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SERVICING AUSTRALIA'S FUTURE

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ANZ

FOREWORD

'Servicing Australia's Future' is the seventh instalment in the ANZ Research In-Depth series. We began the work for this paper, by asking "what will Australia, and Australians, look like in 2030?" Beyond confirming the things that many of us already suspect, such as an older and heavier population, we were struck by the projections for a more demographically balanced workforce and higher levels of education. This led us to look more closely at the service sector, which we now believe will be an even more dominant force in the Australian economy than it is today. Crucially, we found that the services-driven economy of 2030 will be one where workers are in strong demand for the first time in several generations.

While the dominance of Australia's service sector is well covered in recent papers, a number of aspects of that story have been neglected to date. In particular, the industries with the strongest growth prospects, such as health and education, are very labour-intensive, but relatively capital 'light'. When viewed in light of Australia's ageing population, this means there could be significant shortages of skilled labour by 2030. It also means financial service providers and investors may have to adapt to a world with lower funding requirements.

In fact, the early signs of this new paradigm are already evident. Some commentators have been wondering how to reconcile Australia's resilient GDP growth, weak investment, and falling inflation with strong employment numbers. But in our view this is consistent with an economy transitioning to a new set of drivers – one where traditional goods industries like mining, which until recently drove out-sized growth and required high levels of investment, are now being eclipsed by large employers of skilled labour.

Despite the challenges of the new service economy, there will still be opportunities for investors. Services companies will still need investment to develop their service offerings and the platforms via which they are offered. And there will be many advantages to this new world, including the fact that service jobs will drive higher education levels in Australia and many of these jobs could be considered more fulfilling jobs than those in mining, construction, and manufacturing.

This In-Depth paper is the result of six months of collaboration between ANZ Research and the University of Queensland's Australian Institute for Business & Economics (AIBE). It is a good example of the partnerships between universities and businesses which we advocate in this paper – partnerships which will be needed to produce the knowledge workers of 2030. Toby Roberts and Daniel Gradwell from ANZ worked closely with Paul Gollan and Chris Henderson from AIBE to review the literature and data, refine the modelling outputs, and prepare the report. See page 35 for biographies of the authors involved.

We hope you enjoy 'Servicing Australia's Future'. It is our intention to spark a debate about the steps that businesses and governments can take to prepare themselves, and the rest of us, for the Australia of 2030.

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SERVICING AUSTRALIA'S FUTURE

This paper forecasts a number of changes in Australia's service sector over the next 15 years, and draws out the implications of those changes for Australia's economy and business environment.

- The service sector will make up an even greater proportion of the Australian economy by 2030 (up 5% to 77.3%).
- In particular, the healthcare industry will expand as a result of an ageing population, while the education and professional services industries are set to benefit from growth in Asia.
- New business models and digitisation should see more Australian companies exporting their services to the region. Australia's disadvantages of scale are less of a constraint in services.
- The shift away from goods, towards services, means businesses of the future will be less capital intensive and more people-dependent. This has some significant implications:
  - The fight to retain skilled workers will intensify, especially as demographic forces begin to make labour more scarce;
  - Education will be more crucial than ever, so better partnerships between businesses and the education sector will be needed;
  - Labour's share of income will rise, after a multi-decade decline, which should result in both a rise in consumption and a decline in income inequality; and
  - Financial services providers will have to adapt to the smaller, more frequent funding needs of the strongest growing service industries.
- Ultimately this is a positive story. While it implies some challenges for management, workers will be in demand, and opportunities will open up for service industries.

STRUCTURE, CONTEXT, AND METHODOLOGY

The first section of the report sets out our projections for Australia's service sector (including service exports and emerging business models), and the second explores the implications of that outlook for the economy, labour and investment in Australia.

In making our predictions about the future of Australia's service sector, we reviewed the work on Australia's longer-term outlook by government agencies and professional services firms in order to create a context and framework within which to understand the evolution of services in this country. That context includes a range of largely inescapable trends such as an ageing population, slowing economic growth, technological innovation, and climate change — all of which mean that Australia will look very different in 2030. Appendix 1 presents our findings.

As for our more specific predictions about Australia's service sector, we fed detailed forecasts into a structural model of the Australian economy which broke down the outlook for each sector over the next 15 years. See Appendix 2 for details.


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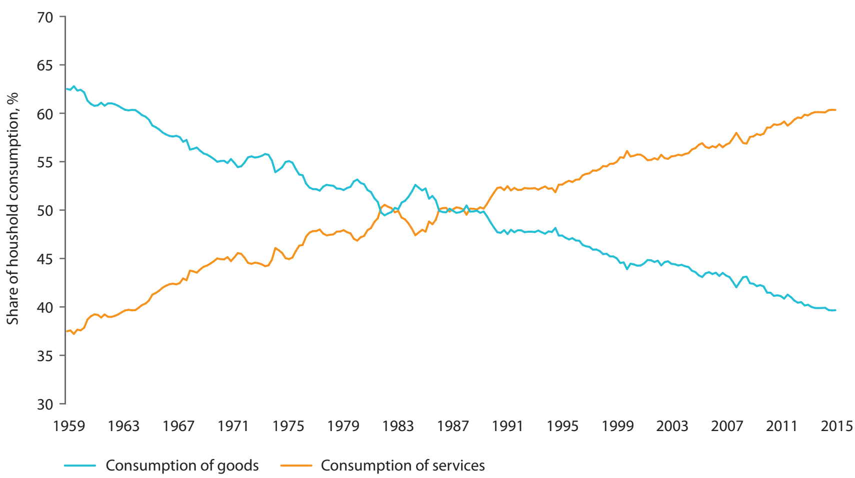
THE RISE OF THE SERVICE SECTOR

A strong service sector is already well entrenched in Australia. Over the last five years Australia's service sector has grown at nearly double the rate of its goods counterpart (2.9% p.a vs 1.7% p.a[1]). In particular, the health and business services industries have been key contributors to the Australian economy over this period.

This shift away from products towards services is not unique to Australia; declining material intensity has been observed in all OECD countries, in part because wealthier consumers buy 'experiences' once their primary material needs are met[2]. But in Australia's case, this trend has been amplified by:

1. An ageing population and demand for new medical technologies, which causes spending on healthcare to increase;
2. Higher qualification requirements for a 'knowledge' workforce, which causes spending on education to increase; and
3. Growth in the key service export areas of education and tourism, largely due to the rise of Asia's middle class.

FIGURE 1
Services are attracting a rising share of spending



Source: ABS, Outlook Economics, ANZ Research

1. All growth rates in this paper are in real terms unless stated otherwise.
2. As Australian consumers become wealthier, more is being spent on experiences. Studies such as Hajkowicz, Cook & Littleboy (2012), *Our Future World: Global Megatrends That Will Change the Way We Live,* predict this trend will continue, with spending on leisure and travel growing one-third faster than total private consumption.

Our modelling predicts these demographic and regional trends will continue, driving services to an even higher portion of Australia's overall economic activity (see figure 2).

The more profound implications of this shift will be explored later in this report, but one is already being felt in the Australian economy today — softer business investment. While capital intensity (measured by the value of capital stock per worker) can vary greatly, the majority of the service sector has below-average capital requirements, meaning less investment is required. Consumer services, business services, health and education all have quite low capital stocks relative to their output. By contrast, these industries are relatively labour-intensive.

The effect on the economy's growth drivers is evident even now. Business investment has been soft (even after accounting for the mining downturn), and business surveys suggest further declines are coming in the next two years. On the upside, the higher labour requirements of an expanding service sector have produced strong gains for the labour market.

SERVICES EXPORTS ARE GROWING TO MEET ASIAN DEMAND

The growth of the service sector is also apparent in Australia's export profile. Australia's service exports have grown substantially in recent years, with education and professional services exports especially buoyant (expanding around 20% over the past 2 years). While that rate of expansion will be hard to maintain, our projections indicate that services exports will on average grow solidly at about 3% a year between now and 2030 (see figure 3).

Demand for Australian services is driven in part by a reputation for safety, the rule of law, a 'clean and green' environment, and high quality standards. These characteristics draw Asian consumers in particular to a diverse range of services, from education to tourism and even niche specialties like urban consulting. (Architectural and urban design firms have been successful in the region and should continue to benefit from programs such as India's 'Smart Cities' initiative.)

But it is the rise of the middle class in China, and also in ASEAN, that has driven the expansion of Australia's service exports (see figure 4), and this looks set to continue given our forecasts for Chinese consumption by 2030. Namely:

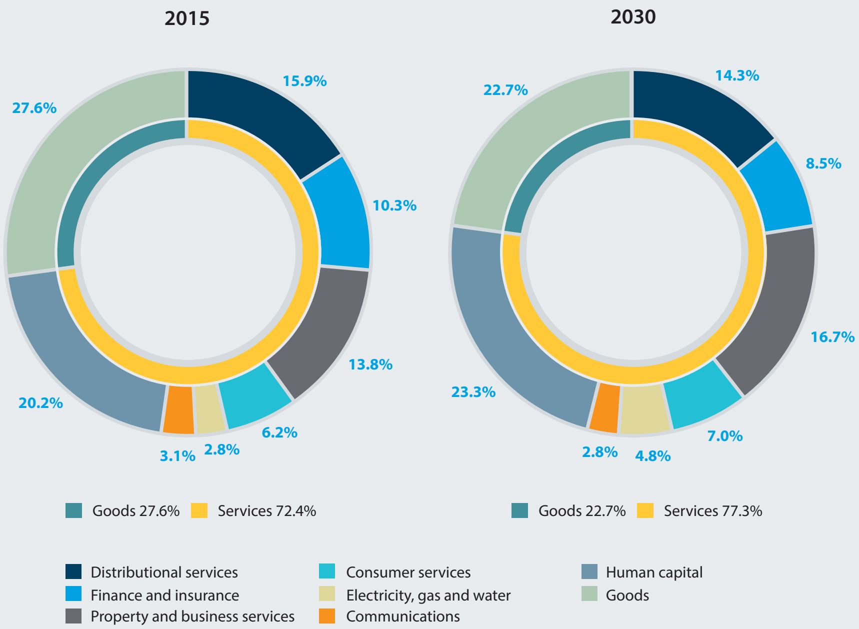
1. A quadrupling of urban disposable incomes;
2. Over 300 million new middle class members; and
3. Chinese consumers spending three times the amount they do now.[3]

Australian education providers are enrolling large numbers of Chinese and Indian students again, with the weaker Australian dollar and streamlined visa requirements helping to distinguish the offering from universities in the UK and USA. And the outlook for tourism is equally bright — leisure arrivals to Australia increased 8.9% in 2015, and Tourism Australia expects China alone to contribute nearly one quarter of the growth in the number of visitors to Australia over the next decade.

Other Australian services providers in health, finance, insurance, hospitality, construction, and engineering services are also likely to find opportunities in Asia, with improved access supported by recently signed free trade agreements with China, Japan, Korea, and ASEAN.

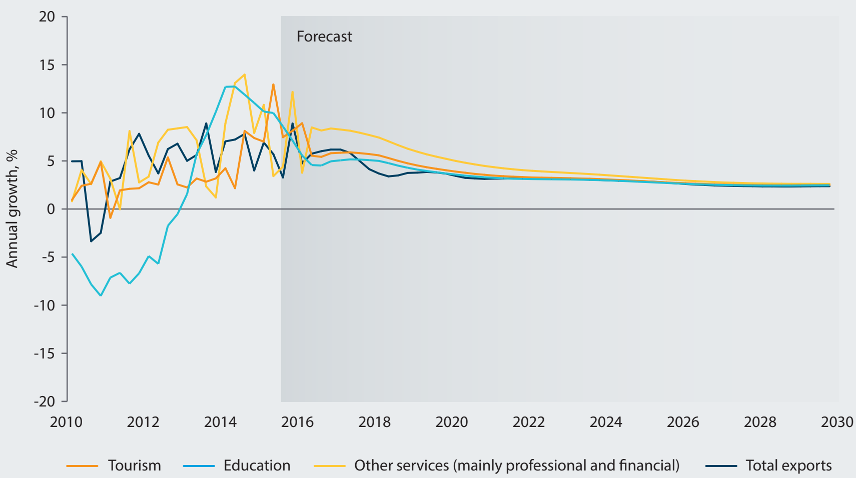
3. ANZ Research, October 2015. *Sleeping Giant — China's Consumer.*

FIGURE 2
The service sector is set to be even larger by 2030



Source: ABS, Outlook Economics, ANZ Research

FIGURE 3
Australia's export of services rising strongly



Source: ABS, Outlook Economics, ANZ Research

INNOVATION AND DIGITISATION

Growth industries that have highly competitive domestic markets such as education, aged care, and health services are well positioned to secure niche markets in the region and beyond. With a small and open domestic market, Australian companies in these sectors are exposed to competition, but until recently have lacked scale relative to international competitors. As the service sector has grown, new business models have emerged which are enabling Australian companies to scale their services internationally. Moreover, scale disadvantages are less binding for services firms.

It is easier than ever before to enter foreign markets due to digital disruption, cheaper flights, and new free trade agreements. Companies are now able to achieve greater scale and wider reach without necessarily becoming more complex or costly. In fact, some service providers are driving their expansions with even leaner structures — embracing digital innovation to connect with new partners and clients, and lowering the costs of collaboration and service delivery.

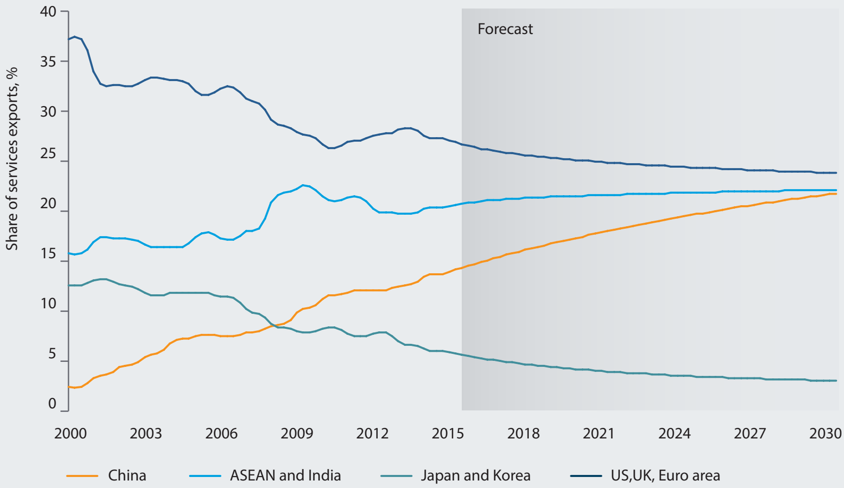
For example, firms in Queensland have developed a service for asset-intensive businesses in the mining and resources sector. High tech sensors are used to collect data about wind turbines and other key assets offshore, and this data is fed remotely back to Australia where it is analysed by experts to determine maintenance requirements and identify potential faults before they occur. Companies such as these are leveraging a highly skilled local workforce but are not constrained by Australia's high cost base to anything like the same extent as manufacturers.

Not all these developments work in favour of Australian businesses. New opportunities to compete internationally are open to Australia's competitors as well, and the effect of online sales upon traditional retail stores in Australia is a case in point. However, on balance, the service sector has more to gain than lose in this new world, given Australia's comparatively high education standards and its reputation for quality, which place it in a strong competitive position regionally. Moreover, the overwhelming dominance of the service sector in the Australian economy means the negative impact on manufacturing, retail, and other sectors has less severe implications for the economy as a whole than it would have had in the past.

OVERALL OUTLOOK FOR SERVICES

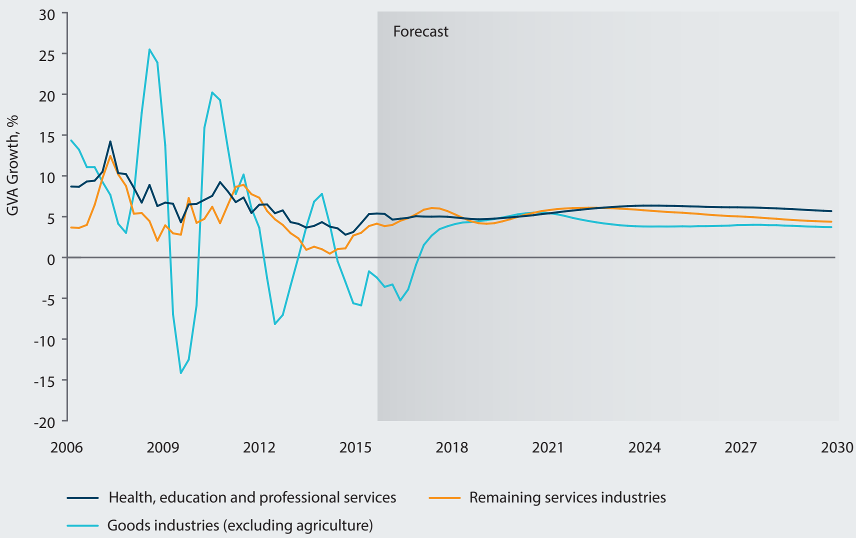
All in all, we believe the healthcare, education, and professional services industries are set to be the main growth areas of Australia's economy over the next 15 years, thanks in part to the growth in neighbouring Asian economies. We expect these industries to expand at an average rate of 6.0% per year (in nominal terms) through to 2030 — significantly faster than the traditional goods industries of mining, manufacturing, and construction (see figure 5).

FIGURE 4
Asia's rising middle class driving demand for Australian services



Source: ABS, Outlook Economics, ANZ Research

FIGURE 5
Service industries likely to drive Australia's growth



Source: ABS, Outlook Economics, ANZ Research

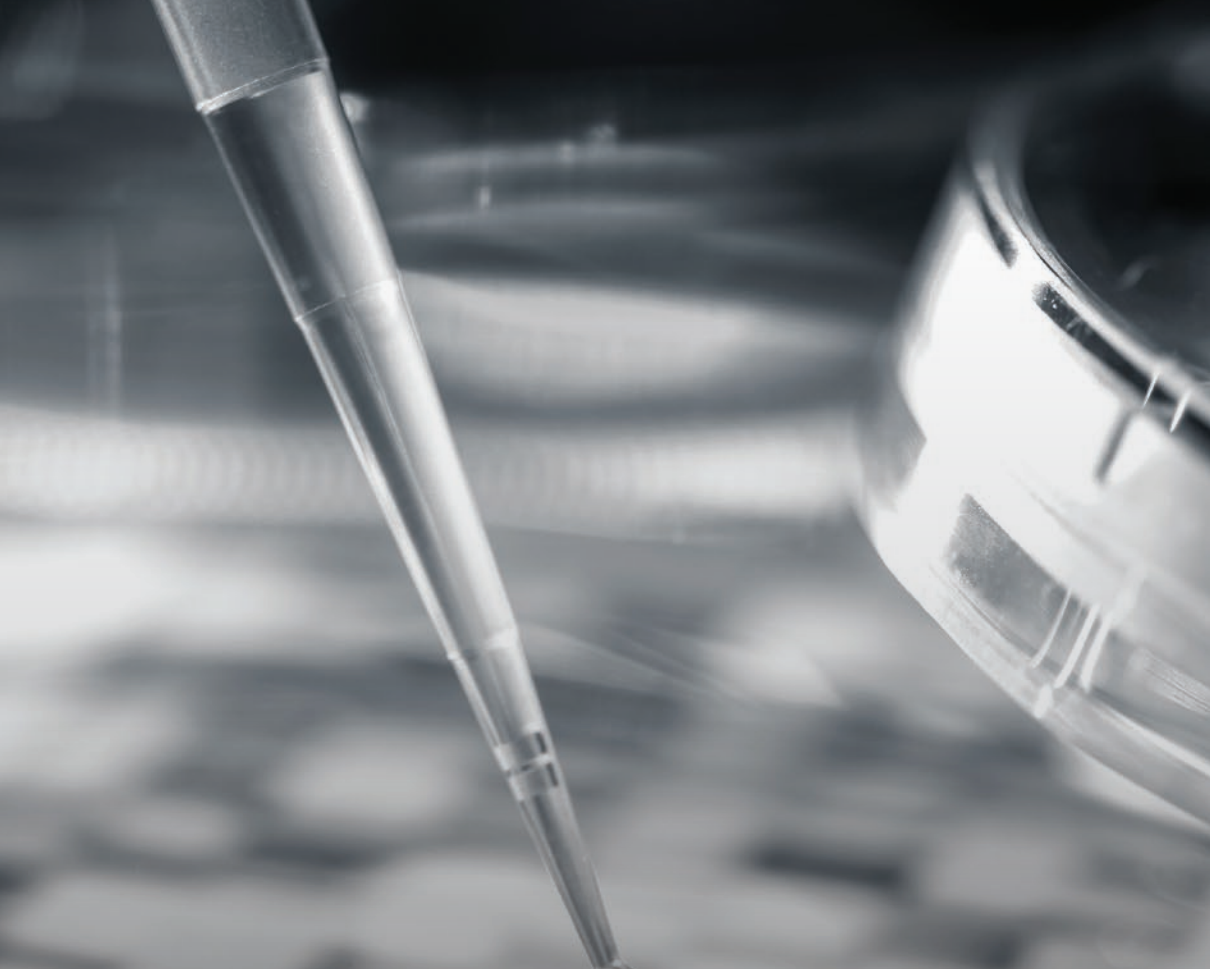
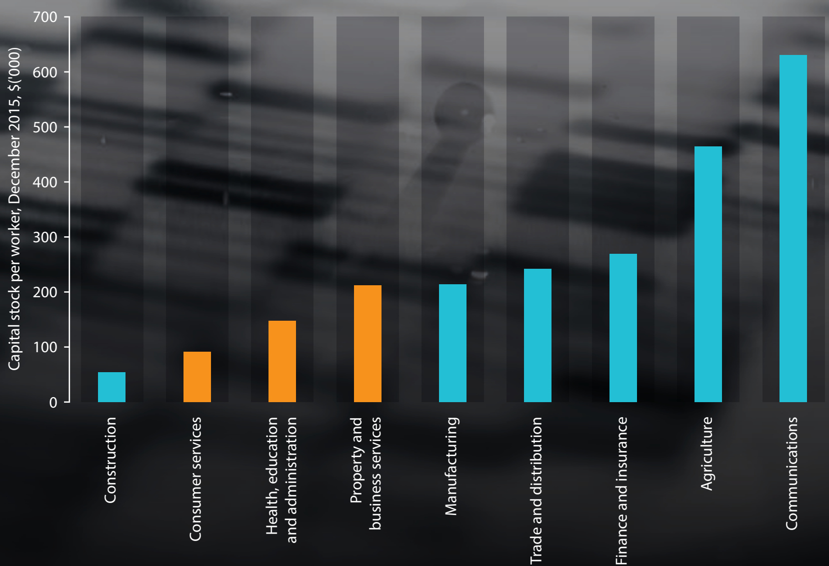


FIGURE 6
Service industries are less capital intensive



Source: ABS, Outlook Economics, ANZ Research

THE IMPLICATIONS FOR LABOUR AND CAPITAL

COMPETITION FOR LABOUR WILL BECOME MORE INTENSE

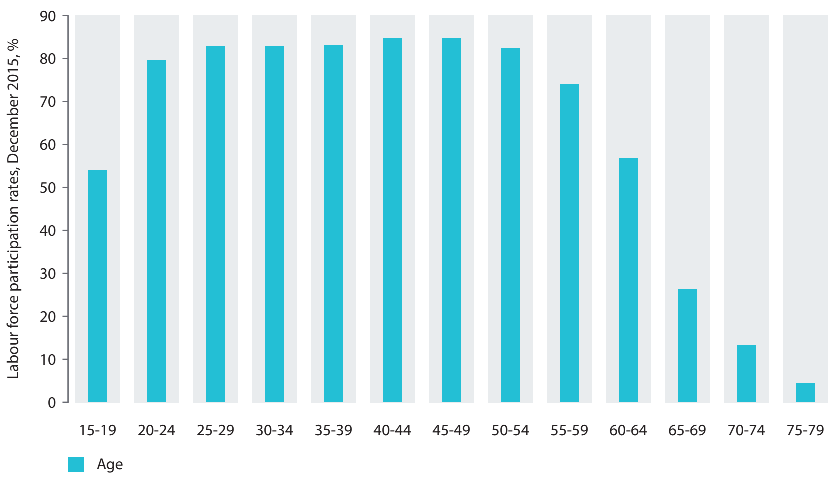
One important implication of a services-driven economy has been neglected in studies to date: service industries are relatively less capital intensive (see figure 6) and rely more upon people — particularly highly skilled workers. This could prove challenging for businesses given Australia's ageing population and changing workforce composition.

The industries with the most intensive demand for labour also happen to be those with the strongest growth prospects. Our modelling suggests that the service sector will continue to expand in both absolute and relative terms, driven by growth in the human capital areas of health and education in particular. The net result is that demand for labour will continue to rise at a solid average pace of 1.6% per year over the next 15 years.

The challenge for businesses, however, is that demographic factors will limit growth in the availability of labour. The first of the baby boomers have now entered retirement, and this trend is set to accelerate over the next decade. In addition, fertility rates have steadily declined over the past century, and now sit at record low levels, while medical advances mean people have longer life expectancies.

This triumvirate of forces is resulting in a structural shift in Australia's population. The number of people aged 65 or over will increase 60% by 2030 to 5.5 million. They will account for almost 20% of the population, up from 13% in 2000 (see Appendix 1 for more detail). As people age, their willingness or ability to work decreases, resulting in lower labour force participation rates (see figure 7).

FIGURE 7
Workforce participation drops sharply for older Australians



Source: ABS, Outlook Economics, ANZ Research

In recent decades Australia has benefited from a 'demographic dividend', in which the working age population has grown faster than the total population, providing a boost to GDP growth. In addition, the economy benefited from the increasing participation of women in the workforce as traditional household roles changed. From just 51% in 1978, female participation rates have steadily increased and are now over 70%.

While the increasing role of women in the workforce is set to continue, the ageing of the population means Australia's overall participation rate will stagnate and may even decline (see figure 8). A flat-to-declining participation rate, coupled with slower population growth, will make competition for available labour increasingly intense.

This slowdown in the availability of labour is likely to cause problems for businesses over the next 15 years. Greater competition for skilled and educated workers will make HR functions increasingly important and will require a flexible approach to working arrangements. Businesses will need to focus in particular on attracting and retaining women and aged workers.

Some of the strategies employed by businesses will likely include more part-time work and facilitating 'work from home' arrangements through the faster adoption of technology. More workers than ever are currently employed part-time. At 31% of total employment, this is nearly double the level of 30 years ago. Further growth is likely, given the benefits of part-time work for parents and the elderly (see figure 9).

Governments also have a part to play in mitigating the effects of Australia's growing demographic challenge. There are a range of issues that Australian policymakers will need to address, such as:

- The need to lift labour force participation among older workers and women.
- Boosting skilled immigration. The three most likely sources of talent will be China, India and Brazil[4], with more people deciding to stay in Australia for professional opportunities post study.
- Over the longer term, developing policies to arrest Australia's declining fertility rates.

EDUCATION WILL BE EVEN MORE IMPORTANT

Today, over half of Australia's population has completed year 12 and has at least a post-school certificate — more than twice as many as in 1981.[5] This rapid increase of education levels has supported productivity growth and the growth of services.

By 2030 the proportion of Australians with post-school qualifications could jump above 70%, but this increase in the pool of potential skilled workers is unlikely to fully satisfy demand due to the downward pressure on overall worker numbers.

The growth sectors identified earlier (eg healthcare, education, and professional services) all require high levels of education, so it is fair to assume that the knowledge requirements of Australia's workforce in 2030 will be even greater than today.

Digitisation and automation are key factors in that trend. Over the past 30 years, roles for labourers and trade workers have been displaced by automation. Conversely, the strongest growth in employment has occurred in positions that cannot readily be replaced by machines — such as health workers. These changes suggest education will continue to grow in importance for Australia's workforce.

4. Deloitte Australia (2013). *It's (almost) all about me. Workplace 2030: Built for us.*
5. Australian Bureau of Statistics (2013). *4102.0 - Australian Social Trends - The 'average' Australian.*

FIGURE 8
An ageing population will outweigh rising female participation

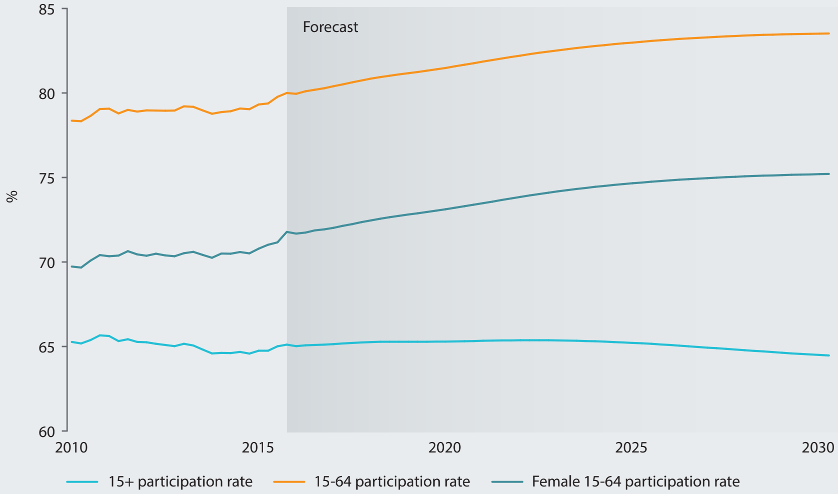
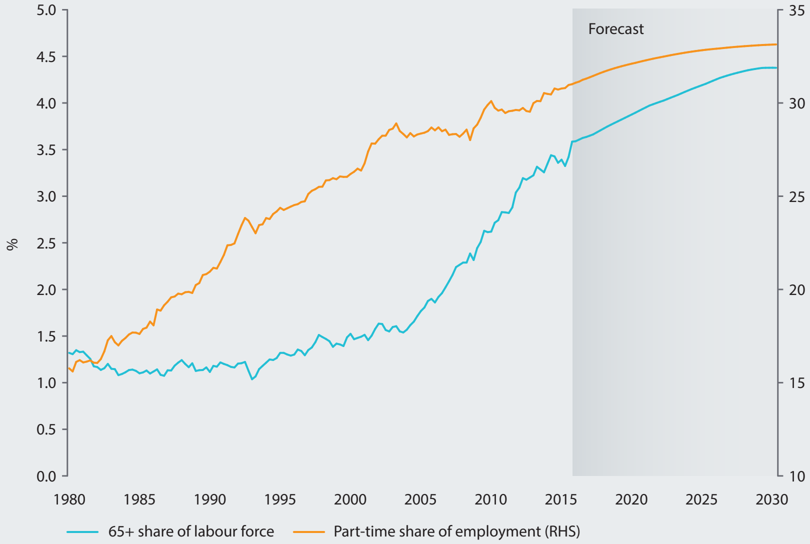
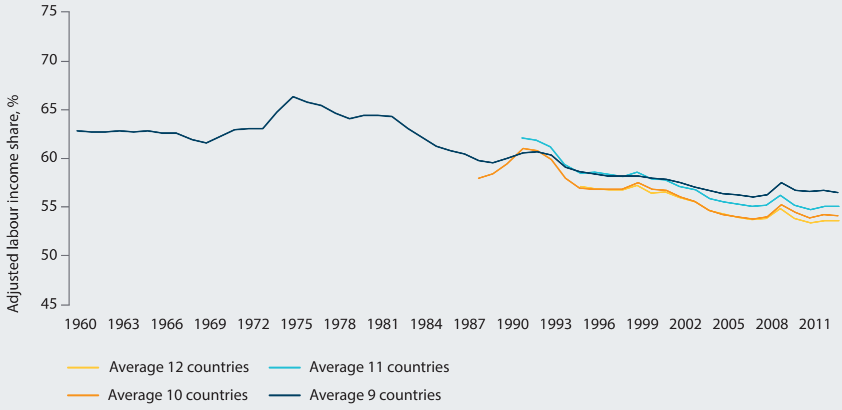


FIGURE 9
Australia's changing workforce



Source: ABS, Outlook Economics, ANZ Research

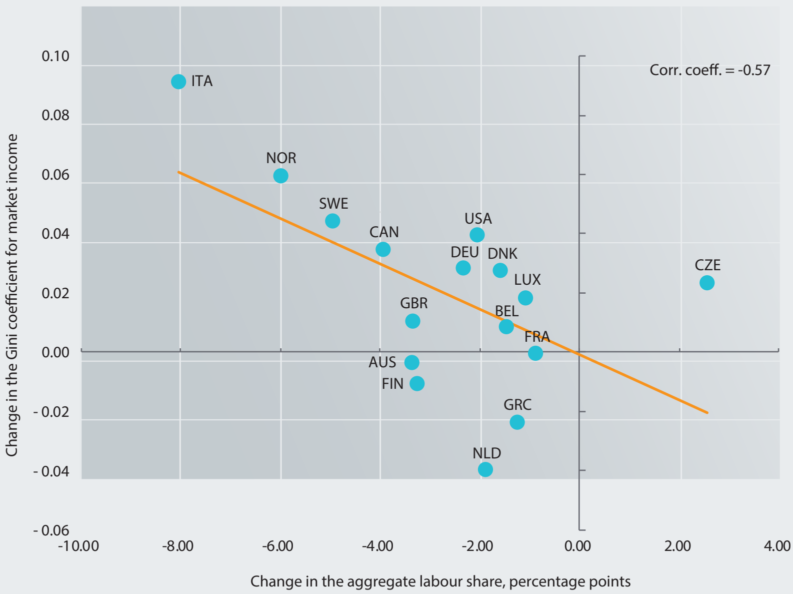
FIGURE 10
Adjusted labour income share in selected developed countries[6]



Source: ILO & OECD (2015), AMECO, *The Labour Share in G20 Economies*

6. The 9 countries are Australia, Canada, Germany, France, Italy, Japan, Spain, the United Kingdom and the United States. The other series include respectively the Republic of Korea (10 countries), Mexico (11 countries) and Turkey (12 countries).

FIGURE 11
Labour share vs income inequality[7]



Source: ILO & OECD (2015), *The Labour Share in G20 Economies*

7. Labour share: 3-year moving averages centred around start and end dates. The wage of the self-employed is imputed assuming that their annual wage is the same as for the average employee of a whole economy. The Gini coefficient is based on pre-tax and transfer income of a population aged 18 – 65 years. a) 1990-2004 for Canada; 1990-2005 for Denmark, Netherlands and the United States; 1991-2004 for Italy, Sweden, and the United Kingdom; 1995-2004 for Australia, Belgium, Germany, and Norway; 1995-2005 for Finland; 1996-2004 for Czech Republic, France, and Luxembourg; 1999-2004 for Greece. Source: OECD calculations based on the OECD income distribution database, OECD STAN and EUKLEMS.

In order to meet the growth in demand for tertiary qualifications, Australia will need to explore more effective ways of securing private sector investment. Better partnerships between businesses and the education sector will help bridge the funding gap needed to create a world-class university infrastructure, maintain high teaching standards, and drive innovation.

The OECD ranks Australia 29 of 30 for collaboration between the university sector and industry on innovation, and Australia ranked 116th of 142 countries for efficiency in converting research dollars into commercial success.[8] Securing the gains of research undertaken by Australian institutions will secure high skilled jobs and enable Australian companies to sell more value added services into international markets.

LABOUR'S SHARE OF INCOME WILL RISE

The labour share of income in Australia has started to increase since the global financial crisis. A significant cause of this has been the lower returns in the mining sector as commodity prices have fallen heavily. Given the likelihood that commodity prices will remain subdued, the mining sector is expected to weigh on the overall return to capital. In turn, this will have the effect of increasing the relative return and share of income of labour.

Australia's changing industry structure may also contribute to a rising labour share of income because some of the strongest growth areas outlined earlier are labour intensive, with relatively low capital requirements. The overall demand for labour driven by these industries, combined with the demographic challenges described previously, should support a recovery in the labour share of income.

Until recently, there was a slow but steady decline in labour's share of income. Incomes had not increased at the same rate as labour productivity, meaning that the return on capital grew in both absolute and relative terms. The OECD found that over the two decades to 2009, the labour share of income fell in 26 out of 30 advanced economies (see figure 10).

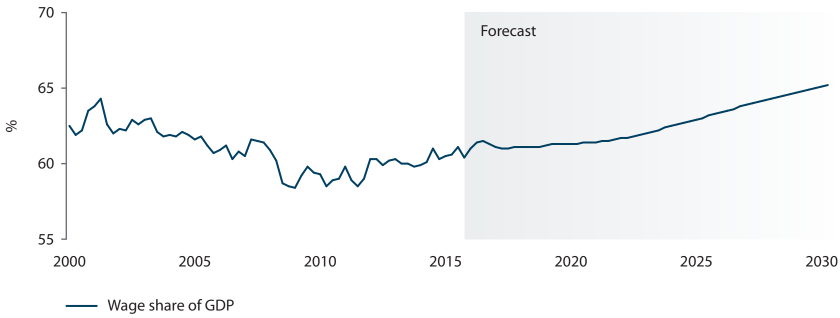
This development has had a number of consequences. Most importantly, a lower labour share tends to contribute to rising income inequality. This is because most individuals have a labour endowment (ie ability to work for income), but capital endowments (ie ownership of capital assets) are more likely to be owned by a small subset of the population. As the labour share of income falls and the capital share of income rises, the relative income of labour falls too, which exacerbates income inequality. Figure 11 shows the relationship between changes in the labour share and income inequality for OECD countries.

As well as affecting individuals by worsening inequality, a falling labour share has broader economic consequences. The lower relative return to labour predominantly affects lower income earners, who have a higher propensity to consume rather than save.

Consequently, a lower labour share tends to slow household spending. Thankfully, the era of a declining labour share may be set to unwind in Australia, due mostly to above-average growth in the labour-intensive service sectors of health, education and professional services. The overall demand for labour, driven by these industries, combined with the ongoing demographic challenges outlined earlier, should support a recovery in the labour share of income (see figure 12).

8. Cornell University, INSEAD and WIPO, (2013). *The Global Innovation Index 2013 : the Local Dynamics of Innovation.*

FIGURE 12
Australia's labour share may have troughed already



Source: Outlook Economics, ANZ Research

As a result, the consequences of a falling labour share, such as growing income inequality, may begin to unwind as well. A reduction in Australia's income inequality would directly improve the wellbeing of the average Australian. Although Australia's income inequality is substantially better than countries like the United States, it is slightly worse than the OECD average, which suggests there is still plenty of room for improvement.

A rising labour share would also have implications for the broader economy through higher consumption. The flipside, however, is that lower demand for — and lower return on — capital could result in lower rates of investment. So we can expect stronger growth in consumption and weaker growth in investment, or in other words, more demand for retail bankers than investment bankers.

FINANCIAL SERVICES PROVIDERS WILL HAVE TO ADAPT

A services-oriented economy will have a significant effect on investment and financing strategies. Rather than have funding revolving around multi-billion dollar mining projects, this will be replaced by the smaller, but more frequent, funding needs of the services industries.

Projects associated with the mining boom had very high capital requirements as businesses invested in new equipment and facilities to boost production and meet market demand. With many of these projects now complete, and lower commodity prices meaning fewer new projects, investment is being redirected to other sectors, including the service sector.

Industry specific hubs, including new fintech centres, are attracting the attention of investors as new businesses in these areas look for funds to grow. Some health and mining technology companies are also securing strong investment, especially those which have managed to expand globally while keeping R&D and key manufacturing functions in Australia.

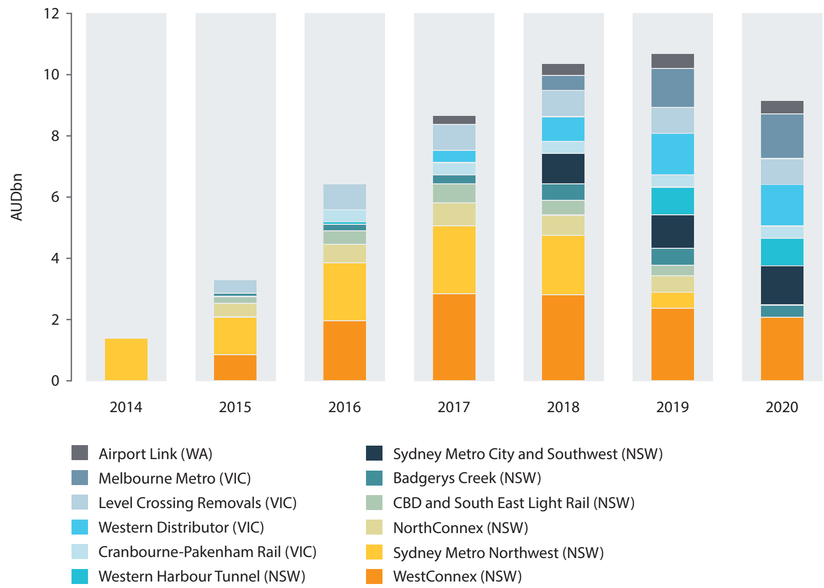
Supporting these businesses clearly requires a different investment profile to resources projects. In particular, bringing new services to a regional market may require investment in R&D and/or the platform via which the services are scaled for export. Lower capital requirements at all stages of growth means that there are challenges and opportunities for financial service providers looking to help those businesses achieve scale and reach new markets. By adapting to the new pattern of smaller but 'continuous' investment in these sectors, financial services providers will find new investment opportunities and help support export growth.

But the outlook for investment and financing opportunities is not limited to the service sector. Infrastructure is the one sector where the investment model more closely resembles the bigger projects of the mining boom. Australia's expanding population means there will be no shortage of opportunities, with Sydney and Melbourne approaching 6 million people each by 2030[9], adding to an already significant infrastructure requirement.

Transport infrastructure is set to be a key winner as Australia's urban footprint continues to expand. Sydney is currently investing in light rail, new tunnels and toll roads, major changes to the rail network, and plans are underway for a second airport at Badgerys Creek. Melbourne and Brisbane are also in the planning stages of major transport projects. In addition, we expect to see substantial growth in the healthcare and education space. While hospitals and universities are not as capital-intensive as transport infrastructure, they still require substantial investment. The strong growth outlook for these sectors will ensure that opportunities continue to arise for investors.

We are already seeing the combined effect of growing infrastructure needs and rising levels of capital. The availability of finance in the private sector, both domestic and foreign, is resulting in new, innovative methods of financing infrastructure.[10] Figure 13 shows the state of play for specific infrastructure projects as we go to print, many of which involve partnerships between governments and private enterprise. We believe that closer collaboration between the private and public sectors will continue to drive significant investment in Australia's infrastructure out to 2030 and beyond.

FIGURE 13
Major public sector backed projects



Source: BREE, Company reports, Deloitte Access Economics, State and Federal Government Budget papers, ANZ Research

9. Extrapolating from the 2060 projections in Productivity Commission (2013), *An Ageing Australia: Preparing for the Future.*
10. Funding models recently used include the 'Availability PPP', State build followed by monetised tolling rights, and even unsolicited proposals from the private sector.

CONCLUSION

In recent years Australia's service sector has grown at nearly double the rate of its goods counterpart and now makes up 72.4% of the Australian economy. We expect the service sector will comprise an even greater proportion of the Australian economy by 2030 (up 5% to 77.3%).

The healthcare industry will expand as a result of an ageing population and demand for new medical technologies, while the education and professional services industries are set to benefit from growth in Asia. We expect these industries to expand at an average rate of 6.0% a year (in nominal terms) through to 2030 — significantly faster than the traditional goods industries of mining, manufacturing and construction.

Australia's exports profile will continue to shift towards education, tourism and professional services. It is becoming easier to enter foreign markets due to digital opportunities and new free trade agreements, and a range of Australian service providers are now achieving greater scale and wider reach through the clever application of technology. Our projections indicate that service exports will on average grow solidly at about 3% a year between now and 2030.

This expansion of the service sector will also require some adjustment on the part of businesses. Service industries are relatively less capital intensive and rely more upon skilled workers, which will prove challenging for Australian businesses given the ageing population and changing workforce composition.

The industries with the most intensive demand for labour, such as health and education, are also those with the strongest growth prospects. As a result, we project that demand for labour will continue to rise at a solid average pace of 1.6% per year over the next 15 years.

On the labour supply side, by 2030 almost 20% of the Australian population will be older than 65, so businesses will need to adopt more flexible work arrangements as labour becomes harder to find.

Businesses will also need to focus on attracting and retaining female workers. While participation rates have been rising for women, there remains significant upside potential.

The growth sectors such as healthcare, education, and professional services, all require high levels of education, which presents another challenge — funding the tertiary education sector. In order to meet the growth in demand for tertiary qualifications, Australia will need to explore more effective ways of securing private sector investment. Better partnerships between businesses and the education sector could help bridge the funding gap.

A growing service sector could change the distribution of wealth in Australian society too. The overall demand for labour in services, coupled with a contraction in the more capital-intensive industries like mining, should support a recovery in the labour share of income. As a result, some of the consequences of a falling labour share which we have seen in recent decades, such as growing income inequality, may begin to unwind. A reduction in Australia's income inequality will mean a fairer society and less wasted potential.

A rising labour share would also have implications for the broader economy as lower income earners could be expected to consume more. But on the downside, the lower demand for, and lower return on, capital could result in lower rates of investment.

Projects associated with the mining boom had very high capital requirements. With many of these projects now complete, and with lower commodity prices meaning fewer new projects, investment is being redirected to areas like computer software and R&D. We expect that to continue. Investment in these areas will be smaller in scale in comparison with mining, but also more frequent, so financial services providers will have to adapt to this new landscape.

Infrastructure is the one sector which is likely to be an exception to this new pattern, and one where there is no shortage of opportunity because Australia's infrastructure requirements continue to grow. Transport infrastructure will probably remain the primary focus, but hospitals and universities will require substantial investment too, particularly given the strong growth outlook for these sectors.

In summary, by 2030 the service sector will be playing an even greater role in the Australian economy than it already does, providing new export opportunities for businesses and many more new jobs than the goods industries.

Moreover, these new jobs will generally be more satisfying, requiring higher levels of education and human judgment of the kind which cannot be automated. The higher labour requirements of an expanding service sector, colliding with a demographic wave of ageing, means businesses and governments will have to work harder to secure Australia's future workforce.

APPENDIX 1

WHAT DOES AUSTRALIA LOOK LIKE IN 2030?

An ageing population, slowing economic growth, digital disruption, climate change, increased pressure on urban infrastructure, and other developments all mean Australia will look very different in 2030.

This appendix will make some predictions about Australian life in 2030, summarising the good work of government agencies and professional services firms, before moving to our own forecasts for the Australian economy over the same time frame.

AGEING — OLD, HEAVY, AND UNWELL

The average Australian will be over 40 years old by 2030, and the cohort above 65 years of age will be larger than at any time in Australia's history, putting enormous pressure on health-related spending and government finances generally. In particular, rising expenditure on healthcare, aged care, and retirement benefits will require significant increases in state and federal taxes. Most workers born 100 years ago spent only 13 adult years out of the workforce, whereas workers born today may spend over 30 years in retirement[11] — a retirement which will have to be funded in part by the workers of 2030.

A combination of ageing, dietary changes, and sedentary lifestyles are taking their toll on Australian physiques, with the average person 4kg heavier than 16 years ago.[12] There is no reason to suspect that this trend will slow over the next 15 years. This will place further strain on health spending, as cardiovascular disease, diabetes, and diet-related cancers become more prevalent. While any negative impact on Australians' longevity will probably be offset by medical advances, Australia's enviable position at the top of international league tables for 'healthy years of life'[13] could be at risk.

In other words, Australians in 2030 will probably be older, heavier, and sicker, with all the restrictions that entails for mobility and productivity.

WORKERS — FEMALE, SMART, AND FLEXIBLE

By 2030 there will be more women and significantly more workers over the age of 65 in the workforce. The proportion of women in the workforce is steadily on the rise[14] and by the middle of the century they could rival men's participation rates[15], with increased participation in highly skilled sectors such as health and professional services.

11. Productivity Commission (2013). *An Ageing Australia: Preparing for the Future.*

12. Australian Bureau of Statistics, (2013). *4102.0 - Australian Social Trends - The 'average' Australian.*

13. Commonwealth of Australia (2015). *2015 Intergenerational Report: Australia in 2055.*

14. Australian Bureau of Statistics, (2013). *4102.0 - Australian Social Trends - The 'average' Australian.*

15. According to the *2015 Intergenerational Report,* by 2055 70% of women between 15 and 64 will be employed. This would be higher than the 67% participation rate for men in 2011 Census.

As for the kind of work Australians will perform, rising automation rates will probably place a range of more routine jobs at risk, especially in the retail, transport and hospitality industries.[16] So the most common job for men and women now (sales assistant[17]) is unlikely to be the most common job in 2030. In its place, jobs involving creativity (eg designers), social or fine motor skills (eg health practitioners), and jobs generating genuine insight from data will all prosper, as these are not easily performed by a machine.[18]

The jobs which will enjoy the most growth will be those which require higher education levels. Despite this lift in sophistication and a growing labour share of income, growth in disposable incomes could slow to around 1.1% per year, in part due to lower labour productivity growth.[19]

In short, the workforce of 2030 will be older, female-friendly, better educated, more ethnically diverse, and less likely to be involved in manual or routine work. And while these workers of the future will be wealthier, the growth in their incomes may be slower.

URBAN LIVING — DENSE, CONGESTED, AND EXPENSIVE

Australia's biggest cities, Sydney and Melbourne, will both be approaching six million people by 2030[20] and some studies suggest that this is the tipping point at which poorly managed infrastructure can render a city unliveable.

In order to avoid those problems and relieve pressure on transport infrastructure in particular, governments will be focusing upon denser urban corridors. So it is likely we will see more Australians living in apartments and terrace houses over the next 15 years. Urbanisation itself may also increase beyond its already high level of 90%[21], as immigrants continue to choose Sydney or Melbourne over other destinations.

Driving is currently the dominant mode of transport (especially for work travel, with 69% of Australians getting to work by car[22]), but this could become harder as congestion increases. If more people revert to public transport to avoid lengthy delays or congestion tolls, this may accelerate the move towards denser 'corridor' living.

In terms of property rights, more people will be mortgaged or renting, with fewer people owning outright. Owning outright fell from over 40% in 2001 to 33% in 2011[23] and current affordability trends suggest this will fall further in the period to 2030.

CULTURE — LESS WASP, MORE ASIAN

By 2030, nearly a third of Australia's inhabitants will have been born outside of Australia. The percentage of people born in Australia has steadily fallen from its high point of 90% in 1947 to 74% in 2011, and the fall is more dramatic in capital cities, where only 66% were born in Australia.[24] Based on current rates of immigration, we can expect that to fall further to around 60% for capital cities by 2030.

16. Edmonds & Bradley, Dept of Industry Innovation & Science (2015). *Mechanical Boon: Will Automation Advance Australia?*
17. Australian Bureau of Statistics, (2013), *4102.0 - Australian Social Trends - The 'average' Australian.*
18. Edmonds & Bradley, Dept of Industry Innovation & Science (2015). *Mechanical Boon: Will Automation Advance Australia?*
19. According to Productivity Commission (2013), *An Ageing Australia: Preparing for the Future*, this is less than half the rate of the boom period of 1993-2012, when it was 2.7%.
20. Extrapolating from the 2060 projections in Productivity Commission (2013), *An Ageing Australia: Preparing for the Future.*
21–24. Australian Bureau of Statistics, (2013). *4102.0 - Australian Social Trends - The 'average' Australian.*

Looking more closely at that next wave of new Australians, many will speak an Asian language at home. Nearly 1 in 5 people now speak a language other than English at home, with Chinese and Arabic strongly on the rise.[25] Present immigration patterns, and Australia's growing ties with Asia generally, suggest Asian languages and backgrounds will be even more prominent by 2030.

If the changes over the last 100 years are any guide, there will also be a more cosmopolitan mix of religions and cultural backgrounds in Australia by 2030. From a 96% Christian nation in 1911 (and predominantly White Anglo Saxon Protestant), only 61% of Australians identify as Christian now, due to significant growth in non-Christian religions and atheism.

CLIMATE — HOT, DRY, AND STORMY

Based on the present trajectory of greenhouse gas emissions, the average global temperature is expected to rise by approximately half a degree in the next 15 years.[26]

As a result of that warming, sea levels will rise (eroding some coastal areas in the process), drier parts of Australia will experience more severe and frequent droughts, and flash floods will afflict catchment areas with greater frequency. Overall, 'extreme precipitation' will be four times as likely to occur and while coastal cyclones may not strike any more often, the intensity of those cyclones will continue rising, as has been the case since 1975.[27]

On the related issue of energy use and resources, by 2030 there will be a significant increase in demand for 'cleaner energy', water, and a range of other resources, both here and overseas. Water consumption, for instance, is forecast to rise around 40%.[28] This, combined with more droughts in the southern half of Australia, will mean higher water prices, more water use restrictions, more trading of water use rights, and probably more disputes over access in areas like the Murray-Darling Basin.

Similarly, Australia's total energy consumption is set to grow 35% by 2030.[29] While all sources of energy will experience strong demand growth, renewable or cleaner energy sources will experience the strongest growth as political and social pressure builds in favour of those sources which do not emit greenhouse gas.

Resource scarcity could also provide the necessary impetus to properly price other externalities beyond greenhouse gas emissions (eg extending the equivalent of carbon credits to things like biodiversity). This development would require institutions, most likely in the form of government agencies, to create incentives and disincentives to protect a range of natural resources.[30]

25. Australian Bureau of Statistics, (2013). *4102.0 - Australian Social Trends - The 'average' Australian.*
26. According to the Intergovernmental Panel on Climate Change, by 2035 the global average temperature will have increased by 0.3-0.7 degrees Celsius. IPCC (2015). *Climate Change 2014: Synthesis Report.*
27. Hajkowicz, S. CSIRO (2015). *Global Megatrends — 7 Patterns of Change Shaping our Future.*
28–29. Water consumption will rise in Australia by 42% between 2009 and 2026 according to *Global Megatrends.*
30. Moody, J & Nogrady, B (2010). *The Sixth Wave — How to Succeed in a Resource-limited World.*

Some likely consequences of these trends include:

- Australia will export more energy sources like gas in response to growing global demand and Australians will pay more for energy as a result;
- More homes will adopt solar energy and the commercial generation of solar energy will grow;
- Australians will rely more heavily on public transport and cycling, and electric car sales will grow strongly;
- Agricultural production will make more efficient use of water and there may be breakthroughs in semi-arid agricultural science;
- Some agricultural centres will become less economically viable due to climate change, while other new centres will emerge (eg WA may get wetter);
- Insurance premiums may climb steeply as a result of extreme weather events;
- More accurate attempts to value the true environmental impact of production could mean that certain goods become significantly more expensive;
- A new generation of green businesses and jobs will arise, with new technologies to support them, focused on converting waste and maximising energy efficiency;
- Advances in clean coal technology could spur growth in Australia's coal industry; and
- Australia may be taking its first steps towards 'geo-engineering' in order to combat climate change.

TECHNOLOGY — ROBOTS, ANTI-AGEING, AND THE 'EXPERIENCE ECONOMY'

The online shopping trend may seem like old news, but it still has a long way to run, with only 10-20% of total retail transactions currently performed on the internet. As people's familiarity with internet purchases increases and more tech-savvy generations enter the workforce, we can expect this rate to increase substantially.

One natural consequence of this may be that Australian consumers source even more goods overseas, further increasing the challenges for domestic retailers in certain sectors. Retailers with a physical presence may respond by shrinking floor space and focusing on a range of services which cannot be experienced remotely (including the ability to trial products before purchasing them online).

Growth in Australian incomes has already caused a shift away from products in favour of services. In fact, declining material intensity has been observed in all OECD countries, with greater shares of GDP now devoted to services.[31] The retailers who adapt quickest to this new 'experience economy' [32] (and the businesses which support e-commerce, such as freight and logistics) will prosper.

By 2030, we can also expect robots to be playing a more significant role in our lives. Industries such as manufacturing, mining, agriculture, and defence will see even greater involvement by machines and it's conceivable that Australia will have its first human-free work sites, like FANUC's 'lights out' factory in Japan.[33]

31. Hajkowicz, S. CSIRO (2015). *Global Megatrends — 7 Patterns of Change Shaping our Future.*
32. Businesses will increasingly realise value from services according to 'Moody, J & Nogrady, B (2010), *The Sixth Wave — How to Succeed in a Resource-limited World*. Even by 2020, 55% of companies expect to compete primarily on a service basis according to Deloitte Australia (2013), *It's (almost) all about me. Workplace 2030: Built for us.*
33. Edmonds & Bradley, Dept of Industry Innovation & Science (2015). *Mechanical Boon: Will Automation Advance Australia?*

Meanwhile, 'sensory' software, with application for self-driving vehicles, will move out of niche industries (like driverless trucks in mines[34]) and into the wider market. The average Australian driver will probably still be involved to some degree, but collision-avoidance functionality will become commonplace.

Biotechnology also has the capacity to transform our lives. Regenerative medicine, aimed at reproducing organs or limbs, slowing the ageing process or fighting cancer, could have made significant gains by 2030. The overlap between this field and the ones above could create other exciting fields too, such as the capacity to encode bacteria with data[35] or commercialising mechanical limbs which respond to nerve signals.

It is unlikely that biotech innovations will be readily available to the average Australian by 2030 — the timelines and costs involved suggest any early releases will be prohibitively expensive. But we cannot discount the possibility that Australia plays a part on the development side, given Australia's record of health innovation.

So, given these likely changes to our health, our urban and natural environment, the way we work, the jobs we do, and the things we consume — what is in store for the Australian economy by 2030?

AUSTRALIA'S ECONOMIC OUTLOOK IS TIED TO CHINA

Since the early 2000's Australia has experienced a remarkable period of economic prosperity. The re-emergence of China into the global economy and its rapid industrialisation boosted demand for bulk commodities and lifted Australia's terms of trade to the highest level in 150 years. The impacts on Australian households, businesses, and governments have been profound. However, the foundations that have underpinned the economy over the previous decade have begun to fray, meaning that the economic environment is set to become more challenging to navigate moving forward. We expect the Australian economy to be characterised by weaker GDP growth, slower household income growth compared to the past (even with a rising labour share of income), a greying workforce, and lower interest rates.

Of vital importance for Australia will be the growth path of the Chinese economy. China represents both great uncertainty and a source of tremendous opportunity for Australian businesses and the economy more broadly. It is not only a large economy, but also one that is undergoing a major transformation, with slowing growth.

At present, China's industrial economy is under pressure as the new industries orientated towards domestic consumption and services are not strong enough to provide an offset. Importantly, this transition will be curtailed unless resources can be freed from old industries and put to work in the new growth drivers. The foundation of Chinese growth for the past two decades has been two 'pillar' industries: manufacturing and heavy industry. These pillars have supported the rapid development of a large export platform and modern infrastructure. They have had the full weight of government financial and political support. This has been the real engine of Chinese growth.

34. Deloitte Australia (2013). *Positioning for Prosperity? Catching the next Wave.*
35. Hajkowicz, S. CSIRO (2015). *Global Megatrends — 7 Patterns of Change Shaping our Future.*

These industries are no longer competitive as labour costs have risen and over-capacity has emerged. These manufactured goods and infrastructure markets have matured. The strong growth of the last decade is no longer there. For China these industries have been caught in a pincer movement of declining demand and diminishing competitiveness.

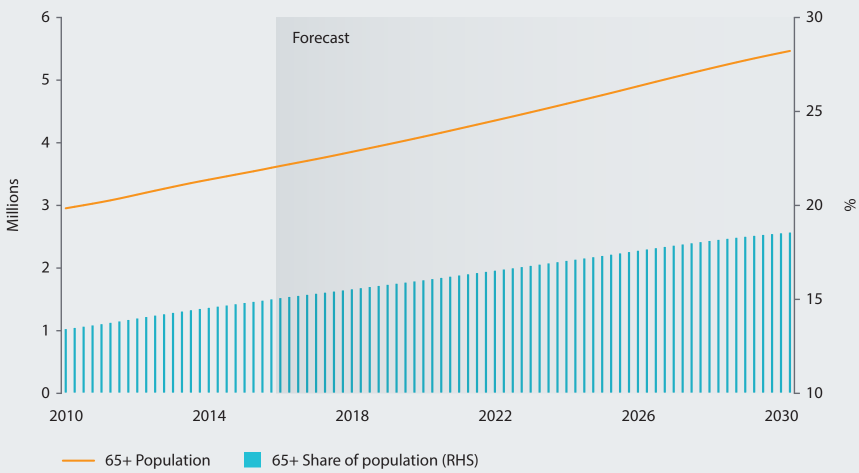
The sustainable course for China seems to be an acceleration of microeconomic reforms and a slowing of overall economic growth. However, the reform process is fraught, and like any reform process, progress will be uneven.

If navigated successfully, the transformation of China's economy will provide significant opportunities for Australian businesses across a range of industries. These opportunities will also support strong foreign investment from China in Australian businesses. The composition of foreign investment from China is likely to shift over time to be less focused on hard commodities and more targeted at industries aligned with China's changing growth drivers — that is, consumer-orientated and services businesses. As a result, we expect Australia's total exports to China will almost double to around USD175bn by 2030.[36]

THE ECONOMIC IMPACT OF AGEING IS SIGNIFICANT

Australia is set to become older, with the baby boomers entering retirement age, steadily declining fertility rates, and longer life expectancies (see figure 14).

FIGURE 14
Australia's population will continue to age



Source: ABS, Outlook Economics, ANZ Research

36. ANZ Research, October 2015. *Sleeping Giant — China's Consumer.*

These demographic shifts will have a profound impact on Australia's potential GDP. By taking into account population growth, changes in the working age population and participation rates, it is possible to estimate the impact of demographic change on GDP growth. It is estimated that labour, on average, contributed around 1.3ppts of GDP growth between 1981 and 2012. Over the next 15 years, however, demographics will have less of a positive impact on GDP growth. Under our projections, labour force growth will slow between 2015 and 2030 and as a result, demographic factors, on average, will add just 0.6ppts to growth over this time frame. As such, we expect potential GDP growth to slow to around 2¼-½% from over 3% in the preceding decade.

While the ageing of Australia's population provides a sobering picture of potential GDP growth prospects, demographic trends are not immutable and governments have an active role to play in shaping their direction. Moreover, the ageing population will also create opportunities and challenges for business and governments alike. Indeed, most advanced economies are already spending around 10% of GDP on health expenditure and this is expected to rise as the number of people in the 65+ age-category increases.

Hospital admissions are forecast to continue to expand rapidly as population growth and ageing is compounded by further rises in the non-demographic demand for health services. Improved diagnostic technology and availability of medical services will continue to drive admission rates higher. The rise in aged dependency will be a key structural pressure on the Commonwealth budget and has also been recognised as a structural impediment to budget management for state governments. The forecasts for health services demand foreshadow a severe challenge to the public provision of aged care and health services in the decades ahead.

A TIGHTER REVENUE ENVIRONMENT IS ON ITS WAY…

The structural shifts in the Chinese economy, combined with a sharp weakening in commodity prices, have ushered in a period of adjustment for the Australian economy. The terms of trade have declined 32% from their peak, while resources investment has fallen by a little under AUD40bn. This adjustment, however, still has further to run. The decline in resources investment is likely to remain a drag on economic growth until 2018.

Moreover, the potential for further weakness in the terms of trade will continue to provide an ongoing challenge to the economy on a number of fronts. Most notably, nominal GDP growth is likely to remain well below the rates recorded over the previous 10-15 years, meaning governments, businesses, and individuals will continue operating in an environment of lower revenue growth than previously experienced.

For the average Australian the ongoing adjustment in the economy means that income growth is likely to be much weaker than experienced over the previous five decades. Indeed, the terms of trade boom provided a free kick for Australian government, businesses, and households in which income and revenue growth vastly outstripped gains in productivity growth. So it is only through a substantial uplift in productivity that incomes will be boosted again on a sustainable basis.

APPENDIX 2

THE AUS-M MODEL

The Australian Macroeconomic (AUS-M) model is a quarterly time-series structural model of the Australian economy. It is essentially an outgrowth of the Treasury Macroeconomic (TRYM) model. It is an evolution of that model towards a CGE style model incorporating input/output-based demand systems and far greater industry and commodity detail than the original model, but retaining the same overarching design philosophy. Like the original TRYM model, it has three broad sectors (the household sector, the business sector, and the public sector) and three markets: the product market, the labour market, and the financial market. Systems of equations link each sector and each market. Like TRYM, each equation has a long run representation. The long run components are combined to form a steady state version of the model that is simulated to provide forward values for 'expectational' variables.

Overall, the model has around 685 equations and around 2,000 time-series variables, covering national income, expenditure and production, the financial market, the labour market, housing, balance of payments, and trade. Key supply and demand classifications are shown in Table 1. Most model series extend back to the 1960s. A system of identities link national accounts flows (eg savings, investment, net lending) with their associated stocks (capital stocks, wealth, public debt, foreign assets, and liabilities). The model is updated and re-estimated each quarter following the release of the national accounts.

Unlike models such as ORANI, GTAP, and G-Cubed where parameters are largely imposed by the model builder, the parameters in AUS-M are almost entirely estimated on the basis of the historical time series data. (Doing so limits the size of the model, so it is not as detailed as a traditional CGE model.) The model is designed to be updated quarterly and used for detailed forecasting and sensitivity analysis. The comparative advantage in a model of this kind comes from being constantly tested against the data. If structural change is occurring in any individual sector of the economy, this should be reflected in the model's parameters reasonably quickly. It has a good fit with historical data, and hence is able to provide a coherent explanation of historical developments. Its focus on dis-equilibrium adjustment processes (eg in the dwelling and labour markets) and its empirical grounding make it a useful complement to the more detailed models (or alternatively the more detailed models are a useful complement to AUS-M)

For the purposes of this paper, the AUS-M model has been adjusted to line up with ANZ Research's forecasts. The major macroeconomic variables in the base case AUS-M model were tuned to approximate ANZ's forecasts (as at March 2015), particularly over the next two years.

A short description of the model including comparisons with the Monash Model can be found in Appendix A and Appendix B of the following paper.

http://www.rba.gov.au/publications/rdp/2014/pdf/rdp2014-08.pdf

SUPPLY AND DEMAND VARIABLES IN AUS-M

Supply variable	Mnemonic	Price
Domestic supply		
Agriculture	GAG	PGAG
Mining	GMIN	PGMIN
Manufacturing	GMAN	PGMAN
Construction	GCST	PGCST
Distributional Services	GSD	PGSD
Retail Trade	GRET	PGRET
Wholesale Trade	GWST	PGWST
Transport Services	GTRN	PGTRN
Finance and Insurance	GFIN	PGFIN
Property and Business Services	GPBS	PGPBS
Real Estate and Rental Services	GRES	PGRES
Professional and Technical Services	GPRO	PGPRO
Administrative and Support Services	GADS	PGADS
Consumer Services	GSC	PGSC
Accommodation and Food Services	GACC	PGACC
Arts and Recreational Services	GREC	PGREC
Other Services	GOTS	PGOTS
Communications	GCOM	PGCOM
Electricity Gas and Water	GEGW	PGEGW
Human Capital Services	GHUC	PGHUC
Health Care and Social Assistance	GHLC	PGHLC
Education and Training	GED	PGED
Public Administration and Safety	GPAD	PGPAD
Dwelling Services (Owned by Households)	GDW	PGDW
Dwelling Services (Total Dwellings)	GDWT	PGDWT
Taxes Less Subsidies on Products	GITS	PGITS
Adding Up Discrepancy (Production)	DISADP	
Gross Domestic Product Production	GDPP	PGDPP
Statistical Discrepancy (GDPA-GDPP)	DISP	
Imported Supply		
Imports of Consumer Goods	MCON	PMCON
Imports of Capital Goods	MCAP	PMCAP
Imports of Intermediate Goods	MINT	PMINT
Imports of Services	MSRV	PMSRV
Imports of Petroleum Products	MPE	PMPE
Imports of Information Technology	MGIT	PMGIT
Imports of Civilian Aircraft	MCA	PMCA
Imports of Non-Monetary Gold	MNMG	PMNMG
Adding Up Discrepancy (Imports)	DISMGS	
Imports of Goods and Services (Total)	**MGS**	**PMGS**

Demand variable	Mnemonic	Price
Domestic demand		
Food	CFD	PCFD
Cigarettes and Alcohol	CCAL	PCCAL
Durables and other Goods	CDOG	PCDOG
Services from Durables	CSDOG	
Motor Vehicles	CMV	PCMV
Services from Motor Vehicles	CSMV	
Operation of Motor Vehicles and Transport	COMT	PCOMT
Electricity Gas and Water	CEGW	PCEGW
Communications	CCOM	PCCOM
Health and Education	CHUC	PCHUC
Other Services	CSRV	PCSRV
Adding up discrepancy (Consumption)	DISCON	
Non-rental Consumption	CNR	PCNR
Rental Consumption	CRE	PCRE
Total Consumption	CON	PCON
Dwelling Investment	IDW	PIDW
Non-dwelling Construction	IOB	PIOB
Machinery and Equipment	IPE	PIPE
Second Hand Asset Sales	IBS	
Private Business Investment	IBP	PIBP
Public Enterprise Investment	IGE	PIGE
General Government Investment	IGG	PIGG
General Government Consumption	CONG	PCONG
Mining Stock Building	SMIN	
Manufacturing Stock-Building	SMAN	
Wholesale and Retail Stock-Building	SSD	
Other Industries Stock-Building	SOTH	
Non-Farm Stock-Building	SNN	PSNN
Farm Stock-Building	SFM	
General Government Stock-Building	SBG	
Additive Discrepancy (Expenditure)	DISEAD	
Gross Domestic Product (Expenditure)	GDPE	PGDPE
Statistical Discrepancy (GDPA-GDPE)	DISE	
External Demand		
Agricultural Exports	XAG	PXAG
Mining Exports	XMIN	PXMIN
Manufacturing Exports	XMAN	PXMAN
Service Exports	XSRV	PXSRV
Adding Up Discrepancy (Exports)	DISXGS	
Exports of Goods and Services (Total)	**XGS**	**PXGS**

Note: The table shows the main variables. Business investment is modelled on an industry basis so that there are investment volume and price variables plus variables for sub-components by asset class for each individual industry. These are aggregated up to produce the investment variables shown.

Source: Outlook Economics, AUS-M Model Database

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