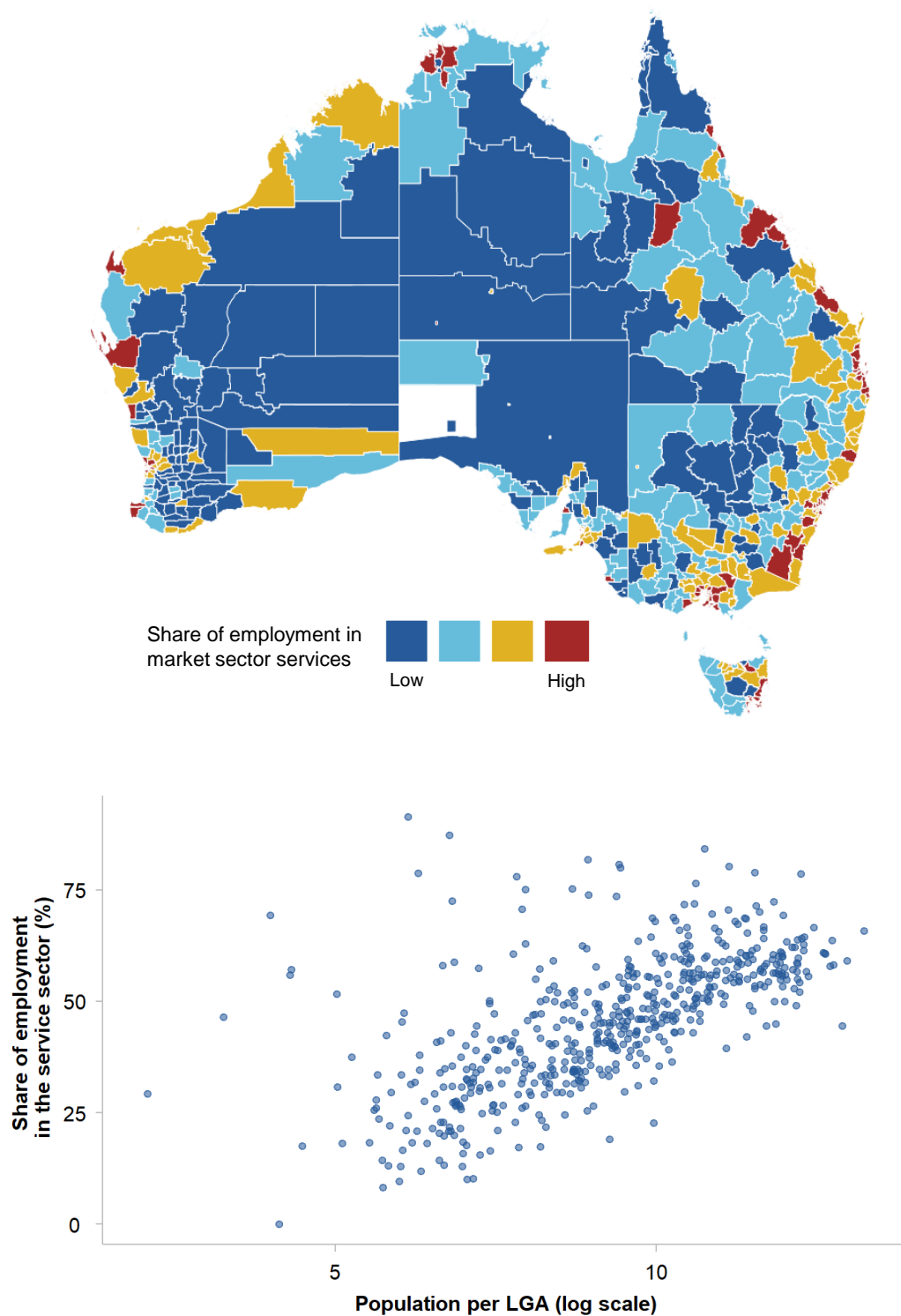
Market sector services<sup>2</sup> are highly clustered around the coastline of Australia, and market sector service employment is positively correlated with population (figure 14). Intuitively this makes sense, many service industries deliver labour as their ‘final product’ and can therefore reduce their transaction costs by operating in the most densely populated areas, which in Australia’s case is around the coast. In contrast, goods producing industries are more likely to operate away from dense areas (relative to service industries), taking advantage of the lower cost of land and transporting their goods to high density areas for distribution. That said, the relationship between population density and service sector employment appears to be slightly funnel shaped — low density areas can have large service sectors, but an area cannot become high density without having a sizeable service sector (figure 14).

<sup>2</sup> We restrict the analysis to market sector services as many non-market services are delivered in rural areas to meet specific policy objectives rather than structural, economy-wide forces that will apply to most other service industries.

Figure 14

### Market sector services are concentrated around Australia's coast

Share of employment<sup>a</sup> in market sector services by local government area (LGA) (top) and the correlation of market sector service employment and population density (bottom)



<sup>a</sup> The share of employment is binned into quartiles that are displayed as colours from low to high.

Source: ABS Tablebuilder (*Microdata: Census of Population and Housing, 2016*, Cat. no. 2037.0.30.001).

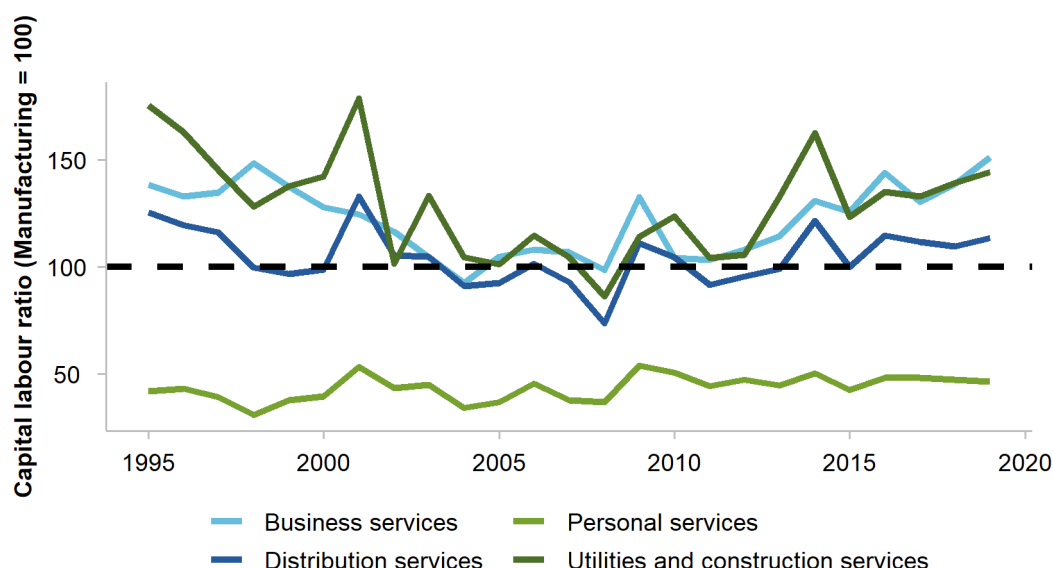
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## Myth: services are all labour intensive

Capital intensity can also affect labour productivity growth. Contrary to common wisdom, most service industries are actually more capital intensive than manufacturing (figure 15), though this may merely reflect the small scale and scope of the contemporary Australian manufacturing industry. The exception to this is personal services, which has always been less capital intensive than manufacturing.

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Figure 15 **Most services industries are more capital intensive than manufacturing**  
Capital-labour ratio <sup>a</sup> of service sectors relative to manufacturing between 1994-95 and 2018-19



<sup>a</sup> Calculated as the ratio of nominal productive capital stock and actual hours worked.

Sources: Commission estimates using ABS (*Estimates of Industry Multifactor Productivity, 2018-19*, Cat. no. 5260.0.55.002, tables 1-19; *Labour Account Australia, March 2020*, Cat. no. 6150.0.55.003, tables 2-20).

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## 3 Challenges in measuring productivity in the service sector

### What is a 'unit' of services?

A basic requirement of productivity measurement is defining a 'unit' of output. Without knowing what constitutes a single unit of output, one cannot determine the price of output and hence cannot control for the changes in prices. Service sector productivity is more difficult to measure than for the goods sector mainly because it is difficult to define a standard 'unit' for many services. For physical goods, one can either look at either the

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smallest unit (*a* car, or *a* toaster) or they can be standardised by weight (an ounce of gold, a tonne of iron ore). But often neither of these approaches has an obvious application for services. What is the smallest unit of a haircut? And can one standardise a haircut by say the time taken or the particular tasks included (men's cut, hair dye, wash and shampoo etc.)? Statistical agencies take a variety of approaches to address these issues but there is still doubt about how well these problems of measurement can be solved.

Goods often have some of these definitional issues as well. For example, do all potential car models from all companies need to be accounted for to represent the 'car market' in national accounts? However, in the case of most goods, it is at least theoretically feasible to account for most of the variations of a particular good. But this is not possible for certain services where every single firm could be thought of as offering a distinct service, and even for any particular firm these services might vary over time (for example, if provided on a different day by a different employee).

Services sector productivity measurement is also complicated by the contribution of the 'customer' to the product. The healthiness of the patient will affect how well a particular treatment plan works. And whether or not a student pays attention and studies (and even the ways in which that individual learns) will affect how well a school can educate this student.

That said, it is important not to overstate the difficulty of measuring productivity in the service sector relative to the goods sector. Productivity measurement in *any* industry is fraught with numerous theoretical and practical issues and even choosing the right measure of productivity can be challenging (box 7). Indeed, the Commission (Barnes et al. 2013; Topp et al. 2008; Topp, and Kulys, 2013) has delved into the challenges of productivity measurement in the 'goods' sector in numerous past papers.

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**Box 4****Which measure is which in productivity measurement?**

A comparison of productivity growth between industries and sectors is complicated by the numerous different measures of productivity. The broadest definition of productivity is ‘the ratio between output and the total input of factors required to achieve it’. Therefore, the difference between productivity measures comes from the input and output measures used. There are three commonly used measures of productivity, each with their relative merits and drawbacks. Labour productivity — output divided by hours worked — measures the efficiency with which labour produces output. Multifactor productivity (MFP) extends this definition by measuring the efficiency with which the combination of capital and labour produce output. And finally KLEMS relates gross output to a combination of primary (capital and labour) and intermediate inputs (energy, materials, services).

Labour productivity is measured as dollars of output divided by the number of worker hours to produce the output. It is an imperfect measure, because an industry that uses more capital (machinery, IT, etc.) will have a higher labour productivity, even if it is not using those inputs efficiently. However, it may capture the *capacity* to expand use of a particular input (without hitting significant diminishing returns or capacity constraints), which may be as relevant as how efficiently it uses that input. For example, innovation in manufacturing can allow factories to use more capital per worker rather than just making individual workers more productive with their existing capital. By contrast, an orchestra may use its existing capital and musical instruments very efficiently, but it has little capacity to increase its use of musical instruments per musician.

Value added MFP is a measure of ‘total factor’ productivity, measuring how much value added is created by a given amount of labour and capital. (KLEMS is even more precise, but the underlying data is generally more difficult to obtain.) The large difference in performance between MFP and labour productivity for the goods sector (figure 18) highlights the importance of evaluating multiple indicators when assessing performance. While MFP is better indicator of the overall ability to use resources more efficiently, labour productivity allows for both differences in efficiency and the *capacity* to increase capital inputs to effect output.

*Source:* Australian System of National Accounts Concepts, Sources and Methods (ABS 2020a).

It is convenient to divide the measurement issues affecting services into two parts: those affecting the ‘market’ provided services (box 5) and those affecting the ‘non-market’ services. The non-market sector is defined as those services (health care and social assistance, education and training, and public services) that lack meaningful market prices due to them being provided ‘free of charge, or sold at highly subsidised prices’ (ABS 2020e). Prices are used to weight different goods in overall production and without them a measure of overall output (and productivity) is not possible. Many non-market services have prices, but they may not convey economically meaningful information. For example, GP services are subsidised (often to the full cost) by Medicare, so the price of seeing a GP does not reflect the (marginal) cost of providing health care.

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## Box 5      **Output measurement issues in the market sector**

Productivity measurement for the market sector is considered less difficult than for the non-market sector. Nonetheless there are still numerous conceptual and methodological challenges in the market sector. Perhaps the most significant of these is the issue of changes in the quality of output, especially for information and communication technology (ICT) where some services are provided free of charge (such as Facebook) so the value created by these services are not captured in productivity statistics (Brynjolfsson, Eggers and Gannamaneni 2018), or where firms have intangible ICT assets that are difficult to measure (discussed below). These issues can amount to substantial mismeasurement. For example, Nakamura et al. (2017) estimated that the consumer surplus from free digital services is the equivalent of an additional 0.1 percentage points of GDP growth between 1995 to 2015.

Most of the other issues in service output measurement differs by industry. Taking an industry-by-industry approach, some examples are in:

- Financial and insurance services: over 65 per cent of the output in the finance and insurance industries is imputed in a way that conflates production with the risk premium received by banks. In times of rising or falling market risk, this can cause over or underestimation of financial services output and productivity (Zhao et al. 2016).
- Retail and wholesale trade: changes in practices such as longer trading hours or greater scope of retail offering may not be fully captured in the retail price (though higher costs of providing these may partially offset this), giving the potential for underestimation of productivity. On balance, it is unclear if these issues matter very much in practice and may be offset by other issues that would be expected to cause *overestimation* of productivity, such as outsourcing (Johnston et al. 2000).
- Electricity, gas, water and sewerage: numerous unmeasured quality improvements in the provision of utilities (such as undergrounding of electricity distribution and changed standards for sewerage and waste disposal) are believed to have contributed to low productivity growth in this industry (Topp and Kulys 2012).

## **Service inputs can also be harder to measure ...**

There are also issues in the service sector in measuring changes in the quality of *inputs* as well as outputs. Unlike unmeasured quality improvements in output (which would lead to underestimation of productivity growth), unmeasured quality improvement of inputs leads to *overestimation* of productivity growth.

The ABS attempts to adjust for the fact that workers with more skill might be more productive, but this only captures the effect of *formal* education and not the effect on the job skill acquisition. Moreover, the ABS methods do not capture the potential heterogeneity of different qualifications within the same class (say law degrees vs medical degrees) on productivity (ABS 2015).

There can also be issues in the industry classification of inputs (especially labour) due to outsourcing, which is particularly acute for the service sector. For example, revisions to the classification of labour hours worked by labour hire workers in the construction industry led to the office administration and support industry having its productivity growth revised down significantly.



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## **... especially intangible investment, which might affect more than just measurement of productivity**

The need to measure investment accurately is critical to the measurement of productivity for two main reasons. First, investment (used to estimate the stock of capital) forms a part of the inputs a firm uses and so mismeasurement of investment results in mismeasured productivity. Second, measuring investment is directly related to the measurement of gross value added (the main measure of output) because recurrent non-wage expenditure is counted as an intermediate input, which is deducted from gross output. Hence misclassification of investment as recurrent expenditure (or vice versa) leads to mismeasurement of output and hence mismeasurement of productivity.

‘Intangible’ (non-physical) investment contributes to these measurement problems because it can be difficult to accurately (and consistently) delineate between recurrent and capital expenditure when the spending is on intangible products. For example, when a firm spends money on marketing this is usually classified as recurrent expenditure rather than investment. But for many firms, marketing builds a brand name that delivers value for years or even decades, and so might be better classified as investment.

Just as intangible products (services) are a large and increasing share of economic activity, intangible investment — any investment that is not in physical capital — is an increasing proportion of total investment (figure 16).<sup>3</sup> And this increase has been more pronounced in certain subsectors of the service sector (figure 17). The gradual adoption of computers and information technology in the 1980s, 1990s and 2000s explains most of the increase in the share of intangibles investment in the official ABS data, although a small increase in research and development investment since 1990s has also played a role.

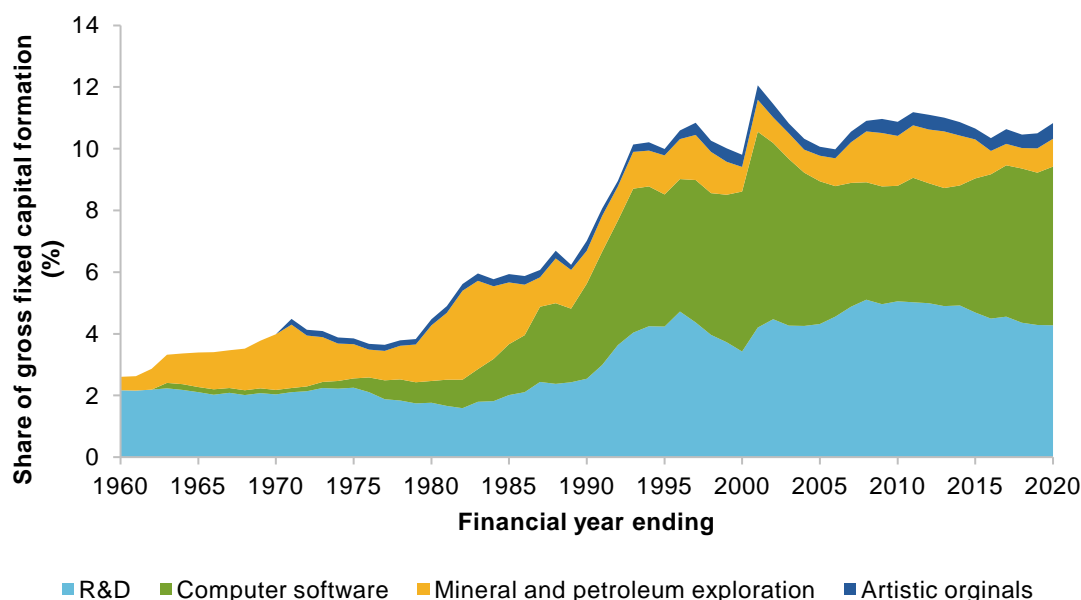
The sector that uses the most intangible investment is business services (figure 17), mainly reflecting higher software investment across its subindustries as well as increased R&D in professional services and an associated fall in investment in machinery and equipment (ABS 2020a). And intangibles are more important for certain service subindustries than they are for the goods sector. For example, the assets of the ‘FAANG’ firms — Facebook, Amazon, Apple, Netflix and Alphabet (Google’s parent company) — are mostly intangible assets (such as intellectual property), even though many of their intangibles are not recognised as assets under accounting conventions. Indeed, for Alphabet alone, the ratio of its market value to its net assets (assets minus liabilities) is 6.2 (Yahoo 2021), implying investors recognise the significant value of its intangibles that are not accurately captured on balance sheets. Together the FAANG firms account for about 15.5 per cent of the US stock market (Hartford Funds 2020).

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<sup>3</sup> The increasing importance of intangibles is a significant caveat to the above analysis that found most service are more capital intensive than manufacturing. Taking a broader definition than the one used by the ABS, many services subsectors use intangibles more intensively than manufacturing, such as business services, but as a whole manufacturing appears to use more intangibles (Haskel and Westlake 2017, p. 31).

Figure 16 **Intangibles have become a larger share of gross fixed capital formation**

Share of total intangibles as a proportion of total investment, and the components of this intangible investment between 1959-60 and 2019-20



Source: ABS (*Australian System of National Accounts, 2019-20*, Cat no. 5204.0, table 56).

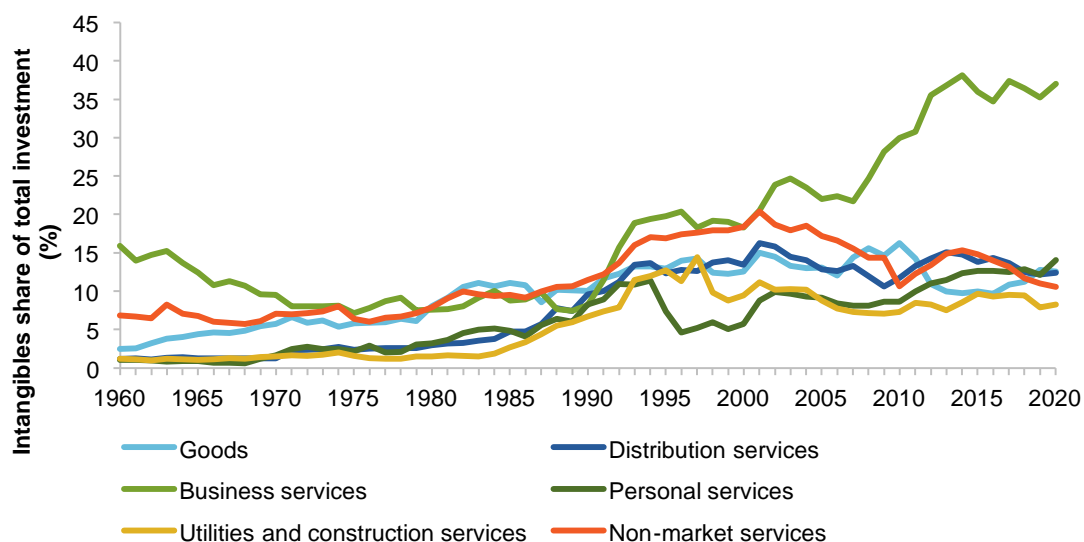
However, the ABS data only recognises a small subset of the total activities that could be defined as intangible investment (and so these are not captured in figure 16). Many activities that require a fixed investment for future payoff — such as staff training, brand development and organisational practices — are considered current (rather than capital) expenses for the purposes of the national accounts. Australian (Barnes 2010) and overseas research (Haskel and Westlake 2017) has confirmed that broader definitions of intangible investment mean that the share of intangible assets is higher than is implied by the national accounts, and that its increase over time is more pronounced.<sup>4</sup>

<sup>4</sup> There is some evidence that the share of intangibles (using a wider definition than the one used by the ABS) in value add is higher in manufacturing than in services as whole, though the share of intangibles is much higher for certain service subindustries (Haskel and Westlake 2017, p. 31).

Figure 17

### Intangibles investment is highest in business services

Intangibles<sup>a</sup> as a proportion of total fixed capital formation by subsector between 1959-60 and 2019-20



<sup>a</sup> Intangibles are all intellectual products recorded by the ABS, including computer software, artistic originals, research & development, and mineral & petroleum exploration.

Source: ABS (*Australian System of National Accounts, 2019-20*, Cat no. 5204.0, table 64).

The economic significance of intangibles for economic growth and productivity measurement is contentious (box 6). Some of the possible effects of intangibles on productivity growth include: that they present challenges to the measurement of economic activity and that they could be weakening competition and reducing productivity growth. Which, if any, of these scenarios is the case for Australia, or anywhere, is not yet settled and requires further investigation.

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## Box 6      **Intangibles may pose economic challenges**

Four distinct economic trends have puzzled economists in recent years: the apparent fall in business dynamism (lowering job switching, falls in firm entry/exit) (Decker et al. 2017; Pugsley and Sahin 2019), higher market concentration and mark-ups (interpreted by some as evidence of lessening competition) (De Locker, Eeckhout and Unger 2019; Diez and Fan 2018), increased importance of superstar firms (that appear to financially outperform to a greater degree than in the past) (Andrews, Criscuolo and Gal 2015; Andrews, Criscuolo and Peter 2016) and slower productivity growth (PC 2017a). How these trends relate to each other — and the degree to which they are under or overestimated — is contentious.

A strand of literature attempts to tie these economic trends together with the rising importance of intangible investment. These explanations can be summarised as follows:

- intangibles may lead to mismeasurement of productivity and mark-ups. For example, unmeasured growth in intangibles could mean that a larger portion of economic growth is attributable to input growth than was previously thought. Papers that have tested this hypothesis have not found mismeasured intangibles to be very important in explaining the productivity slowdown (Corrado et al. 2016; Corrado, Hulten and Sichel 2009) but others have found evidence of mark-ups being overestimated due to the capital stock being underestimated (Ayyagari, Demircuc-Kunt and Maksimovic 2018)
- intangibles may enhance the market power of some firms at the expense of competition, business dynamism and productivity growth. This is thought to occur through intangibles creating greater economies of scale — many intangibles have low or no marginal cost of use and so early adopters can more easily squeeze out incumbents leading to slower long-run productivity growth (Haskel and Westlake 2017). Some models of this kind feature *faster* productivity growth, for example, as ICT adoption begins (similar to the Australian and US experience of the 90s), followed by slower productivity growth as fewer firms are left to compete (De Ridder 2019).
- intangibles may have greater ‘spillover effects’ than tangible capital so that a fall in intangible investment causes outsized fall in economic growth (relative to a model of constant returns to scale). Haskel and Westlake (2017) show empirical evidence of this in advanced economies but the causality is difficult to pin down. For example, a slowdown in the pace of technological innovation could conceivably cause both a slowdown in economic growth and a slowdown in the uptake of intangibles without intangibles having any kind of spillover effects
- these theorised spillover effects of intangibles could be diminishing over time, leading to slower productivity growth. This might be due to an increased importance of zero-sum intangible investment, such as lobbying, that divert resources away from more productive uses. For example, Bessen (2016) notes that not only is R&D and software investment associated with firm profitability but also lobbying and campaign spending.

Each of these explanations have very different implications for economic policy and wellbeing. The first would imply that some perceived economic problems are merely mismeasurement related, while the second and third would appear to imply real issues of reduced productivity. It could also be that some of these issues are transitional — as better measurement of intangibles or regulation of firms subject to higher economies of scale improves, then measured productivity could improve.

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## 4 Service sector productivity: evidence and theory

In the aggregate, the service sector had faster MFP growth than the goods sector since 1993-94, though this is mainly due to the goods sector exhibiting close to zero MFP growth over the period (figure 18). A large portion of this poor performance can be attributed to the dynamics of the mining industry's investment production cycle: due to the long lags in attaining full capacity production after initial capital investment, the capital to output ratio in the mining industry increased significantly during the investment phase, lowering MFP estimates (Jenner et al. 2018; Syed et al. 2015). Additionally, the high price of mined minerals and petroleum meant that firms were incentivised to dig up high cost, difficult to obtain deposits. This example illustrates the risks associated with comparing MFP growth across industries: there may be structural features of certain industries (such as the long investment production cycle in mining) that are unique to that industry, making comparisons potentially misleading.

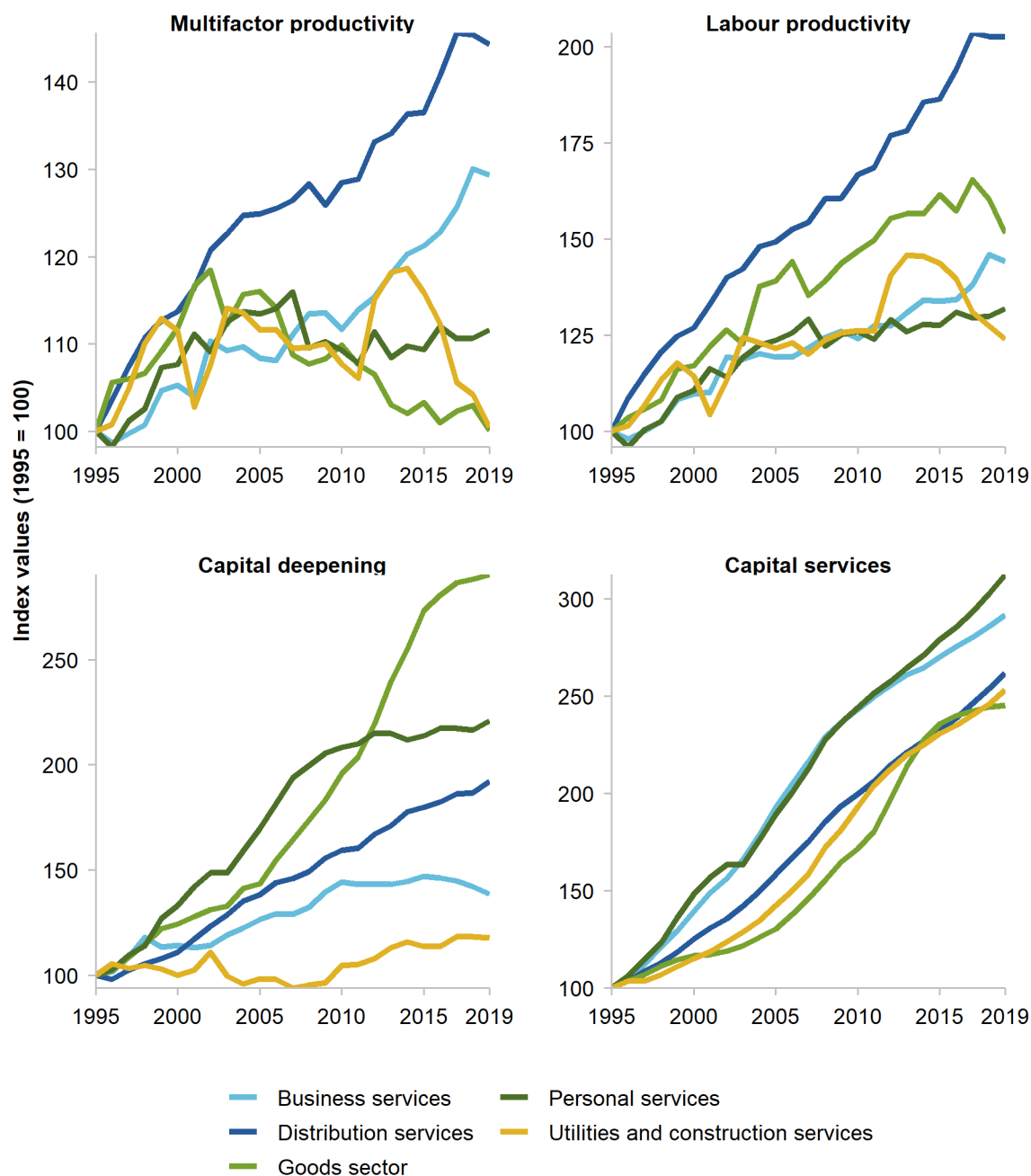
Market sector service performance has differed significantly depending on the measure of productivity. While the Australian service sector MFP growth has been strong, labour productivity has lagged, placing Australia among the best and worst performing developed nations in MFP and labour productivity respectively since 2000 (figure 19). Strong MFP performance suggests that market sector services are utilising existing resources well (box 5 above). However, its poor labour productivity performance alongside strong relative MFP performance suggests that Australian market sector services have experienced limited capital deepening since 2000. This is likely because of Australia's mining investment boom, where a larger share of investment was in the mining sector with the result that the cost of capital rose for other industries (PC 2020).

It should be noted that high *growth* in productivity need not imply high *levels* of productivity — it could be that Australia started with low service sector productivity and was catching up to leader countries. Older evidence on the levels of labour productivity in services tended show significant gaps between the US (considered the frontier) and Australia (figure 20) (PC 2020).

Figure 18

### In some areas the service sector has outperformed the goods sector ...

Multifactor productivity (MFP) <sup>a</sup>, labour productivity, capital deepening<sup>b</sup> and capital services<sup>c</sup> indices in select components of the service sector and the goods sector between 1995 and 2018



<sup>a</sup>Individual industries are weighted into sectors using two-year average nominal value-added shares.

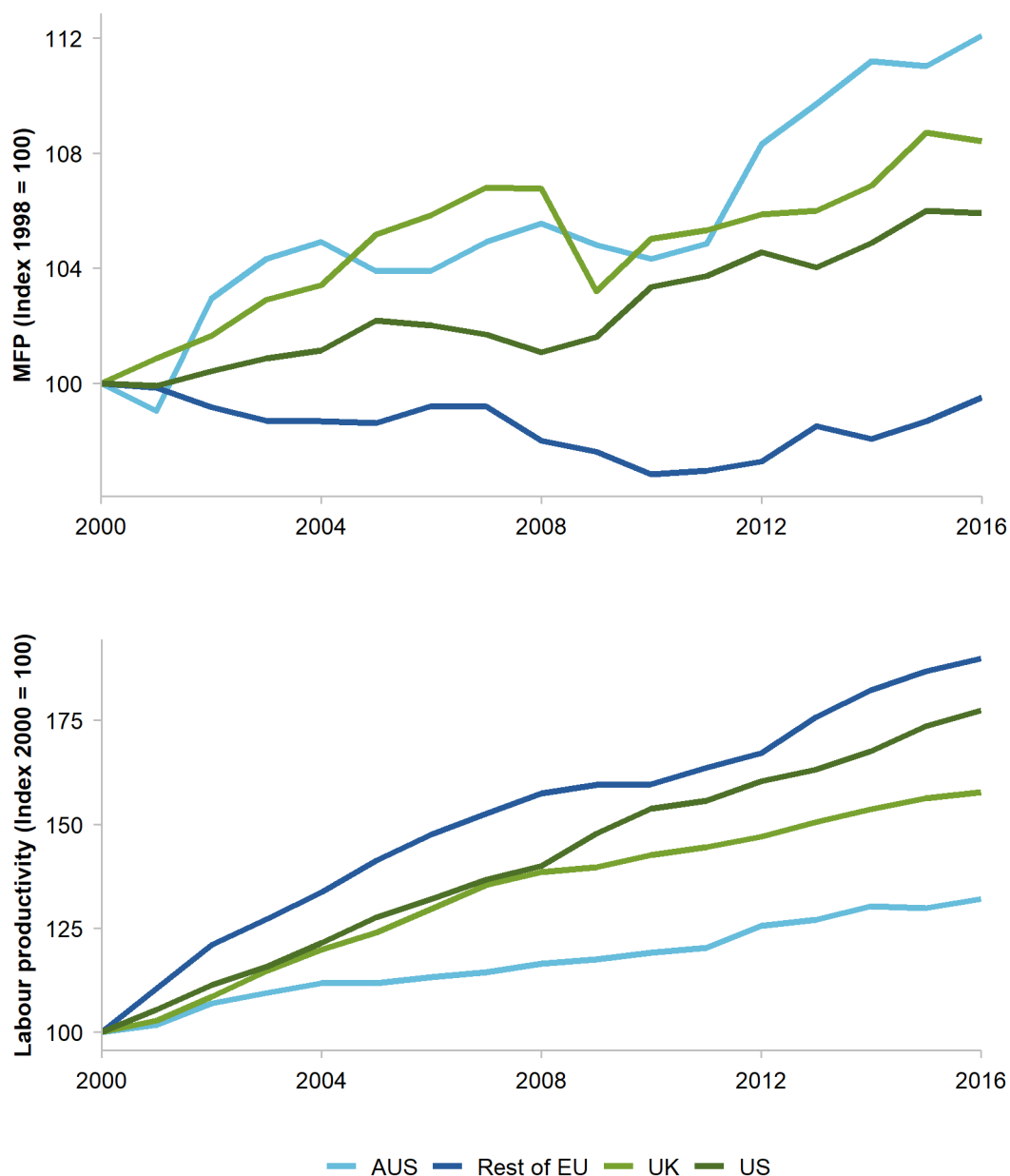
<sup>b</sup>Capital deepening growth defined as the growth in capital services minus the growth in hours worked.

<sup>c</sup>Individual industries are weighted into sectors using two-year average shares of nominal productive stock.

Sources: Commission estimates using ABS (*Estimates of Industry Multifactor Productivity, 2018-19*, Cat. no. 5260.0.55.002, tables 1-19; *Australian System of National Accounts, 2018-19*, Cat. no. 5204.0, table 5; *Labour Account, 2018-19*, Cat. no. 6150.0.55.003, tables 2-20).

Figure 19 ... which has led to mixed performance in Australia's market sector service productivity

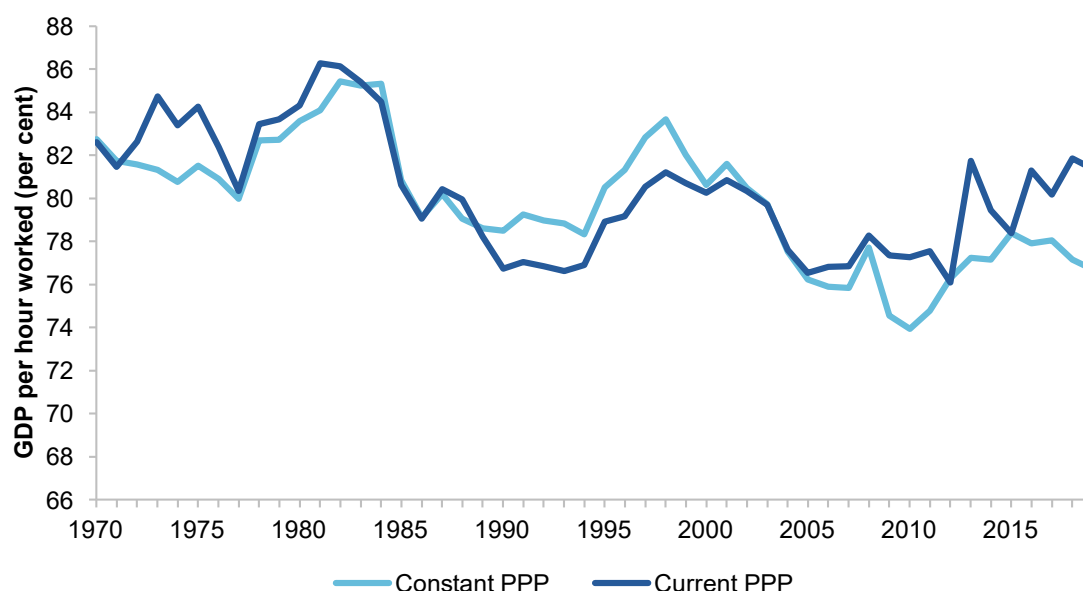
Market sector service multifactor productivity estimates of Australia, UK, US and EU<sup>a</sup>



<sup>a</sup> The rest of EU includes Austria, Czechia, Germany, Denmark, Spain, Finland, France, Italy, The Netherlands, Sweden, Belgium, Slovakia, Estonia, Hungary, Lithuania, Luxembourg, Latvia, Romania, and Slovenia.

Sources: EU KLEMS database and ABS (*Estimates of Industry Multifactor Productivity, 2018-19*, Cat. no. 5260.0.55.002, table 25; *Australian System of National Accounts, 2018-19*, Cat. no. 5204.0, table 5).

Figure 20 **Labour productivity levels have been persistently lower in Australia compared to the US**  
GDP per hour worked in Australia relative to be US – constant (2015) and current PPP



Source: OECD stat database.

## Do characteristics of some services limit their productivity growth?

While service sector MFP has outperformed goods sector MFP in recent years, figure 18 demonstrates that some service sub sectors such as utilities, personal services and business services have had low labour productivity growth since at least 1994-95. Given the persistence of this underperformance, it seems likely that some of this slow growth is due to the characteristics of these services.

Two aspects of some services produced for final consumption that may limit their productivity performance are that they require face-to-face service delivery (for example, personal services and food and accommodation), and have less standardised output (for example, professional services) (Sorbe, Gal and Millot 2018). These features may weaken productivity growth through:

- high labour intensity and a lack of economies of scale — for example, scaling up the overall number of haircuts in a salon does not drive down average costs of delivering each haircut. Moreover, there are limited opportunities to substitute machines for hairdressers
- reduced competitive pressures — although competition in a particular locality might be intense, the absence of non-local competitors may mean local producers are less exposed to competition from potentially more efficient models of production developed



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overseas.<sup>5</sup> However, this does not mean that face-to-face service industries are completely free from overseas competition. For example, local cafes are exposed to overseas competition indirectly through their competition with franchisees such as McDonalds. Additionally, movement of labour between countries can bring cutting edge innovations to local markets.

The lack of these features may explain some of the faster productivity growth experienced by some service industries (figure 18). For example, financial services can be delivered remotely and have seen significant capitalisation (ATMs replacing tellers). At the same time, many financial products are highly standardised and financial institutions often compete directly with firms from across the world.

There are also other mechanisms that limit opportunities for productivity improvement in services. Innovations in services, which can come in the form of human resource management, organisational change and other intangible investments, can be more difficult to diffuse or imitate than in the case of technology used by the goods sectors (van Ark, O'Mahony and Timmer 2008). Workers, unlike machines, can resist change, be exhausted by change and may find it difficult to adapt. Furthermore, hiring new staff and retraining existing staff can come with significant costs.

Another limiting feature for measured productivity of some service subsectors is that production and consumption (often) occur simultaneously, especially in personal services (Morikawa 2011). Firms operating in this way cannot build up inventories to smooth production, causing fluctuations in the level and location of demand to have a greater impact on productivity (Morikawa 2011, p. 1). That said, this issue does not affect some service sector industries, such as online streaming and utilities.

## What does the evidence say?

The relative merits of the above theories in explaining slow productivity in certain services is difficult to determine. Indeed, there is little agreement among economists on the importance of factors contributing to industry level productivity growth. As a first step to understanding the factors *associated* with productivity growth, the Commission examined the correlations between a set of variables that might be relevant to innovation with MFP growth (table 2). Although these associations can be important, the Commission is not able to provide a definitive account of the ultimate *causes* of productivity changes in Australia. However, this analysis can assist in clarifying some high-level common themes for industries that have exhibited higher or lower rates of productivity growth.

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<sup>5</sup> Although greater competition is not universally conducive to productivity growth (for example, policymakers purposely limit competition with intellectual property laws), the factors that can make reduced competition beneficial for innovation (greater return on investment due to limited spill overs) are often limited by the reduced economies of scale and limited size of the market (due to localised production and consumption) for many service sector industries.

The variables the Commission chose to investigate are ones that the economics literature has indicated could be important to productivity performance: human capital, research and development, remote delivery and offshorability. Human capital represents the skill level of an industry's labour force, research and development (R&D) represents the ability for an industry to produce and use labour augmenting technology. Offshorability proxies an industry's ability to *produce* some components of the service remotely (i.e. can an industry outsource its internal production) and remote delivery represents an industry's ability to *deliver* the end-product remotely. Proxies for lack of standardisation of output (a potential hinderance to growth, discussed above) were not developed, mainly reflecting the difficulties in measuring standardisation (especially across industries). Table 2 provides a more technical definition of each measure.

Figure 21 plots the indices of these four variables against MFP growth for each industry. There appears to be a positive correlation between offshorability and productivity growth, and remote delivery and productivity growth, suggesting that in-person delivery may be limiting service sector productivity growth. However, human capital and R&D do not appear to be correlated with productivity growth at an industry level. It is unclear if this is because these factors do not affect productivity or because they are correlated with other unobservable characteristics (such as occupational regulation in the case of human capital) that might be associated with slower productivity growth.

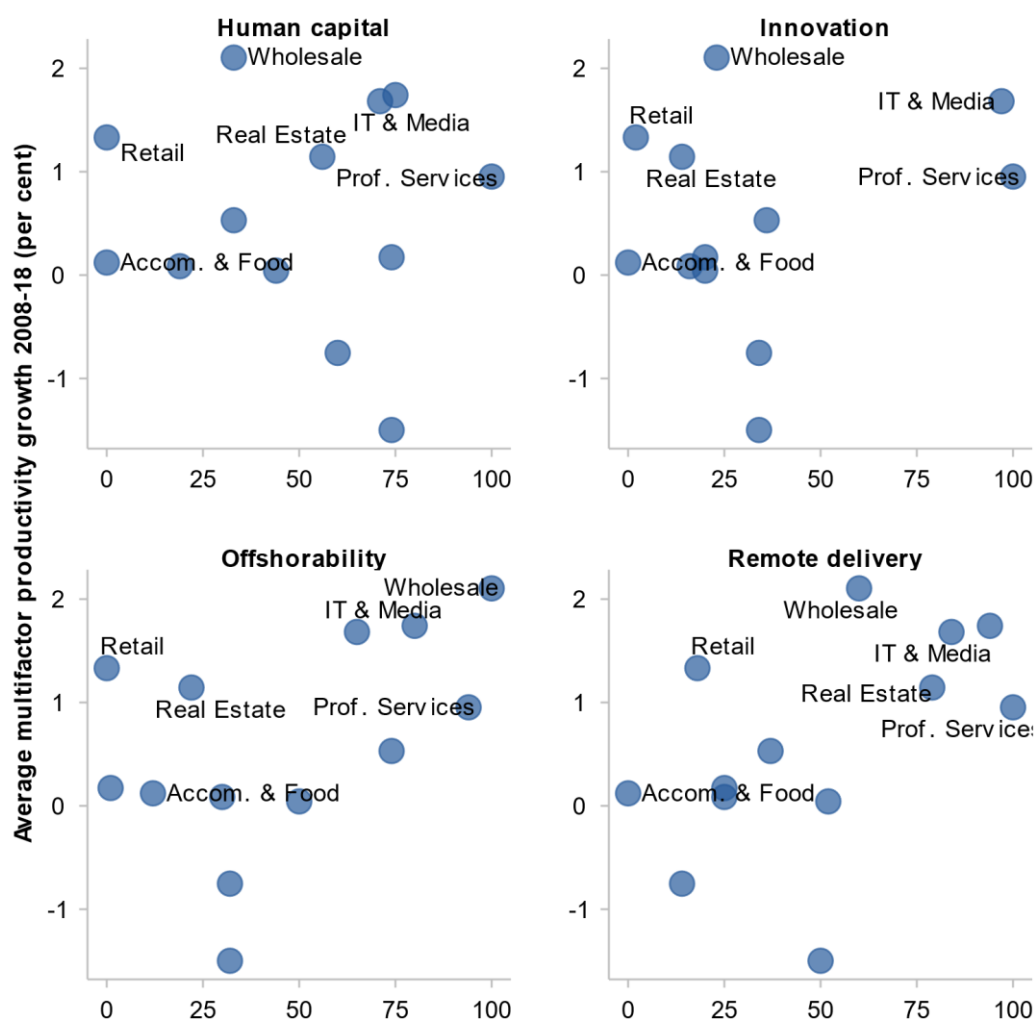
**Table 2      Observable characteristics of service industries**

<i>Category</i>	<i>Method</i>	<i>Literature</i>
Human Capital	Share of tertiary educated/post-high school educated workers in total employment.	(Sorbe, Gal and Millot 2018)
Research and development	Ratio of R&D spend to total sales	(Keller and Yeaple 2013)
Remote delivery	If any of the following questions <sup>a</sup> in the Work Context survey responses (O*NET) are true for an occupation, we code that occupation as one that cannot be performed at home. Then we take proportion of workers in each industry that are in occupations that can be performed from home as the degree an industry can deliver its services remotely.	(Dingel and Neiman 2020)
Offshorability	O*NET scales <sup>b</sup> are created using the following variables: Face to face discussions, assisting and caring for others, performing for or working directly with the public, inspecting equipment, structures, or material, handling and moving objects, 0.5 * repairing and maintaining mechanical equipment, 0.5 * repairing and maintaining electronic equipment.	(Acemoglu and Autor 2010)

<sup>a</sup> (Q4, 4A, 14, 16A, 17A, 18A, 29, 32A, 33, 37, 43, 44, 18A, 20A, 22A, 23A). <sup>b</sup> Using the O\*NET-SOC we concord into ANZSIC occupations. Each scale is standardized to have mean zero and standard deviation one, using labour supply weights from the 2016 census. The composite task measures are equal to the summation of their respective constituent scales, then standardized to mean zero and standard deviation one. The task measures are then collapsed to the industry level using ANZSIC concordance to give an industry index of offshorability.

Sources: ABS Census 2016 for human capital; ABS (*Research and Experimental Development, Businesses*, 2017-18, Cat. No. 8104.0, table 2) for R&D; ABS (*Australian Industry*, 2018-19, Cat. No. 8155.0, table 1) for total sales; Productivity Commission estimates for offshorability and localisation derived from the US Bureau of Labour (converted into Australian equivalents using Department of Education, Skills and Employment, joboutlook.gov.au, ANZSCO to O\*NET concordance).

Figure 21 **Remote delivery and higher offshorability are correlated with higher MFP growth**  
 Indices of human capital<sup>a</sup>, research and development<sup>b</sup>, offshorability<sup>c</sup> and remote delivery<sup>d</sup> (described in table 2)



<sup>a</sup> Share of higher educated workers. <sup>b</sup> Research and development to sales ratio. <sup>c</sup> Commission estimates using O\*NET. <sup>d</sup> Commission estimates using O\*NET.

Sources: ABS Census 2016 for human capital; ABS (*Research and Experimental Development, Businesses*, 2017-18, Cat. No. 8104.0, table 2) for R&D; ABS (*Australian Industry*, 2018-19, Cat. No. 8155.0, table 1) for total sales; Productivity Commission estimates for offshorability and localisation derived from the US Bureau of Labour (converted into Australian equivalents using Department of Education, Skills and Employment, [joboutlook.gov.au](http://joboutlook.gov.au), ANZSCO to O\*NET concordance).

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## 5 Improving service sector productivity through digitisation

### Technology can mitigate some of the characteristics that limit service sector growth

As discussed above, the characteristics of some services may explain why certain subsectors (such as personal services, and food and accommodation) have had persistently slow productivity growth. In particular, it was noted that these services tend to be less standardised and many of them require in-person delivery. But recent technological advancements have the potential to change these characteristics, allowing these service sector industries to realise the productivity benefits of remote delivery and more standardised output. Some examples of promising recent technological advances include:

- digital delivery allowing services to be more easily provided remotely
- digital platforms that reduce the search costs and information asymmetries that often are associated with less standardised output, allowing more efficient firms to grow.

The analysis in Figure 21 suggests that allowing for remote delivery and allowing for greater competition and larger scale (as proxied by offshorability) has the potential to significantly improve productivity.

### Technology is allowing services to be delivered remotely

Digital delivery of services increases the size of a firm's market, reduces both delivery costs (in some cases to zero) and the cost of obtaining information ('search costs'). This opens a firm's market to more than its immediate geography. For example, high quality video calls negate the need to fly to another city to visit an architect. Another example of this is that the digital delivery of business services has facilitated the widespread uptake of firms outsourcing such activities overseas (for example payroll or travel and expense management) (Abramovsky and Griffith 2006; Abramovsky, Griffith and Sako 2004). Increased access and a larger market have the potential to increase competitive pressures on firms. However, online presence may give rise to 'superstar' effects (a few large firms supplying a large proportion of the market) if consumers have similar preferences. This could be a persistent issue in markets with large network effects, as network effects create significant barriers to entry (Goldmanis et al. 2010).

Even though services can be (or are) delivered online, this does not mean it is the manner of delivery most highly valued by consumers. In many cases, digital delivery of a service is not a perfect substitute for in-person delivery as consumers may prefer face-to-face delivery of many services. Digital service delivery can, in some cases, fundamentally change the nature of the consumer experience, for example a concert viewed online. Moreover, some services are subject to asymmetries of information that are worsened by online delivery or require some degree of gatekeeping by suppliers that is more difficult online (such as doctors only

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handing out prescriptions when they can ascertain that the patient genuinely needs the medicine). There may also be productivity hindering effects of digital delivery of services in workplaces due to the loss of ‘informal contact, trust-building and sharing tacit knowledge that is difficult to codify’ (Sorbe, Gal and Millot 2018, p. 35).

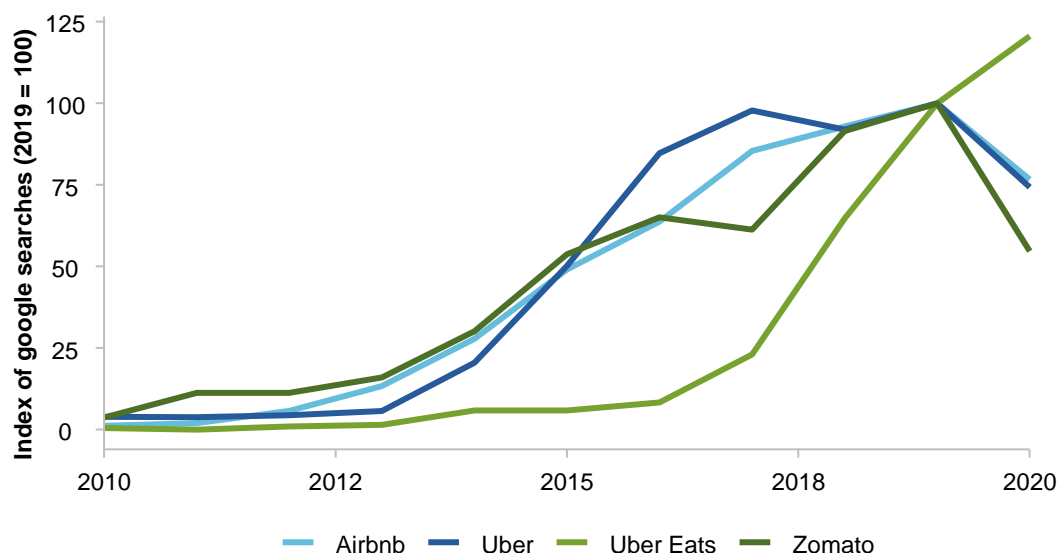
The key point is that having the *capacity* to deliver service in a remote fashion (e.g., by adopting new digital technologies for the delivery of services) allows firms to experiment with new business models, which may be more profitable, and that would tend to have aggregate benefits for productivity performance if widely adopted. The COVID-19 pandemic has forced many industries to experiment with remote delivery (box 7), some of which will prove to have benefits.

### **Digital platforms are reducing the inefficiencies of less standardised output**

Recently, there has been a significant rise in digital platforms that connect service providers with customers (figure 22). Platforms that specialise in rating and reviewing existing service providers increase the information available to consumers, allowing them to make more informed decisions. For example, Zomato provides a platform for users to review restaurants giving customers access to information on the quality of restaurants that might have difficult to compare before (due to different service offerings and quality). This reduces asymmetries of information and facilitates both the creation of new markets and the deepening of existing ones.

Digital platforms also reduce search costs, which makes comparing prices easier and equalises prices for similar services (Goldfarb and Tucker 2019). This has been borne out in goods markets with the advent of the internet (Brynjolfsson and Smith 2000)). Lower search costs may also increase demand for quality and ‘niche’ products (Yang 2013). That is, it may create more of a premium for quality improvements, leading to innovations that may not show up in productivity statistics, but could deliver large consumer surplus gains (Brynjolfsson, Hu and Smith 2003). And even in the absence of improved quality, greater variety of goods and services can be welfare improving, for example assistive technology expanding the options for Australians with disabilities. Lower search costs also increase the quality of matches between consumers and producers who are operating in the online environment, as well as between firms and workers (and other inputs) (Goldfarb and Tucker 2019). For example, LinkedIn and Seek reducing search costs by providing a platform for employers and employees to publicly display information that assists in making informed hiring choices.

Figure 22 **The popularity of digital platforms was on the rise before COVID-19**  
Popularity of digital platforms based on the number of google searches



Source: Google trends database.

How COVID-19 and associated social distancing is affecting innovation continues to be a subject of keen interest (box 7). On the one hand there has been significant innovation as businesses adapt to a socially distanced environment. On the other hand, the reduction in person-to-person interactions may have reduced the creation of new ideas over this period. Much uncertainty remains about whether trends that arose in response to COVID-19 (for example, increased rates of work from home, reduced rates of restaurant dining and increased home delivery and moves away from in-store retail towards online purchasing) will persist into the future. The net and enduring effect of COVID-19 on innovation and business activity will only become clear in time.

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**Box 7****Did the COVID-19 crisis accelerate service sector innovation?**

In the long term, the COVID-19 pandemic is likely to affect innovation, but the magnitude and direction of these effects is uncertain. How individuals, businesses and governments respond to prolonged periods of social distancing (both voluntary and mandatory) will determine the net effect on innovation. On a positive note, the quick adaptability of the economy has been impressive. About 31 per cent of the workforce had moved to working from home most days by September 2020, with indications of a smooth transition (ABS 2020c). Additionally, many firms have made their services remotely accessible, for example high-end restaurants providing ‘dining at home’ experiences. And for large portions of the year both health and education services shifted to online or remote delivery to some extent.

However, a sustained period of social distancing could be a double-edged sword.

On the one hand, for many firms, working from home itself is an innovation and provides a suite of benefits to both employers and employees (for example increased leisure time for employees and reduced costs for employers). Additionally, past recessions have sometimes been followed by a rise in productivity due to lower productivity firms exiting. Finally, social distancing has accelerated the remote delivery of services such as telehealth and education. Once thought of as a strictly in-person affair, seeing a doctor can now be done online and from the ease of your own home. However, some services that are being delivered remotely in a socially distanced world will return to in-person delivery after the pandemic (for example, online concerts) due to consumer preferences. As a result, only innovations to remote delivery that survive after the pandemic can be considered productivity enhancing in the long run.

On the other hand, in a world of social distancing there is less incentive to innovate in-person services as they are currently unable to be delivered. For example, while elective surgeries were suspended there was a temporary disincentive to innovate in that area. Additionally, innovation is elusive and often occurs through serendipitous person-to-person exchange. While new ideas can be fostered through virtual exchange, it is perhaps less likely. A prolonged period of remote work may reduce the organic development of ideas, dampening potential productivity gains.

## Regulatory frameworks and technological innovation

Technological innovation in the service sector poses numerous policy challenges. First, novel technology can create new challenges. Examples include the privacy issues created by social media or the security implications of crypto currencies. Second, when policy tries to respond to these challenges in a manner that hinders innovation, this can do more harm than good. This would likely be the case if, for example, governments attempted to ban social media and crypto currencies altogether. How policymakers balance the need to address the legitimate challenges posed by technological change with the desire to not hinder the innovation process will be a key theme in the service sector for the decades to come.

As the *productivity in the service sector* series explores individual industries, particular government actions and regulatory responses will be discussed. While the remainder of this series will focus on industry-specific policy, this paper touches only on some of the broad themes of regulatory response to technological innovation.

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There are numerous examples of how a regulatory framework developed decades ago for a different business environment can fail to keep pace with new developments (box 8). In many cases, regulators fail to adapt existing or develop new regulatory approaches for new business models in a timely manner.

**Box 8                      Ridesharing and Uber-adaptable regulation**

After launching in Australia in October 2012, Uber, was the first of the ‘ridesharing’ services to begin operations in this country. The Silicon Valley start-up was initially met with hostility from regulators who sought to apply existing taxi and car hire regulations, citing concerns for passenger safety (taxi cars have video cameras inside them while Ubers do not), worker rights (drivers are classified as independent contractors and not subject to award conditions) and equity issues for the existing taxi operators (who, unlike Uber drivers, had purchased government licenses to operate).

Most of the legal issues fell under the jurisdiction of state governments, which, in many cases, tried fining (usually \$1700 to \$2500) individual drivers for breaches of hire car regulation. This quickly evolved into a futile cat and mouse game from the state governments’ perspective as drivers who were caught and fined were often reimbursed by Uber, removing any incentive to cease operations. In addition, state governments adopted tactics such as getting transport regulatory officials to order Ubers and then fine the driver on arrival, but this was countered by Uber using spyware software called Greyball. This software would use geolocation data, credit card information, social media accounts and other data to identify regulatory officials and then ‘greyball’ them by showing drivers in their Uber app but never having any drivers pick them up.

In October 2015, in advance of Uber’s arrival in that region, the ACT became the first jurisdiction to regulate the ridesharing industry. NSW followed suit shortly after and most other states had legalised it within the two years, with the end result that Uber and other ridesharing operators only operate on a booked-ride basis (giving taxis exclusive rights to be hailed or use a taxi rank) and in some cases a small levy was charted on rideshare and taxi trips to compensate incumbent taxi license holders.

Ridesharing unquestionably posed a difficult challenge to regulators. Authorities had little information about how well the new ridesharing business model overcame the intrinsic safety issues of taxi and hire car services. And Uber’s business model of using contractors to deliver the primary product of the business was very unusual in the Australian context. Finally, regulators were hindered by the inefficiency of the previous taxi regulation, which created monopolies through expensive licensing and made extension of existing regulation to new entrants hard to justify on a public benefit basis.

Ideally, authorities would have used the emergence of new entrants like Uber to both reduce the market power of taxi monopolies *and* impose some regulations on the ridesharing companies where it was in the public interest to do so. A more proactive and time consistent approach would have created more certainty and lower costs for all relevant parties.

*Sources:* Carrie (2017); Grubb (2014); Remeikis (2016); Sier (2015); Szekely (2018).

To address this issue, the Commission (PC 2015b, p. 228) has previously recommended Ministers be allowed to suspend a regulation where an entrant’s novel business model is not compatible. Alternatively, regulators may take a more proactive approach with programs such as regulatory sandboxes that place lower regulatory burden on firms experimenting with new models. For example, the Australian Securities and Investment Commission allows



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financial technology providers to start certain innovative service offerings and only requires them to acquire the relevant licensing once they are viable (ASIC 2020).

Aside from the regulatory response to new business models and innovations, there are parts of the regulatory framework that may hinder the diffusion of innovation and weaken competitive forces that often drive innovation. The numerous barriers to service sector imports and exports are one example of these types of regulation (PC 2015a). Reducing foreign competition in the service sector limits its productivity growth through at least three channels: it distorts the allocation of resources between different industries, limits the diffusion of innovation across borders and limits the incentive to develop new innovations by limiting the size of markets and reducing the competitive pressures that firms face (Acemoglu and Linn 2004; Crespi, Criscuolo and Haskel 2008; Melitz and Redding 2012). Many of the recommendations that the Commission (2015a) has previously made, such as removing barriers to foreign airlines operating in domestic airports and consistency in the screening thresholds for foreign investment between different countries of origin, appear to be still relevant.

## **6 Conclusion**

The service sector has come to account for a large share of economic activity in Australia and other developed nations and will likely continue to grow into the future. This presents a set of challenges and opportunities. Measuring changes in service sector productivity is one of those challenges, and designing appropriate regulatory frameworks in response to novel business structures as they emerge is another. These issues are best addressed with respect to the particular industry in question and for that reason, the Commission has decided to undertake further work on certain service industries with the aim of shedding light on their particular characteristics and how they differ. This paper provided an overview of key aspects of services in the Australian economy to set the scene for the individual analyses to follow.

COVID-19 has forced businesses, consumers and workers to experiment with remote delivery technology, and in doing so, demonstrated the potential for technology to alter the characteristics of many services and thus their potential for productivity growth.

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