Actuaries Institute

Mind the Gap – The Australian Actuaries Intergenerational Equity Index

GREEN PAPER
AUGUST 2020

About the Actuaries Institute

The Actuaries Institute ('the Institute') is the sole professional body for actuaries in Australia. The Institute provides commentary on public policy issues where there is uncertainty of future financial outcomes. Actuaries have a reputation for a high level of technical financial expertise and integrity. They apply their risk management expertise to allocate capital efficiently, identify and mitigate emerging risks and help maintain system integrity across multiple segments of the financial and related sectors. This expertise enables the profession to comment on a wide range of issues including retirement income policy, general insurance, life insurance, health insurance, enterprise risk management and prudential regulation, and finance and investment.

This Green Paper was commissioned and overseen by the Actuaries Institute and reflects the Institute's public policy principles which can be viewed at: https://actuaries.asn.au/public-policy-and-media/public-policy/policy-principles.

The Paper was prepared by **Hugh Miller, Ramona Meyricke** and **Laura Dixie** from Taylor Fry.

We would like to thank the people who generously contributed to this project. The reference group of Hazel Bateman, Christa Marjoribanks and Peter Martin provided valuable feedback and oversight throughout the project. Bruce Bradbury shared underlying data and detailed results from the publication Poverty in Australia 2020 (ACOSS and UNSW, 2020). Peter McDonald shared data and detailed results from the National Transfer Accounts (NTAs) for Australia between 2003/04 and 2009/10 (Rice et al., 2014). Finally, particular thanks go to the staff and interns at Taylor Fry who contributed to the collation of data and construction of the index – Kevin Fong, Aidan Robern, Anthea Michalopoulos and Crispin Cayley.

This Green Paper is provided for discussion purposes only, and does not constitute consulting advice on which to base decisions. To the extent permitted by law, all users of the Paper hereby release and indemnify The Institute of Actuaries of Australia and associated parties from all present and future liabilities, that may arise in connection with this Paper, its publication or any communication, discussion or work relating to or derived from the contents of this Paper.

©Institute of Actuaries of Australia 2020
All rights reserved

Contents

1 Executive Summary 4

2 Introduction 8

2.1 What is intergenerational equity? 9

2.2 Role of the Australian Actuaries Intergenerational Equity Index 9

2.3 What is meant by index? 10

2.4 What principles have we adopted for the Australian Actuaries Intergenerational Equity Index? 10

2.5 What is not captured in the Australian Actuaries Intergenerational Equity Index? 10

2.6 Intergenerational equity and the COVID-19 pandemic 11

3 Other work on intergenerational equity 13

3.1 Australia 13

3.2 United Kingdom 15

3.3 Europe 15

3.4 Canada 16

3.5 New Zealand 16

3.6 Summary 17

4 Australian Actuaries Intergenerational Equity Index – method 18

4.1 Domains 18

4.2 Indicator selection 19

4.3 Comparing age cohorts 23

5 Index results 24

6 Indicators 26

6.1 Economic and fiscal 26

6.2 Housing 34

6.3 Health and disability 36

6.4 Social 40

6.5 Education 45

6.6 Environmental 47

7 Policy implications 50

7.1 Key policy challenges 50

7.2 Options for reform 51

7.3 Final thoughts 53

References 56

Appendix A– Index construction 60

A.1 Measurement error 60

A.2 Transformation 60

A.3 Imputation and extrapolation 60

A.4 Timing 60

A.5 Standardisation 60

A.6 Weighting and aggregation 61

A.7 Final scaling 61

A.8 Index sensitivity 61

Appendix B– Other technical details 62

B.1 Approach to National Transfer Accounts 62

Executive Summary

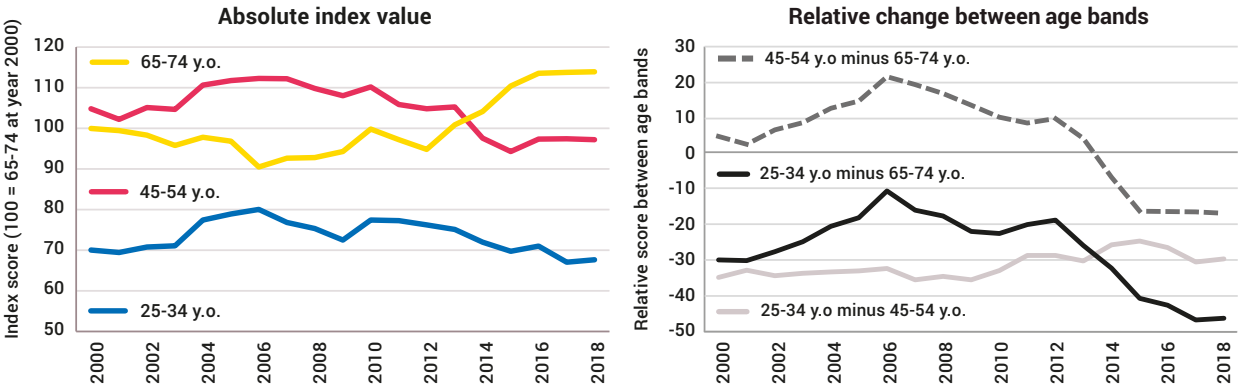
Most Australians want fair outcomes across generations, whether that be older Australians able to retire with dignity, middle-aged Australians rewarded appropriately for work, or younger Australians having opportunities in education and employment. However, differences in life stages mean that assessing intergenerational fairness is difficult. Regardless of this difficulty, many Australians have concerns that perhaps things are not as fair as they used to be and will be less fair in the future. A 2017 Pew Survey found that 69% of Australians thought that when today's children grow up, they will be worse off financially than their parents, up from 53% in 2013 and despite a record-breaking run of economic growth for the country (Stokes, 2017).

1

While older people are the most vulnerable to the worst *health impacts* of COVID-19, the *economic impacts* of the pandemic have brought many intergenerational issues into even sharper relief. Younger workers have been more likely to lose income and less likely to qualify for government payments, such as the JobKeeper payment. Significant increases in government debt will take decades of fiscal restraint to reduce as a fraction of GDP. These negative economic consequences will impact younger generations for years to come. Major slumps in incomes plus higher unemployment amongst younger generations could place significant pressure on intergenerational social contracts such as government pensions, which are effectively claims on the future earnings of younger generations (Swiss Re, 2020).

Now more than ever, it is important to understand how intergenerational equity is changing over time. The Australian Actuaries Intergenerational Equity Index (AAIEI) contributes to this discussion by tracking and assessing 24 indicators across six broad domains that relate to wealth and wellbeing (Economic and fiscal, Housing, Health and disability, Social, Education and Environment). For three age groups we track the absolute change as well as the relative change between age bands over time, as shown in Figure 1.

Figure 1 – Main results of the Australian Actuaries Intergenerational Equity Index (AAIEI)



The absolute lines (left) indicate whether wealth and wellbeing are improving for particular age bands across the range of domains. The level of the lines for different age bands also indicates that measures are generally better for older versus younger people. For the last calculated year, the index is 68 for the 25-34 age band, 99 for the 45–54 age band and 115 for the 65-74 age band. This compares to an average standard deviation of approximately six within each age band over the time period and, therefore, the gaps are substantial. This ordering seems natural. For example, in the economic and housing domains older Australians have had more time to accumulate wealth and housing, which is reflected in the differences. The most notable trend in the absolute index values is the marked increase in the index for the 65-74 age band from 2012 onwards, while over the same period there was a pronounced drop in the index for the 25-34 and 45-54 age bands.

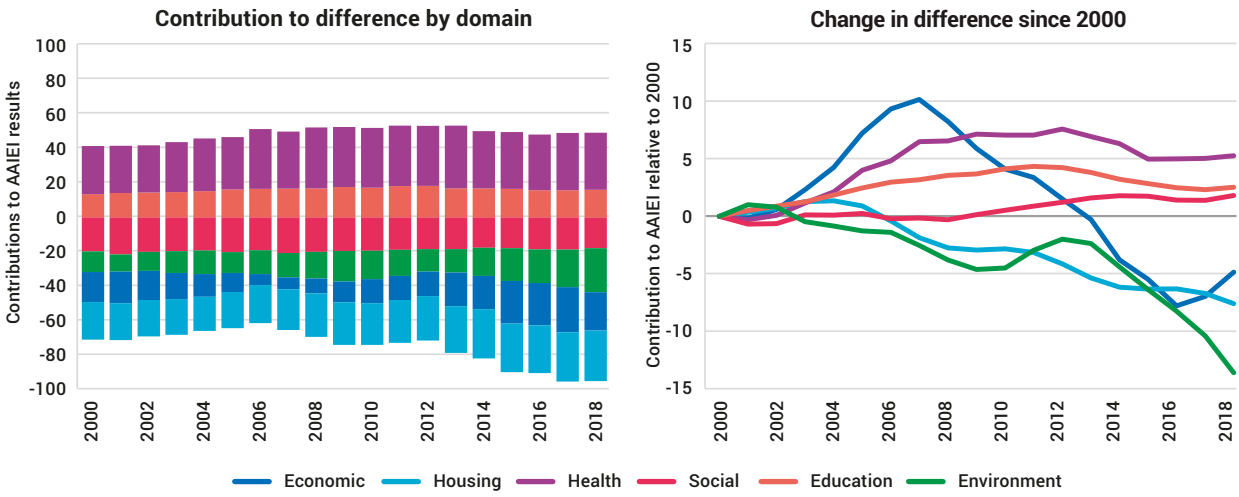
The relative change in the index across ages (right panel) is more important for understanding changing intergenerational equity and the results are striking. Specifically the 'gap' in the index between the 25-34 and 65-74 age bands has increased from -10 around 2006 to -46 in 2018. This suggests that younger people have been relatively disadvantaged across a range of measures in the past few years. This period coincides with Baby Boomers entering the 65-74 age band and Millennials entering the 25-34 age band, suggesting a growing tension between these cohorts. Notably, the gap between the 25-34 and 45-54 age bands has remained relatively steady, and the absolute index for the 65-74 age band has similarly pulled away from the middle age band. We regard this as a material and adverse shift for younger and middle-age Australians as well as an indication of worsening intergenerational equity.

Younger people have been relatively disadvantaged across a range of measures in the past few years.

Any index that attempts to boil complex social issues down into a single number is inherently limited. To better understand the index, this report unpacks the trends in the underlying domains and indicators that drive the numbers. Figure 2 shows domain-level differences between the two bands. While younger Australians have significantly higher scores for health and education related measures, we can see large deficits for the economic, housing, social and environment domains. When focusing on change – particularly over the past five years – it is the movement of the economic, housing and environmental components of the index that causes the observed slide in relative score for 25-34 versus 65-74 age bands.

The findings gel with concerns prominent for young people. Recently wage growth has been weak, often negative in real terms, and low unemployment

Figure 2 – Contribution of domains to the values and movement in AAIEI: 25-34 versus 65-74 age bands.



(prior to the pandemic) masked underutilisation that was particularly prominent for younger workers. Government spending has skewed towards older generations with increased health, pension and aged care spending, while unemployment benefits remained low (again, prior to the pandemic). And increases in government debt since the Global Financial Crisis (GFC) represent a potential burden on future taxpayers.

For housing, the home ownership rate for the 25-34-year-old age group has fallen from 51 to 37 per cent over the past two decades, but has remained more stable in older age bands. While personal choice plays a role, few would dispute that young people's ability to buy into the housing market has fallen. At the same time, rapid rises in house prices compound the wealth of those who own housing already, typically older Australians. Housing affordability contributes to social issues too – homelessness is rising, and gaining access to social housing is more difficult.

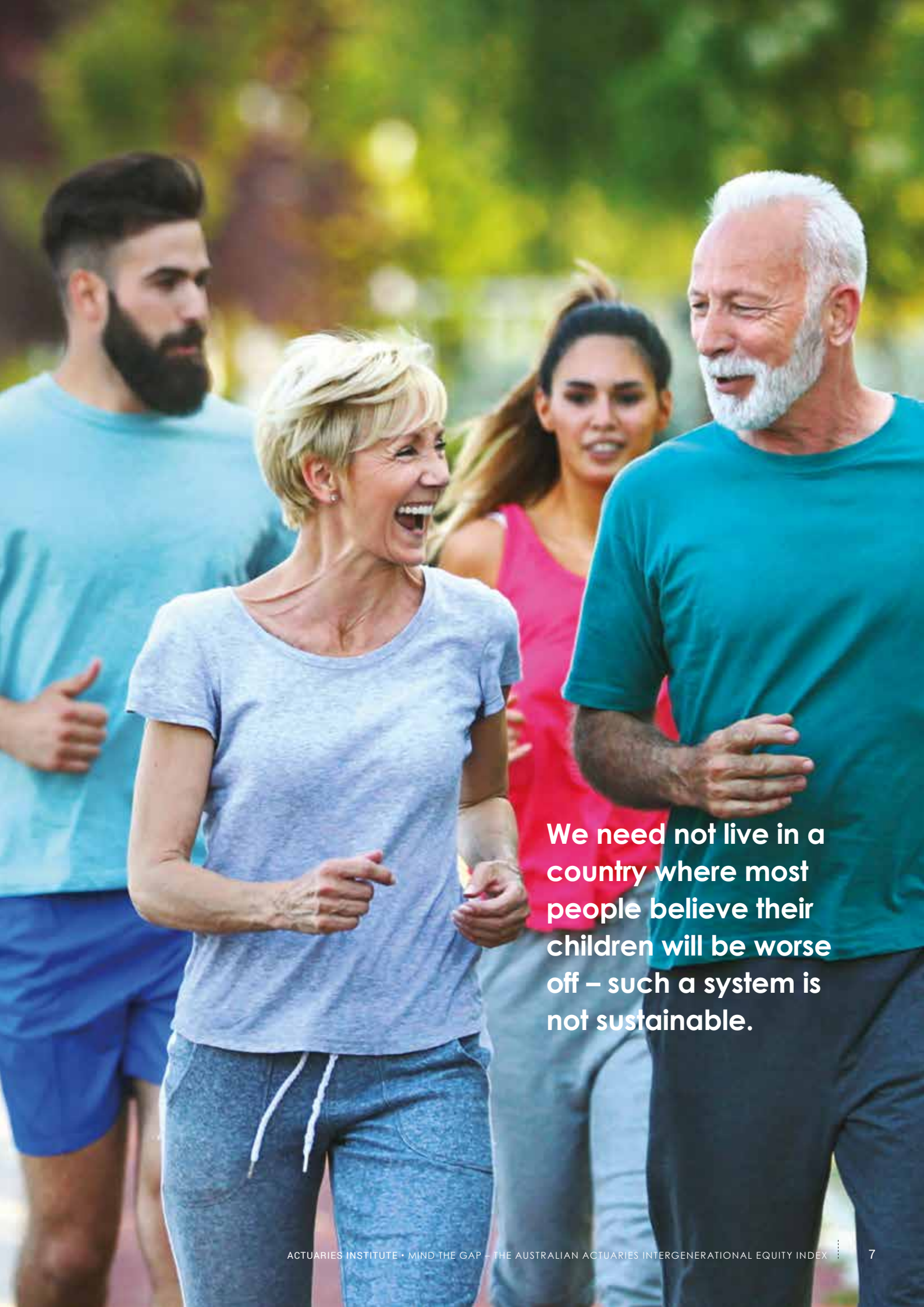
The environment that young people are experiencing nowadays is different to that experienced by older generations when they were young. Climate change, measured through both CO_2 levels and temperature, is a quintessential intergenerational issue. In Australia, climate change is also associated with a drying of the Murray-Darling Basin, one of our key agricultural regions that has recently experienced prolonged drought. Other environmental measures such as biodiversity are also declining.

Not all trends are negative, of course. Education, as measured by attainment, has steadily improved. Life expectancy and disability rates have also markedly improved, although mental health remains a challenge for many. In the social domain, reductions in the gender pay gap and falling crime rates are also encouraging and tend to benefit younger people more. However, these improvements are not sufficient to drive the relative difference between young and old into positive territory.

The finding that the wealth and wellbeing of older Australians has improved on average relative to that of younger and middle-aged Australians does not diminish the challenges faced by some older Australians. For example, poverty rates are highest for those aged 65 and above who rent; and obesity rates are growing, with higher rates in older Australians.

What are the implications of rising intergenerational inequity? Most of the issues highlighted in this paper are well-known and detailed thinking on potential policy solutions is ongoing. Our report points to many of these potential solutions, which range from better retirement income policy, to phasing out land tax, increased preventative health spending and greater activity to mitigate and adapt to climate change. We believe there is significant opportunity for policy to drive improvements in intergenerational equity; and that consistently measuring intergenerational equity will aid long-term policy decision-making. We need not live in a country where most people believe their children will be worse off – such a system is not sustainable.

Older Australians face challenges too, including poverty rates are highest for those who rent and obesity rates are rising.



We need not live in a country where most people believe their children will be worse off – such a system is not sustainable.

Introduction

2

In late 2019 many countries worldwide had a generational moment. The 'OK Boomer' meme spread quickly to capture the sense that older generations were not appreciating the views of younger generations and were being obstacles to change.

Dylan Storer, a young Western Australian journalist, summarised many people's feelings when he appeared on the ABC's Q&A program; "I certainly feel that, at the moment, especially in the debate around climate change and things, [at] the last federal election, [there was] more time spent on talking about franking credits than there was on anything to do with substance when it comes to youth issues, when it came to things such as youth suicide and the mental health crisis we're seeing in the country, housing affordability, and we're not seeing any action on those topics. So, I think that young people are feeling a little bit pessimistic about the future."[1]

However, it is not all one-way traffic. Chris Richardson, Director at economics consultancy Deloitte Access Economics, notes[2] there are significant challenges facing younger people but also many compensating factors. On Boomer benefits such as free university education, he states "There were the lucky few who got a quality education at zero cost, but there was the vast many who didn't get that. HECS is a much better system." He also challenges the engagement of younger people; "Unless you actually go out there and get involved, nothing much is going to change." Other challenges for older Australians abound. For example, the current low interest rate environment reduces income for net savers, who are typically in or approaching retirement. The 2008-09 GFC and the present economic crisis have been particularly disruptive for those about to retire. Poverty rates are high for older people without housing assets, while young people benefit from significant historical improvements in health, technology and productivity. Many older Australians make the point that there has "never been a better time to be young".

There have always been tensions between generations. Aristotle complained about the social battles between young and old in Greek city-states and many of the European revolutions in the 18th and 19th centuries were led by the young. Rapid and remarkable changes in the economy, technology and culture over the 20th Century means that intergenerational debates are acute today. Young people today do not live in the same world as their parents, let alone their grandparents.

Government policies and payments often target specific generations. For example, the age pension supports older generations, while childcare subsidies, public education and youth allowance support younger generations. The needs of different generations must all be met from a finite pool of government funding. As the large generation of Baby Boomers retire and there are fewer working-age people to support the elderly, will an unfair tax burden fall on younger workers to pay for superannuation tax breaks, pensions, health care and aged care? Or are such concerns outweighed by broader improvements in health and wellbeing? Amidst significant change, it is difficult to determine what is fair or appropriate.

Adding some rigour and data to the debate is the purpose of this paper. It looks across a broad range of issues to develop a measure of intergenerational equity.

1 https://www.abc.net.au/qanda/2019-18-11/11687794
2 https://www.theage.com.au/business/the-economy/ok-millennial-in-defence-of-baby-boomers-20191206-p53hgp.html

2.1 What is intergenerational equity?

Intergenerational equity is the concept of fairness or justice between generations, often covering economic, psychological and sociological aspects. In public debate, the term is used to refer to a range of related concepts:

- the relative standard of living experienced by today's youth versus the experience of their parents and grandparents at comparable life stages,
- the expected future standard of living that today's youth will have in retirement versus current retirees, and
- the standard of living that future generations will have.

In Australian public debate, the concerns of younger generations have been discussed with coverage of a broad range of issues. These include unaffordable housing; high youth unemployment (and underemployment); HECS debts; poor wage growth and axed penalty rates; ever-increasing living costs; poor graduate employment opportunities and low rates of apprenticeships; historically high levels of private and government debt; climate change and environmental degradation.

On the other hand, some factors are arguably 'better' for today's youth compared with past generations. These include low interest rates (implying lower interest repayments[3]), better quality of housing, goods and services, increased life expectancy, better medical treatments and technology, compulsory superannuation, easier access to knowledge and online entertainment (e.g. streaming services).

As the public debate reflects, people care about much more than just their income and consumption of goods and services. People also care about factors such as health, housing and the environment, as these are also important to broader wellbeing[4]. A discussion of intergenerational equity, therefore, should consider how a broad range of wealth and wellbeing dimensions differ across generations.

Using historical data to shed light on intergenerational equity in modern Australia, this report assesses how key indicators of the wealth and wellbeing of different generations have changed over time, using historical data to shed light on intergenerational equity in modern Australia.

2.2 Role of the Australian Actuaries Intergenerational Equity Index

The Australian Actuaries Intergenerational Equity Index (AAIEI) has been established to better understand and highlight intergenerational issues. The purpose of the index is as follows:

- To understand change over time in Australian society, particularly the way younger people are better or worse off over time. This change is both absolute (genuinely better or worse off) and relative (whether gains made overall have been unevenly distributed).
- To understand how government policy contributes to, or detracts from, intergenerational equity. This helps to inform policy considerations going forward.
- To provide the ability to test scenarios and their impact on intergenerational equity. This is useful when considering implications of changes in government policy.

The AAIEI is likely to be of interest to policymakers, researchers and social commentators.

3 In Section 6, we explain why low interest rates do not automatically imply lower housing costs. The lifetime cost of housing is a function of wage growth, interest rates, inflation and house prices at the time of purchase.

4 Wellbeing has been defined as "a global assessment of a person's quality of life according to his own chosen criteria" (Dodge et al., 2012). Thus wellbeing is closely related to quality of life, which the World Health Organisation (WHO) defines as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". The WHO tool to measure quality of life, WHOQOL-100, captures six broad domains: Physical Health, Psychological Health, Level of Independence, Social Relations, Environment and Personal Beliefs. The Environment domain encompasses financial resources, freedom, physical safety and security, health and social care, the home environment, opportunities for acquiring new information and skills, and the physical environment.

2.3 What is meant by index?

An index is a simple measure that reflects how the overall level of a complex system (in this case intergenerational equity) is tracking. It is formed from several indicators spanning different domains, all of which contribute to the overall level. Indicators (or domains) are assigned weights, which then determine how much a given domain or indicator influences the index.

The absolute level of the AAIEI for an age band is clearly synthetic but indicates whether wealth and wellbeing (as measured by the range of indicators) is getting better or worse over time. Relative movements of different age bands provide insight into how developments over time differentially affect various age groups. Specifically, a widening of gaps between age bands can represent a deterioration in intergenerational equity.

2.4 What principles have we adopted for the Australian Actuaries Intergenerational Equity Index?

Indices measuring social concepts have been used since the 1960s, with application to the environment (1970s), sustainability (1990s) and more recently social vulnerability and resilience (2000s). There are no established rules for index construction. During each stage, choices need to be made between multiple legitimate options. For example, should indicators that form the index be weighted equally or not? There is no right or wrong answer to this question.

While there are many ways an index can be constructed, the main design principles that guided the development of the AAIEI are the following:

Currently, there are no established rules for Intergenerational Equity Index construction.

- The index should **distinguish between absolute and relative changes**. This will be clear in the presentation itself, but there are plenty of situations where the absolute trend is positive (e.g. increased wealth for an age group over time), whereas the relative trend is not (e.g. a growing gap in wealth between age groups).
- To construct the index using **publicly available data** where possible. This increases transparency and plants much of the discussion firmly in existing public debate.
- To place importance on the **discussion and understanding of indicators**, not just the index itself. All indices are ultimately ad hoc. While a useful summary tool, they can potentially mask important underlying trends that deserve attention.
- To focus on time-series data and the **current state of indicators**. It would be possible to forecast components to understand how outcomes for those who are currently young are likely to be different to those who are currently older – for example, an increased rate of superannuation savings for young people today will likely generate benefits later that could be recognised by projection. However, such approaches require greater complexity and rely on assumptions. In our view this is less suitable for an index.
- Indicators with **longer historical time series** are preferable. These can better illustrate how intergenerational equity has changed over time.

2.5 What is not captured in the Australian Actuaries Intergenerational Equity Index?

Our focus here is equity across generations, although the broader context is important. For example, when talking about wealth inequality between generations, it is worth noting that widening inequality between generations is usually accompanied by wider within-generations too; however, only the

former is recognised by our index. Thus, general measures of inequity are not captured by the AAIEI[5] to the extent that they are not visible across generations.

Many potential indicators of intergenerational equity are **not** included in this report due to the following:

- It was necessary to limit the number of indicators for simplicity and to aid understanding. We've aimed to select only one indicator where there are sets of different possible indicators which are correlated.
- The time series of indicators included in the index needed to be robust so that movements in the index over time are meaningful. Many social, health and wellbeing statistics use self-reported measures (e.g. life satisfaction, loneliness and social engagement). Self-report measures were not included, primarily due to public availability of suitably detailed time series.

Finally, we have not attempted to translate all measures of intergenerational equity into dollar values nor determine the cost, value or price of intergenerational equity.

Any index carries limitations related to the data on which it is based; therefore we have attempted to make reasonable assumptions for situations where time series are incomplete or contain changes in basis over time.

2.6 Intergenerational equity and the COVID-19 pandemic

Much of the research and writing for this project occurred before the COVID-19 pandemic and many of the datasets supporting indicators are updated too slowly to reflect its impact. Australia's swift and strong actions to protect lives and the economy have been significant, but the success and cost of these actions has yet to be fully measured. Hundreds of billions of dollars of government support for the economy represents a material increase in debt as fraction of GDP. The long-term economic cost is highly uncertain but unemployment impacts are likely to affect younger generations more (as shown in Section 6.1, unemployment and underemployment have always been higher among younger age groups) and the impacts of poor employment opportunities can be long lasting (Greenfield et al., 2016).

Significant levels of government debt will have consequences for future government policy and government spending. Under the current tax and transfer system, the burden of interest and debt repayment will fall primarily on current and future workers – today's younger generations. This may partially be offset by low interest rates for an extended period of time.

Changes to policy, taxation and government spending, however, need to be carefully considered. The European experience following the 2008-09 GFC, illustrated that policies that aim to reduce government budget deficits through spending cuts and poorly targeted tax increases can stifle growth, meaning debt to GDP ratios do not reduce (Eurostat, 2020).

One other common issue raised in the aftermath of the GFC is the role for infrastructure spending to both boost productivity and reduce a shortfall in aggregate demand. Well-targeted investment will be of value in pandemic recovery too; despite high levels of net debt, borrowing rates remain low.

Broader impacts of the pandemic will also affect intergenerational equity going forward. Poor mental health is discussed in Section 6.3.4 and suicide rates, as a narrow but robust indicator of psychological distress, are included as part of the index. Many experts are concerned about increases in mental health issues and suicides due to the COVID-19 pandemic, since social isolation and increased financial distress are risk factors for poor mental health.

It is also important to recognise changes to the composition of government spending which may act to address some intergenerational equity issues. The doubling of the JobSeeker payment level (although at this point it is unclear at this point whether this will be fully unwound) increases income to the unemployed, often younger Australians. This likely offsets the general trend of a greater share of government spending going towards Australians older than 65 (see Section 6.1.4). Also, the pandemic has led to increased spending on other support services, such as those for people experiencing homelessness, who are disproportionately younger (see Section 6.4.3).

Table 1 summarises some of the impacts of COVID-19 for older and younger people by domain of the AAIEI. The domains are further discussed in Section 4.1.

5 We note that a large body of literature exists tying increasing income and wealth inequality (across a population, not between generations) to worse economic, social and health outcomes. Changes in inequality over time, therefore, may serve as a proxy for a change in the wellbeing of different generations and be reflected in the index. See also the discussion in Section 6.1.

Table 1 – Selected impacts of COVID-19 by domains of the AAIEI

Economic and fiscal	Reduced employment opportunities and income, particularly for younger people. Net savers, including retirees living on superannuation asset income, are seeing reduced income due to lower interest rates. Superannuation balances diminished through the facility to access accounts as part of COVID-19 emergency measures, with younger people (aged 35 and under) being the largest group by number to access their accounts. An economic downturn and increased unemployment will also reduce super contributions, ultimately disproportionately impacting the projected super balances of young people. High current government expenditure (including increased payment rates for benefits such as JobSeeker) will likely mean increased net government debt, potentially reducing future fiscal spending and increasing future taxes. This will impact younger generations more.
Housing	Housing costs likely to decrease, both rental and ownership. However, decreases unlikely to outstrip the loss of income among younger people. Decreased home building activity may reduce future housing supply but may be offset by temporarily lower immigration.
Health and disability	COVID-19 tends to have more severe health impacts for older people who contract the virus. Deferred healthcare during the pandemic may also have more severe consequences for older people. The impact on mental health is a concern, particularly due to lower social interaction, anxiety about the virus and financial stress.
Social	Many types of crimes are lower during the pandemic, although increased domestic violence is a concern. Some increased spending seen on some social issues (e.g. homelessness supports) to manage heightened risks caused by the pandemic.
Education	Possible significant impact for the cohort finishing school in 2020 in their assessment and subsequent study options. University sector hit with a revenue shortfall due to lower numbers of international students, which can have longer-term consequences for research capacity and standing.
Environment	Temporary reduction in CO_2 emissions due to lower business activity and demand, (e.g. air traffic). Unclear longer-term impacts. Potential for less attention to be paid to longer-term environmental challenges while the pandemic endures.

A key question around all of this is how much of the recent change will persist in the 'new normal', and how much will prove a temporary change to Australian society. Any crisis also represents an opportunity to make policy reforms that will provide lasting benefits.

3 Other work on intergenerational equity

We reviewed Australian and international studies and measures of intergenerational equity across Australia, the United Kingdom, Europe, Canada and New Zealand.

3.1 Australia

The most well-known publication on intergenerational issues in Australia is likely to be the Commonwealth Government's five-yearly Intergenerational Reports (IGRs). The IGRs focus on long-term fiscal sustainability and project the budget position forward 30 to 50 years. Under the IGR framework intergenerational issues are framed by looking at the budget position over time (rather than by looking at differences between generations at a single point in time and/or over time).

While our report on intergenerational equity also has implications for government policy, it has important differences in scope:

- A significantly broader view of changes beyond economic and fiscal measures.
- A targeted focus on generational differences at a single point in time and how these differences are changing over time (e.g. how income and wealth are distributed between age cohorts).

Work on intergenerational equity along these lines has been produced by Lateral Economics in 2011, the Centre for Independent Studies (CIS) in 2016 and the Grattan Institute in 2014 and 2019.

Lateral Economics (2011) produced the Herald/Age – Lateral Economics (HALE) Index of Australia's Wellbeing. While not explicitly addressing intergenerational differences, this study is notable because it constructs a broader wellbeing measure by modifying GDP using Australian data sources that cover education, environment, income inequality, health, political capital and social capital. The HALE Index of Australia's Wellbeing was volatile but increased from 2005 to 2010. The main driver of the trend was the growth of human capital. 2005 was characterised by an unusually low human capital contribution from schooling. From 2005 to 2010, however, the proportion of tertiary qualified people in the workforce rose, driving an increase in the index.

Intergenerational equity and the Intergenerational Report

The Commonwealth Government's Intergenerational Report (IGR) is prepared every five years and provides a long-range look at the impacts of population changes and government policy on the federal budget over the next 40 years.

The inaugural IGR was delivered by Peter Costello in 2002 and warned of pressures on the budget from ageing Baby Boomers. Wayne Swan's 2010 IGR set off debates about productivity, a 'big Australia' in terms of population growth and focused on the challenge of climate change. The fifth IGR is expected in 2021 (delayed one year due the COVID-19 pandemic).

The primary focus of the IGR is long-term fiscal sustainability (whether the budget is in surplus or deficit) and implications for current policies. Past IGRs have analysed the drivers of economic growth over the next 40 years in Australia such as the impact of falling productivity growth and the benefit of increasing workforce participation among older Australians and women.

The Organisation for Economic Co-operation and Development (OECD) also maintains a wellbeing index for Australia, called the Better Life Index, which combines a broad range of indicators across several domains to facilitate international comparisons (Balestra et al., 2018). Again, it is not explicitly designed around intergenerational issues, but covers many related measures.

The CIS (2016) report *The myths of the generational bargain* focuses on the relative wellbeing of different generations – the young and working age generations versus those who have retired. In this paper, the 'generational bargain' refers in this paper to the way in which working age generations support those in retirement though the Age Pension and other spending. The paper questions whether the share of income going to older Australians in the form of the Age Pension is fair and sustainable. After detailed analysis of rising pension costs over the 20th Century, Cowan (2016) concludes that the growing proportion of income transferred from those of working age to retirees via the Age Pension is unsustainable.

The generational bargain may be at risk because government transfers from younger to older cohorts are now so large that future budgets may not be able to afford them.

The Grattan Institute has also taken a continuing interest in generational issues, most notably in their two reports: *The wealth of generations* (Daley and Wood, 2014) and *Generation Gap: Ensuring a fair go for younger Australians* (Wood et al., 2019). The former report concluded that "the generational bargain is at risk because government transfers from younger to older cohorts are now so large that future budgets may not be able to afford them, and incomes may rise more slowly over coming decades". These reports mainly focus on economic issues and related government fiscal spending. Key reform options suggested included increases to the retirement age (and preservation age) as well as improving the effectiveness of superannuation tax concessions[6].

Daley and Wood (2014) show that all age groups over age 35 were richer in 2014 than they were in 2004. The average 35 to 44 year-old household was $80,000 richer in real terms and the average 65 to 74 year-old household was $215,000 better off over the same period. However, 25 to 34year-old people had less wealth than people of the same age eight years before – even though they saved more than did people of that age in the past. There is no evidence that younger people's spending patterns are to blame for their declining wealth. Younger people are in fact spending less on non-essential items such as alcohol, clothing and personal care, and more on necessities such as housing, than three decades ago (Wood et al., 2019).

The average young person today faces challenges their predecessors did not: wage stagnation and rising under-employment, large government net debt and growing pressures on government budgets driven by increased government spending on pensions and healthcare for older households. These trends are discussed in Wood et al., (2019). Several policy recommendations are put forward across the areas of economic growth, housing affordability and winding back age-based tax concessions and intergenerational transfers.

Finally, focusing specifically on younger people, the *Australian Youth Development Index (2016)* measures youth development across five domains: Education, Health and Wellbeing, Employment and Opportunity, Political Participation and Civic Participation for young people. The report found there to be large variations between the states and territories with the Australian Capital Territory having the highest score and the Northern Territory having the lowest. The report also highlights the large gap between youth in urban and rural areas. In all states and territories, the rate of youth not engaged in education, employment or training is significantly higher in rural areas. This is obviously concerning in terms of future outcomes.

6 The Actuaries Institute also explored retirement policy options in the 2019 Actuaries Institute Green Paper *Options for an Improved and Integrated System of Retirement*.

3.2 United Kingdom

The UK Institute and Faculty of Actuaries (IFoA) believes that intergenerational fairness must be a priority for policymakers. There are a range of policy issues where a long-term view is essential to meet today's needs, without putting younger (or future) generations at a disadvantage. This includes in the retirement and the age pension settings. Much of the policymaking community in the UK is beginning to consider issues of intergenerational equity. Further, many of these issues are central to the work of actuaries.

The UK Resolution Foundation's 2019 *Intergenerational Audit* (Bangham et al., 2019) focuses on key living standards and labour market metrics to describe the profiles and trajectories of different generations in terms of jobs and wages, housing costs and housing security, taxes, benefits and household income, wealth and assets. The results are shocking. The 2016-20 cohort in the UK is expected to face the highest rates of relative child poverty to date, at 35 per cent at the age of two. They project that more than 20 per cent of the cohort born 1991-95 will be in relative poverty in their late 20s as they begin to raise children of their own. This is the result of a deterioration of younger adults' relative earnings and housing costs compared with older groups as well as significant cuts to working-age benefits.

Fairness must be a priority for policymakers a long-term view is essential in order to meet today's needs, without putting younger, (or future) generations at a disadvantage.

3.3 Europe

The European Intergenerational Fairness Index is produced by UK-based charitable think tank, the Intergenerational Foundation. It includes the UK. The Intergenerational Fairness Index launched in 2012, backfitted to year 2000, measures the impact that government policies have on **young people** over time. It combines measures of unemployment, housing, pensions, government debt, health, income, environmental impacts and education. Each year the index is updated and progress or deterioration is measured overall and for each measure. Recent editions have pointed to improvements in income and education but falls in employment, fiscal issues (e.g. pensions and government debt) and health.

The EU Intergenerational Fairness Index for 2016 (Leach et al., 2016) highlights the deterioration in prospects of the young across Europe, with a 10-year low in the last year recorded, 2014. Youth poverty has increased, youth unemployment is at historic highs in many countries, the pay gap between the young and the population average is widening and housing costs are rising.

At a governmental level, many EU countries continue to struggle from the fallout of the GFC, with national debt increasing and strained welfare systems.

A common issue for EU governments is maintaining health and pension spending on the old as the population ages. At the same time there is evidence of stalling government investment in the young. This is widely recognised as unsustainable because today's young cannot carry the burden of an ageing population without themselves having decent jobs, wages and fair living standards.

This research suggests that EU governments should explicitly assess all policies for their impact on younger and future citizens. Policy options put forward are to raise retirement ages more rapidly and to increase investment in education.

3.4 Canada

Quebec-based think tank The Generations Institute developed an index of intergenerational equity that **compares the relative wellbeing of young people versus older people over time** in Canada's two largest provinces, Ontario and Quebec. Two interrelated issues are at the core of the Index:

1. Has the living standard of young people improved or deteriorated?
2. Have power, wealth and jobs been shared more (or less) equally across generations?

To answer these questions, the research collected 26 socio-economic indicators and combined them to form the Index of Intergenerational Equity, shown in Table 2. These were divided into two groups. The first group of 16 indicators aims to answer the first question by analysing different factors contributing to the quality of life of young people. The second group of 10 indicators answers the second question and, as such, is more focused on analysing the sharing of power and wealth between generations.

Table 2 – Indicators used in the Canadian Index of Intergenerational Equity, (The Generations Institute[7]). Note: Grouping of indicators is our own.

	Quality of life	Sharing of opportunity
Economic	• Median income • Unemployment rate • Unemployment duration • # hours worked • Gender pay equity • Income inequality • Median net assets • Infrastructure stock	• Age 25-34 incomes relative to total • Age 25-34 unemployment rate relative to total • Age 25-34 net assets relative tototal • Age 25-34 tax rate relative to total • Net government debt • Fiscal spending (education, health, childcare, debt servicing)
Housing	• House prices ÷median income • Rents ÷ median income	
Other social	• Per capita crime rate • Life satisfaction • High school graduations • University graduations • Life expectancy • Depression rates	• Age of large company directors • Greenhouse gas emissions • Fine particle concentrations • Water quality

The results of the index indicate **an improved quality of life and resource-sharing for Quebec's younger working generation** relative to their parents' generation. In Ontario, however, the index decreased between 1990 and 2013, indicating **a deterioration in standard of living and resource-sharing for Ontario's younger working generation relative to their parents.**

3.5 New Zealand

In 2019, the New Zealand Government produced the world's first 'Wellbeing Budget', supported by the New Zealand Treasury's Living Standards Framework (LSF).

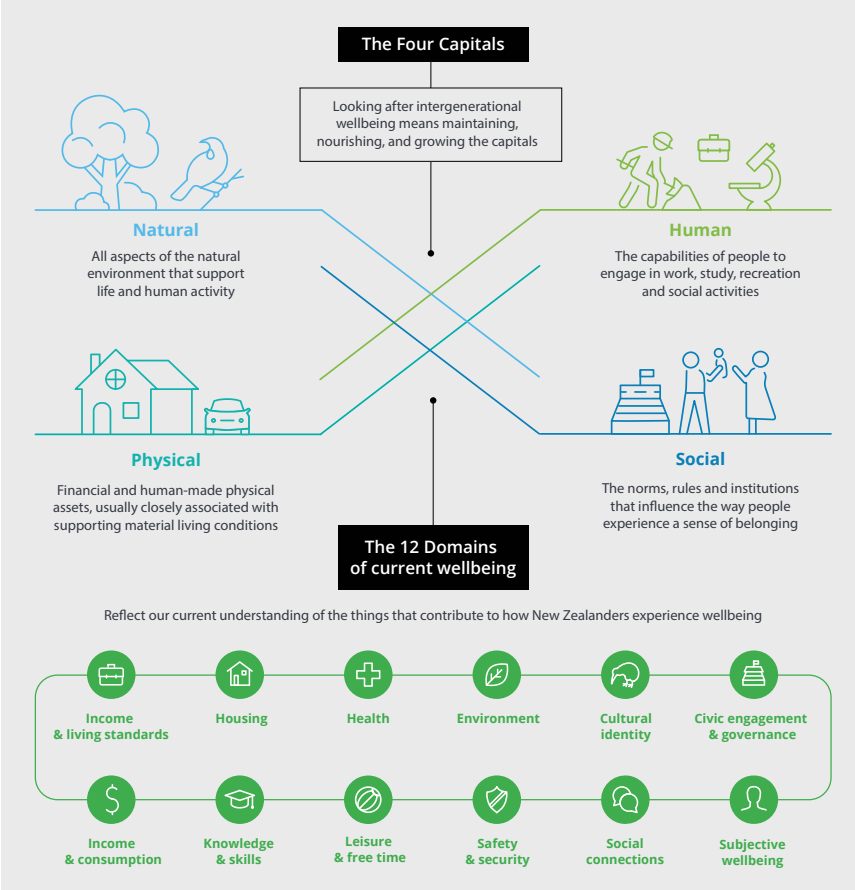
> *"Our Wellbeing Budget priorities show how we have broadened our definition of success for our country to one that incorporates not just the health of our finances but also of our natural resources, people and communities."*
> Jacinda Ardern, NZ Prime Minister, 2019.

7 https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/the_index_of_intergenerational_equity_2016.pdf

A core concept in the LSF is 'intergenerational wellbeing', which is long-term, sustainable wellbeing for all generations. Looking after intergenerational wellbeing means maintaining, nourishing and growing natural, human, physical and social capitals. These four capitals are broken down into 12 domains that reflect contributions to New Zealanders' wellbeing: Income, living standards and consumption, housing, health, environment, cultural identity, civic engagement and governance, subjective wellbeing, social connections, safety and security, leisure and free time, and knowledge and skills.

By defining a framework and process to design and measure the impact of public policy on intergenerational wellbeing, New Zealand has formalised the role of its public policy to incorporate not just the economic or financial wellbeing but also natural resources, people and communities.

Figure 3 – New Zealand's Wellbeing Budget framework



(a) Figure from State of the State, New Zealand 2019, Deloitte

3.6 Summary

Similarities exist across the measurement and tracking of intergenerational equity in all studies. In all countries the measurement of intergenerational equity was as follows:

- Long-term, with a focus on sustaining or improving wellbeing for all generations over time.
- Broader than just economic measures, recognising the importance of health, housing, environment and social cohesion and/or community life to wellbeing.

In terms of methodology, indices in the UK and EU focused on tracking indicators specific to the wellbeing of the younger generation over time. In contrast, the frameworks in Canada and New Zealand incorporated measures tracking how resources and outcomes have been shared across generations over time.

While our comparisons are primarily around approach and method, it is worth noting that intergenerational concerns often identify the significant challenges facing the generation currently young.

EMBARGO COPY LIMITED CIRCULATION NOT TO BE PUBLISHED UNTIL THURSDAY 17.8.20

4 Australian Actuaries Intergenerational Equity Index – method

The Australian Actuaries Intergenerational Equity Index includes six domains of wealth and wellbeing.

This section provides information on key attributes of the AAIEI: the domains and indicators as well as the methodology used to construct the index.

4.1 Domains

Drawing on common themes across the studies and applications of intergenerational equity reviewed in Section 3, we identified six common wealth and wellbeing domains, as shown in Table 3.

Table 3 – Domains of the AAIEI

Economic and fiscal	How does the Australian economy and government spending affect intergenerational equity? Spans income, wealth, economic growth, public debt and age-specific fiscal spending.
Housing	Do people have access to good quality and affordable housing?
Health and disability	How are health outcomes changing for different generations?
Social	How are people experiencing life and being a part of society? How are they interacting with systems like justice and child protection?
Education	Are people becoming better educated over time?
Environment	Is the environment changing in ways likely to adversely affect current and future generations?

These domains are interrelated and these interrelations can be important. For example, good health, social cohesion and maintenance of Australia's environment support a strong economy; alternatively, housing availability and a strong economy increase Australians' health and wellbeing. Poorer suburbs often have less access to green spaces or may have higher exposure to environmental disasters such as flooding. The distinct domains are used, however, to facilitate discussion on different trends and policy debates that can arise in different spheres.

4.2 Indicator selection

4.2.1 Choosing indicators across domains

Within each domain, multiple indicators were chosen that reflected various aspects of intergenerational equity. To reflect intergenerational equity, each indicator needed to satisfy the following criteria:

a Impact wealth and wellbeing.

b Able to be linked to a specific generation, either explicitly or implicitly[8].

c Ideally be underpinned by publicly available data for ten or more years historically.

d No indicator should be overly correlated with another as this would potentially lead to overweighting effects in the index[9].

Under each domain there are numerous indicators that could be used. The preference for those with a consistent, robust and publicly available time series allowed the list of potential indicators to be filtered. The preference for indicators to generally be underpinned by publicly available data also means that indicators are based on realised values of variables rather than expected or forecast values. This means that, year to year, historical values of the index will not change. Some of the indicators are implicitly forward-looking. For example, current values of atmospheric carbon dioxide concentration are important as a lead indicator of the future climate and current government net debt is an indicator of money that must be paid in the future via taxation.

We compiled a full list of indicators meeting the criteria above from the literature review and searching publicly available sources of data in Australia in each of the identified domains. We then calculated measures of correlation of the indicators to further refine the list to the selection shown in Table 4. In most cases we were able to source suitable data on indicators that reflected the domain.

To reflect intergenerational equity, each of the indicators in the six domains need to satisfy four criteria.

8 This distinction will be clearer when we discuss specific indicators. Some naturally link to younger people (e.g. home ownership for those aged under 35), whereas others are global but affect younger generations more (e.g. the economic costs of climate change will be disproportionately borne by younger people).

9 Consideration was given to the fact that housing is a major part of the net wealth of many Australians, and therefore there is some overlap between the Economic and Fiscal and Housing domains. This was adjusted for by assigning a weight of 10 per cent to the Housing domain, a figure lower than our original weighting.

Table 4 – Indicators selected for the AAIEI

	Indicators	Main data source
Economic and fiscal 30% weight	Employment (weighted underutilisation)	ABS 6291.0.55.003 – Labour Force, Australia, Detailed
	Income (Equivalised disposable household income)	ABS 6523.0 – Household Income and Wealth
	Poverty rates	ACOSS and UNSW (2020)
	Net wealth	ABS 6523.0 - Household Income and Wealth
	Government spending by age as a % of GDP	Rice, J. M., Temple, J., & McDonald, P. (2014)
	Commonwealth Government net debt	Mid-Year Economic and Fiscal Outlook, Budget 2019-20
Housing 10% weight	Home ownership rate	ABS 4130.0 – Housing Cost and Occupancy
	Rental costs	ABS 4130.0 – Housing Cost and Occupancy
Health and disability 20% weight	Life expectancy at birth	Human Mortality Database
	Obesity rates	ABS 4364.0.55.001 - National Health Survey
	Disability rates	ABS 4430.0 – Disability, Ageing and Carers, Australia
	Suicide rates	ABS 3303.0 – Causes of Death, Australia
Social 15% weight	Rate of robbery victimisation	ABS 4510.0 – Recorded Crime – Victims
	Rate of incarceration	ABS 4517.0 – Prisoners in Australia
	Rate of homelessness	ABS Census & AIHW Specialist Homelessness Services Collection
	Gender pay gap	ABS 6302.0 – Average Weekly Earnings (seasonally adjusted)
	For the younger generation only[10]: • Rate of those aged 0-17 years in out-of-home care • Teenage birth rate	AIHW Child Protection Australia AIHW Australian Mothers and Babies & AIHW Children's Headline
Education 10% weight	Percentage that completed Year 12	ABS 6227.0 – Education and Work, Australia, May 2019
	Percentage with bachelors' degree qualification or above	ABS 6227.0 - Education and Work, Australia, May 2019
Environment 15% weight	Atmospheric carbon dioxide concentration	CSIRO Cape Grim data
	Average mean temperatures (5-year rolling avg)	Bureau of Meteorology Climate Change Series
	Murray-Darling Basin rainfall, April – November (10-year rolling avg)	Bureau of Meteorology Climate Change Series
	Number of species listed as threatened, endangered or extinct	Department of Environment's Species Profile and Threats Database

10 Social, economic and other life outcomes are materially affected on average by being placed in out-of-home care and/or being a teenage mother. While these indicators are not available for the older generations in this study, their impact on affected youth is typically so major that they have been included for the youngest generation in the study only.

Selection of weights and the process to combine indicators is discussed in Section 4.2.5. In the Section 6, we discuss the trends in each indicator (by domain) from 2000 to 2019.

4.2.2 Focus on absolute indicators

We have used absolute indicators in selecting components (e.g. real income rather than income as a ratio of the population average). This is done so that an increase in the 'absolute' index for an age band genuinely reflects improvements over time for that age band. Similarly, differences between age bands can be interpreted as meaningful relative differences in wealth and wellbeing (for the choices of weights and indicators used).

4.2.3 Age band specific measures versus global indicators

Where possible we have used measures that can be expressed for each age band – for example, income by age, or disability rates by age. This is most direct for the index. This is not possible for some indicators that we judged to be important to include:

- Environment indicators (carbon dioxide concentration, temperature, rainfall and biodiversity).
- Government net debt.
- Some social indicators (child out-of-home-care rates, teenage pregnancy rates).
- Life expectancy.

For these we have lagged the variables for older age bands effectively asking 'what were these measures like when older generations were younger?' If the measure has improved over time (such as life expectancy), this will then come through as a higher value for younger age bands.

4.2.4 Limitations of the indicators and areas for future data collection

An index is only as good as the data that goes into it. In many cases a 'better' choice of indicator is not used because the data doesn't exist, or has not been collected for long enough, or is not split by age. The criteria for indicator selection, (discussed in Section 4.2.1) meant that, within some domains, the set of indicators included was limited by data availability.

The health domain is a good example of data limitations. Many experts prefer measures such as quality-adjusted life years rather than pure life expectancy. Quality adjusted years better recognises the advantages of additional time spent 'healthy'. However, such measurement has not been as consistent or as objective as pure life expectancy, and correlations between the two are sufficiently strong that conclusions remain similar. Rates of dementia and mental illnesses (such as anxiety and depression) affect a larger slice of society than suicide rates, but collection has not been consistent and there have been significant changes in diagnosis and reporting in Australia as awareness of mental health issues has grown. By comparison, suicide rates are much more consistently reported over time. In the health domain there are also a plethora of possible indicators that cover the hundreds of common medical conditions and treatments – we have elected to be economical in choosing a smaller number of indicators.

The social domain is also missing some important wellbeing elements. First, civic engagement is typically included as an indicator of social cohesion. Internationally, voter turnout is used as one measure of this, however, compulsory voting in Australia reduces its applicability and turnout rates are not reported by age band. Alternative measures for civic engagement were considered, such as participation in voluntary work. This has been measured sporadically by the ABS but may be measured more consistently from 2020 onwards. Second, we sought a reliable index for domestic violence rates (split by age), recognising it as an important social issue. However, likely changes in reporting rates and consistency of data similarly meant we did not include a measure in the final index.

In the economic domain, we use high net government debt as an indicator of poor intergenerational equity (as future generations will pay for today's spending). This is obviously a gross simplification. Debt may be used to pay for infrastructure that provides benefits over many years. Or it could be incurred to ensure that future generations inherit a stronger economy (e.g. the role of the JobKeeper subsidy in maintaining employment). Such subtleties, some of which are subjective, are difficult to incorporate into an index.

In the environment domain we sought, but did not find, a good indicator for changes to landcover in Australia over time.

Additionally, while our index is broad, it does not capture everything. There are a few areas that are clearly important but not currently built into the index, so there may be opportunities to extend the index in the future. This may include, for example:

- **Ongoing benefits of technology.** Access to knowledge and entertainment has never been greater but is not something easily measured. The benefits of the Internet, where often services are provided for free, are far-reaching and advantage those willing to adopt new technologies. Early adopters tend to be younger.
- **Subjective wellbeing measures**. Overall happiness, as well as other subjective measures such as social cohesion, trust in institutions and loneliness, are all important and often subject to study via survey. We have not attempted to add series related to subjective wellbeing measures, primarily due to a lack of publicly available robust data series, but do not want to underemphasise their importance.

All the limitations discussed above represent opportunities for better data collection going forward. In some cases, we would gain a better understanding of important economic and social issues, in addition to a clearer picture of their impact on intergenerational equity.

The Household, Income and Labour Dynamics in Australia (HILDA) Survey is a household-based panel study that collects valuable information about economic and personal wellbeing, labour market dynamics and family life. It covers a group of approximately 20,000 individuals who have been surveyed annually since 2001. We have not used the HILDA survey in the current index, but it may be explored for filling some of these gaps in the future. It could also provide an interesting qualitative comparison point in future updates for measures that are included in the index.

4.2.5 Combining the indicators into an index

Combining the indicator measures into an index is a multi-stage process that includes scaling, calculating domain indices, weighting domain indices and aggregating across domains. These steps are briefly summarised below. Further detail on the methodology is included in Appendix A.

- **Rolling averages:** For two of the environmental indicators (temperature and rainfall), we have used rolling averages (5- and 10-year respectively). These show significant volatility year-to-year, but the climate trends we are concerned with are long-term – the averages we judged more suitable on this basis. Rainfall is relatively more volatile than temperature, hence the longer smoothing window.

- **Scaling:** The time series of values for individual indicators is scaled by z-score standardisation, which subtracts a mean (μ) and divides by the standard deviation (σ) of a time series. Indictors are standardised so that they are on a comparable scale to one another.

- **Calculating domain indices:** Within each domain the domain index is calculated as the average of all standardised indicators. This means within a domain each indicator has been given equal weight to the domain (with the one exception being home ownership rates in the housing domain, which was judged to have particular importance).

- **Weighting domains:** The weights assigned to each domain are shown in Table 4. Ultimately, the choice of domain weights is subjective and not all stakeholders will agree on any single set of weights. Widespread sampling by the OECD as part of their *Better Life Index* shows that what matters to people varies by gender, age and the region you live in: "men assign more importance to income than women, while women value community and work-life balance more than men. Health, safety, housing and civic engagement become more important with age, while life satisfaction, work-life balance, jobs, income and community are particularly important for youth" (Balestra et al., 2018). We encourage interested readers to explore the impact of different weights on the data.

  Weights needed to be chosen for presentation in this report, however. The selection of the weights used in this report was guided by consultation with the Institute's reference group and stakeholders, and with the reference to the limited applicable literature, mainly the results of sampling by the OECD as reported in Balestra et al. (2018).

- **Aggregation to produce the AAIEI:** The final index is a weighted average of domain-specific indices. The final index is scaled so that the 65-74 age band is set to 100 in the year 2000, and the standard deviation across all 57 index values (three age bands times 19 time points) is 15.

Assigning weights to domains is subjective but necessary and informed by research.

This methodology is consistent with previously employed and accepted methods of index construction, which are outlined in the OECD's *Handbook on Constructing Composite Indicators* (Nardo et al., 2008).

4.2.6 Sensitivity of the index to movements in the indicators

The sensitivity of the index to specific indicators is shown in Appendix A.8. For example, a one-point improvement in the index corresponds to a 0.6 percentage point decrease in underemployment, a 1.3 percentage point increase in home ownership, and an 8.5 parts per million decrease in CO_2 concentrations.

4.3 Comparing age cohorts

The index is focused on three age groups: 25-34, 45-54 and 65-74. These bands provide good separation between groups and span a wide range of ages, enabling meaningful talk of generational differences. It is more difficult to meaningfully make comparisons with younger age groups (e.g. 15-24), who have had less interaction with the labour and housing markets or older age groups (e.g. 75+), who face quite different life stage issues.

The index is based on a cross-sectional approach using how indicators have changed within an age band over time. An alternative would have been a cohort approach comparing how the indicators have changed for a fixed group as they age. The cross-sectional approach was chosen as it is suited to comparing how intergenerational equity has changed over time and to constructing an index. In some cases, this can oversimplify. Specifically, much attention is given to the characteristics of particular cohorts in social sciences. We acknowledge some of this in our discussion throughout.

Though not exact, in the last few years of the index the three age groups roughly align with the demographic cohorts known as Baby Boomers (born 1945 to 1964), Generation X (born 1965 to 1980) and Millennials (born 1981 to 1996).

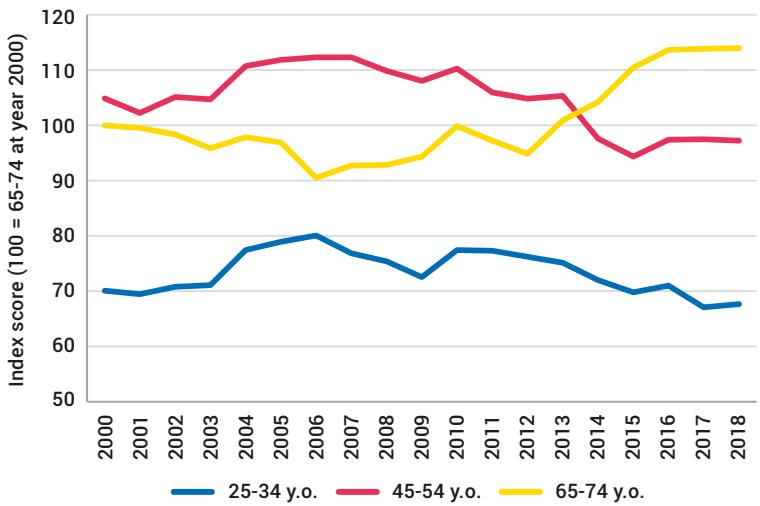
While we limit the index to just the three age groups for tractability, our discussion on issues is broader – for example, it is difficult to discuss underemployment without examining changes for the 15-24 age band.

Though not exact, in recent years, the age groups in the index align with the demographic cohorts of the 'Baby Boomers', 'Millennials' and 'Gen X'.

Index results 5

An index of wealth and wellbeing has been created for each age band.

Figure 4 – Absolute index scores for three age bands (2000 to 2018)



We explore the index results in two ways:

- The **absolute index** scores for each age band. This reflects how the index is tracking over time for an age band, where each is normalised to the score in 2000 for the 65-74 age band. An increase in the absolute index reflects overall improvements in the wealth and wellbeing experienced for that age band.
- The **Australian Actuaries Intergenerational Equity Index (AAIEI) is the difference in absolute scores between age groups.** We primarily consider the difference between the 25-34 and 65-74 age groups, although relative movements for the 45-54 age group are still important. An increase in the index means things are improving for young people relative to older people. In the current context of a large negative score, this implies that intergenerational equity is improving.

Figure 4 shows the absolute index score for the three selected age bands from 2000 to 2018 (relative to the year 2000). Several things are clear. First, the scores for the 25-34 age band are significantly lower than for 45-54 and 65-74.

This is understandable; indicators such as wealth, crime and environment heavily favour older generations. Second, while the index for 65-74 starts close to that of 45-54, it then lags behind it for a about 5 years and then catches up significantly (and even overtakes) in the last five years. The current day Baby Boomers are better off than preceding generations at that age. In contrast, there has been a deterioration for the 25-34 age group since 2011. This represents falling scores for the economic, housing and environment domains, which are no longer being offset by improvements elsewhere.

Figure 5 – Australian Actuaries Intergenerational Equity Index (AAIEI) – Intergenerational Equity differences between age bands over time

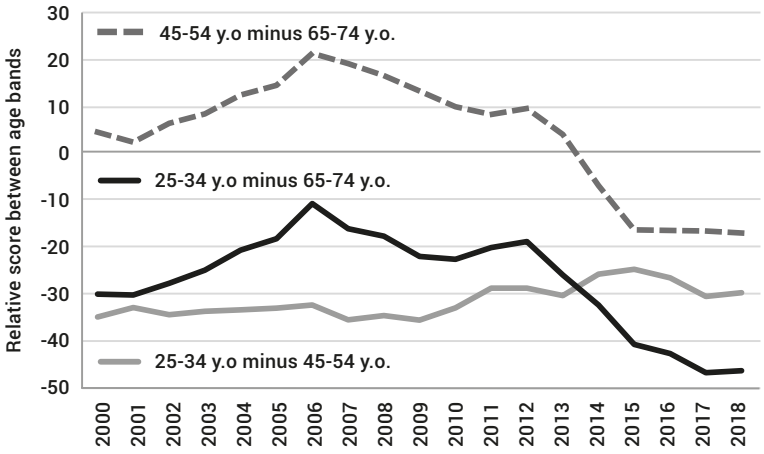
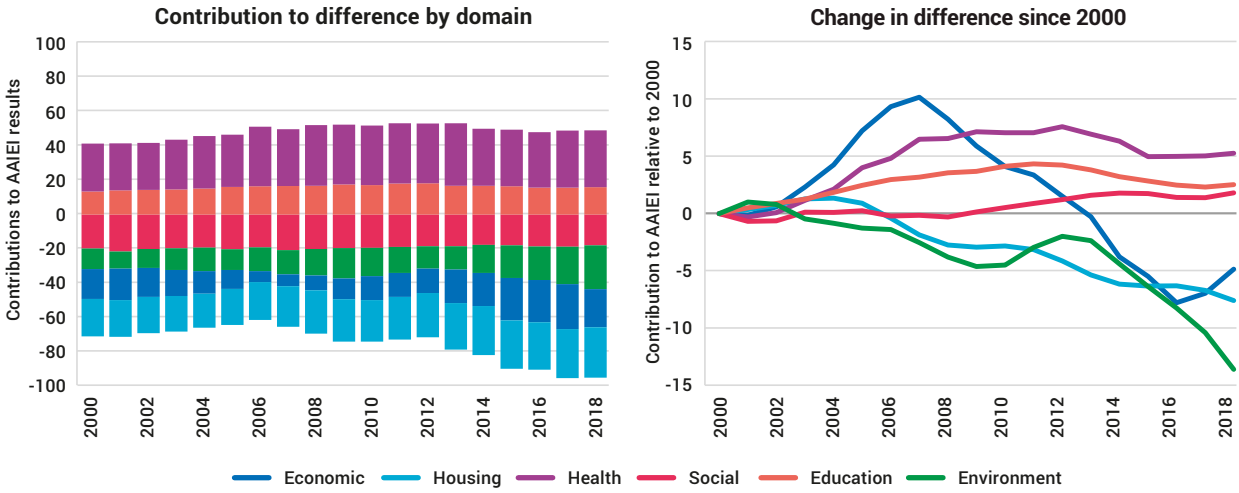


Figure 5 shows the differences between age group indices, which we regard as more important for understanding changing intergenerational equity. The results are striking. Specifically, from 2012 onwards there was a marked increase in the index for the 65-74 age band, while over the same period there was a pronounced drop in the index for the 25-34 age band. The 'gap' in the index between the two age bands has increased from -10 in 2006 to -46 at the latest timepoint. This suggests that younger people have been relatively disadvantaged across a range of measures in the past few years. This period coincides with Baby Boomers entering the 65-74 bracket and Millennials entering the 25-34 bracket, so suggests a wider gap between these generations than has been present for previous cohorts. A similar widening gap exists between the 45-54 age band and 65-74 age band lines, whereas the gap between the 25-34 age band and the 45-54 age band has remained relatively stable. We regard this as a material and adverse shift for younger and middle-age Australians and indicates worsening intergenerational equity. Recent values of the gap sit lower than any other time in the past two decades.

In the last few years, the younger and middle-age groups have been increasingly disadvantaged.

Figure 6 shows the contribution of each domain to the AAIEI results. While the 2000s saw increases in the Economic and Health components (for young people relative to older people), these have fallen back materially in the past decade. There have been large and steady decreases for the Housing and Environment domains over the entire two decades. Section 6 delves further into the underlying indicators by domain to unpack these trends.

Figure 6 – Contribution of domains to the values and movement in AAIEI: 25-34 age band versus 65-74 age band



Indicators 6

Economic and fiscal indicators

- Economic indicators
- Employment underutilisation (volume measure)
- Average Wages
- Poverty rates
- Net worth
- Government per capita spending
- Government net debt

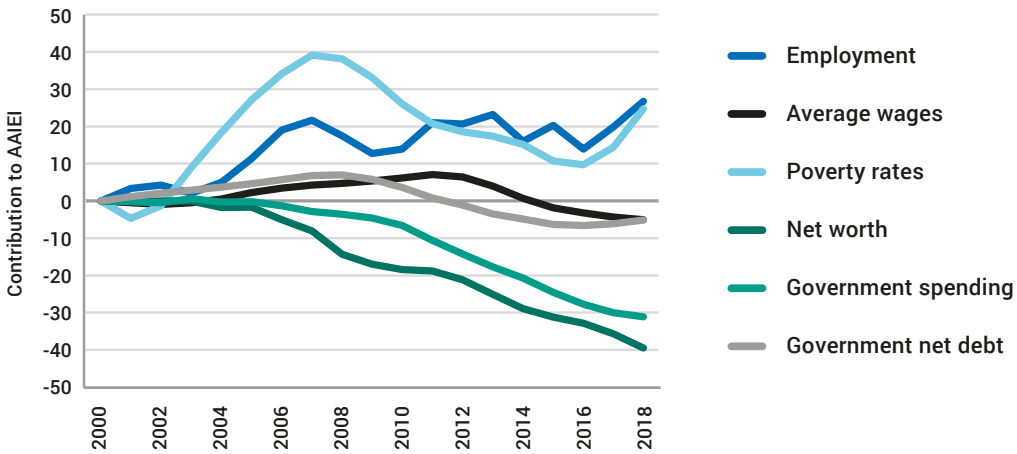
The discussion of individual domains and indicators is important – an aggregate index cannot convey the full story. Unpacking the trends in each indicator and domain is necessary to reveal the underlying drivers of intergenerational equity. In this section we step through each domain to explore trends in the underlying indicators.

6.1 Economic and fiscal

Economic and fiscal factors are given the greatest weight in the index, by virtue of the importance of these issues in driving outcomes across all domains. Much of the writing on intergenerational equity is associated with economic and fiscal issues, highlighted in publications such as the Commonwealth Government's regular Intergenerational Reports (IGRs).

Figure 7 shows the contribution of each economic indicator to the AAIEI results. The poverty rate improved for younger generations (relative to older generations) in the early 2000s, but net worth and government spending have deteriorated significantly, particularly since the GFC.

Figure 7 – Contribution of economic indicators to the intergenerational equity difference between 25-34 and 65-74 (3-year moving average)

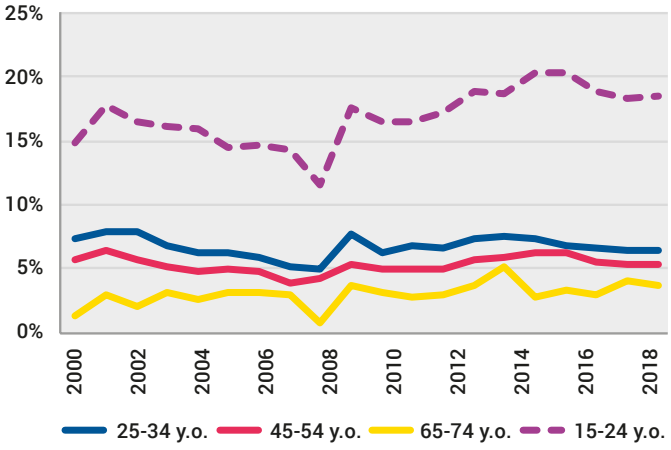


6.1.1 Employment underutilisation

High rates of employment are a fundamental objective of government and the Reserve Bank of Australia (RBA). Statistics on unemployment are among the most carefully collected and central to economic modelling and decision-making.

We have chosen to look at underutilisation, which captures both unemployment and underemployment (those who are employed but would like more hours). Underemployment has been recognised as an important factor in recent work on the labour market, including being part of the explanation for why wages have languished despite low unemployment prior to the COVID-19 pandemic (see, e.g. Bishop and Cassidy, 2017).

Figure 8 – Indicator: Weighted underutilisation rate



Source: ABS 6291.0.55.003 - Labour Force, Australia, Detailed

The ABS maintains a volume weighted measure by age band which we have adopted for the AAIEI. The volume measure is defined as the total volume of underutilised labour in the labour force (hours preferred by those in unemployment, plus additional hours preferred by those in underemployment), as a percentage of the volume of total potential labour. Unlike straight headcount measures, the volume measure takes into account the number of hours worked or preferred by individuals and this is a better proxy for the untapped capacity in the labour market.

Unemployment and underemployment have always been higher among younger age groups. For the age groups used in the index the relationship has largely been maintained over time, with increases during the GFC for those aged 25-34 mirrored (off a lower base) for older age groups.

The most interesting story from the indicator is for the 15-24 age group – they have seen a marked rise in (volume-weighted) underutilisation since 2012, which is driven by increasing underemployment, suggesting a lack of stable fulltime positions for those partly engaged in the workforce. This highlights challenges for younger people. The share of employed young people who are actively seeking and available for more work has grown from 12 per cent to 20 per cent over the past decade (Wood et al., 2019).

The share of employed young people who are actively seeking and available for more work has grown from 12 per cent to 20 per cent over the past decade.

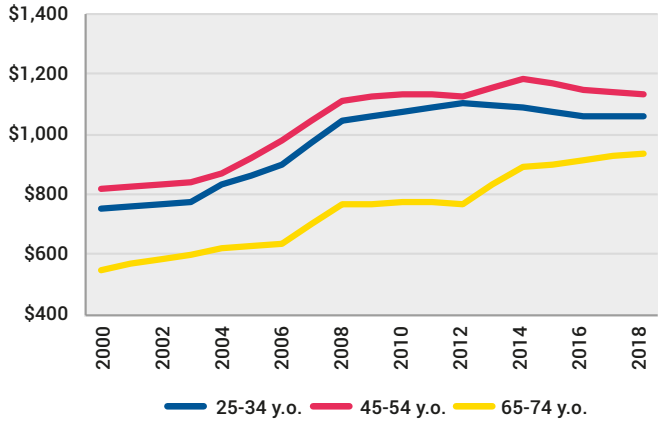
The impacts of poor employment opportunities for a cohort of young people can be long-lasting. For example, research in New Zealand (see Section 4.5 of Greenfield et al. [2016]) shows that:

- A high proportion of long-term welfare cost is attributable to young entrants to the welfare system (75% of future cost for the current welfare cohort is attributable to people who enter welfare before age 20).
- Impacts of the 1992 economic downturn are still visible, with higher ongoing benefit payments visible for the generation of people who entered the labour market at that time but are now in their late 40s – labour market scarring is visible.

There are many potential reasons for an increase in rates of underutilisation for the youngest in the workforce. It is reasonable to posit that labour market changes such as the rise of the gig economy and continued casualisation in many industries contribute to underutilisation[11].

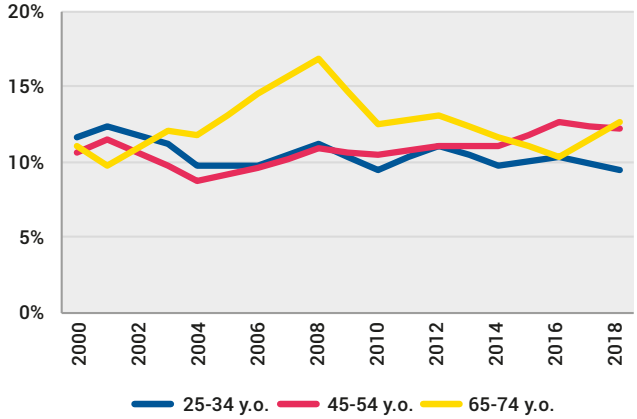
11 The Actuaries Institute will be publishing a Green Paper this year on the gig economy which will examine this and other issues.

Figure 9 – Indicator: Real equivalised household income



Source: ABS 6523.0 – Household Income and Wealth

Figure 10 – Indicator: Poverty rates (<50% median income)



Source: ACOSS and UNSW (2020)

6.1.2 Income and poverty

Income is an obvious measure of economic progress, with higher incomes generally associated with better outcomes across a broad number of domains.

The biennial ABS Household Income and Wealth survey is a useful source for understanding trends in Australians' income and wealth and includes age-based splits. Our preferred measure is real equivalised disposable household income, with *age band* here corresponding here to the household head responding to the survey. *Real* adjusts for inflation (purchasing power), *equivalised* adjusts for the size of the household (larger households need more income for a comparable standard of living), and *household* represents a natural unit for consumption.

On this measure Australia does reasonably well. A progressive income tax system combined with a targeted transfer system means that income inequality is moderate and has barely increased in recent decades, in contrast to other countries. These effects translate generationally too; all age bands have seen increases in income over the past two decades and the ratio between the 25-34 and 45-54 age groups has been maintained. The main relative move in our indicator has been the increase for the 65-74 age group catching up to prime working-age groups. This reflects an increased propensity to work at older ages, increased superannuation income supplementing age pension income, as well as material increases to the age pension rate over time.

Interestingly, despite complaints about young people not saving enough (with avocado toast occasionally mentioned as a culprit), evidence suggests that saving rates have increased in most age groups over time (Cokis and McLoughlin, 2020).

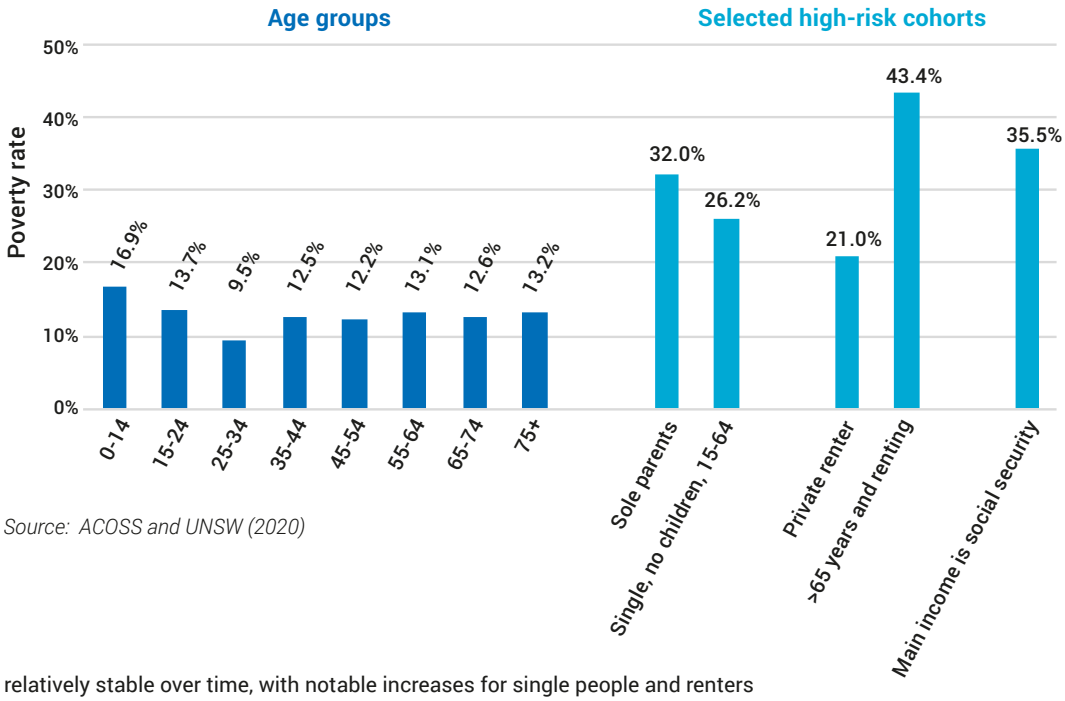
While trends in average income are an important part of the story, poverty rates supplement the picture, helping to understand how well the lower end of the income distribution is travelling.

There are many ways to measure poverty. For example:

- One common measure is asking people about their ability to access $2,000 (or another set amount) quickly if needed.
- Material deprivation measures ask if people are going without items judged as necessities (e.g. heating, or three full meals).

For the index we have used an income-based approach, as used in the 2020 ACOSS and UNSW poverty report (ACOSS, 2020). This report uses ABS data up to 2017-18 to unpack poverty rates using the common relative measure of 50 per cent of median income (after housing costs), adjusted for household size. Under this measure 13 per cent of the population falls below the poverty line. While poverty rates are relatively stable across age groups, as shown in Figure 11, there is much more variation by household type and for other specific cohorts. Poverty rates under this measure appear to have been

Figure 11 – Poverty rates in 2015-16, for age groups and selected cohorts at high-risk



Source: ACOSS and UNSW (2020)

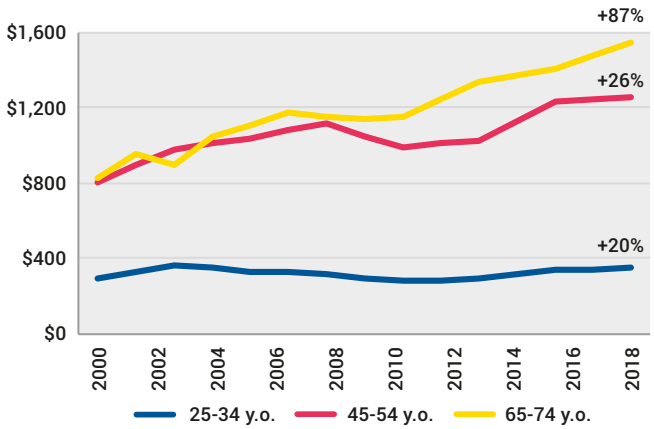
relatively stable over time, with notable increases for single people and renters aged over 65. For the index, the fall in poverty rates for the 65-74 age group aligns with the faster increases in income seen for those households.

There are significant challenges to future growth in real incomes. Wage growth has been tepid for much of the last decade – from 2013-2018, real wage growth was 0.5 per cent per annum[12]. Reasons for the wage growth slowdown are discussed in Gilfillan (2019) and Bishop and Cassidy (2017). Much of the blame falls on weak productivity growth, which has been below historical levels globally. Continued increases in living standard for future generations will rely on productivity growth across broad sectors of the Australian economy; continued low productivity growth disproportionally affects those with more years remaining in the workforce.

6.1.3 Net worth (wealth)

Whereas income inequality is relatively modest in Australia and has remained stable, **wealth** inequality has widened. At a whole population level, the Gini index[13] has increased from 0.57 to 0.62 from 2003-04 through to 2017-18. This represents a significant increase on a relatively high number; the richest quintile of households has 90 times the wealth of the poorest quintile, up from 59 times over the period. This change aligns with global increases in wealth inequality which have gained increased attention (see, e.g. Piketty, 2013).

Figure 12 – Indicator: Real household net wealth ($000)



Source: ABS 6523.0 - Household Income and Wealth

The wealth of households headed by those aged 65 and over has increased faster than households in any other age group. Daley and Wood (2014) present evidence that this is mainly a result of relatively higher capital appreciation for older generations, driven by rising house prices. The Productivity Commission (2016) similarly shows that housing and superannuation balances account for most of the increase in wealth inequality and note that those aged 65 and over make up a disproportionate share of the upper wealth deciles.

12 https://www.ceicdata.com/en/indicator/australia/house-prices-growth

13 A single-number measure of inequity. A score of zero means all people have equal wealth, whereas one means one person has all the wealth

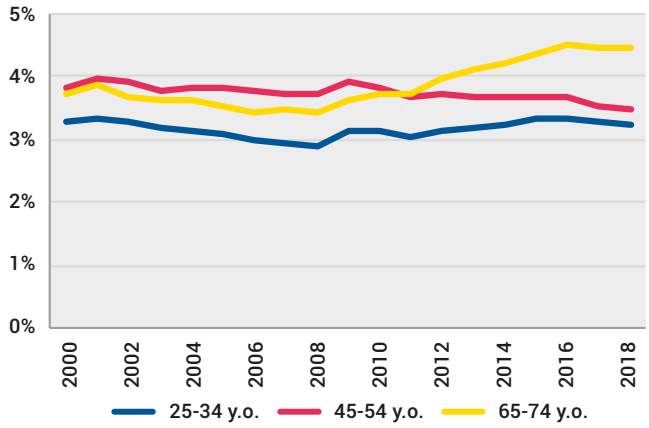
Some of this change is policy-induced. For example, persistent low interest rates since the GFC have led to substantial asset price increases in housing, bonds and equities that have advantaged those who already had substantial assets – often older people.

Wealth inequality almost always has an intergenerational element.

Another important point is that wealth inequality almost always has an intergenerational element. More so than income, a person's wealth will naturally vary over different courses of the life cycle (youth, working age, old age). Income and wealth are naturally lower in younger age bands, because younger generations have had shorter working lives over which to accumulate wealth or salary increases than older generations. In economics, life-cycle theory posits that individuals build up a store of wealth during their younger working lives to consume during their old age. However, if the wealth gap (i.e. the inequality in wealth) between generations is growing in an unsustainable way, this can be a concern, particularly if younger generations' opportunities to improve their income and/or wealth over their working life (i.e. life course or socioeconomic mobility) reduce. This is because entrenched disadvantage can lead to lower social cohesion and reduced economic growth (PC, 2018).

One argument sometimes raised is that increased wealth for older Australians evens out over time through intergenerational gifts to children and bequests. However, this can exacerbate inequality (e.g. 'it pays to have rich parents'), and bequests often go to the next generation (e.g. wealth moving from 90-year-olds to 65-year-old children), rather than supporting the youngest generations of Australians.

Figure 13 – Indicator: Government expenditure by age band as a percentage of GDP



Source: Authors' calculations

We estimate that a third of wealth inequality is attributable to differences between age bands and that a third of the increase in wealth inequality is similarly attributable. This is clear on our selected indicator (real net household wealth); the 65-74 age band has increased wealth by 87 per cent since 2003-04, compared twith 20 per cent for the 25-34 band. The ratio has increased from 2.8 to 4.4 times.

While in absolute terms wealth for young people is still increasing slowly, the increasing gap is concerning, particularly as it is related to housing affordability and intergenerational wealth transfer mechanisms which can impede socioeconomic mobility. The OECD (2011) advocates equal access for all of the population to high quality public services such as education, health and family care to reduce inequality. Policy options are discussed further in Section 7.2.

6.1.4 Government expenditure

Every year government spends large amounts of money on direct consumption (e.g. paying directly to fund schools or hospitals) or on transfers (e.g. welfare payments to those with insufficient income). One way to view this spending from an intergenerational viewpoint is to consider how this spending is allocated across different age groups.

We have built on the work of the National Transfer Accounts (NTA) project (Rice et al., 2014). This work uses government revenue and spending (across State and Commonwealth) for the 2009-10 year to estimate per capita expenditure for each component (e.g. social security, education, and health etc) for different ages. We have taken these estimates and assumed that the per capita relativity across ages remains fixed through time[14]. We have then applied these factors to actual government spending and population statistics from between 1999/2000

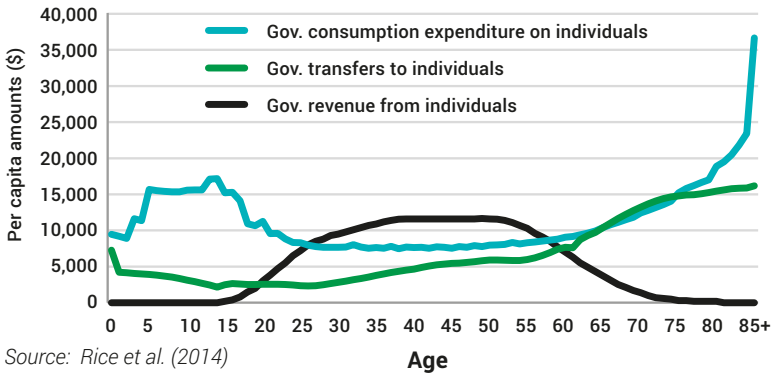
14 We have used the most recent NTA per capita measures and believe this assumption is reasonable because (a) per capita expenditure by type was very stable from 2003-04 to 2009-10 and (b) while the absolute level of expenditure may vary substantially as policy priorities and needs change, the age profile of per capita spending is driven by the underlying needs at different ages and is more stable. For example, younger people (excluding females of childbearing age) will require less health care expenditure than an older people generally irrespective of policy settings.

through to 2017/2018 to calculate the total expenditure by age band. Further details on the approach are described in Appendix B.

The basis for some of the allocations is shown in Figure 14. For example, government consumption expenditure is higher for young people (due to higher education spending) and for older people (aged care and health care spending). Government transfers to individuals are higher at older ages, reflecting age pension spending. In contrast, government revenue from individuals (primarily income and capital gains tax) is high during the prime working years. Long-term fiscal sustainability requires that tax revenues – a large share of which currently comes from working age taxpayers – need to fund expenditure on all generations over time.

Fiscal sustainability requires that tax revenues need to fund expenditure on all generations over time.

Figure 14 – Selected National Transfer Account estimates for 2009-10

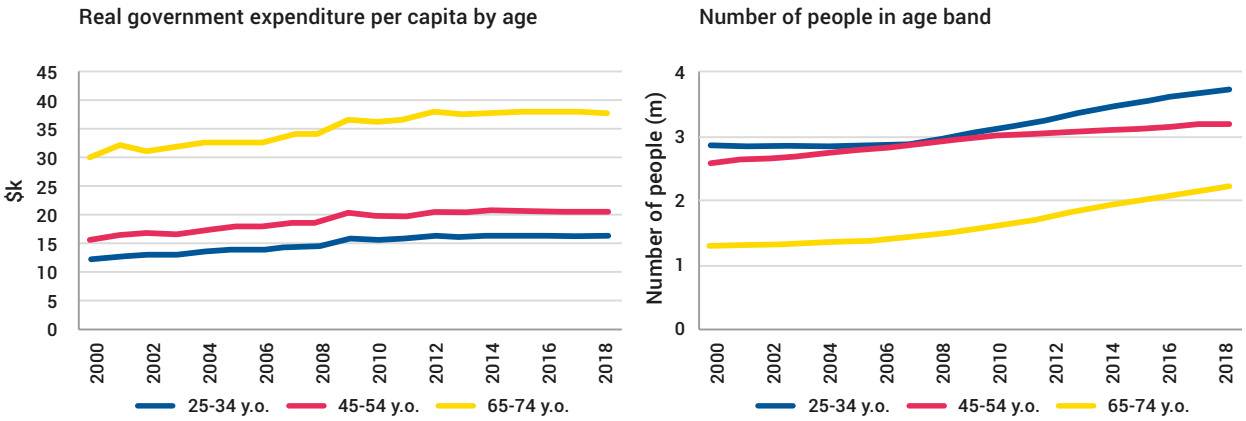


Source: Rice et al. (2014)

Our selected indicator is total government expenditure across each of our three primary age bands, which we have expressed as a proportion of GDP. The final calculation gives flat results for the 25-34 and 45-54 age bands, sitting in the vicinity of 3.5%, whereas government spending on the 65-74 age band is estimated to have grown from 3.7 per cent of GDP to 4.5 per cent of GDP. This suggests a growing generational gap in government spending induced by a combination of demographics and increased spending on age-specific factors such as aged care, health care and the age pension.

It is important to recognise that the indicator reflects both per capita trends (changes in per-person spending in each age band) and demographic change (changing numbers of people in each age band); both of these effects are important in thinking about intergenerational equity, since they both contribute to the total transfer across age bands from government spending. These two components are shown in the figure below.

Figure 15 – Per capita and demographic components contributing to the government spending measure



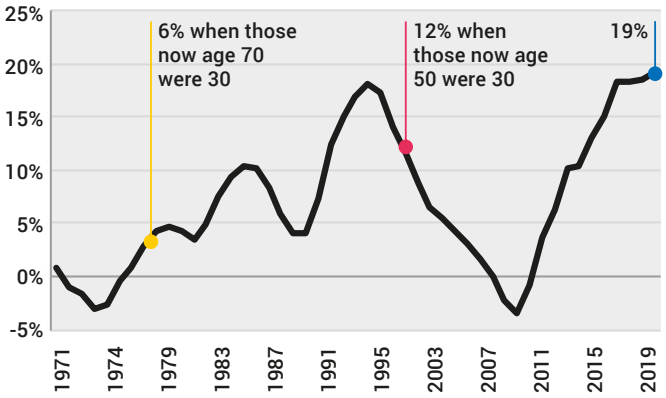
An increase in the number of people aged 65 and over has been a major driver of increased government spending.

First, we note that per capita spending (consumption plus transfers) is higher for older age bands and has increased faster in real dollar terms over time for older age bands. The 65-74 age band has seen a $7,500 increase in per capita spending (in 2019 dollars) to $37,750 compared to a $4,000 increase to $16,250 for the 25-34 age band.

Second, there has been a significant compositional change. In other words, a major driver of increased spending on 65- to 74-year-olds is that the size of the population over aged 65 almost doubled in the period 2000 to 2019. This is a much larger relative change compared with other age bands, particularly as Baby Boomers have entered the age band since 2010. This speaks to common concerns about dependency ratios and whether the Australian economy can adequately support an ageing population. Superannuation savings place Australia better than many other countries, as these reduce pressure on age pension payments. However, other types of support, including superannuation concessions but also health and aged care, still create significant future budgetary pressures as the population demographics change.

6.1.5 Government net debt

Figure 16 – Indicator: Government net debt



Source: Mid-Year Economic and Fiscal Outlook, Budget 2019-20

Net debt is a measure of the strength of a government's financial position. While not all debt is bad (see discussion in Section 4.2.4), high levels of net debt impose a call on future revenue flows to service that debt and is therefore rightly considered an intergenerational issue. Repayment of net debt needs to be funded by the taxation of future generations, so high net debt is a burden on future generations (and younger age groups).

Net debt is the sum of selected financial liabilities (deposits held, advances received, government securities, loans and other borrowing) less the sum of selected financial assets (cash and deposits, advances paid, investments, loans and placements). For inclusion in the AAIEI, Australian Government net debt (Commonwealth Government only) is reported as a proportion of GDP to allow comparison across years.

The Australian Government's net debt has increased materially off a low in 2008 and as at the end of 2018-19 was as high as it had been for over 50 years, at 19 per cent of GDP. Further, this is now projected by the Commonwealth Government to reach 36 per cent of GDP by June 2021. Although net debt levels are still low by international standards, this issue is a concern to some due to Australia's high level of overall net foreign debt (i.e. both private and public net foreign debt). It is workers of the future (i.e. today's young) whose taxes must repay this debt. Our index reflects this by comparing today's debt level to the equivalent at 20-year intervals in history.[15]

Some commentators have judged Australia's budget as being in structural deficit for much of the past decade. Ageing of the population will continue to create pressure, as a proportionally smaller tax base needs to fund increasing demand for government programs that support older Australians, as well as other items including interest and/or repayment of net government debt. Budget implications of the ageing population are explored further in sources such as the Australian Government's Intergenerational Report (Treasury, 2015). Finally, while Commonwealth debt has been the biggest component of debt historically, state debt may become more prominent in the future depending on different jurisdictional responses to the COVID-19 recovery. The inclusion of state debt is a possible future extension of the index.

15 The net debt figure is for the Commonwealth Government.

6.1.6 Infrastructure

Economist Paul Krugman (2013) argues that government debt alone does not make future generations poorer, rather, neglecting public investment in infrastructure and education and failing to provide jobs makes children poorer in the future. Studies show that a reallocation of public spending towards infrastructure and education raises income in the long run (Johansson, 2016).

Infrastructure investment covers spending on new construction and the improvement of the existing network across categories such as transport (road and rail), water assets and the National Electricity Market. Infrastructure investment is a key determinant of performance in the transport sector. Efficient transport infrastructure provides economic and social benefits to economies by improving market accessibility and productivity, ensuring balanced regional economic development, creating employment, promoting labour mobility and connecting communities (OECD, 2020).

In Australia, infrastructure investment comes from both Commonwealth and state and territory budgets and the relative importance of infrastructure funding in each jurisdiction can change in different ways at different points in time (e.g. NSW and Victoria will not follow the same pathway of infrastructure investment).

For infrastructure investment to benefit younger generations, the benefits of the investment need to exceed its cost. The correct governance structures are critical to ensuring this is achieved, however, as noted by Terrill and Coates (2016), *"In practice, the only way to ensure that new infrastructure projects are worth the cost is to subject them to a rigorous, like-for-like analysis of claimed project benefits and expected costs. If a project's benefits exceed its costs, then by definition, it will provide a net benefit to the community. And if no government could commit public money to an infrastructure project before a rigorous evaluation of the business case had been tabled in the Parliament, politicians would think twice before committing money to dodgy projects for political gain."*

Infrastructure Australia (IA) was established in 2008 as the nation's independent infrastructure advisor to advise governments, industry and the community on the investments and reforms needed to deliver better infrastructure for all Australians. Governments, however, are currently not required to ask for IA's advice, nor do they always follow it when given. For example, from 2012 to 2016, 55 per cent of Commonwealth spending on transport infrastructure was allocated to projects where IA did not publish a project evaluation (Terrill and Coates, 2016). Furthermore, in 2018, the projects identified for funding in the Budget did not align with IA's priority projects and initiatives list: "12 of the 29 projects from the Budget were not on the IA priorities list and, conversely, of the 13 projects on IA's high priority and priority projects list, only four received funding in the budget" (Ludlow, 2018).

Governments are currently not required to ask for Infrastructure Australia's advice as part of their decision-making.

Due to overall low transparency over the costs versus benefits of historical spending on major infrastructure projects in Australia (and, therefore, their contribution to intergenerational equity), we do not include a specific indicator for infrastructure spending in the AAIEI. Such comparisons are also heavily affected by assumptions such as the discount rate. We support recommendations, including those from the Grattan Institute (see Wood et al., 2019), to reduce the role of politics in project selection and require published independent assessment of all proposed projects in order to boost economic growth.

Housing indicators

- Home ownership rates
- Rental costs

6.2 Housing

Housing is often touted as the single biggest issue that faces younger people making their own way in Australia. In Rebecca Huntley's book on Generation Y (Huntley, 2006), many people in her interviews nominate housing affordability as their biggest political issue.

The housing market and related policy is a complex area; affordability is driven by many factors including interest rates, investment behaviour, population growth and government intervention. Further, housing is local – most people have preferred locations and so market imbalances between supply and demand can generate very different housing markets in our big cities compared with smaller cities and regional centres.

While there are many potential indicators, we have selected two. Specifically, home ownership is a telling and direct measure of overall affordability, and rental costs are important for considering housing outcomes for those who are not owners – disproportionately the young.

Home ownership has worsened considerably for younger people. For those aged 25-34 the rate of ownership has fallen from 51percent in 2001 to 37 per cent in 2018. Some falls are visible in other generations, but on nowhere near the scale seen for young people.

Figure 17 – Indicator: Home ownership rates

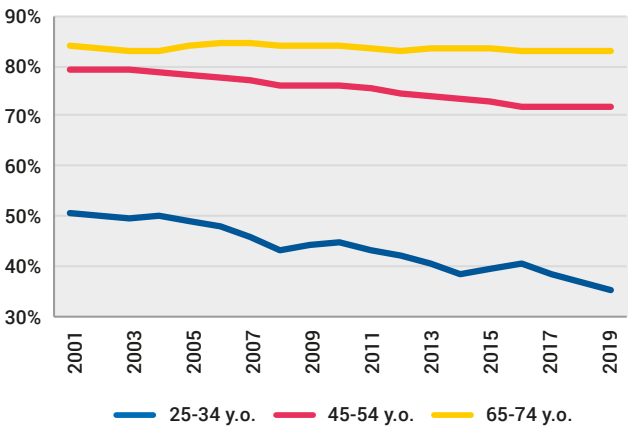
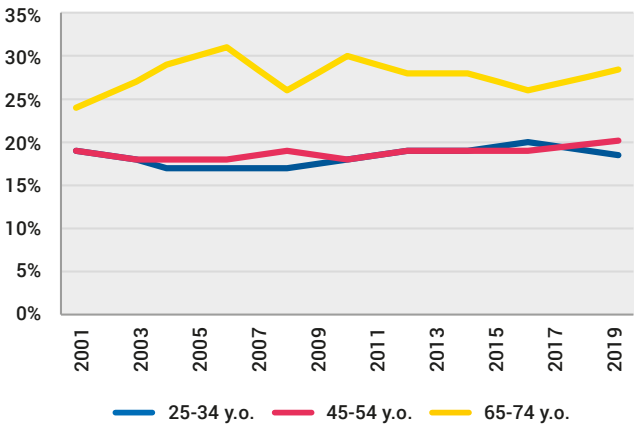


Figure 18 – Indicator: Rental costs as a % of gross income



Source: ABS 4130: Housing Cost and Occupancy

Levels of home ownership are naturally higher amongst older age groups than the young for two key reasons. First, older people have more time to accumulate wealth to put towards a house. Second, buying a home is significantly linked to events such as marriage and having children. Research shows that delayed household formation is one factor determining declining rates of homeownership (CEPAR, 2019), implying some potential for catch-up over the lifecycle.

While changing preferences can explain some of the decline in ownership, it does not explain it all. Further, there still remain intergenerational issues since younger people are locked out of the asset accumulation associated with home ownership, even if some of this is personal preference.

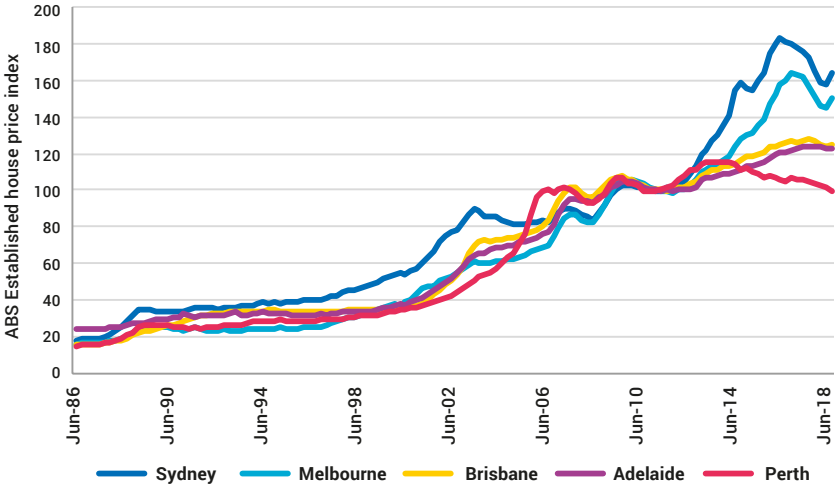
The decline in home ownership also reflects high prices, particularly in Sydney and Melbourne (see Figure 19) where there have been several steep rises in prices, including in the past seven years. Prices have grown significantly faster than incomes, making it harder to save for a deposit.

When an average Generation X member turned 30 the house price index for capital cities was three-and-a-half times that for the Baby Boomers. As the average Millennial turns 30 it has increased by an additional factor of two.

It has been suggested that low interest rates offset increased house prices enough such that housing affordability is only moderately worse than historical levels. However, this is an oversimplification of reality. First, the ability to save for a deposit on housing does

not benefit from low interest rates (quite the reverse), so younger people are often forced into larger mortgages for longer. Second, low interest rates have directly increased demand for housing, with the majority of benefits passing to existing property-holders, leading to wealth inequalities of the type discussed in Section 6.1. Finally, when high interest rates exist their impact is felt less severely in later stages of a mortgage; as wages rise and households can repay faster, this generates savings on the upfront costs of a lifetime mortgage. This mechanism is significantly weakened in a low-interest rate environment.

Figure 19 – ABS established house price index for the five largest capital cities



Following the lack of home ownership there has been a moderate rise in the proportion of median housing cost to household income for those renting. In 2001 median rental costs were 18.8 per cent of gross household income, however, in 2018 it made up 20.2 per cent of gross household income. Due to the lack of data for the age band 25-34 the median cost as a proportion of gross household income for all household renting was used a proxy. Comparing the two datasets together they appear to be near identical or, in some cases, the overall proportion understates the cost for renters aged 25-34. For these cases using the overall data inevitably dilutes the level of inequity for these periods.

Supply issues have often been touted as a key driver of high prices. Some supply issues appear to be being addressed, with increased completions in Sydney and Melbourne – particularly in apartments – over the past half-decade. That said, supply continues to be a challenge and improving supply is generally seen as far more effective in promoting ownership compared with demand-side interventions like grants to first homeowners.

While average incomes have largely kept pace with rents, this will be of small consolation for those whose incomes grow at a lower rate – particularly those on working age benefits, which are typically inflated with CPI rather than wages. Commonwealth Rent Assistance is a small fraction of typical rents and cannot be put towards mortgage repayments – in contrast to housing supports in other countries such as New Zealand. At the extreme, the inability for those on benefits or low incomes to sustainably afford housing has likely contributed to observed increases in homelessness, discussed in Section 6.4.3.

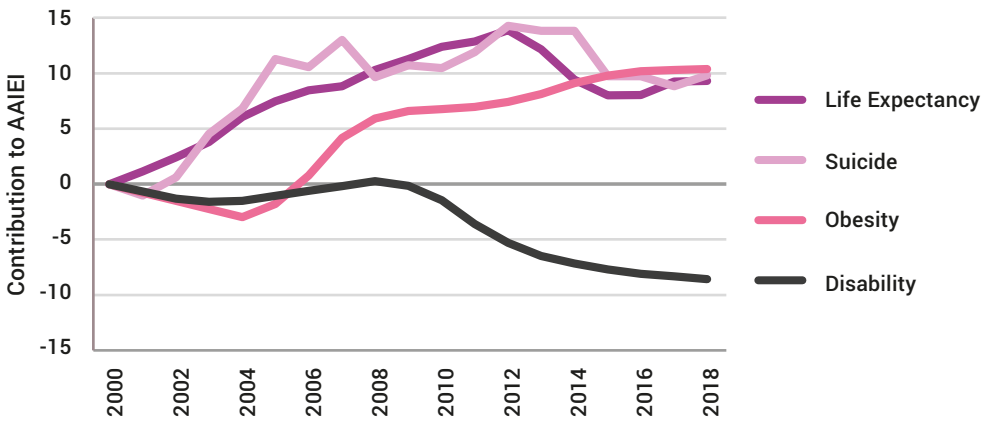
Health and disability indicators

- Life expectancy
- Disability rates
- Obesity rates
- Suicide rates

6.3 Health and disability

Health and disability indicators are given a significant weight in the index (20%), reflecting that both physical and mental health play a large role in wellbeing. The overall domain contributed positively to the AAIEI; within the health and disability domain things are getting better for younger people. Figure 20 shows the contribution of each health and disability indicator to the AAIEI results. Life expectancy, obesity rates and suicides rates have improved intergenerational equity on the overall index – for example, suicide rates have fallen more for younger people than older. On the other hand, while disability rates have fallen across all age bands, they have fallen more quickly for older generations, meaning that the corresponding contribution to the absolute index has increased more for the 65-74 age group compared with the 25-34 age group.

Figure 20 – Contribution of health and disability indicators to the intergenerational equity difference between 25-34 and 65-74 (3-year moving average)



There are many potential health and disability indicators given the wide array of diagnoses and treatments. Mortality and life expectancy can be viewed as a key headline measure of good health, and broad disability rates are also natural inclusions since they directly affect quality of life. Obesity is included as a representative of chronic conditions, many of which have been on the rise in Australia. Suicide rates are a robust measure that speak to mental health issues, albeit the severe end of the spectrum.

6.3.1 Life expectancy

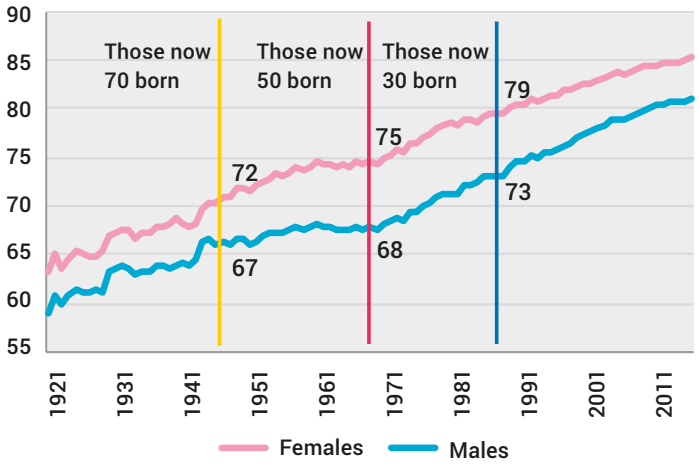
Life expectancy can be considered the 'ultimate' expression of health. Combined improvements in different areas of health generally lead to longer lives. Life expectancy at birth has been increasing, in Australia and overseas, since the late 19th Century. Those born today are expected to live an additional 20 years compared with those born in 1920.

The life expectancy indicator each year was calculated as the average male and female life expectancy at birth in that year[16]. For someone aged 70 now, this refers to life expectancy in 1949.

Major drivers of the increases in life expectancy in Australia over the 20th Century were: reductions in infant mortality rates, decline in smoking rates, introduction of laws requiring seatbelts to be worn in motor vehicles and medical advancements such as the widespread use of statins and associated reductions in cardiovascular disease. Higher life expectancy at birth, therefore, implies younger and future generations will experience longer lives than previous generations.

16 Several alternatives to life expectancy at birth were considered for the index. Current life expectancy is not comparable across age bands because of survivorship bias. Alternatives such as Health Adjusted Life Expectancy or Disability-Adjusted Life Years (DALY) were very difficult to include due to limited data availability. Age-specific DALYs, for example, were only available in 2003, 2011 and 2015.

Figure 21 – Indicator: Life expectancy at birth



Source: ABS estimates of life expectancy via https://mortality.org/

Mortality rates are still declining but at a slower rate than in the past.

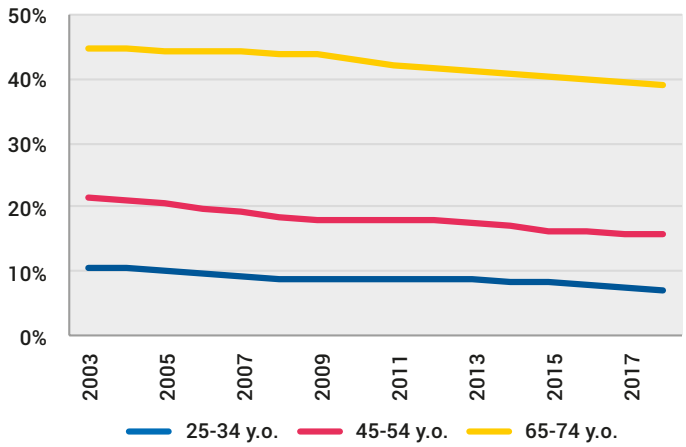
The increases have not been uniform, with slower improvements in the late 1960s. This means the improvement has been slightly less for those in the 45-54 age group. There remain questions on the speed of future improvements. Recent data suggest that while mortality rates in many developed countries are still declining, they are doing so at a slower rate than in the past (Swiss Re, 2018). Future mortality improvements will have consequences for intergenerational equity going forward.

'Longevity risk' refers to the risk that individuals outlive their retirement savings. In Australia, individuals in this situation fall back on the government funded age pension, so increasing life expectancy creates a risk for government that the age pension system is not sustainable. Policy to address this issue needs to include a suite of measures such as encouraging older Australians to remain in the workforce past 65, encouraging innovation in retirement income products and making the age pension system more adaptable. These measures are discussed in Section 7.

6.3.2 Disability

There are many forms of disability – our review is at best cursory. A disability can result from an accident, illness or genetic disorder and can impact any or all of mobility, ability to communicate easily and ability to learn. Disability may be permanent or temporary. Older people are far more likely to be affected by a disability; less than 4 per cent of the population aged 4 and under have a disability, with this proportion steadily rising with age to nearly three quarters of those aged 85-89.

Figure 22 – Indicator: Disability rates



Source: ABS catalogue 4430.0

Overall disability rates have been decreasing over time across virtually all age bands. This is obviously good news and is in part due to improved safety and falling rates of serious car crash and workplace injury. The rate for older age groups has decreased more, but from a higher starting point. The proportions of individuals aged 25-34 with a disability has declined 15 per cent from 10 per cent in 2003 to 8 per cent in 2018. The data lacks numerous data points, which may have resulted in missing significant movements in the true proportion young people with a disability.

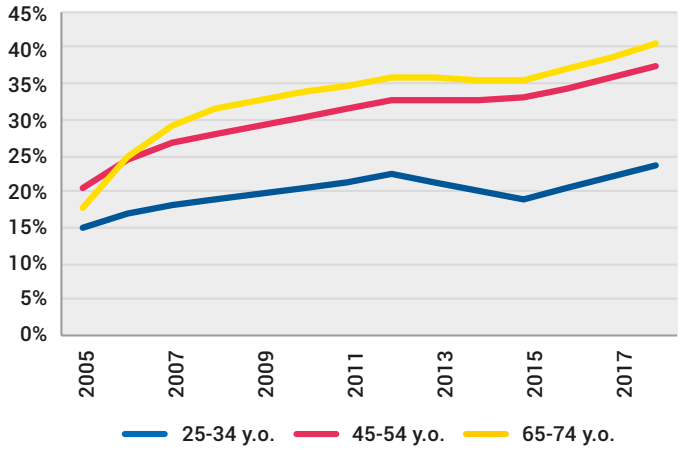
Trends can differ by disability type. For example, there are increasing rates of autism in children, although it is unclear the extent to which higher reporting rates and changes in diagnosis have contributed.

The National Disability Insurance Scheme (NDIS) represents a major investment in those with a permanent disability with ongoing support needs. While not built into the index, this should contribute to increased wealth and wellbeing for disabled Australians.

6.3.3 Obesity

Some chronic conditions are caused by lifestyle factors and reflect trends that form barriers to future improvement in health. Obesity (and related conditions such as diabetes) is one example that we have included in the AAIEI.

Figure 23 – Indicator: Obesity rates



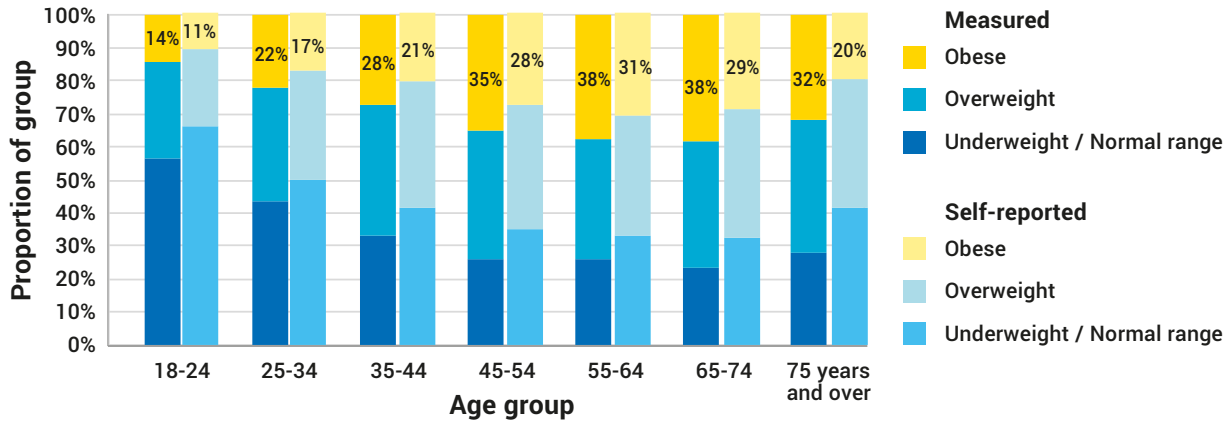
Source: 2001, AIHW "Are all Australians gaining weight?", 2008, 2012, 2015, 2018, ABS National Health Survey: First Results 2017-18 [17]

Unfortunately, the measured level of obesity has nearly doubled from 2001 to 2018, with the percentage of those obese at 16.7 per cent in 2001 and rising to 30.8 per cent in 2018. The increase has been larger among the older age groups (65-74 and 45-55).

Obesity has been found to have severe health impacts, particularly cardiovascular health and increased risk of certain cancers. The health risks associated with obesity place significant pressure on the present healthcare system (Djalalinia et al., 2015). As obesity is becoming more prevalent in society, over time it is expected to contribute to a decline in average physical wellbeing.

Figure 24 shows how measured and self-reported Body Mass Index classification vary. Australians consistently underestimate their Body Mass Index, but the difference is particularly large among the older age groups – 38 per cent of those aged 65-74 are obese, yet only 29 per cent self-report this. By definition, obesity is a larger problem than Australians recognise.

Figure 24 – Measured and self-reported Body Mass Index, by age band, 2017-18



Source: ABS National Health Survey: First Results 2017-18

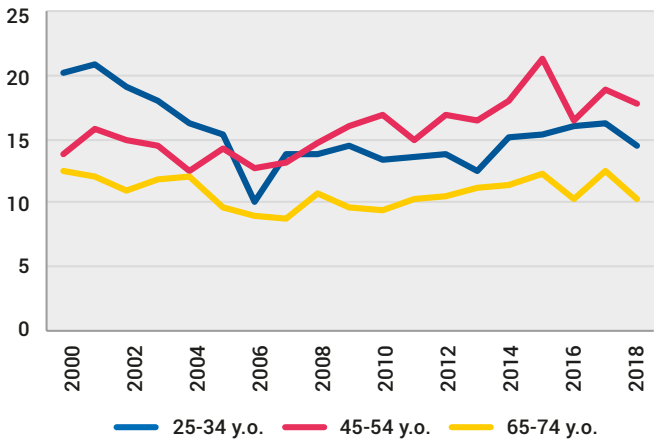
Childhood obesity has been a topic of interest in the media in recent years due to the long-term impacts, both physical and social. However, in contrast to adult obesity, the proportion of children (aged 5-17) that are overweight or obese has been fairly stable in Australia from over 2000 to 2018 (AIHW, 2020).

17 Missing data from 2001-2018 were interpolated and 2000 missing data was extrapolated using a linear trend

6.3.4 Suicide and mental health

Poor mental health is an increasingly pressing problem in many developed countries, with one in five Australians suffering from a mental health condition in any given year (ABS, 2008).

Figure 25 – Indicator: Annual suicide rate per 100,000 people



Source: ABS catalogue 3303

Individuals' experiences of mental health are recognised as being socially and culturally mediated. An experience that is mentally distressing in one culture may not be in another. Likewise, mental health awareness and willingness to seek treatment for mental illness varies between societies and cultures (Centre for Mental Health Services, 2001).

Most publicly available data on mental health is based on self-reported measures of mental health from surveys. Self-reported measures may vary over time as awareness and acceptance of mental illness in the community changes. The same is true for Medicare payments, which vary over time with these factors, and there are also policy driven effects and supply limitations.

For inclusion in the AAIEI, we needed a measure that is comparable over time. However, many statistics on mental health issues are likely to be affected by increased reporting prevalence from heightened awareness over time. We have used the suicide rate as a robust indicator, noting that it relates to a small but particularly important subset of the mental health challenge. We note it is an area disproportionately affecting younger people (and particularly males), with suicide being the leading cause of death among Australians aged 15-44.

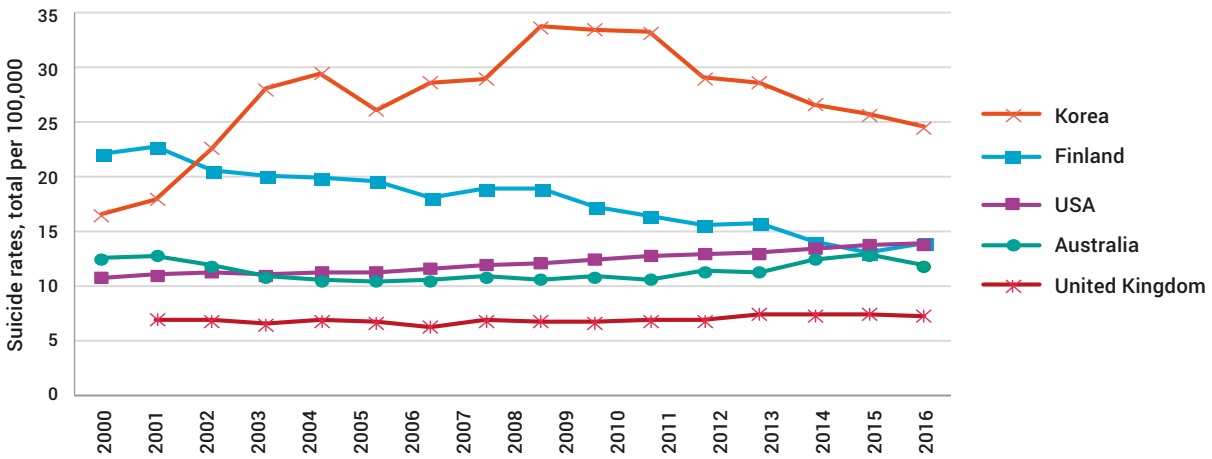
The number of suicides per 100,000 of those aged 25-34 has varied over the last 20 years with a general decline from 20.2 suicides per 100,000 in 2000 to 14.5 in 2018 and a minimum of 10.1 in 2006. The trend for those aged 65-74 is similar. In contrast suicides among those aged 45-54 have increased from 13.8 per 100,000 in 2000 to 17.8 per 100,000 in 2018.

The suicide rate in Australia is similar to that in the United States and in New Zealand. Figure 26 shows how the suicide rate in Australia has compared to selected countries over time, notably:

- The United Kingdom has maintained a relatively low suicide rate.
- The United States has seen a gradual but steady increase in suicides.
- Finland has seen a steady decrease off a historically high rate.
- Korea is seeing a decrease following a large increase over 2000 to 2010.

While the suicide rate in Australia is not high by international standards, the slow drift up observed in the past decade is concerning.

Figure 26 – Total suicide rates per 100,000 population, selected countries



Source: OECD (2020), Suicide rates (indicator). doi: 10.1787/a82f3459-en (Accessed on 12 April 2020)

Improvements in intragenerational health will also correlate with improvements in intergenerational issues.

6.3.5 Other aspects of health

There are of course many other elements that contribute to good health; the health domain has perhaps more complexity than any other. One consequence of improving longevity means a need to improve care for older Australians and the illnesses that present more frequently at older ages. For example, we see a rising incidence of dementia, which presents challenges for both family and paid care environments. The Royal Commission into Aged Care has also identified systematic failures that need addressing to enable people to live out their final years with dignity. While these have not been built into the index (in part due to the challenge of defining the 'intergenerational' aspect and, also, since some issues concern those aged older than the 65-74 age band), the need for good healthcare and support for older Australians is not to be minimised.

As with other domains, health sees significant intragenerational inequity too. The socioeconomic gradient of health recognises that those with lower socioeconomic status also have higher incidence of chronic health conditions and other poor outcomes (see e.g. AIHW, 2016). Improvements in **intra**generational health will also correlate with improvements in **inter**generational issues.

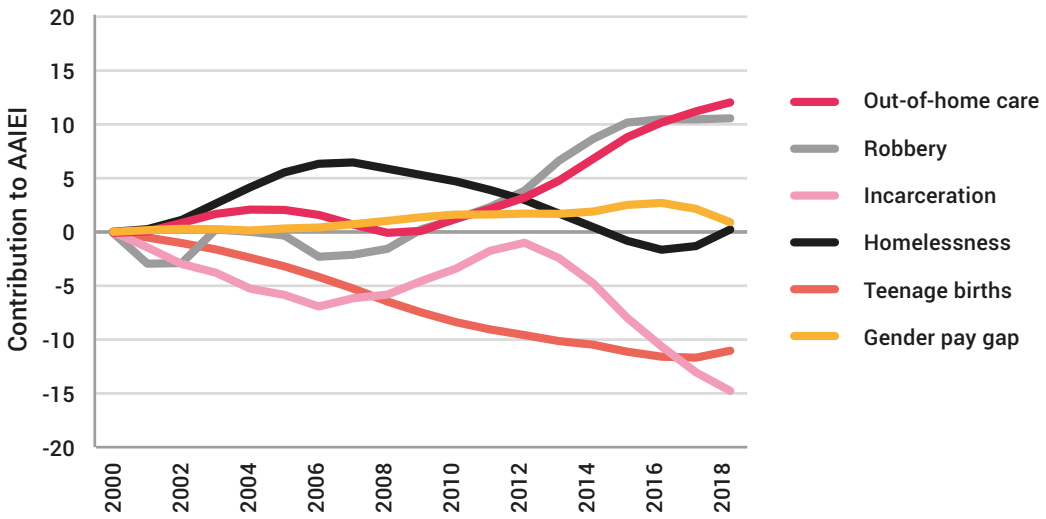
Social indicators

- Rate of robbery victimisation
- Rate of incarceration
- Rate of homelessness
- Gender pay gap
- Rate of children aged 0-17 years who are in out-of-home care
- Teenage birth rate

6.4 Social

Indicators in the social domain reflect social cohesion and community life largely through interactions between people and with key institutions. Overall, this contributes a small negative amount to the AAIEI. This is because the indicators are a mix of improvements and deteriorations, as shown in Figure 27. Robbery victimisation rates and teenage birth rates have improved intergenerational equity, while incarceration rates and out-of-home-care rates have worsened intergenerational equity.

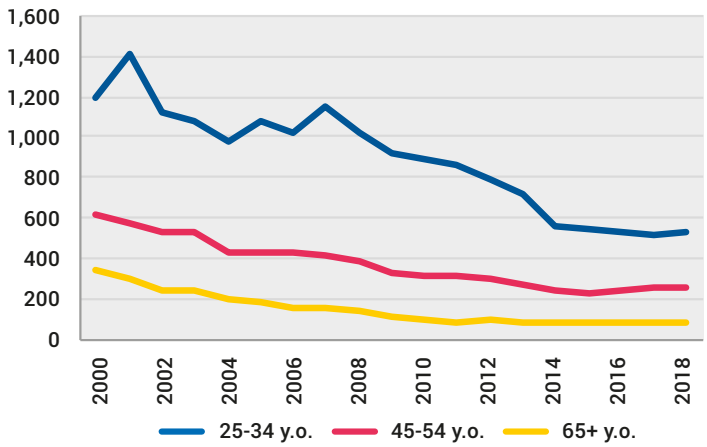
Figure 27 – Contribution of social indicators to the intergenerational equity difference between 25-34 age band and 65-74 age band (3-year moving average)



6.4.1 Crime

All societies aspire to lower levels of crime. Not only does crime result in immediate harm and loss to the victim but there are also impacts on the broader societal spirit and how safe people feel. Trends in crime rates have generally been very favourable over the last twenty years. Robbery victimisation rates are a representative example and as a higher rate (than, for example, homicides) are subject to less volatility, so have been selected for the AAIEI.

Figure 28 – Indicator: Robbery victimisation rates per 100,000



Source: ABS Catalogue 4510

The incidence of crime varies by type, but young people are more commonly victims of crime. The number of young robbery victims (aged 25-34) has decreased nearly three-fold over the reference period, from a high of 1,400 victims per 100,000 persons aged 25-34 in 2001 to 500 victims in 2018. The victimisation rates among the older age groups have seen similar relative reductions, although from a lower base rate.

Reflecting the decreasing trend of all age bands the indictor contributes positively to the absolute index scores for each age band. The increase in the absolute index score over 2000 to 2018 is about twice as large for the 25-34 age group as for the older age groups reflecting the larger absolute decrease in victimisation rates among those aged 25-34.

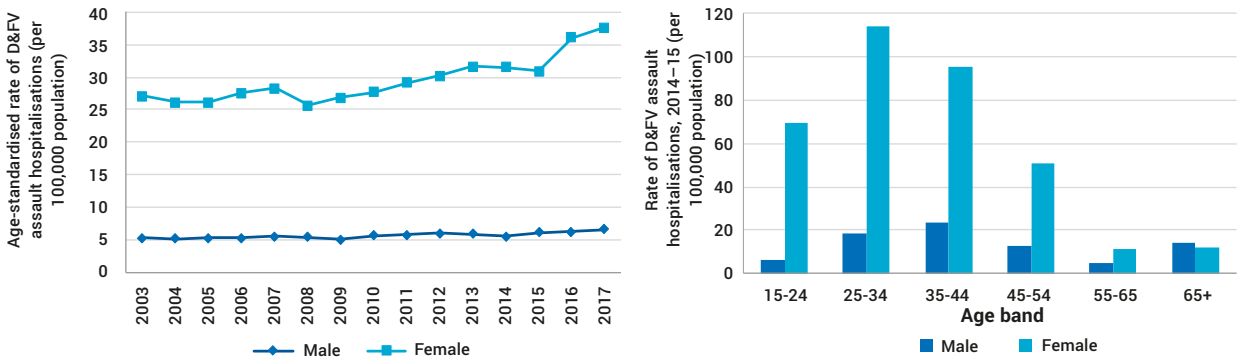
While victimisation rates for most offences have decreased, domestic violence is an important area where that downward trend does not exist on many measures. Many crimes go unreported and there is not a national method for consistent identification or measurement. Further, increases may reflect increases in reporting rather than increased offending. This ambiguity led to omission from the AAIEI despite its obvious importance.

ABS figures (catalogue 4510) have shown increases in family and domestic violence (F&DV) sexual assault rates since 2014 and victims are disproportionally younger.

The AIHW reports an alternative measure the rate of assault hospitalisations where the perpetrator was a spouse or partner (from the AIHW National Hospital Morbidity Database). Among females this has increased from 27 incidents per 100,000 women in 2002-03 to 38 incidents per 100,000 in 2016-17. An age split over time is not available, but, as shown in Figure 29, the highest rates are among the 25-34 age group.

At face value, these measures suggest a worsening situation and that younger age groups are likely disproportionately affected. affected. However, reporting rates may have changed over time, particularly as there has been increased funding, awareness and focus over the last ten years with the Commonwealth Government's National Plan to Reduce Violence against Women and their Children 2010-2022 as well as numerous broadly publicised cases of sexual assault.

Figure 29 – Rate of assault hospitalisations where the perpetrator was a spouse or partner over time (left) and by age band, 2014/15 (right)

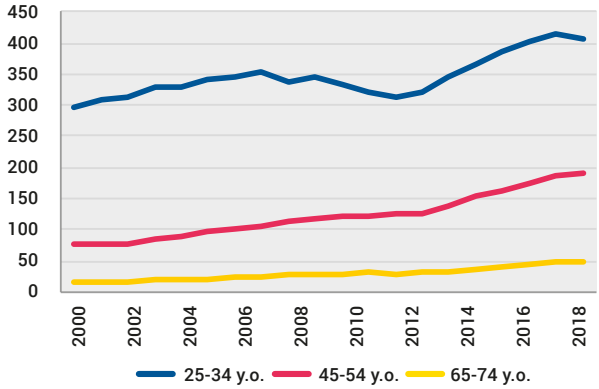


Source: AIHW analysis of the AIHW National Hospital Morbidity database. Reported in Family, domestic and sexual violence in Australia: Continuing the national story 2019

6.4.2 Incarceration

Incarceration of dangerous criminal offenders is intended to protect people from violence and harm as well as provide a deterrent and justice for victims. However, high incarceration rates for particular subgroups is also an indicator for disaffection and disadvantage. Further, there is a large amount of research suggesting people have poor employment and social outcomes following incarceration.

Figure 30 – Indicator: Incarceration rates per 100,000



Source: ABS Prisoners in Australia, catalogue 4517

Despite falling crime rates, the rate of incarceration has been increasing. The rate of incarceration for those aged 25-34 has increased from 300 people per 100,000 in 2000 to 410 people per 100,000 in 2018. The 34-45 age group has seen a similar absolute increase. The 65-74 age group has seen a much smaller absolute increase from 20 people per 100,000 in 2000 to 50 people per 1,000 in 2018.

Reflecting the increasing trend for all age bands the indictor contributes negatively to the absolute index scores for each age band. The decrease in the absolute index score over 2000 to 2018 is similar for the 25-34 and 45-54 age bands. This is between three and four times as large as for the 65-74 age group.

The base rates are very different; the incarceration rate for those 25-34 is about three times that for those aged 45-54 and eight times that for those aged 65-74. Those in jail are also predominantly male and Aboriginal and Torres Strait Islanders and are over-represented by a factor of about ten.

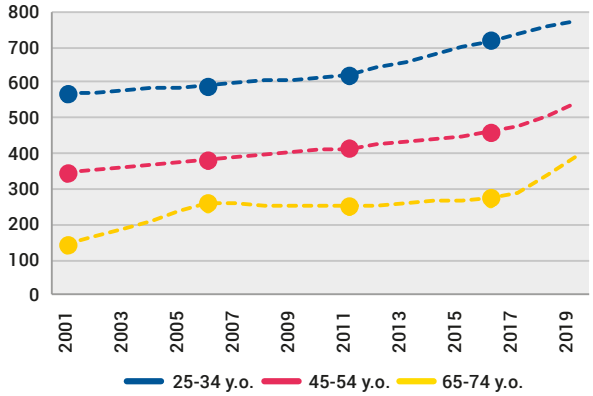
The overall rate can be influenced by changes in things such as tougher stances on crime, propensity to incarcerate, length of sentences and propensity to grant parole. The net effect is that young people, who are more likely to be offenders, suffer the consequences of increased incarceration.

There has been plenty of research exploring why the rate of incarceration has increased and whether it can be attributed to increased violent crime, increased reoffending or less parole being granted. An important dynamic has been found to be the rise in unsentenced prisoners, which is attributable to more stringent conditions on the granting and keeping of bail (Bushnell and Wild, 2016). According to 2019 ABS statistics on Prisoners in Australia, 33 per cent of the prison population had not been sentenced. The equivalent proportion in 2000 was 17 per cent.

6.4.3 Homelessness

Having a place to live that provides shelter is a fundamental requirement for humans. The ABS definition of homelessness is living arrangments that do not have a sense of security, stability, privacy, safety and the ability to control living space. This encompasses living in vehicles, couch surfing, living in crowded arrangements and only having access to emergency accommodation on a short-term basis.

Figure 31 – Indicator: Homelessness rates per 100,000



Source: ABS Census and AIHW Specialist Homelessness Services Collection

Rates of homelessness are included as an indicator as they reflect the rate of people experiencing extreme social disadvantage. Experiences of homelessness are often intertwined with at least one of unemployment, financial hardship, mental illness, and domestic and family violence.

The rate of homelessness has increased over the last twenty year. This is reflected in the both Census results and the numbers seeking support from Specialist Homelessness Services, an important part of the homeless population. The rates of accessing Specialist Homelessness Services are influenced by policy and supply as well as demand. For this reason we have relied on Census results, but have used rates of access from Specialist Homelessness Services to interpolate between and extrapolate from Census data points.

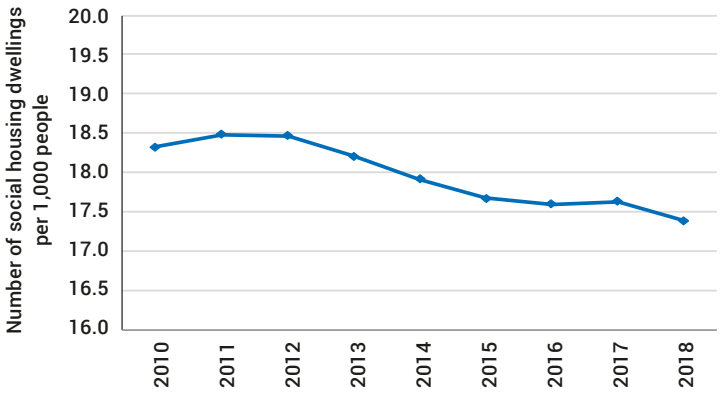
Increasing homelessness rates contributes negatively to the absolute index scores for each age band. Among young people the rate has increased from 57 per 100,000 people in 2001 to 78 per 100,000 people in 2018. The overall increases are similar across the three age groups reported in the index. In the last few years, increases have been fastest for the 65-74 age group.

There are multiple drivers of homelessness. Income and poverty was discusssed in Section 6.1.2, with homelessness often preceded by an extended period of financial hardship. Those on income support payments as their main source of income, such as the unemployed, are at higher risk.

Housing affordability was discussed in Section 6.2 and plays a role in the rates of homelessness. With strong housing demand and decreasing affordability, everyone is shifted down the 'housing ladder'. Those in the past who would have owned their own homes, rent. The rental market is more competitive and those on the lowest incomes are left with fewer housing options.

Social housing is one support for those unable to rent in the private market and is often included in discussions of homelessness, but is also a system under pressure. While exact numbers vary, Figure 32 shows how the number of social housing dwellings per 1,000 people has decreased on a per capita basis over time. There has not been additional stock to house additional people experiencing homelessness.

Figure 32 – Number of social housing dwellings per 1,000 people over time

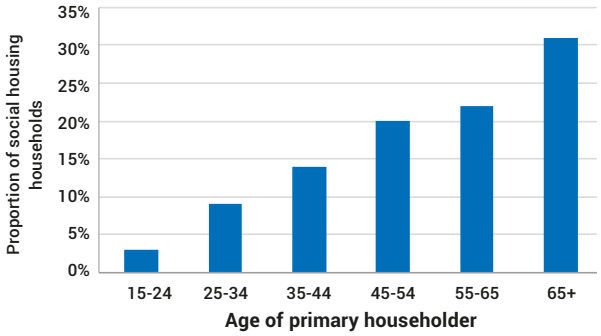


Sources: Report on Government Services 2020 Section 18A and plus ABS population statistics

Waitlists for social housing are long. Over 2017/18 just over 37,500 households were newly allocated social housing, from a waitlist of around 150,000 households (Housing Assistance in Australia, 2019, AIHW). While those assessed as priority applications are usually housed within a year of being assessed as a priority application, non-priority applications spend much longer on the waitlist, with half waiting more than two years.

As shown in Figure 33 over half of existing households in social housing have a main tenant aged over 55. The tenure of households in social housing has also been increasing and, as at 30 June 2018, 43 per cent of public housing households had been in the same tenure for more than a decade. This implies social housing may not be providing the same safety net to younger people today.

Figure 33 – Proportion of ongoing social housing households by age of main tenant at June 2018



Sources: Housing Assistance in Australia 2019, AIHW

6.4.4 Gender pay gap

A world that better includes groups that have historically experienced disadvantage is a good thing. Recognising progress in inclusion and equity is important (and used in other indices). To do this we have included the gender pay gap as an indicator. While this indicator reflects the inequity only one group has experienced over time, the poor availability of robust data series precluded most other alternatives from the index.

As recorded by the ABS Average Weekly Earnings (seasonally adjusted)[18], females earned 13.6 per cent less than males in 2000, rising to 17.4 per cent less in 2014 before the gap reduced to 12.7 per cent in 2019. This improvement was almost entirely among the 45-55-year-old age group, with the gap constant for the 25-34-year-old and 65-74-year-old age groups[19].

Over the full reference period the generally increasing pay gap contributes negatively to the absolute index scores for each age band. The exception is the 35-44 age band for which the strong decrease in pay gap for from 2014 leads to an overall slightly positive contribution to the index score.

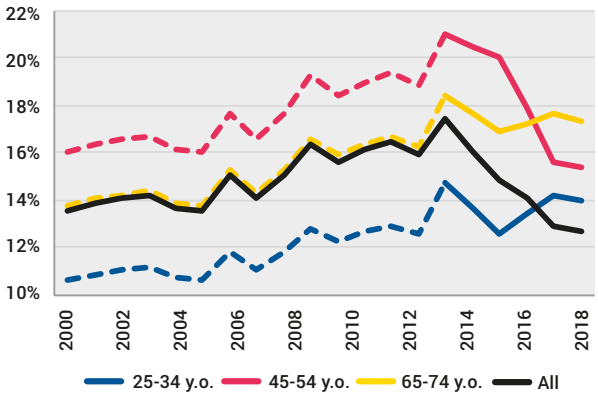
The gender pay gap is a subject of heavy research. At an aggregate level some of the gap is compositional. Women are overrepresented in lower paid roles and industries (such as caring and teaching) and underrepresented in higher

18 For 2000-2011 data was released quarterly and from 2012 onwards data was released biannually. The November data points have been used.

19 In years prior to 2014 the age split of the gender pay gap is not available, only the gender pay gap across all ages. To estimate an age-specific gender pay gap, the 2014 age-specific values are extrapolated back to the year 2000 as a fixed difference of the total all-ages gender pay gap.

paid roles (particularly at the executive level). The pay gap persists – although is much smaller – after controlling for industry and position.

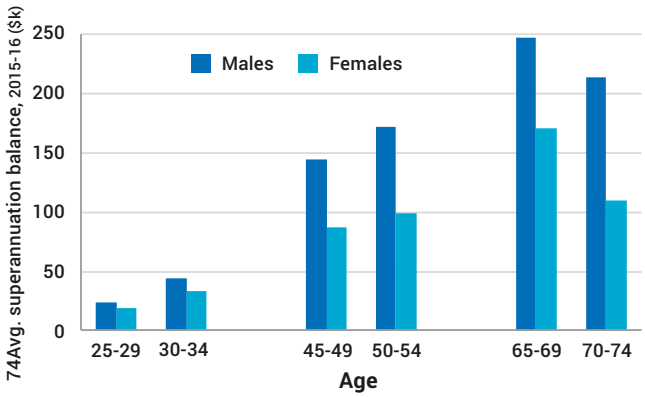
Figure 34 – Indicator: Gender pay gap (1 – female / male)



Source: ABS Average Weekly Earnings (seasonally adjusted)

The pay gap contributes to women retiring with superannuation balances that are about half those of men. Also contributing is women taking more time on average, out of paid work, particularly relating to raising children. Figure 35 shows a snapshot of average superannuation balances from 2015-16. The disparity is clear with lower balances for women at each age; and although the difference is much smaller for the youngest age groups, these groups have not had the same period of time in the workforce for the difference to accumulate.

Figure 35 – Average superannuation balances in 2015-16 by gender, selected age brackets



Source: Superannuation account balances by age and gender, October 2018 Ross Clare, ASFA Research and Resource Centre.

The decrease in pay gap in the past few years is positive and demonstrates that progress towards equal pay is possible. Other measures are also improving, albeit slowly. While the proportion of female CEOs remains flat at 16 per cent[20], the number in key management positions has risen from 26 per cent to 32 per cent over the five years to 2018/19.

20 Figures from Australia's gender equality scorecard, November 2019, Workplace Gender Equality Agency

Australia's gender equality scorecard also highlights improvements in employment actions around flexible working arrangements, parental leave and domestic and family violence policies. These are all things that support both men and women in the workforce, but disproportionately impact women.

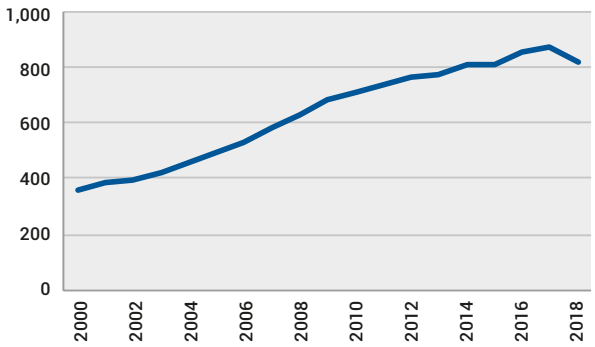
6.4.5 Out-of-home care and teenage births

Both the rate of young people in out-of-home care and the rate of teenage births are specific to young people. This means we cannot compare how things have changed for different age bands in the same way as for other indicators. Instead we include these two indicators only as part of the absolute index for the 25-34 age group, as a way of recognising their importance for younger members of society.

Rate of young people in out-of-home care

Young people with a history of out-of-home care are believed to be at elevated risk of poor social outcomes, including homelessness, criminality, poor health and low educational attainment (Campo and Commerford, 2016, Miller and Dixie, 2018).

Figure 36 – Indicator: Out-of-home care rates per 100,000



Source: AIHW Child Protection Australia

Out-of-home care rates have increased and we regard this as a deteriorating trend in the index. It is commonly accepted that there is no reliable information about the prevalence of abuse and neglect but that Child Protection statistics are the best available indicator.

As per the AIHW Child Protection Australia 2017–18 report the number of children receiving Child Protection services has increased, as have the number of notifications, investigations and substantiations as well as the number of young people in out-of-home care.

The rate of children in out-of-home care has increased steadily from 360 children per 100,000 to 870 in 2017 before a slight dip to 820 in 2018.

Over the last five years, the rates of admission to and discharge from out-of-home care have been stable, although the admission rate is higher than the discharge rate. This gives a slight growth to the rate of young people in out-of-home care.

Rates of out-of-home care among young Aboriginal and Torres Strait Islanders is much higher than the population average and has also been increasing faster than for young non-Indigenous children. In 2010, the rate was eight times higher for young Aboriginal and Torres Strait Islanders. In 2018 it was eleven times higher (59 per 1,000 Aboriginal and Torres Strait Islander children compared to 5.2 per 1,000 non-Indigenous children).

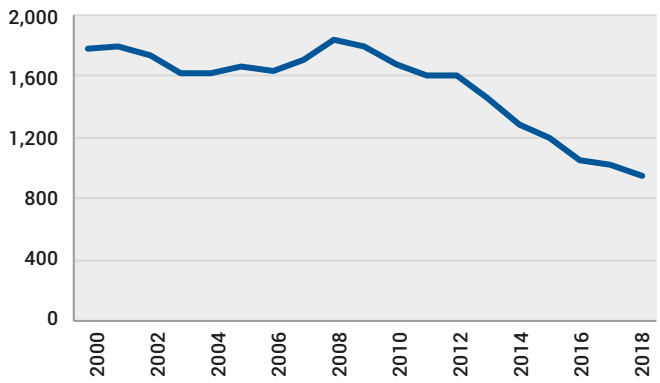
Rates of out-of-home care among young Aboriginal and Torres Strait Islanders is much higher than the population average.

Teenage births

Teenage births are often (but importantly, not always) associated with poor outcomes. In some cases, unplanned teenage births correspond to lower educational attainment and poorer long-term economic outcomes if people cannot complete education. Age at giving birth can also be a risk factor for both maternal and perinatal outcomes.

The rate of teenage births has decreased over the last 10 years. This trend is also seen in other developed countries and we recognise this trend as improvement in the index. In fact, the teenage birth rate has nearly halved since 2000, from 18 births to mothers aged 15-19 per 1,000 females in 2000 to 9.5 births in 2018.

Figure 37 – Indicator: Teenage births per 100,000



Source: 2000-2005 AIHW Australian Mothers and Babies 2006-2015 AIHW Children's Headline Indicators

The decline in teenage birth rates is thought to be the result of increased availability of contraception and improved sexual education.

Supporting this, the rate of terminations is thought to have also decreased. While national statistics are not collected, South Australia Health reports the rate of terminations in South Australia as part of their Pregnancy Outcomes in South Australia annual report. Terminations decreased from about 20 per 1,000 women aged 15-19 in 2000 to 7.6 per 1,000 women aged 15-19 in 2017.

Teenage birth rates are five-to-six times higher among Aboriginal and Torres Strait Islander women. The decreasing trend over time is still present, with the birth rate per 1,000 Aboriginal and Torres Strait Islander women aged 15-19 decreasing from 70 in 2006 to 52 in 2015.

6.5 Education

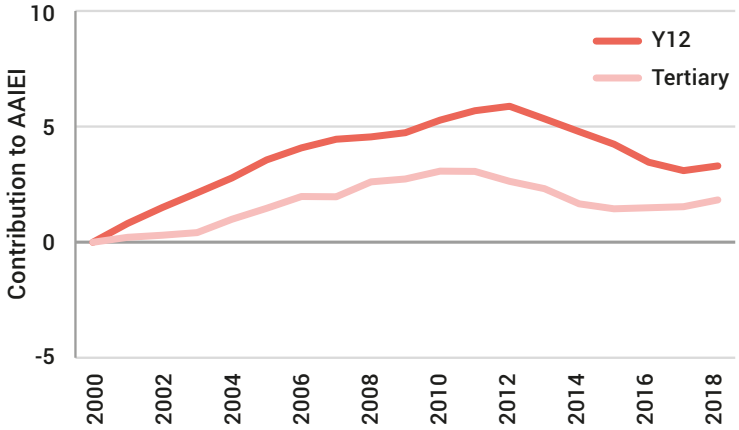
Education at all levels is important for a modern economy and cohesive society. Better access to childcare and education boosts workforce participation, productivity and living standards over the medium- to long-term. It is good news then that education outcomes have greatly improved over the past 20 years. Figure 38 shows the contribution of each education indicator to the AAIEI results. The rapid growth in educational attainment for younger

Education indicators

- **Year 12 completion rate**
- **Percentage with tertiary qualifications**

people helped close the gap between 2000 and 2012, but the trend has reversed somewhat as attainment amongst older generations has started to catch-up more quickly.

Figure 38 – Contribution of education indicators to the intergenerational equity difference between 25-34 age band and 65-74 age band (3-year moving average)



6.5.1 School education

High school completion through to Year 12 has long been a government priority. The attainment rate is the proportion of all estimated Year 12 students who meet the requirements of a Year 12 or equivalent qualification. This rate has been steadily increasing over the last few decades (AIHW, 2019).

In the overall population, the proportion of individuals with at least a Year 12 education has increased from 56 per cent in 2000 to 70 per cent in 2019. However, the chart on the right illustrates a clear generational difference in Year 12 completion rates, which were much lower when those now aged 45-54 or 65-74 were of secondary school age.

The Council of Australian Governments (COAG) has endorsed national targets to increase the Year 12 attainment rate in Australia. The target to lift the Year 12 or equivalent (including Certificate III) attainment rate of those aged 20–24 to 90 per cent by 2020 is on track (Productivity Commission (PC), 2017).

Performance is trickier to gauge than completions. Some evidence suggests Australia's performance in literacy, science and maths is declining over time. For example, the 2018 Programme for International Student Assessment report

Figure 39 – Indicator: Proportion with Year 12 completion

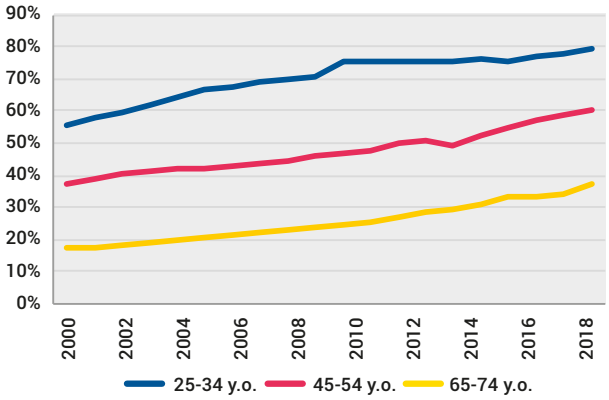
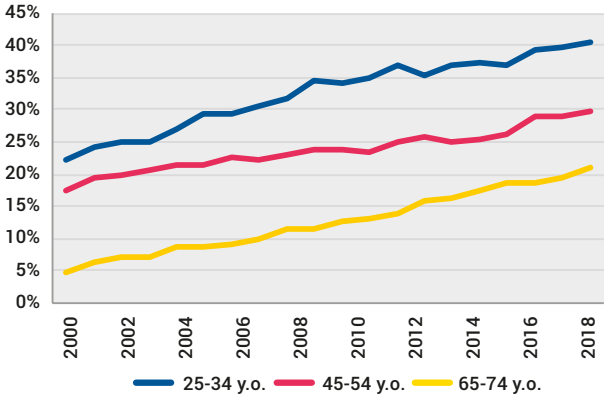


Figure 40 – Indicator: Proportion with a bachelor's degree



Source: ABS Education and Work, Australia, May 2019

raised concerns across the nation, with Australian students recording their lowest results since this form of international testing began. It also highlights some of the education gaps for lower socioeconomic groups and as well as for Indigenous students (Thomson et al., 2019). Governments have generally recognised the need to improve student results. One issue, identified even before the release of these results, relates to teachers having to teach subjects outside their trained field. The PC (2017) recommended that Australian governments should address teaching out of field within a tight timeframe and improve the skills and effectiveness of the existing teacher workforce (PC, 2017).

6.5.2 Education – University education

A 'knowledge economy' requires good access to higher education. While there are important questions as to the right mix of training institutions (across the vocational education and training [VET] sector versus the university sector), the PC (2017) predicts that the university sector will become the key vehicle for skills formation in the economy. We therefore regard increasing rates of university qualification as a positive.

The proportion of Australians aged 20-34 with a bachelor's degree or higher tertiary education qualification has increased 50 per cent over the past 15 years, from 23 per cent in 2004 to 34 per cent in 2019. Government policy has supported university access in many ways, including an income-contingent loan system and direct funding to universities.

Education has been improving for the young- and middle-age groups, although gaps remain for lower socioeconomic groups.

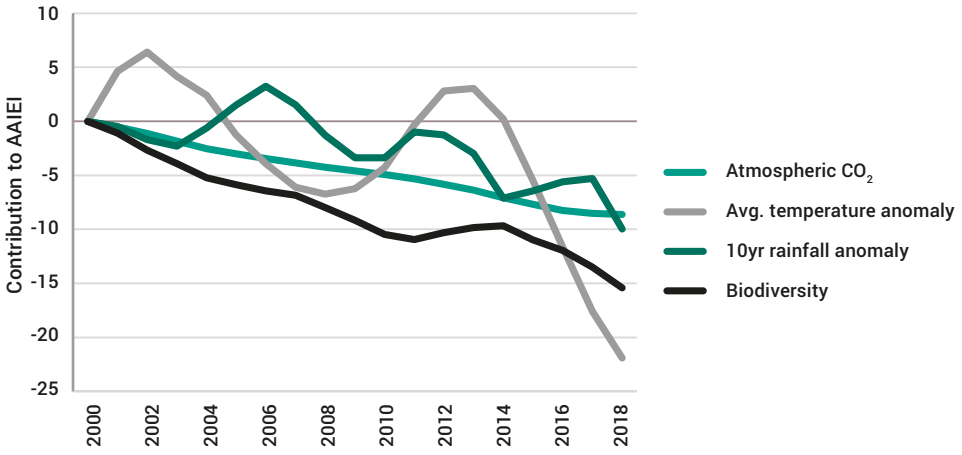
6.6 Environment

The environment has had a significant negative impact on intergenerational equity as all selected indicators show worsening trends over the 20-year reference period. The environment is often interpreted as a heavily intergenerational issue, as younger generations inherit a planet with increasingly poor environmental outcomes that often cannot be reversed. Figure 41 shows the contribution of each environmental indicator to the AAIEI results.

Environment indicators

- **Atmospheric CO_2 concentration**
- **Average 5-year mean temperatures**
- **Murray-Darling Basin rainfall**
- **Number of threatened, endangered or extinct species**

Figure 41 – Contribution of environmental indicators to the intergenerational equity difference between 25-34 age band and 65-74 age band (3-year moving average)



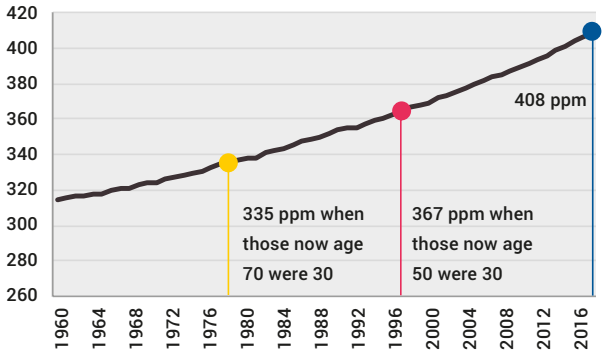
Experts note the urgency of addressing some environmental issues. For example, increasing rates of extreme events (such as cyclones and bushfires) are already apparent, whereas climate policy and adaptation measures have been slower to evolve.

Environmental indicators obviously cannot be split by age band like other indicators in the index. Instead, we have compared the indicator experienced by the 25-34 age band today to what the current 45-54 age band experienced 20 years prior and the 65-74 age band 40 years prior.

6.6.1 Cumulative Atmospheric CO_2

Carbon Dioxide Global temperature is reasonably estimated to change linearly with respect to cumulative CO_2 emissions over time. In other words, for a specific amount of cumulative CO_2 emissions, a known global temperature change (within a range of uncertainty) can be expected (Matthews et al., 2009). The brunt of the impacts of global temperature change will be borne by future generations. So, increasing cumulative atmospheric CO_2 reduces intergenerational equity.

Figure 42 – Indicator: Carbon Dioxide concentration (parts per million in air at Cape Grim, Tasmania)



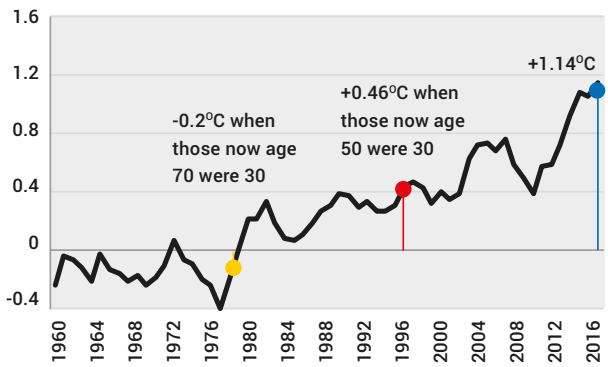
Source: http://capegrim.csiro.au/

The monthly mean baseline of CO_2 parts per million at Cape Grim[21] has steadily increased over time from 367 ppm in 2000 to 407 ppm in 2019.

6.6.2 Average annual temperature anomaly

The average annual temperature anomaly versus the 1961-1990 average, a measure of how much the temperature has changed from the standardised averages across Australia, shows temperatures rising.

Figure 43 – Indicator: Temperature anomaly (versus 1961-1990 average temperatures), 5 year rolling average



Source: www.bom.gov.au/climate/change

21 The Cape Grim station on the north-west tip of Tasmania is one of only three Premier Global Baseline Stations in the World Meteorological Organization's Global Atmosphere Watch program. Prevailing westerly winds mean that the air at Cape Grim has a composition representative of much of the Southern Hemisphere and is free from recent human and natural influences.

In 2000 the average annual temperature anomaly was 0.04 degrees Celsius below the 1961-1990 average, in 2019 it was 1.14 degrees Celsius above this average. Warming temperatures are viewed as undesirable in Australia. It causes greater incidence of extreme heat, particularly in summer. Extreme heat can be dangerous to health, even fatal, and increases the risk of many other adverse outcomes, such as ecosystem change. This includes increased pests, falling crop yields and bushfires.

Bushfires over the summer of 2019-2020 resulted in the exposure of an estimated 11.3 million Australians to hazardous levels of air pollution (Biddle et al., 2020) – these events are between 30 and 80 per cent more likely in the future due to climate change (van Oldenborgh et al., 2020).

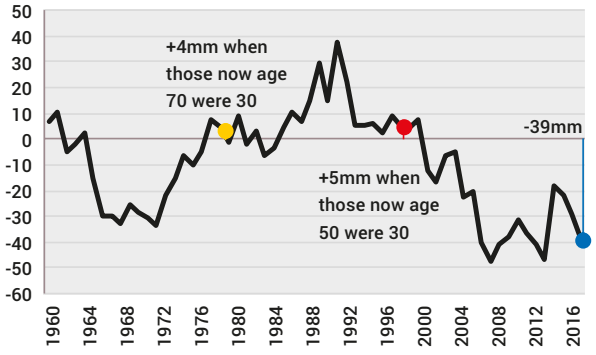
This indicator partly duplicates the CO_2 measure but we have included both. CO_2 is a lead indicator of future climate changes, whereas the temperature indicator in the index measures different generations' lived experience.

6.6.3 Rainfall anomalies

The State of the Climate 2018 (BOM and CSIRO, 2018) report notes that Australia is projected to experience:

- Further increases in sea and air temperatures, with more hot days and marine heatwaves and fewer cool extremes.
- Further sea level rise and ocean acidification.
- Decreases in rainfall across southern Australia with more time in drought, but an increase in intense heavy rainfall throughout Australia.

Figure 44 – Indicator: Rainfall anomaly (mm versus 1961-1990 average), Murray Darling Basin, southern wet season (April to November), 10 year rolling average



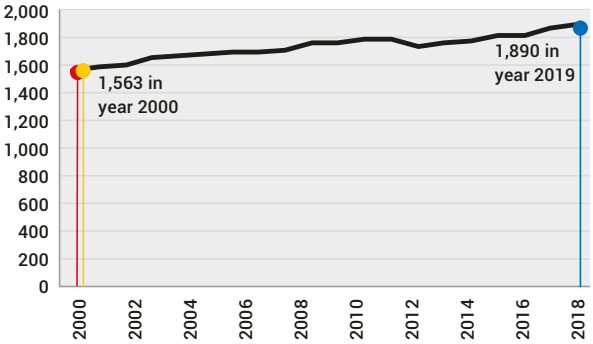
Source: www.bom.gov.au/climate/change

For the AAIEI, we have incorporated rainfall anomalies recorded by the Bureau of Meteorology for winter (April to November) in the Murray-Darling Basin catchment area. This season generally has higher rainfall and, therefore, is important to agriculture across Eastern Australia. While rainfall is more variable over time than average temperature, the fall observed over the last 20 years is consistent with climate model predictions.

6.6.4 Biodiversity

Australia's biodiversity is important to individuals, society and the economy. Biodiversity is a core part of Australians' national identity, culture and way of life. Biodiversity supports human health as it is integral to clean air and water, food, medicines, timber, fuels and genetic materials.

Figure 45 – Indicator: Number of extinct, threatened, or endangered species



Source: www.environment.gov.au/cgi-in/sprat/public/sprat.pl

In economic terms, in 2010 the rivers, wetlands and flood plains of the Murray-Darling Basin were thought to provide $187 billion in ecosystem services annually and terrestrial ecosystems up to $325 billion per year. Biodiversity-related industries also contribute significantly and directly to the Australian economy: it has been estimated that, per year, Australia's commercial fisheries are worth $2.2 billion, kangaroo harvesting is worth $245 million; bushfood production is worth $100 million, and wildflower exports are worth $30 million[22].

The cost in monetary terms of lost biodiversity is significant but difficult to measure (because costs associated with environmental, health or social impacts are difficult to value), however it is clear that a loss of biodiversity will mean future generations will not experience the same positive benefits from Australia's environment as past generations.

The Environment Protection and Biodiversity Conservation Act tracks extinct and threatened species in Australia. Since 2000, the number of species recorded has increased 21per cent (from 1,563 species to 1,890) and the rise in threatened species does not appear to be slowing.

6.6.5 Other aspects of environmental change

Based on expert scientific findings, the Institute recognises that climate change is expected to have major environmental, economic and social impacts. It poses a serious risk to the industries and financial institutions that actuaries advise (Actuaries Institute, 2019c). Accordingly, most of the measures selected in this domain relate to climate change. Also, it is for this reason that in 2018 the Actuaries Institute launched the Australian Actuaries Climate Index which tracks changes in **extreme** weather and sea levels over time[23]. We have not used extreme events as an indicator in our index, but this represents an important lens when considering implications for natural disasters and insurance risk.

We acknowledge, however, that some positive environment outcomes have been achieved over the decades. Levels of carbon monoxide and sulphur dioxide in Australian capital cities have improved with better emissions and pollutant standards (Barnett, 2012). While we do not want to understate these gains, the lack of a consistent policy to reduce Australia's carbon emissions in the past decade represents a very large intergenerational issue that warrants attention.

There are many other indicators that could have been included. Land cover, in particular, was considered but not used due to data availability and its very slow-changing nature. The ABS 2018 Australian Environmental-Economic Accounts reported experimental values for land cover change between 2001/2002 to 2010/2011. It found wood tree coverage and herbaceous coverage had decreased but woody shrubs had increased.[24]

22 www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article12009%E2%80%9310?opendocument&tabn
23 See https://www.actuaries.asn.au/microsites/climate-index
24 https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4655.0Main+Features12016?OpenDocument

7 Policy implications

The AAIEI summarises how the relative wealth and wellbeing (across the economic, housing, health, social, education and environmental domains) of those aged 25-34 and 45-54 has fallen compared with those aged 65-74 over the last 20 years. While on some measures Australians of all ages are better off today than 20 years ago, the older generation's wealth and wellbeing has improved significantly more than the younger generation's wealth and wellbeing and, in some cases, the younger age groups have seen regress. The relative wealth and wellbeing of those aged 25-34 sits lower than any other time in the past two decades. The AAIEI finds that the wealth effects of the housing boom plus rapid increases in government payments on pensions and services for older people are the key reasons that young Australians today have relatively lower wealth and wellbeing than that of their parents at a similar age. This is consistent with research by the Grattan Institute (2018).

The numbers in this report demonstrate the role played by public policy in increasing or reducing intergenerational equity.

The numbers in this report demonstrate the role played by public policy — especially the tax and transfer system (including social security), and housing and employment policies — in increasing or reducing Intergenerational Equity. The evidence shows that social security, housing and employment policies impact the level of intergenerational equity now and into the future. For example, one of the key drivers of the relative and absolute improvement in wealth and wellbeing for older generations reflected in the AAIEI is government spending on those aged 65-74 which is estimated to have grown from 3.7 per cent of GDP to 4.5 per cent of GDP. This suggests a growing generational gap in government spending induced by a combination of demographics and increased spending on age-specific factors such as aged care, health care and the age pension.

7.1 Key policy challenges

This report has focused on intergenerational equity, but it is not possible to discuss policy challenges from a purely intergenerational perspective. Policymakers face a number of other key long-term challenges, three of which we briefly describe below.

Population, productivity and participation

The ageing of the Australian population is likely to be an increasing drag on economic growth over the medium- to long-term. Australians are expected to live longer and to do so in better health; however, the proportion of the

population participating in the workforce is expected to decline as a result of population ageing. A lower proportion of Australians working, having to fund increasing aged care and age pension expenditure, will mean lower economic growth in future years. High immigration rates have postponed this issue for Australia; they have helped offset the effect of ageing (and are more readily within the government's control than the third driver of population – the birth rate).

High levels of productivity growth would be required to offset the drag ageing will place on the economy. Productivity improvements have been declining, however, with Australia recently posting its lowest level of productivity improvement in 25 years (PC, 2020).

> *"Productivity isn't everything, but, in the long run, it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker."* — Paul Krugman

The AAIEI and indicator results highlight a key dynamic underlying this challenge: relative to other ages, those aged 65-74 are the only generation with higher absolute wealth and wellbeing (as measured by the AAIEI) in 2018 than in 2000 (driven largely by increases in government spending, generous tax concessions and increased housing wealth). At the same time, the absolute wealth and wellbeing of those aged 25-34 and 45-54 declined from 2000 to 2018. Put simply, policies that advance the needs of older Australians while those of working age go backwards, are not sustainable.

Over the long run, collected taxes need to be able to support government spending on all Australians. Policy solutions to this challenge tend to fall into one of two buckets: reforming the tax and transfer system and/or enhancing productivity. Dawson and Smith (2018) modelled how the tax and transfer system operates across different income quintiles and calculated the cost of foregone tax revenue from the wealthiest 20 per cent of Australians is over $68 billion per annum ($21 billion of which relates to concessional taxation of superannuation). They conclude that changes to the tax and transfer system should focus on the cost of subsidising the accumulation of wealth by Australians, not on reducing government spending supporting our least wealthy citizens.

Alternative policy approaches to this challenge focus on improving productivity. The 2017 Productivity report (PC, 2017) highlighted a range of options with significant potential for productivity enhancement, such as improving chronic health management, improving teaching and learning, and managing population growth in cities. Polices of this nature are win-win if they improve the absolute wealth and wellbeing of Australians, at the same time as they increase productivity.

Improving participation can also be an important driver of economic growth. As above, Australia faces an ageing population that is expected to reduce participation. Supporting and incentivising older Australians to continue to participate meaningfully in the workforce will be important for overall productivity. Continuing efforts to increase female participation in the workforce will also help overall productivity. Recent positive trends in the gender pay gap (Section 6.4.4) may incentivise increased female participation, however, ABS data shows that childcare remains the biggest challenge to higher female participation (ABS, 2017).

Climate change and the environment

While the current global focus is on COVID-19, climate change and the environment remain urgent and important areas requiring policy attention. Section 6.6 shows that over the last twenty years, biodiversity loss, temperature increases, low levels of rainfall and atmospheric carbon dioxide levels have all worsened. Events like the bushfires that affected large parts of Australia over the summer of 2019-2020 and resulted in the exposure of an estimated 11.3 million Australians to hazardous levels of air pollution (Biddle et al., 2020) are between 30 and 80 per cent more likely in the future due to climate change (van Oldenborgh et al., 2020).

Investing in the transition of the Australian economy to one less reliant on fossil fuels is an opportunity to simultaneously improve intergenerational equity, create a healthier future environment and stimulate economic growth through infrastructure investment. For example, government spending on renewable energy and energy efficiency has been shown to create about three times more jobs than spending on fossil fuels (McKinsey, 2020).

Housing

Section 6.2 highlighted some of the challenges with the housing market in Australia. Young people are essentially locked out of buying homes. Older people renting have the highest rates of poverty in the country (Section 6.1.2). There are interacting issues that make housing particularly problematic in Australia. The means test for the Age Pension creates perverse incentives by exempting the family home (Actuaries Institute 2019a) and discouraging older people from releasing the wealth tied to their property (there are few private equity release products and the Government's Pension Loans Scheme has had a low take-up rate). Improved mechanisms for releasing wealth tied to the family home would also reduce the need for governments to support 'asset rich but income poor' retirees.

7.2 Options for reform

The focus of the paper is to measure and illustrate trends in intergenerational equity, rather than propose a new suite of policy solutions. The breadth of the indicators also inhibits detailed exposition of policy design. However, significant thinking on policy has already been done by others that either directly or indirectly address the issues raised. Therefore, we have mapped many of the issues to these policy options and highlighted previous work done on potential reforms. These options are summarised in Table 5.

Table 5 – Summary of policy options that address issues raised in the AAIEI

Issue highlighted	Policy options to address	Evidence base
Economic – Youth underutilisation	• Review rate of unemployment benefits. • Better targeting of vocational education to growth areas.	ACOSS and UNSW (2020)
Economic – Growth in wealth disproportionately to older generations	• Increase the Age Pension eligibility age to reflect increases in life expectancy (with appropriate carve-outs for people with poor health). • Relatedly, reduce the gap between superannuation preservation age and the Age Pension eligibility age to reflect increases in life expectancy (with appropriate carve-outs for people with poor health). • Tightening and targeting of superannuation tax concessions and/or removing overly generous concessions from wealthy retirees. • Include the value of a retiree's principal residence in the Age Pension means tests, whether in its entirety or above a threshold. • Consider tax treatment of end-of-life bequests and gifts. • Increase the availability of products that efficiently allow retirees to draw down their net wealth (including housing wealth) and also insure retirees against longevity risk, health shocks, long-term care needs, etc.	Cowan (2014) Actuaries Institute (2016) Actuaries Institute (2019a) Actuaries Institute (2020a) Dawson and Smith (2018) CEDA (2019) Wood et al. (2019)
Economic – Government expenditure and the dependency ratio	• Increasing childcare rebates would reduce the income 'traps' facing second earners (mainly women) when they increase the number of days a week they work. • Increasing availability of out-of-school-hours care to encourage parental labour force participation. • Continued focus on primary and secondary education, teacher training and improving educational outcomes. • Implement tax policies aimed at keeping older people in the workforce (e.g. the Mature Age Worker Tax Offset and Senior Australians Tax Offset).	Wood et al. (2019) OECD (2011) Australian Human Rights Commission (2012) Treasury (2015)
Economic – Productivity and infrastructure	• Continue to consider productivity-enhancing reform, including chronic health management, improving teaching and learning and managing population growth in cities. • Require independent project assessments of government infrastructure investment above a certain threshold to ensure benefits exceed costs.	Productivity Commission (2017) Wood et al. (2019)
Housing – Affordability and ownership for younger Australians	• Replacing stamp duty with a land tax to remove the tax burden of 'right-sizing' a household's home. • Maintain supply of social and affordable housing in line with population growth. • Improve support for low-income renters, such as increasing Commonwealth Rental Assistance in line with increases in average rents. • Review state-based residential tenancy laws to improve certainty of tenure for vulnerable tenants.	Henry et al. (2009) Productivity Commission (2019)
Health – Life expectancy and mental health challenges	• Increased spending on mental illness prevention and intervention. This may include the use of risk-based forecasting tools to help identify those most at risk of mental illness. • The Government consider a role for private health insurers – or another party – to help Australians effectively navigate the health system, which at times is complex and disjointed. • Reform private health insurance to improve sustainability.	Productivity Commission (2019b) Actuaries Institute (2019b) Duckett and Cowgill (2019) Obesity Policy Coalition (2018)
Health – Rising obesity	• Continue to monitor international evidence on the effectiveness of sugar taxes. • Consider further enhancement to food star ratings, including treatment of foods with added sugars.	Wilson and Hogan (2017) Duckett et al. (2016)

Table 5 – Summary of policy options that address issues raised in the AAIEI (continued)

Social	• Consider greater use of home detention as an alternative to incarceration. • Housing-first initiatives to tackle chronic homelessness.	Belur et al (2017) Williams and Weatherburn (2019) Baxter et al. (2019) Pleace (2018) AHURI (2018)
Education	• Gonski type funding models for disadvantage. • Improve educational outcomes of school students by addressing out-of-field teaching and continuing reforms to improve the quality and effectiveness of teachers.	Gonski et al. (2011) Gonski et al. (2018) Productivity Commission (2017)

Environment	• Implement a carbon emissions reduction strategy that meets global commitments and provides investment certainty for business, and do so in collaboration with countries to deliver effective mitigation of greenhouse gas emissions on a global basis.
	• Greater activity to prepare for and adapt to climate change:
	  • property damage prevention for natural disasters,
	  • better recognition of natural disasters in land planning decisions and updating building codes, and
	  • maintenance of infrastructure that protects against natural peril damage.
	• Consider increased use of natural environment accounting, to recognise the environment's value to quality of life.
		Garnaut (2008)
		Actuaries Institute (2019c)
		Actuaries Institute (2020b)
		Paddam (2020)
		Interjurisdictional Environmental-Economic Accounting Steering Committee (2018)

7.3 Final thoughts

Any honest reflection of intergenerational issues must recognise the mixed nature of trends, which we have attempted to reflect in both our index and related discussion. Overall, the index suggests that, while wealth and wellbeing have been improving on average for those aged 65-74; younger- and middle-aged generations increasingly face a range of challenges that have reduced their wealth and wellbeing. There are several remedies, many of which are within the power of government, to address the issues that we have identified. There are interdependencies between both domains and indicators. For example, reducing youth underutilisation would improve the equity of growth in wealth between older and younger generations. In turn, this would likely improve housing affordability and ownership for younger generations.

The AAIEI is intended to provide an objective foundation upon which such public policy discussions can be had. Ultimately, greater strength for Australia's younger and middle-aged generations represents a stronger future for Australia, both economically and more broadly.

EMBARGO COPY LIMITED CIRCULATION NOT TO BE PUBLISHED UNTIL MONDAY 17.8.20

References and Appendices

References

1. ABS (Australian Bureau of Statistics) (2008). 4326.0 – *National Survey of Mental Health and Wellbeing: Summary of Results, 2007*. Available at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4326.0Main+Features32007?OpenDocument
2. ABS (Australian Bureau of Statistics) (2017). 6239.0 – *Barriers and Incentives to Labour Force Participation, Australia, July 2016 to June 2017*. Available at: https://www.abs.gov.au/ausstats/abs@.nsf/mf/6239.0
3. ABS (Australian Bureau of Statistics) (2019). *Participation, Job Search and Mobility, Australia, Feb 2019, Cat. 6226.0*. Australian Bureau of Statistics. Available at: https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/6226.0Mai n%20 Features4Feb%202019
4. ACOSS and UNSW (2020). *Poverty in Australia 2020 – Part 1: Overview*. Available at: http://povertyandinequality.acoss.org.au/wp-content/uploads/2020/02/Poverty-in-Australia-2020_Part-1_Overview.pdf [Accessed 12th March 2020]
5. Actuaries Institute White Paper (2012). *Australia's Longevity Tsunami – What Should We Do?* Actuaries Institute White Paper – August 2012. Available at: https://actuaries.asn.au/Library/Submissions/Opinion/2012/AI-WP-Longevity-WEB050912.pdf
6. Actuaries Institute (2016). *Unlocking housing wealth – Options to meet retirement needs*. Actuaries Institute. Available at: https://www.actuaries.asn.au/Library/Opinion/2016/AIHOUSINGGPwebMres.pdf
7. Actuaries Institute (2019a). *Options for an Improved and Integrated System of Retirement*. Actuaries Institute. Available at: https://www.actuaries.asn.au/public-policy-and-media/thought-leadership/green-papers/options-for-an-improved-and-integrated-system-of-retirement
8. Actuaries Institute (2019b). *How to make private health insurance healthier*. Actuaries Institute. Available at: https://www.actuaries.asn.au/public-policy-and-media/thought-leadership/green-papers/how-to-make-private-health-insurance-healthier
9. Actuaries Institute (2019c). The Dialogue – *The impact of climate change on mortality and retirement incomes in Australia*. Available at: https://actuaries.asn.au/public-policy-and-media/thought-leadership/the-dialogue/the-impact-of-climate-change-on-mortality-and-retirement-incomes-in-australia
10. Actuaries Institute (2020a). The Dialogue – *Spending in retirement and the taper rate*. Available at: https://www.actuaries.asn.au/public-policy-and-media/thought-leadership/the-dialogue/spending-in-retirement-and-the-taper-rate
11. Actuaries Institute (2020b). *Actuaries Institute Submission to Royal Commission into National Natural Disaster Arrangements*. Available at: https://www.actuaries.asn.au/Library/Submissions/2020/NaturalDisasters.pdf
12. AHURI (2018). *What is the Housing First model and how does it help those experiencing homelessness?* AHURI policy brief., Available at: https://www.ahuri.edu.au/policy/ahuri-briefs/what-is-the-housing-first-model
13. AIHW (2016) *Australia's Health*. Available at: https://www.aihw.gov.au/getmedia/9844cefb-7745-4dd8-9ee2-f4d1c3d6a727/19787-AH16.pdf.aspx?inline=true
14. AIHW (2020) *Australia's children*. Available at: https://www.aihw.gov.au/reports/children-youth/australias-children/contents/health/overweight-and-obesity
15. Australian Human Rights Commission (2012). *Working past our 60s: Reforming laws and policies*. Available at: https://www.humanrights.gov.au/our-work/working-past-our-60s-reforming-laws-and-policies-2012
16. Australian Youth Development Index (2016). Available at: http://www.youthaction.org.au/australian_yd
17. Balestra, C., Boarini, R., Tosetto, E. (2018) *What Matters Most to People? Evidence from the OECD Better Life Index Users' Responses*. Social Indicators Research 136, 907–930 (2018). https://doi.org/10.1007/s11205-016-1538-4
18. Bangham, G. et al. (2019). *Intergenerational Audit 2019*. Resolution Foundation, June 2019
19. Baxter, A. J., Tweed, E. J., Katikireddi, S. V., & Thomson, H. (2019). Effects of Housing First approaches on health and wellbeing of adults who are homeless or at risk of homelessness: Systematic review and meta-analysis of randomised controlled trials. *J Epidemiol Community Health, 73*(5), 379-387.

20. Biddle, N., Edwards, B., Herz, D., Makkai, T. (2020). *Exposure and the impact on attitudes of the 2019-20 Australian Bushfires*. ANU Centre for Social Research and Methods. Available at: https://csrm.cass.anu.edu.au/sites/default/files/docs/2020/2/Exposure_and_impact_on_attitudes_of_the_2019-20_Australian_Bushfires_publication.pdf
21. Bishop, J., & Cassidy, N. (2017). Insights into low wage growth in Australia. *RBA Bulletin*, March, 13-20.
22. BOM and CSIRO (2018). *State of the Climate 2018*. Available at: http://www.bom.gov.au/state-of-the-climate/State-of-the-Climate-2018.pdf
23. CEDA (2019). *Sustainable budgets: Underwriting Australia's social compact*. https://www.ceda.com.au/News-and-analysis/Media-releases/CEDA-report-rebalance-the-tax-base-and-boost-transparency-to-balance-future-federal-budgets
24. Center for Mental Health Services; National Institute of Mental Health (US). (2001). *Mental Health: Culture, Race, and Ethnicity: A Supplement to Mental Health: A Report of the Surgeon General. Chapter 2 Culture Counts: The Influence of Culture and Society on Mental Health*. Available at: https://www.ncbi.nlm.nih.gov/books/NBK44249/
25. CEPAR (ARC Centre of Excellence in Population Ageing Research) (2019). *Housing in an ageing Australia: Nest and Nest Egg?* CEPAR Research Brief, November 2019.
26. Cokis, T. & McLoughlin, K. (2020). *Demographic Trends, Household Finances and Spending*. https://www.rba.gov.au/publications/bulletin/2020/mar/pdf/demographic-trends-household-finances-and-spending.pdf
27. Davidson, P., Saunders, P., Bradbury, B., & Wong, M. (2018). *Poverty in Australia, 2018*. ACOSS/UNSW Poverty and Inequality Partnership Report No. 2. Sydney, NSW: ACOSS.
28. Djalalinia S, Qorbani M, Peykari, N., & Kelishadi, R. (2015). *Health impacts of Obesity*. Pak J Med Science. 31(1):239–242. doi:10.12669/pjms.311.7033
29. Dodge, R., Daly, A., Huyton, J., & Sanders, L. (2012). *The challenge of defining wellbeing. International Journal of Wellbeing*. doi: 10.5502/ijw.v2i3.4.
30. Duckett & Cowgill (2019). *Saving private health 2: Making private health insurance viable*. Available at: https://grattan.edu.au/wp-content/uploads/2019/12/926-Saving-Health-2.pdf
31. Duckett, S., Swerissen, H., & Wiltshire, T. (2016). *A sugary drinks tax: Recovering the community costs of obesity*. Grattan Institute. Available at: https://grattan.edu.au/report/a-sugary-drinks-tax-recovering-the-community-costs/
32. Garnaut, R. (2008). *The Garnaut climate change review*. Cambridge, Cambridge.
33. Gonski, D., Arcus, T., Boston, K., Gould, V., Johnson, W., O'Brien, L., & Roberts, M. (2018). Through growth to achievement: Report of the review to achieve educational excellence in Australian schools. Canberra: Commonwealth of Australia.
34. Gonski, D., Boston, K., Greiner, K., Lawrence, C., Scales, B., & Tannock, P. (2011). *Review of funding for schooling: Final report*. Canberra: Department of Education, Employment and Workplace Relations.
35. Gilfillan, G. (2019). *The extent and causes of the wage growth slowdown in Australia*. Available at: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1819/WageSlowdown
36. Greenfield, A., Miller, H., & McGuire, G. (2016). *Valuation of the Benefit System for Working-age Adults as at 30 June 2016*. Prepared for the New Zealand Ministry of Social Development and available at https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/evaluation/valuation-reports/valuation-benefit-system-working-age-adults-30-june-2016.pdf
37. Hannan-Morrow, S., & Roden, J. (2014). *Gender, Age and Generational Effects on Turnout in Australian Federal Elections*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2440487
38. Harmer, J. (2009). *Pension Review Report*. Available at: https://www.dss.gov.au/sites/default/files/documents/05_2012/pensionreviewreport.pdf
39. Henry, K., Harmer, J., Piggott, J., Ridout, H., & Smith, G. (2009). *Australia's future tax system. Report to the Treasurer, December 2009*. Available at: https://treasury.gov.au/review/the-australias-future-tax-system-review/final-report

References (continued)

40. Interjurisdictional Environmental-Economic Accounting Steering Committee for the Meeting of Environment Ministers (2018). *Environmental Economic Accounting: A Common National Approach Strategy and Action Plan*, Commonwealth of Australia. Available at: https://eea.environment.gov.au/about/national-strategy-and-action-plan
41. Johansson, A. (2016). *Public Finance, Economic Growth and Inequality: A Survey of The Evidence*. Economics Department Working Paper No. 1346. OECD Publishing.
42. Krugman, P. (2013). *Cheating our children*. New York Times. Available at: www.nytimes.com/2013/03/29/opinion/krugman-cheating-our-children.html
43. Leach, J., Broeks, M., Ostensvik, K., & Kingman, D. (2016). *European Intergenerational Fairness Index: A crisis for the young*. Intergenerational Foundation. London. Available at: http://www.if.org.uk/wp-content/uploads/2016/03/European-Intergenerational-Fairness-Index_Final-2016.pdf
44. Ludlow, M. (2018). *Federal Budget 2018 - Infrastructure rhetoric not matched by more money*. Australia Financial Review. Available at: https://www.afr.com/policy/economy/federal-budget-2018–infrastructure-rhetoric-not-matched-by-more-money-20180509-h0ztx9
45. Matthews, H.D., Gillett, N.P.; Stott, P. A., & Zickfeld, K (2009). *The proportionality of global warming to cumulative carbon emissions*. Nature. 459 (7248): 829–832. doi:10.1038/nature08047. PMID 19516338.
46. McKinsey (2020). *How a post-pandemic stimulus can both create jobs and help the climate*. Available at: https://www.mckinsey.com/business-functions/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate
47. Miller, H., & Dixie, L. (2018). *Analysis of future service usage for Out-of-Home-Care leavers*. Report prepared for the NSW Office of Social Impact Investment. Available at: https://www.osii.nsw.gov.au/assets/office-of-social-impact-investment/OOHC-leavers-phase-3-external.pdf.
48. Nardo, M., Saisana, M., Saltelli, A., Tarantola, S., Hoffman, A., & Giovannini, E. (2008). *Handbook on Constructing Composite Indicators and User Guide*. doi: 10.1787/533411815016.
49. Obesity Policy Coalition (2018). *Policy Brief – Improving the effectiveness of the health star rating system*. Available at https://www.opc.org.au/downloads/policy-briefs/improving-the-effectiveness-of-the-health-star-rating-system.pdf
50. OECD (2011). *Divided we stand*. Available at: http://www.oecd.org/els/soc/49170768.pdf
51. Paddam, S. (2020) *Witness statement to the Royal Commission into National Natural Disaster Arrangements*, on behalf of the Institute of Actuaries of Australia. Available at: https://www.actuaries.asn.au/Library/Submissions/2020/RCWitnessStatement.pdf
52. PC (Productivity Commission) (2013). *An ageing Australia: Preparing for the future*. Commission Research Paper, Canberra
53. PC (Productivity Commission) (2015). *Housing decisions of older Australians*. Commission Research Paper, Canberra
54. PC (Productivity Commission) (2017). *Shifting the dial: 5 year productivity review*. Commission Research Paper, Canberra
55. PC (Productivity Commission) (2018). *Rising inequality? A stocktake of the evidence*. Commission Research Paper, Canberra
56. PC (Productivity Commission) (2019). *Vulnerable private renters: Evidence and options*. Commission Research Paper, Canberra
57. PC (Productivity Commission) (2019b). *Mental health*. Productivity Commission Inquiry, draft report. Available at: https://www.pc.gov.au/inquiries/current/mental-health/draft
58. Piketty, T. (2013). *Capital in the Twenty-First Century*. Belknap Press
59. Pleace, N. (2018). *Using housing first in integrated homelessness strategies*. Report by the Centre for Housing Policy, University of York
60. Rice, J. M., Temple, J., & McDonald, P. (2014). *National transfer accounts for Australia: 2003-04 and 2009-10 detailed results*. Available at: https://openresearch-repository.anu.edu.au/bitstream/1885/12260/4/nta_report_2014_r.pdf

61. Stokes, B. (2017). *Global publics more upbeat about the economy; but many are pessimistic about children's future*. Pew Research Center, 5.
62. Swiss Re (2018). *Mortality improvement: Understanding the past and framing the future*. Swiss Re Sigma. Available at: https://www.swissre.com/dam/jcr:81871581-01f0-450a-adec-37cc5f6534e0/sigma6_2018_en.pdf
63. Swiss Re (2020). Tipping the scale? – *Intergenerational imbalances on the rise*. Swiss Re SONAR 2020. Available at: https://www.swissre.com/institute/research/sonar/sonar2020/sonar2020-intergenerational-imbalances-rise.html [Accessed June 2020]
64. Terrill, M., & Coates, B. (2016). *The Australian 'infrastructure deficit' that isn't*. Available at: https://grattan.edu.au/news/the-australian-infrastructure-deficit-that-isnt/ [Accessed April 2020]
65. Thomson, S., De Bortoli, L., Underwood, C., & Schmid, M. (2019). *PISA 2018: Reporting Australia's Results*. Volume I Student Performance. ACER
66. Treasury (2013). *Income inequality in Australia*. Available at: https://treasury.gov.au/publication/economic-roundup-issue-2-2013-2/economic-roundup-issue-2-2013/income-inequality-in-australia
67. Treasury (2015). *2015 Intergenerational Report: Australia in 2055*. Available at: https://treasury.gov.au/publication/2015-igr
68. van Oldenborgh, G. J., Krikken, F., Lewis, S., Leach, N. J., Lehner, F., Saunders, K. R., van Weele, M., Haustein, K., Li, S., Wallom, D., Sparrow, S., Arrighi, J., Singh, R. P., van Aalst, M. K., Philip, S. Y., Vautard, R., & Otto, F. E. L. (2020). Attribution of the Australian bushfire risk to anthropogenic climate change, *Natural Hazards and Earth System Sciences Discussions*, Vol. 2020, pp. 1–46, Available at: https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2020-69/
69. Wilkinson, R., & Pickett, K. (2009). *The spirit level: Why more equal societies almost always do better.*
70. Williams, J., & Weatherburn, D. (2019). *Can electronic monitoring reduce reoffending*? *IZA* Discussion Papers, No. 12122, Institute of Labor Economics (IZA), Bonn
71. Wilson, P., & Hogan, S. (2017). *Sugar taxes: A review of the evidence.* NZIER report to Ministry of Health. Available at https://think-asia.org/bitstream/handle/11540/7992/sugar_tax_report.pdf?sequence=1
72. Wood, D., Griffiths, K., and Emslie, O. (2019). *Generation gap: Ensuring a fair go for younger Australians*. Grattan Institute. Available at: https://grattan.edu.au/wp-content/uploads/2019/08/920-Generation-Gap.pdf

Appendix A – Index construction

Several choices need to be made to combine the selected indicators into the AAIEI. Index development involves a multi-stage process including consideration of indicator measurement error, data transformation, scaling, weighting and aggregation.

We produce an 'absolute' index for three age bands: 25-34, 45-54 and 65-74. The purpose of this is that an increase in the index should genuinely reflect an increase in wealth and wellbeing across the measured domains.

Our primary relative measure is the difference in the index across age bands.

A1 Measurement error

Many of the AAIEI components are based on surveys that are subject to measurement error. This comes from two sources: sampling error and non-sampling error. Sampling error reflects the difference between an estimate derived from a sample survey and the 'true value' that would be obtained if the whole population was surveyed. Non-sampling error is all other errors in the estimate. Some examples of causes of non-sampling error are non-response, a badly designed questionnaire, respondent bias and processing errors.

We have considered errors in the selection of components but have not attempted explicit corrections for series. This means our numbers will generally be consistent with the source information, often the ABS.

A2 Transformation

In several instances it is necessary to transform the raw data underlying an indicator to make it more relevant for the AAIEI. A common example is converting numbers of events into a rate to control for changes in the size of the population.

A3 Imputation and extrapolation

Some series are reported less frequently than annually. For imputation (missing time points in the middle of the series with before and after values available) we have generally used straight-line imputation. For extrapolation (cases where data does not extend back to 2000 or forward to 2018) we have used judgement to extend trends where appropriate.

A4 Timing

Many of the index components are only updated annually (or even less frequently). For this reason we have reported the index on an annual basis, which takes the data available for that year and the closest to 30 June in cases where multiple points exist.

In many instances the relevant 2019 figure was not available at the time of writing. We have presented results to 2018 to make this explicit in cases where 2019 data is available for a component, we include the longer series in the discussion.

A5 Standardisation

Each indicator will have different measurement units; taking the average of net wealth, incarceration rates and carbon dioxide concentration would be nonsensical. To produce an index, it is necessary to standardise each indicator to make it unitless before it is combined with other indicators. We do this using z-score standardisation which subtracts a mean (μ) and divides by the standard deviation (σ) of a time series:

$$\textit{Standardised component } x'(t)=(x(t)-\mu)/\sigma$$

The effect of this is that each component has a roughly even influence on the index within their domain. For components that have a bundle of time series (e.g. for net wealth we have a time series for each of three age cohorts) we take the mean and standard deviation within each time series and then average across the bundle.

The two exceptions to the above approach above are:

- Government net debt – we use a higher standard deviation to recognise the significantly larger variation in the ratio internationally.
- Rental costs – weighted by the 1-home ownership rate to reflect that any changes will have a greater impact on groups with low rates of home ownership.

For future updates, the mean and standard deviation for each indicator is intended to remain fixed based on the 2000 to 2018 reference period.

The approach to standardisation puts variables with different absolute levels and distributions onto the same scale. For example, standardisation puts incarceration rates (which are very low in absolute terms) and obesity rates (which are an order of magnitude higher than incarceration rates) on similar scales. A doubling of incarceration rates will be of comparable significance in the index as a doubling of the obesity rate, even though the obesity rate change affects far more people. While unavoidable when constructing an index, this means some care is needed when comparing the impact of different indicators in the index.

Standardisation by z-score is common. The main alternative that we considered is min-max standardisation, where the mean is replaced by the minimum (either the theoretical or observed for a time series) and the standard deviation by the range (again, either the theoretical or observed). The downside of min-max standardisation is that the minimum and maximum are potentially unstable if derived from data and choosing theoretical extremes can be subjective. On balance, standardisation by z-score was chosen because it was simpler (than selecting a theoretical min-max for each indictor) and more stable over time (than using observed min-max for each indictor).

Finally, if the increases in the measure are associated with poorer wellbeing (e.g. increased incarceration is 'bad' in the index, compared with increased income which is 'good'), then we multiply the component by minus one.

A6 Weighting and aggregation

The AAIEI uses two stages of weights:

- Aggregation of components within domain. This was almost always equal weight to each component – the one exception being the home ownership rate in the housing domain, which was judged to have particular importance.
- The final index is the weighted average of the six domains. The adopted weights (as shown in Table 4) were set by the authors in consultation with stakeholders at the Actuaries Institute and informed by the literature.

Ultimately, the choice of domain weights is subjective and not all stakeholders will agree on any single set of weights. Therefore, we create sub-indices for each domain so the choice of domain weighting matters less.

The overall choice of weights does matter in the index. Some domains are moving in opposite directions (e.g. health getting better, environment getting worse), so changing weights will produce a change in the AAIEI.

A7 Final scaling

The index produces series for three age bands. We scale these so that the overall standard deviation (treating the three series as a whole) is 15 and the starting value for the 65-74 age band is 100. While arbitrary, it appeals to the type of scaling applied in other domains such as IQ.

A.8 Index sensitivity

To give a guide as to how measures contribute to the index, we have calculated the change required in the indicator to produce a one-point improvement to the index. For example a -0.6 percentage point change to the employment (weighted underutilisation) rate will lead to a 1-point improvement for any of the age bands.

Table A.1 – Australian Actuaries Intergenerational Equity Index sensitivity

Domain	Indicator	Level of index at 2018			Change required to change AAIEI by 1 point
		25-34 y.o.	45-54 y.o.	65-74 y.o.	
Economic and fiscal	Employment (weighted underutilisation)	7.1%	6.4%	3.9%	-0.6 percentage points
	Household disposable income	1,057	1,130	936	$97
	Poverty rates	9.5%	12.2%	12.6%	-0.9 percentage points
	Net wealth	352	1,256	1,549	$101,000
	Government spending	3.23%	3.48%	4.46%	0.15 percentage points
	Government net debt	19%	14%	3%	-10.0 percentage points
Housing	Home ownership rate	36.8%	72.0%	83.0%	1.3 percentage points
	Rental costs	19.0%	19.8%	27.6%	-7.7 percentage points
Health and disability	Life expectancy	79.6	74.2	71.0	0.9 years
	Obesity rates	23.8%	37.4%	40.5%	-3.9 percentage points
	Disability rates	7.2%	15.7%	39.0%	-1.3 percentage points
	Suicide rates	14.5	17.8	10.3	-1.4 per 100,000
Social	Rate of robbery victimisation	527	258	85	-222 per 100,000
	Rate of incarceration	415	186	47	-35 per 100,000
	Rate of homelessness	756	506	338	-74 per 100,000
	Gender pay gap	14%	16%	18%	-2.1 percentage points
	Rate of children aged 0–17 years who are in out-of-home care	822	-	-	-252 per 100,000
	Teenage birth rate	950	-	-	-404 per 100,000
Education	Percentage complete Year 12 by age band	77%	57%	33%	4.5 percentage points
	Rate of persons with bachelor's degree qualification or above	40%	29%	20%	3.1 percentage points
Environment	Atmospheric carbon dioxide concentration	406	365	335	-8.40 ppm
	Average mean temperatures	1.04	0.44	0.40	-0.14 degrees
	Murray-Darling Basin rainfall ANOMOLY, April – November	29.21	8.76	7.60	13.64 mm
	Number of species listed as threatened, endangered or extinct	1,866	-	-	78 species

Appendix B– Other technical details

Approach to National Transfer Accounts

For the AAIEI, total government expenditure by age band is calculated by combining data from three sources:

1. The National Transfer Accounts (NTAs): the key metric used is the per capita age profile of government expenditure by type (e.g. expenditure on health, education and social security etc.) in 2009-10. The detailed results are taken from Rice et al. (2014) which is available here: https://crawford.anu.edu.au/sites/default/files/news/files/2014-07/nta_report.pdf.
2. Current population counts by age and year taken from the ABS Release 3105.0.65.001 Australian Historical Population Statistics, 2019.
3. Total government expenditure by year and type taken from the ABS Release 5512.0 – Government Finance Statistics, Australia.

To calculate total government expenditure for age x, in year t, we use the per capita government expenditure on those aged x by type (from 1.), times the count of those aged x in year t (from 2.), to prorate the total dollar spending in each type category from the ABS Release 5512.0 – Government Finance Statistics, Australia (from 3.) across all ages groups.

Prorating of total expenditure needs to be summed across all types of expenditure from: health, education, social spending on the working age, social spending on assistance to the aged, social spending (social protection other) and other.

For example, total government expenditure on those aged 65-74 in year t =

Total Education Spending in $t \sum_{x=65}^{x=74} n_{x,t} * p_{1,x} / \sum_{x=0}^{x=100} n_{x,t} * p_{1,x} +$

Total Health Spending in $t \sum_{x=65}^{x=74} n_{x,t} * p_{2,x} / \sum_{x=0}^{x=100} n_{x,t} * p_{2,x} +$

Total 'Assistance to Aged' Spending in $t \sum_{x=65}^{x=74} n_{x,t} * p_{3,x} / \sum_{x=0}^{x=100} n_{x,t} * p_{3,x} +$

Total 'Social Protection Other' Spending in $t \sum_{x=65}^{x=74} n_{x,t} * p_{4,x} / \sum_{x=0}^{x=100} n_{x,t} * p_{4,x} +$

Total 'Other' Spending in $t \sum_{x=65}^{x=74} n_{x,t} * p_{5,x} / \sum_{x=0}^{x=100} n_{x,t} * p_{5,x} +$

where:

$n_{x,t}$ = number of people aged x in year t
$p_{1,x}$ = per capita expenditure on education at age x
$p_{2,x}$ = per capita expenditure on health at age x
$p_{3,x}$ = per capita expenditure on 'Assistance to Aged' at age x
$p_{4,x}$ = per capita expenditure on 'Social Protection Other' at age x
$p_{5,x}$ = per capita expenditure on 'Other' at age x

The key assumption made in this calculation is that the per capita age profile of government expenditure by type (i.e. the shape of the per capita spending distribution for each type of government expenditure) remains stable over time. Rice et al. (2014) empirically show that this assumption holds when comparing expenditure profiles in 2003-04 and 2009-10. The most recent update of the NTAs is 2009-10.

A second assumption that needed to be made was that per capita government expenditure by type is constant for all ages 85 and over. For example, it is assumed that health expenditure per person aged 85 is equal to health expenditure per person aged 90. It was necessary to make this assumption because the per capita age profile of government expenditure by type taken from Rice et al. (2014) bucket ages 85 and over. While per capita expenditure by age could vary significantly over age 85, the relatively small proportion of the population aged 85 and over should limit the estimation error associated with this assumption.

Ultimately, greater strength for Australia's younger and middle-aged generations represents a stronger future for Australia, both economically and more broadly.

Institute of Actuaries of Australia
ABN 69 000 423 6546

Level 2, 50 Carrington Street
Sydney NSW Australia 2000
t +61 (0) 2 9239 6100
e actuaries@actuaries.asn.au
w www.actuaries.asn.au