Actuaries Institute

A narrow escape?

The 2021 Australian Actuaries Intergenerational Equity Index

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 update to the 2020 Green Paper 'Mind the Gap' 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 update was authored by **Hugh Miller, Ramona Meyricke** and **Laura Dixie** of Taylor Fry. **Matthew Bray** assisted with numerical work for updating the index.

Disclaimer: This update to the 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.

The Actuaries Institute acknowledges the traditional custodians of the lands and waters where we live and work, travel and trade. We pay our respect to the members of those communities, Elders past and present, and recognise and celebrate their continuing custodianship and culture.

©Institute of Actuaries of Australia 2021
All rights reserved

Contents

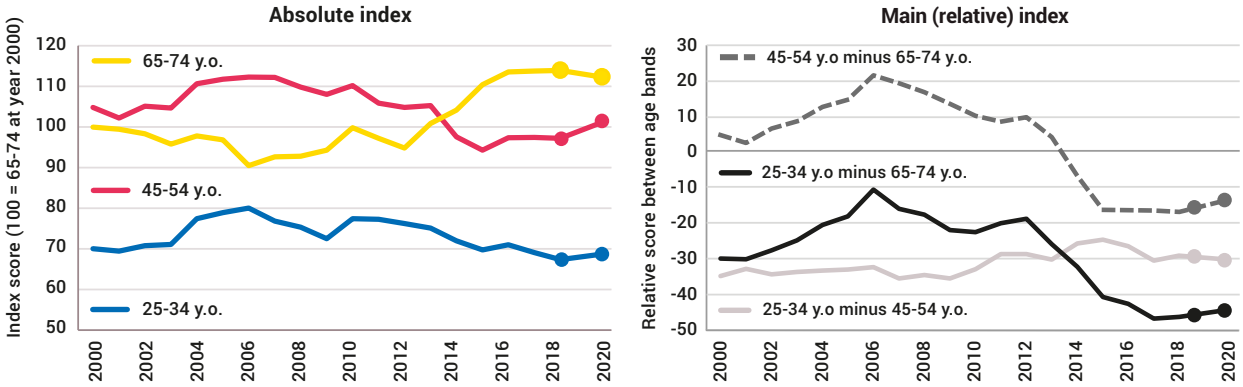
1	**Executive summary**	**4**
2	**Introduction and background**	**8**
2.1	Background	8
2.2	Domains and indicators	8
2.3	Other potential indicators	9
2.4	Overview of approach	10
3	**Updated AAIEI and drivers of change**	**11**
4	**Intergenerational insights: 2020**	**14**
4.1	Economic and fiscal	14
4.1.1	Labour market and household changes	14
4.1.2	Government spending	16
4.2	Housing	18
4.3	Health and disability	19
4.3.1	Suicide and mental health	19
4.3.2	Other health indicators	20
4.4	Social	21
4.4.1	Crime and imprisonment	21
4.4.2	Homelessness	22
4.4.3	Other social indicators	23
4.5	Education	24
4.6	Environment	25
5	**Ongoing policy implications**	**26**
5.1	Economic and fiscal	26
5.2	Housing	27
5.3	Health and disability	27
5.4	Social	27
5.5	Environment	27
5.6	The 2021 Federal Budget	27
	References and Appendices	**28**
	References	29
	Appendix A – Index construction	30
A1	Measurement error	30
A2	Transformation	30
A3	Imputation and extrapolation	30
A4	Timing	30
A5	Standardisation	30
A6	Weighting and aggregation	31
A7	Final scaling	31
A.8	Index figures	31
A.9	Model sensitivity	32
	Appendix B – Other technical details	33
B.1	Data sources	33
B.2	Approach to extrapolation for missing data points	34
B.3	Changes to historical time series	35
B.4	Approach to National Transfer Accounts	36

1 Executive summary

The Australian Actuaries Intergenerational Equity Index (AAIEI), first released in 2020, shines a light on differences in wealth and wellbeing across age bands in Australia and how these have been changing over time. This update adds two new data points to the index – 2019 and the 'year like no other', 2020.

Our previous report identified a growing gap between older and younger Australians. The updated series is shown below and a detailed table in Appendix A.8.

Figure 1 – The Australian Actuaries Intergenerational Equity Index – main results



The absolute lines (left) indicate whether, across the range of domains measured, wealth and wellbeing is improving for each age band. The domains are economic, housing, health, social, education and environment. Each domain comprises several indicators.

The higher level of the lines for older age bands indicate that measures are generally better for older people compared to younger. For the last calculated year, the index is 68 for the 25-34 age band, 101 for the 45-54 age band and 114 for the 65-74 age band. 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. However, in 2020 we see a reversal, with a drop in the 65-74 series and increases in the other two age bands.

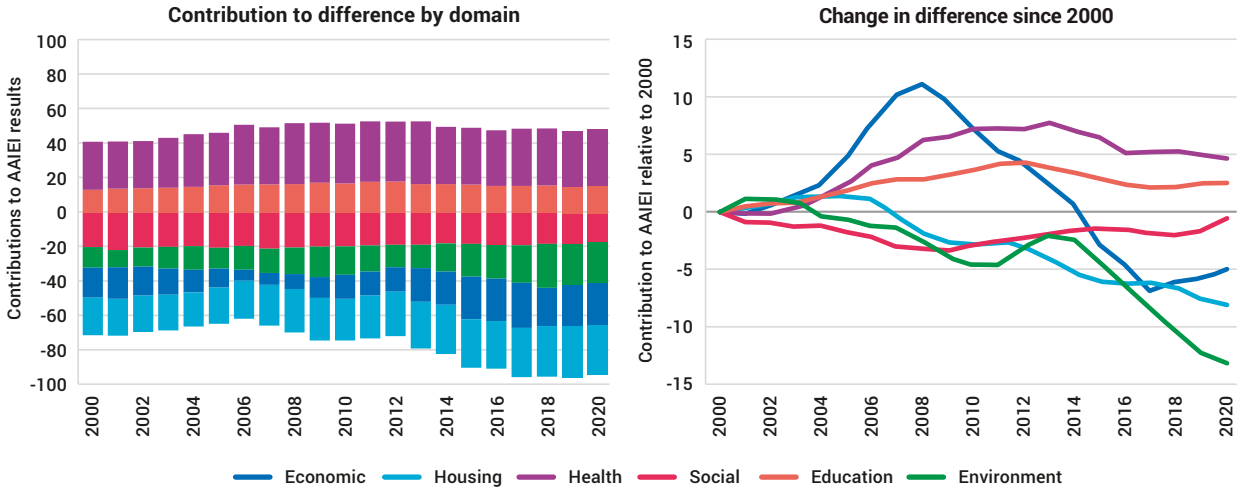
The relative change in the index across ages (right panel) examines the differences between the absolute indices and is more important for understanding changing intergenerational equity. An increase means things are improving for young people relative to older people; in the current context of a large negative score, this implies that intergenerational equity is improving. The 'gap' in the index between the 25-34 and 65-74 age bands increased from -12 around 2006 to -46 in 2018. This gap increased to -50 in 2019 but has decreased to -45 in 2020. This breaks a seven-year streak of growing inequity.

While the trend reversal will be welcomed by some, we note:

- Much of the 2020 change is likely to be temporary. For example, the single biggest indicator movement within the index is the temporary government support directed to working-age people (JobSeeker and JobKeeper), which is largely offset by the significant spike in underutilisation and most acute for younger people.
- The gap between 25-34 and 65-74 age bands is still close to record levels. There are six years where the gap is more than 40 points, and they are the six years from 2015 to 2020.
- Some of the narrowing relates to worse outcomes for the older age band. This includes the rising rate of homelessness for older Australians.

While a single index cannot express the complexity of all intergenerational issues, we can split it into domains to better understand some of the drivers. Figure 2 shows domain-level differences between the 25-34 and 65-74 age bands. At a high level we can see the narrowing of the gap in 2020 is spread across several domains, with the social and health domains making the largest contributions. We can also see a turnaround in the change in the economic domain since 2017; in part this is due to measurable rises in poverty and underutilisation for older Australians.

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



The improvement seen in 2020 is an interesting mix of reversals, accelerated trends and temporary effects across the domains.

In the **economic domain** the pandemic-related spike in unemployment (and underemployment) disproportionately affected young people (although the more recent recovery in employment has pleasingly seen disproportionate improvements for young people). This is counterbalanced by a large increase in temporary government supports (primarily through JobKeeper and the JobSeeker Coronavirus Supplement) that disproportionately went to these younger workers who were affected. The increase in government debt accelerates the existing runs of deficits, which, while manageable, will reduce fiscal flexibility in the future.

In the **housing domain** low interest rates have turned predictions of a house-price crash into a surge. There is evidence that many first-home buyers have entered the market as a result of extremely low interest rates, pausing the

During the past few years prior to 2020, younger people have been relatively disadvantaged across a range of measures.

long-term trend in falling ownership rates for young people. This is tempered by the fact that increasing house prices will further reduce the affordability of housing for young people in the future.

In the **social domain** there have been large increases in the number of people accessing homelessness support, even prior to the pandemic. The end of temporary eviction bans and reductions in government supplements may further accelerate this trend in 2021. While young people access such services the most, the largest growth has come from older Australians, a newer trend worthy of attention. Many crime rates, particularly property crimes, are lower, perhaps reflecting reduced opportunity for offending during lockdowns. Incarceration rates dropped as bail rates increased and court convictions slowed. Higher homelessness rates for older Australians and lower incarceration for younger Australians have contributed most to the index in this domain.

Health was obviously a key focus in 2020, however there has been little change in the intergenerational inequity measures at this stage aside from continued improvements in life expectancy (benefiting younger Australians more in the update). There was concern early in the pandemic that lockdowns and other pandemic-related changes would increase and exacerbate mental health conditions and suicide rates. While there is some evidence of increased psychological distress, particularly for younger people, suicide rates have pleasingly remained stable or even slightly decreased. However, ongoing monitoring of both suicide attempts and broader rates of poor mental health is important since the financial impacts of the recession will linger and some temporary government supports have been only recently removed.

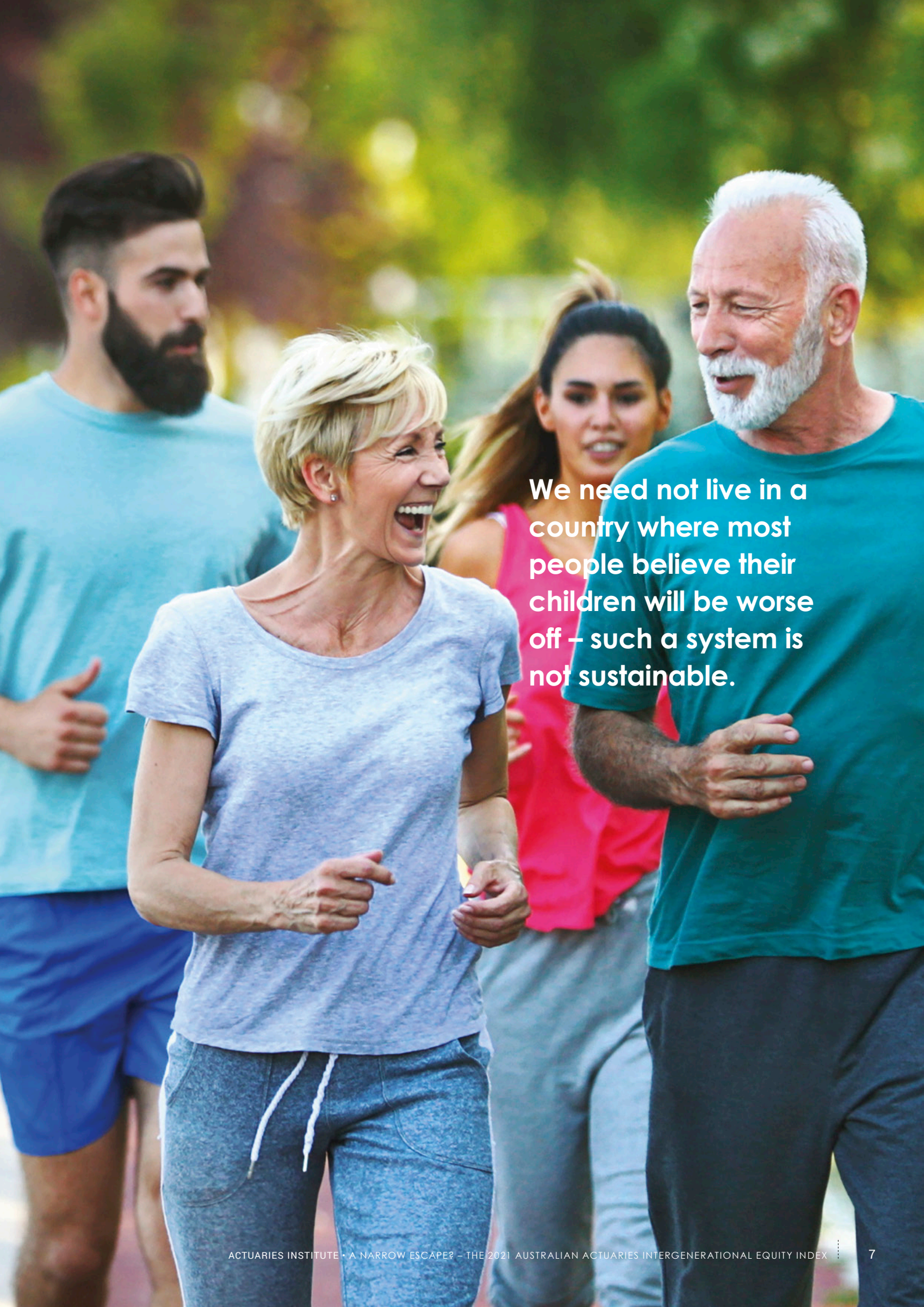
Environmental measures have continued to worsen. 2020 was another hot year and it is estimated that 3 billion vertebrates were impacted by the 2019/20 bushfires which burnt 10 million hectares of land. Heavy rainfalls in 2021 are not yet recognised in the index.

In the **education domain** trends of improving Year 12 completion and higher education rates have continued.

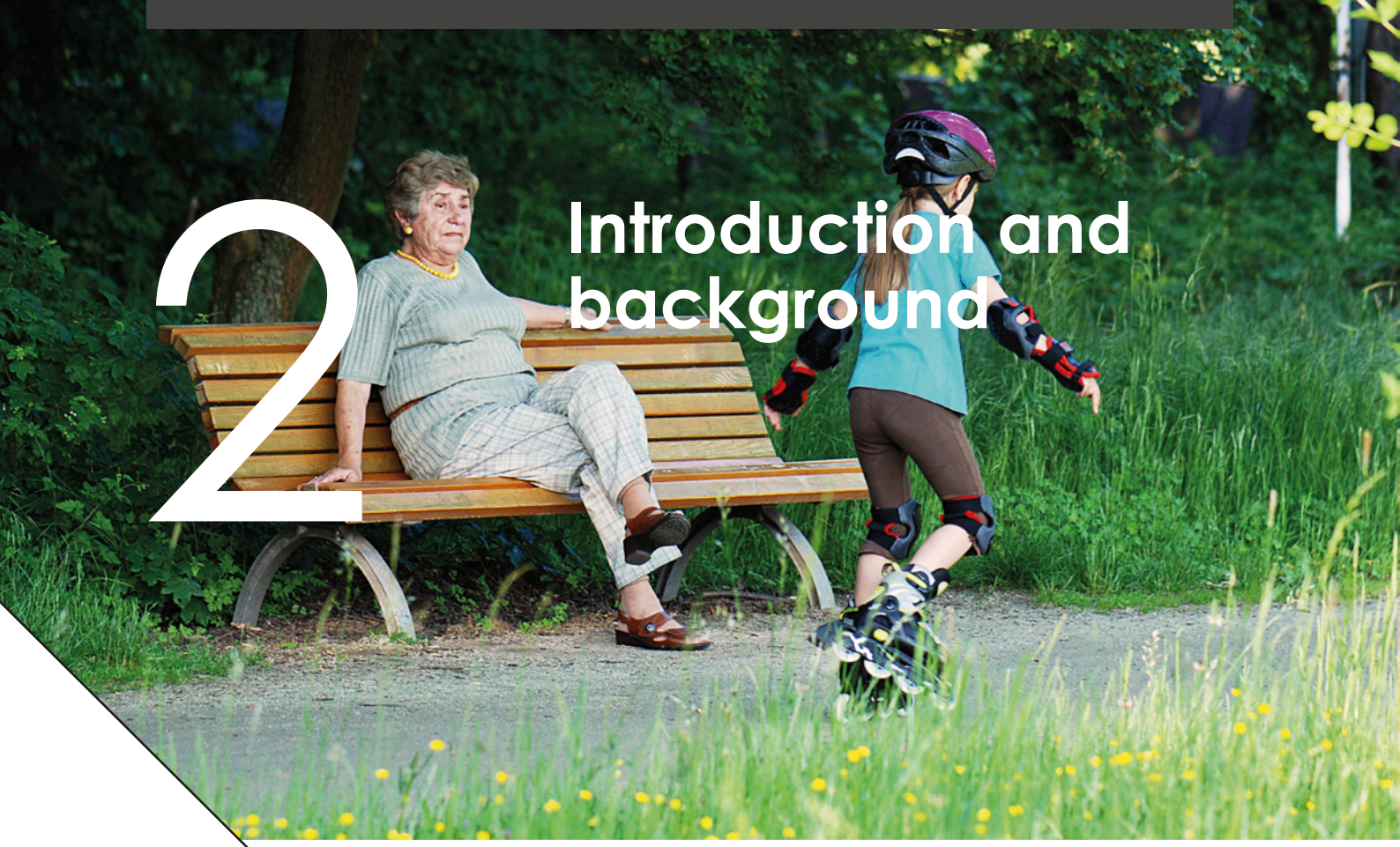
The policy landscape has seen some movement on issues highlighted in this report. There has been a permanent increase to the Jobseeker rate, and spending on early career assistance has increased. High profile inquiries including the Aged Care Royal Commission and the Retirement Incomes Review have called for further work in these areas. Internationally, commitments to achieve carbon-neutrality, or net zero emissions, more than doubled in 2020 from the end of 2019. Major emitters including the US and China have agreed to fight climate change with seriousness and urgency. While there are many policy challenges to address all intergenerational issues in our report, the past year has demonstrated that change is possible, and there may be more appetite to try new things given the rapid adaptations made in 2020.

There are many policy challenges to addressing intergenerational issues, but recent events have demonstrated that major change is possible.

The 2021 Federal Budget has a range of new spending measures. Many of these will potentially improve wealth and wellbeing across areas such as employment (extensions of funding for wage subsidies and training) and health (new money for suicide prevention programs). However, the growing net debt position forecast over the next decade and the continuation of longer-term trends of increasing spending for older Australians (including the welcome $18 billion of additional aged care funding) highlight that intergenerational concerns remain.



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



2 Introduction and background

2.1 Background

Intergenerational equity is the concept of fairness or justice between generations. There are many dimensions to the concept of intergenerational equity. The AAIEI was launched in 2020[1] as a way to track the wealth and wellbeing of Australians and the emerging trends affecting intergenerational equity over time.

The AAIEI does this by tracking and assessing 24 indicators across six broad domains that relate to wealth and wellbeing for three age groups (25-34 year olds, 45-54 year olds, and 65-74 year olds). We track the absolute change as well as the relative change between age bands over time to measure the gaps between different generations in the domains over time.

The absolute differences reflect genuine differences in the wealth and wellbeing between age groups, but many of these differences are natural. For example, older people have had more time to accumulate savings, so this difference in net wealth will contribute to different levels in the absolute index. However, the relative changes between age bands are telling, as they show whether these gaps are growing or reducing over time. A widening of gaps between age bands indicates a deterioration in intergenerational equity.

While any index is an attempt to simplify a range of complex issues, we also unpack the results to draw attention to the domains and indicators that are moving significantly over time.

The concept of fairness or justice between generations should be the fundamental basis of intergenerational equity.

2.2 Domains and indicators

Drawing on common themes across the studies and applications of intergenerational equity reviewed in the inception report of the AAIEI we identified six broad domains that relate to wealth and wellbeing, shown along with the corresponding indicators in Table 1. Primary data sources for each indicator are in Appendix B.1.

1 The 2020 Green Paper is available at https://actuaries.asn.au/Library/Opinion/2020/AAIEIIGreenPaper170820.pdf

Table 1 – Domains of the AAIEI

Domain (index weight)	Key question	Indicators
Economic and fiscal 30% weight	How does the Australian economy and government spending affect intergenerational equity?	• Employment (weighted underutilisation) • Income (Equivalised disposable household income) • Poverty rates • Net wealth • Government spending by age as a % of GDP • Commonwealth Government net debt
Housing 10% weight	Do people have access to good quality and affordable housing?	• Home ownership rate • Rental costs
Health and disability 20% weight	How are health outcomes changing, for different generations?	• Life expectancy at birth • Obesity rates • Disability rates • Suicide rates
Social 15% weight	How are people experiencing life and being part of society? How are they interacting with systems like justice and child protection?	• Rate of robbery victimisation • Rate of incarceration • Rate of homelessness • Gender pay gap **For the younger generation only:** • Rate of those aged 0–17 years in out-of-home care • Teenage birth rate
Education 10% weight	Are people becoming better educated over time?	• Percentage that completed Year 12 • Percentage with bachelors degree qualification or above
Environment 15% weight	Is the environment changing in ways likely to adversely affect current and future generations?	• Atmospheric carbon dioxide concentration • Average mean temperatures (5-year rolling average) • Murray-Darling basin rainfall, April – November (10-year rolling average) • Number of species listed as threatened, endangered or extinct

These domains are interrelated. For example, good health, social cohesion and maintenance of Australia's environment supports 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 of different trends and policy debates that can arise in different spheres.

2.3 Other potential indicators

The approach to combining the selected indicators into the AAIEI was a multi-stage process including significant consultation followed by consideration of indicator measurement error, data transformation, scaling, weighting and aggregation. More technical detail on the index construction is summarised in Appendix A.

We have received significant feedback on the choice of indicators and potential additions to extend the index. All feedback was gratefully appreciated, although we have decided not to alter the composition of the index this year. Primarily this was decided for reasons of consistency (results will be comparable to last year) and practicality (many of the suggested additions were ones previously considered but not added due to the lack of reliable time series data, or other related considerations). However, we make some comments around limitations of the current index and the types of extensions that are possible:

- **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.
- **Community engagement –** Measures of social cohesion and engagement are contributors to wellbeing and often included in related indices. Internationally, voting rates are often used as a proxy for this, but are less relevant to Australia with compulsory voting.
- **Ongoing effects 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. These benefits (and potential downsides) have not been built into the index.
- **Overlaps between indicators –** There are some overlaps in the index, although we have tried to minimise these. For instance, net wealth and home ownership rates are tightly related. We have been mindful of this when setting respective weights. Similarly, average temperatures and CO_2 concentrations are related, albeit at a time lag; we retain both since volatility in average temperatures is complemented by a direct measure of rising CO_2 levels, which has robust trends.

Limitations to the index discussed in our previous report continue to apply here too. One of the larger limitations is that many indicators simplify more complex considerations. For example:

- Health indicators are often measured and compared using quality-adjusted life years. However, data availability prevents us using this to combine various burdens of disease.
- A good education mix in a modern economy needs an appropriate mix of post-school education (vocational and university), as well as an understanding of whether specific skills and occupations being trained match our future needs. Educational quality is also very important. This goes beyond what can be measured using aggregate attainment measures.
- Economic considerations often have a wider context. For example, while government debt is treated as a negative in the index, borrowing to spend on infrastructure that benefits current and future generations could be viewed as positive through an intergenerational lens.

To the extent that our index oversimplifies some issues, we attempt to draw out detail in our discussion.

2.4 Overview of approach

The inception report, released last year, was only able to update the AAIEI to 2018 due to lags in the timing of data releases for some indicators. This year we have extended the index to include two additional years to 2020. This allows us to meaningfully comment on 2020 experience, which was heavily affected by the COVID-19 pandemic.

At the time of writing not all the main data sources in Table 1 had been updated to 2020. We have therefore used secondary data sources to estimate the 2020 values for some indicators. A summary of our approach for each indicator is in Appendix B. This may result in minor retrospective changes in future updates of the index when these estimates are replaced by actuals.

There have been minor changes and corrections to four of the existing indicators used in the model, described in Appendix B.3. These do not materially affect the index, but exact numbers in the historical index values have moved slightly to reflect these updates.

3 Updated AAIEI and drivers of change

The index can be viewed in two ways:

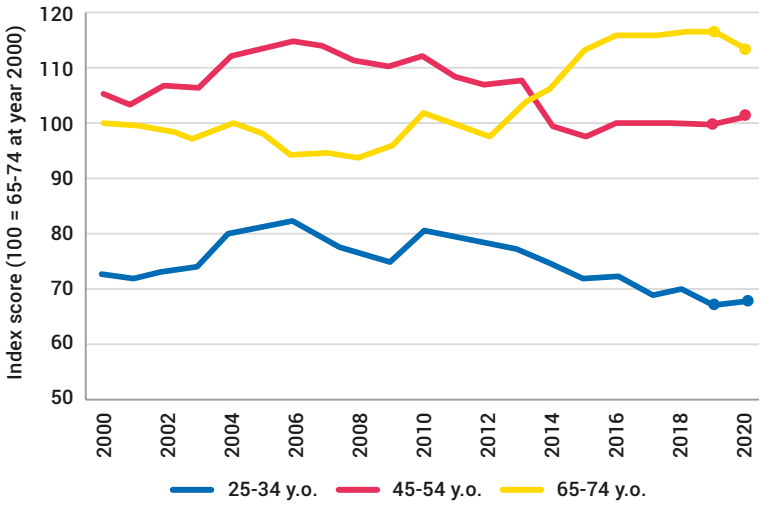
- The **absolute index** scores for each age band. This reflects how the index is tracking over time for an age band. Each series is normalised to the score in 2000 for the 65-74 age band. An increase in the absolute index reflects overall improvements in the wealth and wellbeing experienced by that age band.
- The **Australian Actuaries Intergenerational Equity Index (AAIEI) is the difference in absolute scores between age groups.** We primarily discuss 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 3 shows the absolute index. As previously observed, the index for the 25-34 age band sits significantly lower than the older age bands throughout, driven by poorer scores across the economic, housing, social and environmental domains. However, 2020 sees a reversal of the trend over the previous decade, with a small decrease for the 65-74 age band, compared to increases for 25-34 and 45-54 age bands. This implies that the younger age bands have seen an improvement in wealth and wellbeing in 2020, as measured by the suite of indicators included in the index, despite the COVID-19 pandemic.

In a reversal of trend, younger age bands have seen an improvement in wealth and wellbeing in 2020.

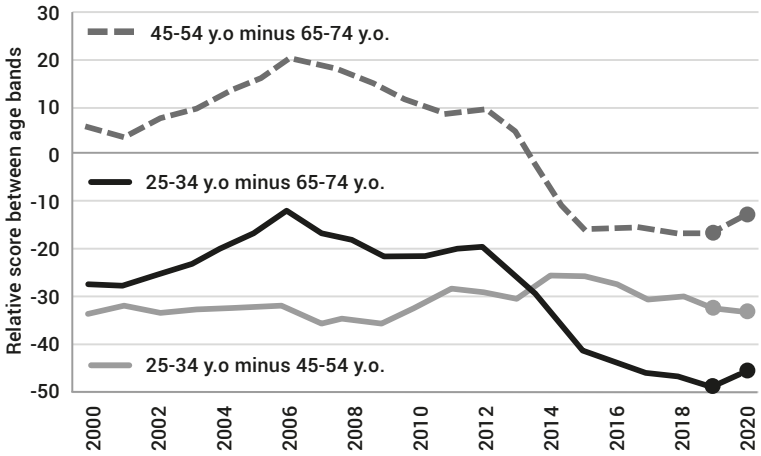
Absolute index

Figure 3 – Absolute index scores for three age bands, 2000 to 2020



Relative index

Figure 4 – Australian Actuaries Intergenerational Equity Index (AAIEI) – Intergenerational Equity differences between age bands over time



Despite some improvement, recent reversals in trend may only be temporary.

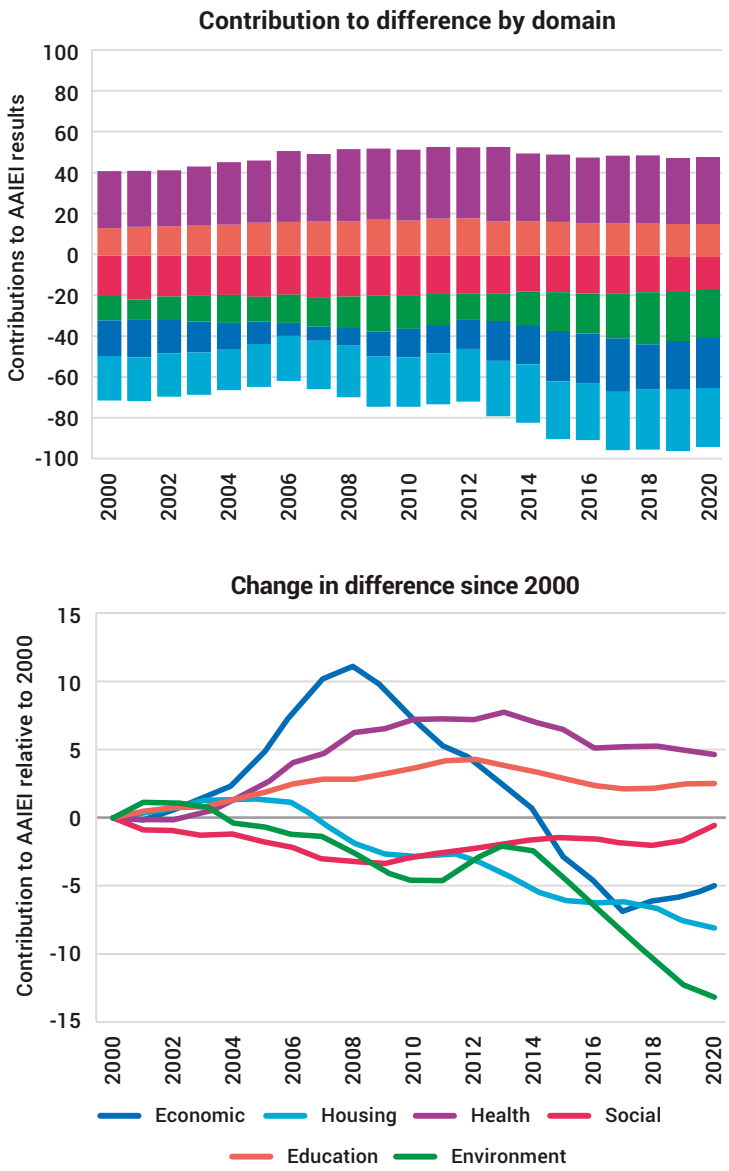
Figure 4 shows the differences between age groups, which we regard as more important for understanding changing intergenerational equity. Most notable is the increasing gap between the younger age bands and the 65-74 age band from 2012 onwards. We identified this in our previous report as a material and adverse shift for younger and middle-age Australians and indicates worsening intergenerational equity. But importantly this trend has reversed in 2020. The difference between 25-34 and 65-74 age bands decreased from 50 to 45 in the year to 2020, which is the second-largest narrowing in the 20-year time series. It also breaks a seven-year streak of widening inequity. The narrowing of the gap between 45-54 and 65-74 age bands is similarly large at 5 points.

A table with the index numbers underlying Figure 3 and Figure 4 is in Appendix A.8.

While a narrowing gap since 2018 represents a reversal of the longer-term trend, we make three comments:

- **Much of the 2020 change is likely to be temporary.** The single biggest movement by an indicator in the index is the temporary government support directed to working-age people (JobSeeker and JobKeeper), albeit largely offset by the spike in underutilisation. Other changes such as those related to a slowdown of custodial sentences and a lift in first home buying activity are also pandemic-related and likely to abate in the future.
- **The gap between 25-34 and 65-74 age bands is still close to record levels.** There are six years where the gap is more than 40 points and they are the six years from 2015 to 2020.
- **Some of the narrowing relates to worse outcomes for the 65-74 age band.** This includes the rising rate of homelessness for older Australians. The group has also seen significant increases in their estimated poverty rate since 2016.

Figure 5 – Contribution of domains to the values and movement in AAIEI: 25-34 age band vs 65-74 age band (right panel uses a three-year rolling average)



Much of Section 4 is devoted to exploring the drivers of the changes observed in 2020. However, at a higher level we can see the contributors towards the gap between the 25-34 and 75-74 age bands by domain in Figure 5. The narrowing of the gap in 2020 is spread across most domains, with the social and health domains making the largest contributions. In the social domain, falling incarceration for younger Australians and rising homelessness for older Australians have contributed to the effect. In the health domain, rising life expectancies have benefited younger Australians most in this update. Some specific indicators, particularly in the economic and fiscal domain, have also moved markedly. The single largest contributor to the narrowing gap among the indicators is the increase in government spending on working-age cohorts (+5 points); the largest offsetting indicator is the large increase in unemployment rates for younger people (-4 points).

Policy fairness and a long-term view is essential in order to meet today's needs, without putting younger (or future) generations at a disadvantage.

4 Intergenerational insights: 2020

Ultimately the AAIEI's role is to point to important trends in the underlying indicators, as these reflect important stories in understanding how different age groups are faring over time.

While the inception report of the AAIEI contained a comprehensive view of all the indicators, this report takes a more selective view; only highlighting effects that are either significant for the index or important to understanding how Australians have coped with the COVID-19 pandemic over 2020.

Economic indicators

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

4.1 Economic and fiscal

Many of the economic and fiscal indicators have moved dramatically in 2020, due to the recession induced by the COVID-19 pandemic and the various government responses. Many of these movements are in opposing directions in our index. The index gap (and so inequality) between older and younger age groups has:

- Increased due to changes in the underutilisation rate, net wealth, and government debt.
- Decreased due to changes in poverty rates and government spending across age groups.

We discuss this in further detail below.

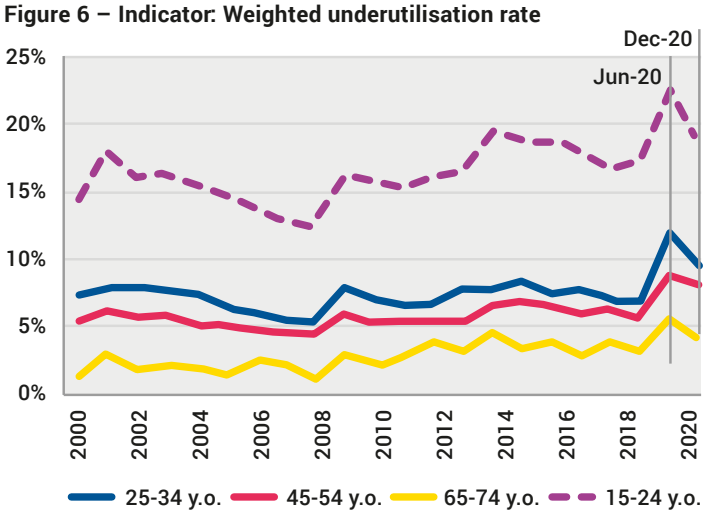
4.1.1 Labour market and household changes

Our preferred measure of underutilisation, which combines unemployment and underemployment, saw a sharp spike in the June 2020 and September 2020 quarters, followed by a significant reduction to December 2020. As is usually the case, younger people bore the brunt of increased underutilisation. The 15-24 and 25-34 age bands saw the measure rise over 5 percentage points in the year to June 2020, compared to 3.2 percentage points for 45-54 and 2.4 percentage points for 65-74. These differences reflect older Australians generally have more stable employment arrangements. Gratifyingly, the subsequent decreases in underutilisation have followed the same pattern, with larger decreases for younger people.

In the labour market, younger people have born the brunt of increased underutilisation.

ACOSS notes other subgroups particularly affected in the labour market during the recession, including women and lower-paid workers (Davidson, 2020). While our index is geared towards differences in age groups, other lenses such as socioeconomic status and gender are very important in understanding the broader economic impacts of the pandemic.

Figure 6 – Indicator: Weighted underutilisation rate



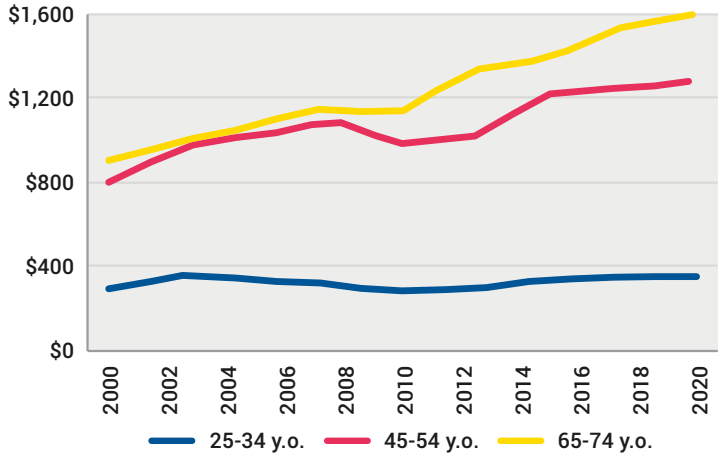
Main source: ABS 6291.0.55.003 - Labour Force, Australia, Detailed

Our previous report talked of the risks of labour market 'scarring', where people excluded from the workforce during a recession can have poorer employment outcomes over the years and decades that follow. Such scarring is difficult to assess at this stage, but the topic has been an active one in economic discussions and government policy considerations (see for example Borland, 2020 and Andrews et al. 2020). Some 2021 Federal Budget measures specifically target long-term unemployment.

We have not seen age-specific impacts for income and wealth over 2020 (ABS statistics are expected later this year), but evidence suggests that overall, incomes have been steady or marginally increased; at an aggregate level, government support has offset decreases in wage earnings. This may change over 2021, with some government support (notably Jobkeeper) ending 31 March 2021.

Our net wealth estimates see larger increases for older age groups, continuing the trend of a widening gap. This reflects the fact that housing and sharemarket returns, two of the main stores of household wealth, have had positive returns. The ABS housing price index measures a 6 per cent real rise in the two years to 2020, and there is evidence of further rises in 2021. Low interest rates have continued the growing wealth disparity by supporting asset price rises.

Figure 7 – Indicator: Real household net wealth ($000)



Main source: ABS 6523.0 – Household Income and Wealth

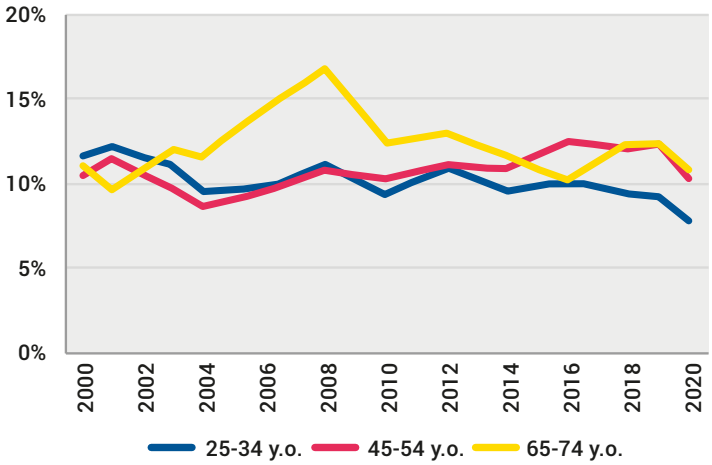
Current low interest rates have continued the growing wealth disparity by supporting asset price rises.

Incomes were largely buoyed during 2020 by temporary support payments; as these end, poverty rates are likely to be impacted throughout 2021.

Superannuation is obviously an important part of wealth accumulation. The pandemic saw the unprecedented step of allowing early release of superannuation savings. In all $36 billion was withdrawn across 3.5 million unique applicants[2]. For many people who lost jobs this extra funding represented an important safety net beyond any existing savings, but we also recognise that this comes at a cost of longer-term accumulations and income in retirement. We also discuss some of the policy attention related to retirement incomes in Section 5.

The incomes of working-age Australians at the bottom end of the income distribution were largely buoyed during 2020 by the JobSeeker and JobKeeper temporary income support payments. This had a significant effect on poverty rates, shown in Figure 8. We have relied on the analysis of Phillips et al. (2020) in setting our estimates. Although their poverty measures do not align precisely with ours, poverty rates have fallen, with the largest falls for the younger 25-34 age group, who were more likely to receive JobKeeper or the elevated level of JobSeeker support[3]. Overall, the number of people expected to be in poverty was estimated to have fallen 13 per cent during the height of the pandemic, compared to an increase of 90 per cent if no additional government support was provided (Phillips et al., 2020). Reductions in the poverty rate were smallest for the 65-74 age group. The age pension rate was not increased, in contrast to JobSeeker. And as we noted in our previous report, poverty rates are high for certain subgroups, such as single age pensioners who do not own their home.

Figure 8 – Indicator: Poverty rates (<50% median income)



Main source: ACOSS and UNSW (2020)

The JobKeeper and JobSeeker supplement payments ceased entirely on the 31 March 2021 and this is likely to change poverty rates throughout 2021.

4.1.2 Government spending

Australian governments responded swiftly to the economic crisis, boosting support particularly for households and wages. The Commonwealth Government spending increased by around a quarter (or $95 billion) over the year to June 2020, largely in direct response to the COVID-19 pandemic (MYEFO 2020/21). A further increase is expected over the year to June 2021 to continue the economic recovery from the pandemic.

2 https://www.apra.gov.au/covid-19-early-release-scheme-issue-36

3 The JobSeeker Coronavirus Supplement was a temporary wage support measure for unemployed working age Australians and those affected by COVID-19. It was paid as a supplement in addition to the regular JobSeeker payment. The supplement was an extra $250 per fortnight from April 2020 until December 2020, then an extra $150 per fortnight from January 2021 until March 2021.

The JobKeeper Payment scheme was a temporary wage support measure for businesses significantly affected by COVID-19. The scheme had three phases, each with their own qualification requirements. Phase 1 ran from April to September 2020; Phase 2 ran from October to December 2020; Phase 3 from January to March 2021.

The key items on which government spending increased were:

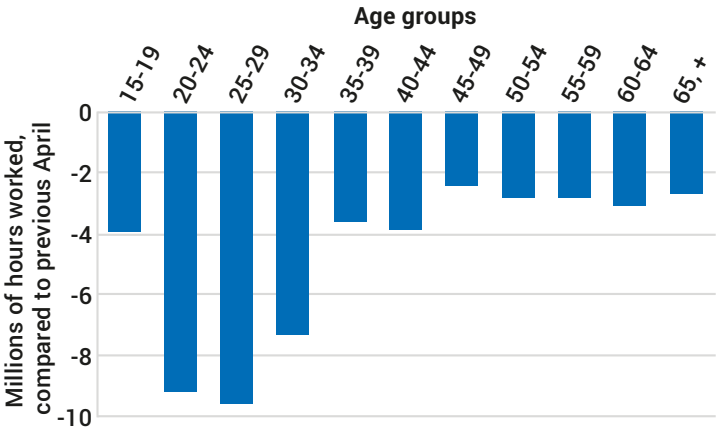
- **Other Economic Affairs –** which increased by around $50 billion. This captures the JobKeeper wage subsidies to support businesses impacted by the pandemic.
- **Welfare –** which increased by around $25 billion. The increase was largely in JobSeeker payments – there were almost twice as many JobSeeker recipients as well as increased payment rates (Coronavirus Supplement). Additional one-off economic support payments to a broader group of welfare recipients also increased spending.
- **Health –** which increased by around $7 billion. This was in part due to the COVID-19 pandemic with additional funding towards COVID-19 vaccines, supporting public and private hospitals to respond to COVID-19, Medicare telehealth services and dedicated respiratory clinics.
- **Education –** which increased by around $5 billion.

This spending was largely focused on working age populations, through the JobKeeper and JobSeeker spending. We have estimated that this was skewed particularly to younger people, who were much more likely to lose work (either through losing their job or working reduced hours), as shown in Figure 9.

Figure 10 shows the per capita rate of Government expenditure has increased for all age groups, but much more sharply for the 25-34 and 45-54 age groups. Spending in the 25-34 age band is now roughly equal to for the 65-74 group. This step change has reversed the trend of the last ten years and reduced intergenerational inequity (albeit with underutilisation rates providing an offsetting effect). However, this is likely temporary.

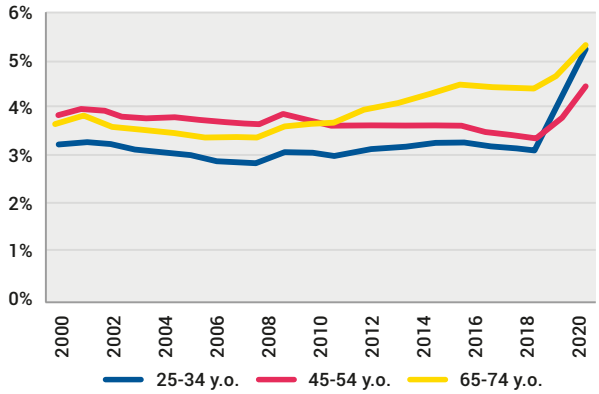
While much of the spending has benefited younger Australians, this is partly offset by the increase in government debt. Increasing debt is treated as a negative for younger age bands in the index, as these are amounts which are generally agreed to lead to higher taxation or lower government spending in the future. Net debt is expected to grow from 19 per cent of GDP to 35 per cent over the two years to June 2021. The debt burden is still low by international standards and viewed as manageable by most economists.

Figure 9 – Estimated working hours lost, April 2020 minus April 2019



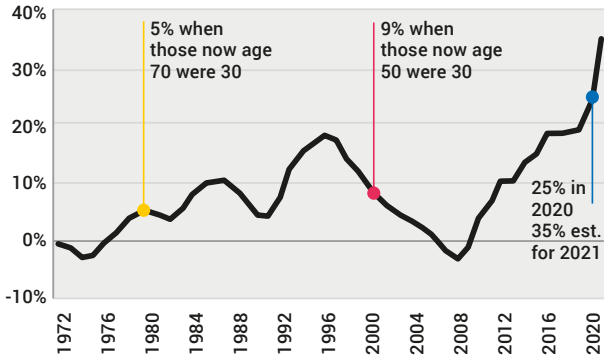
Source: Based on ABS release From ABS 6291.0.55.001 - EM1a - Employed persons by Age, Hours actually worked in all jobs and Sex, January 1991 onwards

Figure 10 – Indicator: Government expenditure by age band as a % of GDP



Source: Authors' calculations

Figure 11 – Indicator: Government net debt as a % of GDP



Source: Commonwealth Treasury Budget statements, MYEFO 2020-21

Increased govenment debt is likely to lead to higher taxation and reduced public spending in the future.

Housing indicators

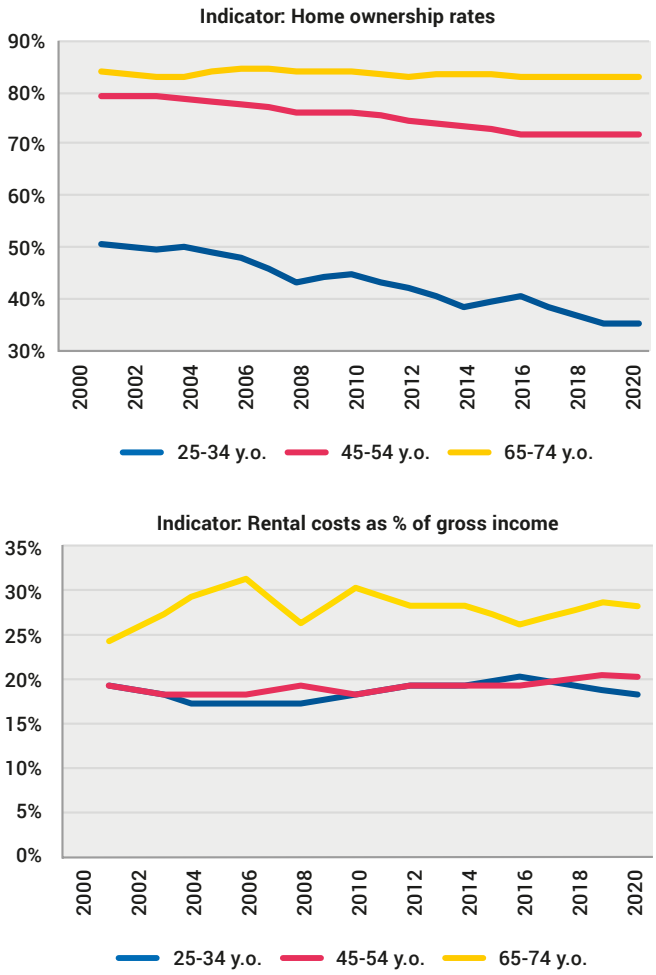
- Home ownership rates
- Rental costs

4.2 Housing

Housing continued to be a topic of active debate throughout the peak pandemic and beyond.

The two indicators we use are shown in Figure 12 and make only a marginal contribution to the change in the index when comparing age bands.

Figure 12 – Housing indicators



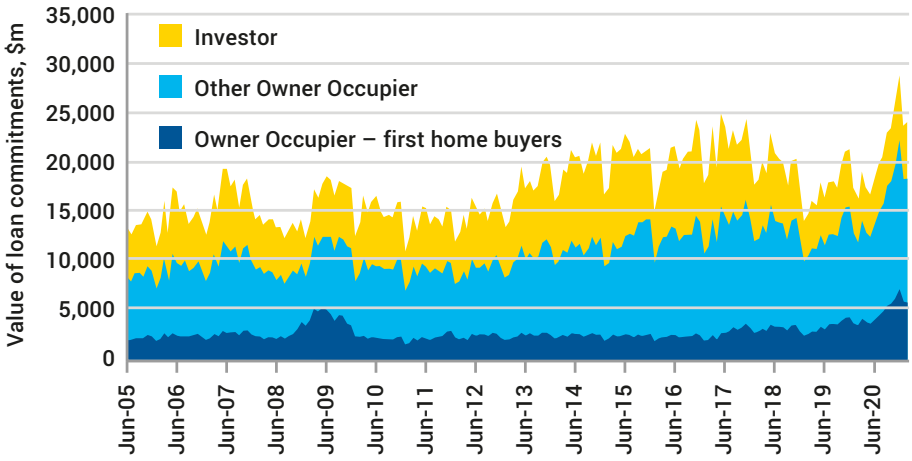
Main source: ABS 4130: Housing Cost and Occupancy

We have estimated (in the absence of an update to the official series) that the decrease in home ownership, particularly for younger people, continued in 2019 but plateaued in 2020. One key piece of evidence in making this estimate is the increase in lending for first home buyers in the second half of 2020. Lower interest rates appear to have boosted lending ability, encouraging more entries. A similar effect was observed in the low-interest rate environment following the Global Financial Crisis (GFC) – this led to a noticeable plateau in ownership rates around 2009 relative to the long-term trend.

The increased borrowing is not all good news, unfortunately. The increase in lending off the back of lower interest rates has been accompanied by upward pressure on house prices. Forecasts early in the pandemic of significant house price decreases due to the recession have now been revised to strong increases extending into 2021 and possibly beyond. This means that the challenge for future first home buyers has increased further again.

Renewed pressure on house prices mean the challenge for future first home buyers has increased further again.

Figure 13 – New home loan commitments excluding refinancing



Source: ABS 5601.0 Lending Indicators

We have estimated rental costs as relatively stable overall, however there have been compositional differences in the market. Many agents reported lower rents for inner-city apartments, whereas rental markets for houses and some regions have become increasingly tight[4].

Research such as Randolph et al. (2020) continues to point to high housing costs as a driver of poverty, particularly for those reliant on government benefits.

4.3 Health and disability

4.3.1 Suicide and mental health

We use age-specific suicide rates in the AAIEI as a robust indicator that relates to mental health but has also been measured reliably over time. Suicide remains the leading cause of death amongst younger Australians (particularly males). However ABS data show that the highest age-specific suicide rate for men in 2019 was found in the 85+ age group (ABS, 2019), at 32.3 deaths per 100,000 persons.

Important risk factors for late school-age children and adolescents include mental illness, specific personality characteristics (impulsivity and passive attitude to problem solving), family processes and/or crises, exposure to inspiring models and availability of lethal means (Bilsen, 2018). While older people may experience life stressors and risk factors for suicide common to all people, some risk factors are more common in later life, including chronic health conditions, disability and/or ongoing loss in capacities and a decline in functional ability (WHO, 2017).

The number of deaths by suicide per 100,000 of those aged 25-34 has varied over the last 20 years with a general decline from 20.2 deaths by suicide per 100,000 in 2000 to 13.3 in 2010, and slowly increasing to 16.1 in 2019. The trend for those aged 65-74 is flatter. In contrast deaths by suicide among those aged 45-54 have increased from 13.8 per 100,000 in 2000 to 18.8 per 100,000 in 2019. In all age bands the rate of death by suicide is three to four times higher amongst men than women.

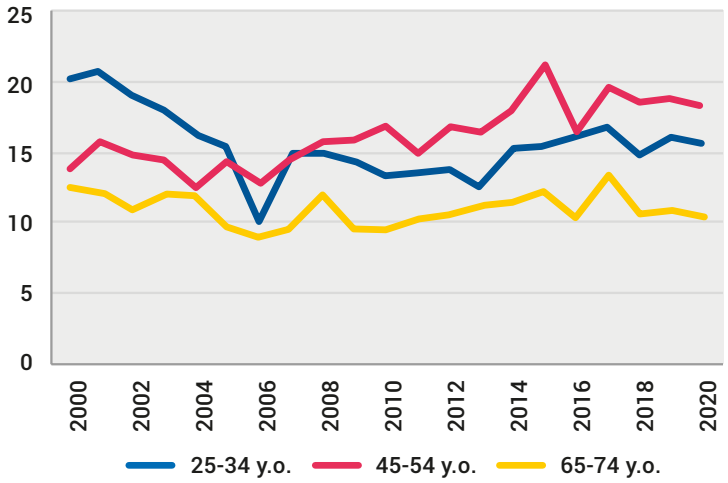
Health and Disability indicators

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

4 https://www.domain.com.au/news/tenants-compete-for-rentals-in-australias-regional-cities-as-vacancy-rates-tighten-985087/

Fortunately, the COVID-19 pandemic appears to have not led to increased suicide rates but this must be carefully monitored.

Figure 14 – Indicator: Annual suicide rates per 100,000 people



Main source: ABS catalogue 3303

At the start of 2020, it was widely expected that the COVID-19 pandemic would increase the number of deaths by suicide, because some risk factors associated with deaths by suicide – such as unemployment, financial and psychological distress - worsened since the onset of the pandemic. While this has not happened, longitudinal research shows that, in general, those aged under 45 experienced higher levels of psychological distress in 2020 while those aged 45 and above either experienced either little change or improvements in their level of psychological distress (Biddle and Gray, 2021). While effects were temporary for those aged 45 and above, younger people still have higher average levels of psychological distress than they had prior to the pandemic (Biddle and Gray 2021).

In Australia, however, data on suspected deaths by suicide in 2020 have been released for Victoria, Queensland and New South Wales from their respective suicide registers. In all cases there is no evidence to date of any increase relative to previous years (AIHW, 2021). In NSW and Victoria, deaths by suicide in were lower in 2020 than 2019. (As data was not available for all states, to derive a 2020 indicator for the index, we scaled the 2019 age specific suicide rate by a multiplier based on the ratio of the number of deaths by suicide in NSW[5] and Victoria[6] in 2020 versus 2019.)

In summary, so far there is no clear evidence of an increase in suicide associated with the pandemic. However, its economic effects are still evolving and are important given the association between the risk of dying by suicide and socioeconomic outcomes. As discussed earlier, the impact of both JobKeeper and the JobSeeker Coronavirus supplement buoyed incomes and poverty rates, so it will be important to monitor suicide and mental health indictors – as well as economic indicators – following the withdrawal of these payments.

4.3.2 Other health indicators

Life expectancy at birth continues to increase in Australia driven by improvements in different areas of health. Over 2017-19 life expectancy at birth was 80.9 years for males and 85.0 years for females. The life expectancy indicator each year was calculated as the average male and female life expectancy at birth in that year. For someone aged 70 now, this refers to life expectancy in 1950, which was about 14 years lower than it is today.

5 www.health.nsw.gov.au/mentalhealth/resources/Publications/suicide-monitoring-report-dec-20.pdf

6 https://www.coronerscourt.vic.gov.au/sites/default/files/2020-08/Coroners%20Court%20Monthy%20Suicide%20Data%20Report%20-%20Report%201%20-%2027082020.pdf

We have projected **disability rates** to continue to fall slightly, based on the steady trend observed in recent decades. As noted in our previous report:

- 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.
- Overall disability rates have been decreasing over time across virtually all age bands. This can mask increases for some subgroups, such as diagnosed autism rates, particularly in children. Supports required for such groups can differ from the broader population living with disability (AIHW, 2017).

We have similarly projected a continued increase in **obesity rates** across age bands, given there has been little published relating to the past two years. While obesity rates are rising across all age bands, the rate of obesity in absolute terms is much higher for those aged 45-54 years old and 65-74 years old than 25-34 years old. Australia's rate overweight or obese people aged 15+ was 6th highest among 22 OECD member countries in 2019 (the latest year of data available).

4.4 Social

The social domain reflects a range of important indicators related the wellbeing of parts of our society not measured in other domains.

Overall the social domain saw the largest contribution to the narrowing gap between age groups in the index. Some of this is good news; lower crime, lower incarceration and continued falls in the teenage birth rate. However, one of the larger factors contributing to the narrowing was a poor reason: an increasing homelessness rate, particularly for the older age groups.

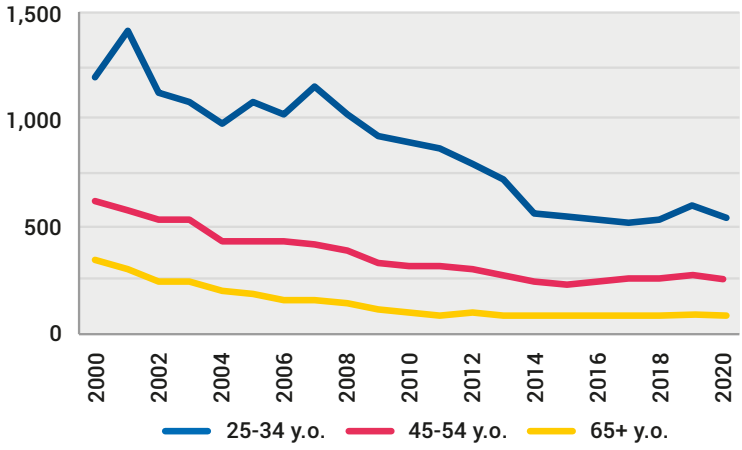
Social indicators

- 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

4.4.1 Crime and imprisonment

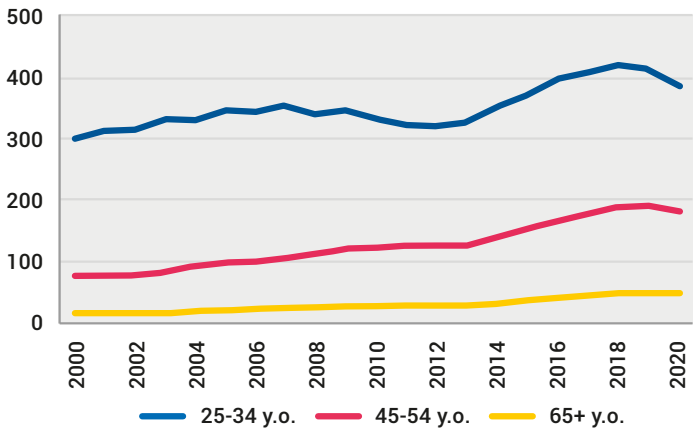
We use robbery victimisation as an indicator of crime rates, noting that there are often different trends in other types of crime. We observe an increase in robbery events in 2019, but a decrease in 2020; the lockdowns tended to reduce the rate of offending, presumably partly because the opportunities to offend were also reduced. The decrease reduces the intergenerational gap since younger people are disproportionately affected by many crimes, including robbery.

Figure 15a – Indicator: Robbery victimisation rates and incarceration rates per 100,000



Main sources: ABS Recorded crime – Victims, cat. no 4510, ABS Prisoners in Australia, cat. no 4517

Figure 15b – Indicator: Robbery victimisation rates and incarceration rates per 100,000



Main sources: ABS Recorded crime – Victims, cat. no 4510, ABS Prisoners in Australia, cat. no 4517

A similar fall in incarceration rates also occurred in 2020. The COVID-19 pandemic raised questions of the dangers of an outbreak in prisons, which would be hard to control and put some prisoners, particularly those with pre-existing health conditions, at risk. While there were some discussions around early release for prisoners, the largest decreases have been in the remand population; there appears to have been a shift towards granting more bail applications to help reduce the potential impact of a COVID cluster (see for example Chan, 2020). The decrease in finalised court cases has also contributed to fewer people starting new custodial sentences.

The last two years has seen fastest growth of homelessness in older age bands.

4.4.2 Homelessness

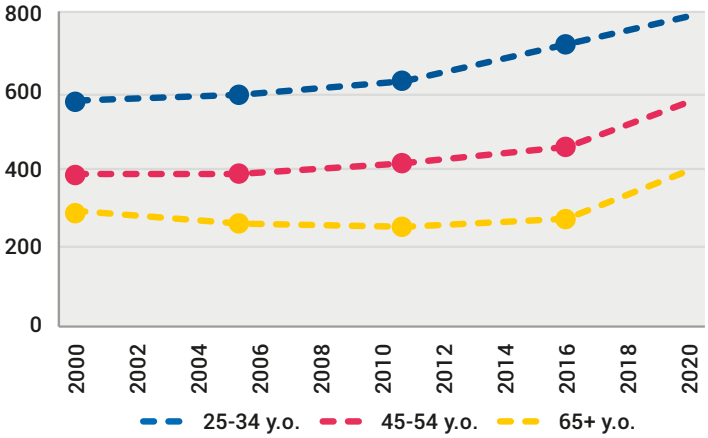
Our homelessness figures for 2019 and 2020 rely on the presentation rate to specialist homelessness service (SHS) providers, scaled to match census estimates (most recently 2016). These services supported about 66,000 people each day in 2019/20 (AIHW, 2020). While an imperfect measure (volume changes can be affected by the availability of provider support, and many homeless people do not seek SHS support), we believe changes are a useful guide to whether need is rising or falling over time.

The measure shows large increases in homelessness over 2019 and 2020; many more people have sought support. This reflects broad growth across the various common reasons for seeking support – while financial hardship remains a primary reason (three quarters of those presenting list government benefits as their primary source of income), more presentations involved someone who was experiencing domestic violence or was suffering a mental health problem.

Most presentations are made by younger people, but the last two years has seen fastest growth (both in number and percentage terms) in older age bands, as can be seen in Figure 16. This steep rise for older Australians suggests that challenges in securing affordable housing is affecting increasingly greater swathes of the population.

Homelessness has received some increased attention in 2020, with particular concerns around protecting those who were rough sleeping during the height of the pandemic. Four state governments (Queensland, New South Wales, Victoria and South Australia) increased short-term support measures, with many rough sleepers provided with extended stays in hotels and other

Figure 16 – Indicator: Homelessness rate per 100,000



Sources: ABS Census and AIHW Specialist Homelessness Services Collection. Chart dots indicate census measures and lines based on trends in annual SHS presentations to June each year.

emergency accommodation. About 40,000 people were supported through this emergency accommodation (Pawson et al., 2021).

However, many of these short-term supports expired later in 2020, and there were not enough medium and long-term housing options (such as public housing) to provide for these people; about a third of former rough sleepers leaving emergency accommodation were supported into a longer-term tenancy (Pawson et al, 2021). The end of supports means that rough sleeping rates are expected to rise again as a result. Additionally, state government bans on rental evictions have now been lifted, creating potentially more demand for short and longer-term housing supports.

Demand for housing support may increase because recent eviction bans have been lifted.

4.4.3 Other social indicators

Overall birth rates slightly fell in 2019, with further decreases seen at younger ages including teenage births. This is a trend extrapolated into 2020; despite some early news reporting, there is no evidence of a lockdown induced baby spike.

Rates of out-of-home care (OOHC) have continued to fall slightly from their 2017 peak but are still double the rate of 20 years ago. As discussed in our previous report, it is hard to simply describe this as bad or good; ultimately lower rates because of reduced neglect and increased safety for children in our community is a good thing, but there will be times when OOHC is in the best interest of a child.

Education indicators

- Year 12 completion rate
- Percentage with tertiary qualifications

4.5 Education

Our two education indicators continue to see increases across all age bands (Figure 17).

Of more immediate concern in 2020 is understanding the impacts of the COVID-19 pandemic on the education system, including the weeks of online schooling that most students undertook. Evidence is mixed:

- Research on Year 3 and 4 children (Miller & Harris, 2020) in NSW found no substantial difference in performance in reading and mathematics overall, but some variation by socioeconomic status. Students from poorer backgrounds fell two months behind previous cohorts. Online study highlighted the challenges for people with less access to devices and the internet.
- The same research also found negative well-being impacts, with higher anxiety for students and lower morale for teachers who faced increased workloads and reduced ability to support students.
- Conversely, NSW Check-in assessments (NSW Dept. of Education, 2020) found that scores in the September Assessments were similar to May NAPLAN performance of the previous year – suggesting students were a few months behind.
- There is some broader evidence that interruptions do not affect measured exam performance, or even improves it in some cases if it allows a reprioritisation of the curriculum. News reports have cited evidence from the Christchurch earthquakes and Hurricane Katrina in New Orleans as examples of this[7].

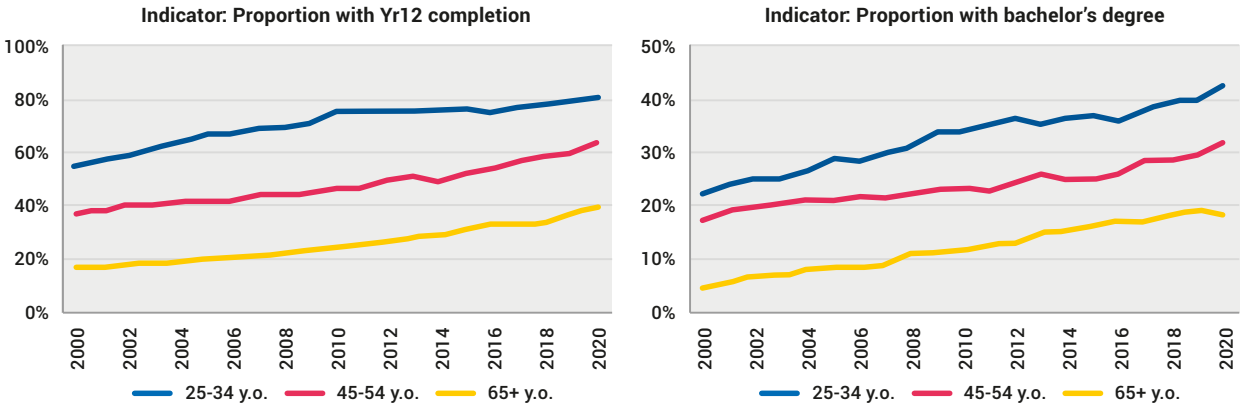
Universities have faced significant financial stress due to the effects of lower numbers of international students.

In any case, the impacts are likely less than in other countries with more extensive lockdowns.

At a tertiary level, universities have seen significant financial stress due to lower numbers of international students. It is unclear how this will affect longer-term sustainability of universities, or whether there will be some further rationalisation of courses or research activities. Impact on student outcomes is less clear, although it obviously accelerated the trend to greater use of online learning and directly affected the on-campus experience, a key feature of university study for many students.

7 https://www.abc.net.au/news/2020-04-17/will-missing-school-due-to-covid-19-matter-for-school-students/12154266

Figure 17 – Education Indicators



Main sources: ABS Education and Work, Australia, May 2019

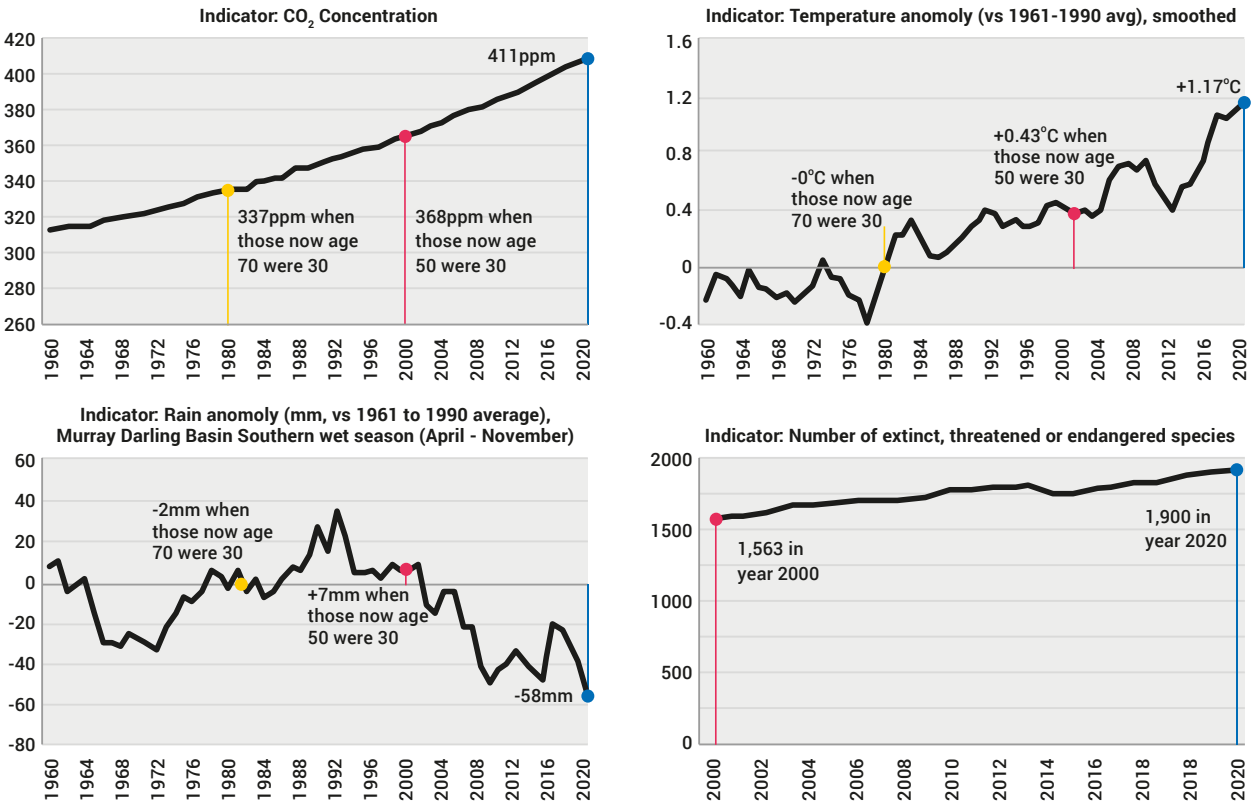
4.6 Environment

Environmental measures continue to contribute heavily to the gap between younger and older age bands. The four indicators have worsened over the past two years, as shown in Figure 18. The smoothed curves of temperature and rainfall saw a new high and low respectively, and there was a net increase of 34 species to the list of those extinct, threatened or endangered. This included the extinction of the Christmas Island pipistrelle, a species of microbat.

Environmental indicators

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

Figure 18 – Environmental Indicators

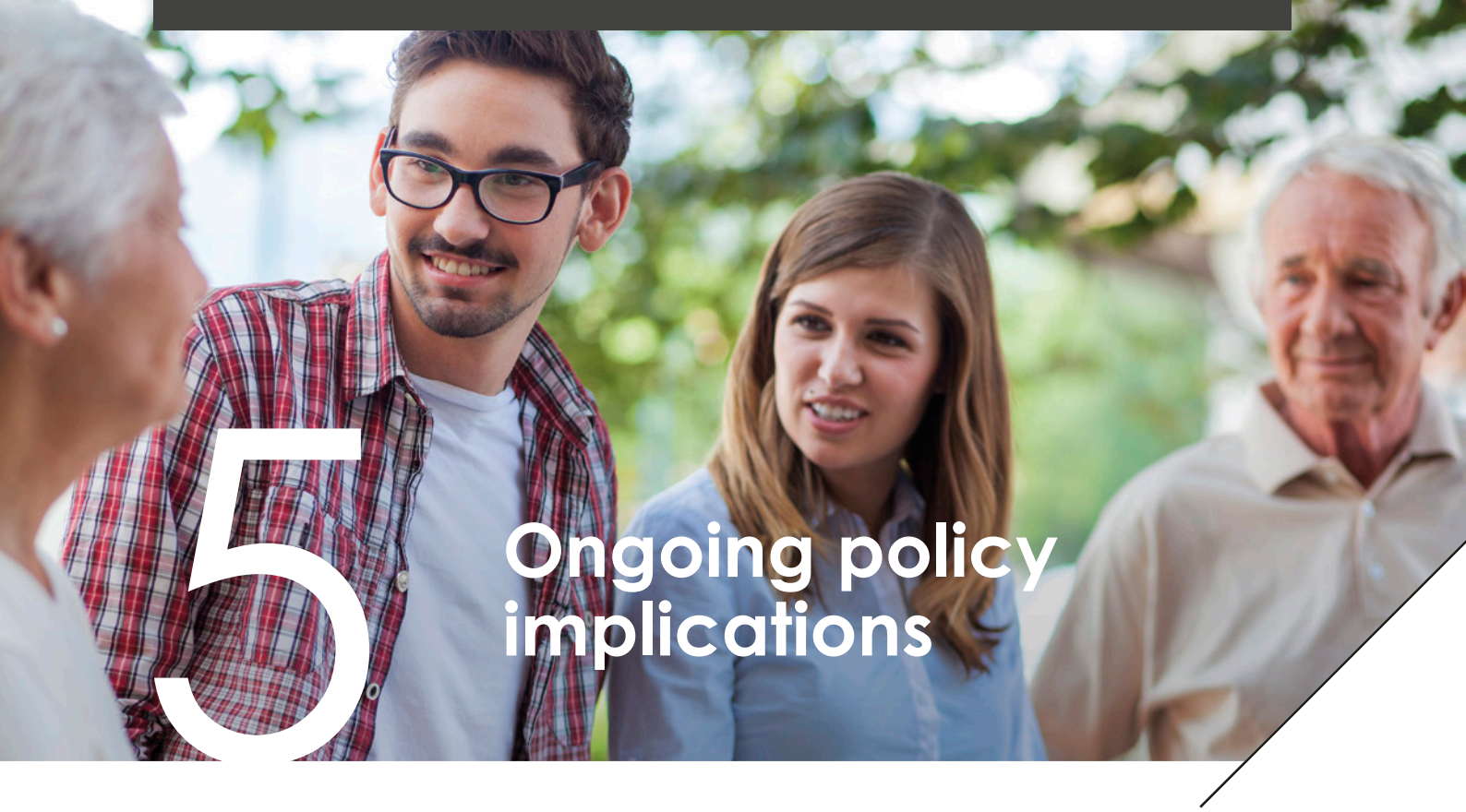


Sources: CSIRO, BOM, www.environment.gov.au/cgi-in/sprat/public/sprat.pl

The impacts of the 2019/20 bushfire season have also become clearer. The WWF estimates that the 10 million hectares of bushfire-affected land means that 3 billion vertebrates (and 140 million mammals), could have been impacted, with a significant proportion of these dying (see WWF 2020, and Dickman & McDonald, 2000). The fires have also seen ongoing impacts to other parts of the Australian economy, including a shortage of structural timber for the building industry, potentially slowing homebuilding in several states.

Global 2020 greenhouse gas emissions have been lowered due to the pandemic. For example, lower transportation emissions across passenger vehicles, freight and air travel in the USA significantly lowered their annual CO2 output (Larsen et al., 2021), a finding that has been replicated internationally.

Internationally, there have also been some significant climate change-related commitments made by governments in the past year (see Section 5).



5 Ongoing policy implications

Our work on intergenerational equity does not seek to advocate for specific policy solutions, but we note that there is a large array of existing work across the various domains, much of which will impact on intergenerational equity. An extensive discussion is provided in our previous report.

This section highlights some of the policy debates and events that have taken place in the last year that relate to our report. Not all directly affect this year's index; in many cases announced policies will have an impact in futures years.

5.1 Economic and fiscal

The JobSeeker income support rate saw three changes over the past 18 months. During the COVID-19 pandemic it was initially boosted by $250 a fortnight, which took the benefit for single people without children from 60 per cent of the age pension rate to about 85 per cent. This then stepped down to $150 and finally permanently increased by $50 relative to pre-pandemic levels. This increase was welcomed by many, although it fell short of the amounts that some groups had called for.

Relatedly, the Commonwealth Government announced a range of early-career supports, including increased subsidies for vocational education, apprenticeships and hiring that seek to support people, particularly young people, into employment.

The Retirement Income Review's (RIR) report was also released in November 2020. It identified some of the inefficiencies with the current system. For example, government tax concessions are provided to encourage saving for retirement and made so that superannuation can be an effective source of retirement income. However, there is some evidence that much of this wealth is not spent as efficiently as it could during retirement. This risks people making larger bequests rather than improving their retirement income – the latter being the widely understood purpose of superannuation. It also noted that the current system favours those who own their home. It also pointed to the need to draw down savings effectively; indeed, some retirees are worse off if they only take minimum withdrawals. The RIR noted that Age Pension spending, as a proportion of GDP, is expected to be stable over time, while the cost of superannuation tax concessions is forecast to increase significantly, overtaking the cost of the Age Pension in 2050. Many of the review's findings, including the broad policy principles set out by the RIR Panel, are aligned with the Actuaries Institute (Actuaries Institute, 2020).

5.2 Housing

The NSW Government has announced phasing out stamp duty and replacing it with an annual land tax. Long recommended by economists, this should remove some of the disincentive for people to switch housing, potentially improving the allocation of housing stock. This future change has no impact on this year's index.

There have been some announcements regarding increased support for affordable housing; at this stage it is unclear whether this will be sufficient to reverse the long-term trends of a falling proportion of subsidised housing and long social housing waiting lists.

Internationally, New Zealand has announced strong macroprudential steps to manage their housing bubble. Australian economists will watch with interest. While such measures may be effective in reducing runaway house price

growth, some commentators say that ultimately increasing the underlying supply of housing is the only reliable way to sustainably improve home ownership and affordability. APRA has previously imposed lending benchmarks on investor loan growth and interest-only loans between 2014 and 2019, but has generally done these to aid 'sound lending practices' rather than explicitly address house price growth. The APRA Chair, Wayne Byres, recently commented that while they were monitoring housing and household debt closely, 'There does not seem cause for immediate alarm,"[8] suggesting there are no immediate plans to adopt similar controls.

5.3 Health and disability

Much of the focus of the past year for Health Departments across the country has been on the immediate COVID-19 health response and the vaccination process. Mental health concerns were also prominent and most state governments have clear strategies for improving mental health outcomes and reducing the number suicides over the next few years.

The Aged Care Royal Commission[9] was finalised in 2020. It shone a light on many issues in the sector, including understaffing, delays for services such as home care and stories of neglect. While the Government response to the Royal Commissioners' final report is still emerging, effective and dignified care of older Australians represents an important intergenerational issue. The Actuaries Institute will release a Green Paper on aged care later in 2021.

5.4 Social

The temporary interventions introduced during the pandemic will serve as important pieces of evidence going forward. What are the implications of increased bail rates? What happens when homeless people are provided with longer temporary accommodation options? In such cases there may be increased appetite for experimenting with different types of support, given the demonstrated ability to adapt quickly in 2020.

5.5 Environment

Internationally, the past 12 months have been characterised by many nations making significant commitments to reduce greenhouse gas emissions. Countries like South Korea, Japan, Germany, the United Kingdom and the USA are leading by committing to net zero by 2050. Under the Biden Administration, the USA has increased its 2030 target to a 50 per cent reduction (relative to 1990) and Japan and Canada are expected to increase their 2030 commitments soon. This means Australia's 2030 commitment sits at the low end of the developed world, and still lacks a formal commitment on a net-zero target, despite 70 per cent of its two-way trade being covered by a net zero by 2050 target. The Actuaries Institutes supports a net-zero emissions target by the second half of the 21st century[10].

Notwithstanding, there is continuing investment in low-carbon technology and falling prices for renewable power sources. In 2020, 28 per cent of Australia's electricity was produced from renewable sources, up 4 percentage points on 2019, reflecting large amounts of rooftop solar installations, among other things[11].

5.6 The 2021 Federal Budget

Our update to the index was performed prior to the May 2021 Budget release. However, some of the announcements are relevant to intergenerational considerations. A deficit of over $100 billion in 2021/22 and net debt approaching $1 trillion by 2024/25 will support the current economic recovery but reduce future fiscal flexibility.

Some parts of the budget will continue the trend towards a widening gap between the older and younger age bands. The growing net debt position will reduce future fiscal flexibility. The significant increase ($18 billion over 5 years) in aged care spending is welcome but will continue the trend of a greater share of government spending being allocated to older Australians.

Other measures should improve the absolute index for younger bands. Continued spending on skills training and wage subsidies target long-term youth unemployment, a key concern following any recession. The significant sums directed towards suicide prevention, if effective, will likely see a greater impact for younger and middle-aged people amongst whom suicide is the leading cause of death. And increased childcare subsidies for those with multiple children will potentially boost participation and incomes for younger Australians.

Some limited housing support was added, in the form of loan guarantees. This is unlikely to make significant inroads into the broader trend of falling ownership rates for younger people.

8 https://www.abc.net.au/news/2021-03-30/surging-property-prices-mortgage-debt-no-cause-for-alarm/100037672

9 https://agedcare.royalcommission.gov.au/

10 https://content.actuaries.asn.au/resources/resource-ce6yyqn64sx3-2093352434-60075

11 https://www.cleanenergycouncil.org.au/resources/resources-hub/clean-energy-australia-report#:~:text=In%202020%2C%20renewable%20energy%20was,percentage%20points%20compared%20to%202019

References and appendices

References

1. Actuaries Institute. (2020). *Submission to the Retirement Incomes Review*. Accessed April 2021 at https://content.actuaries.asn.au/resources/resource-ce6yyqn64sx3-2093352434-55998
2. AIHW. (2017). *Autism in Australia*. Accessed April 201 at https://www.aihw.gov.au/reports/disability/autism-in-australia/contents/autism
3. AIHW. (2020). *Specialist homelessness services annual report, 2019/20*. Australian Institute of Health and Welfare. Accessed April 2021 at https://www.aihw.gov.au/reports/homelessness-services/specialist-homelessness-services-annual-report/contents/summary
4. AIHW. (2021). *Deaths by suicide in Australia.* Accessed April 2021 at https://www.aihw.gov.au/suicide-self-harm-monitoring/data/deaths-by-suicide-in-australia
5. Andrews, D., et al. (2020). The career effects of labour market conditions at entry, *OECD Productivity Working Papers*, No. 20, OECD Publishing, Paris, https://doi.org/10.1787/29c11c75-en
6. Australian Bureau of Statistics (ABS). (2019). *Causes of Death, Australia*. Available at: https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/latest-release#intentional-self-harm-suicides-key-characteristics
7. Biddle, N. and Gray, M. (2021). *Tracking outcomes during the COVID-19 pandemic (January 2021) – Cautious optimism*. Available at: https://csrm.cass.anu.edu.au/sites/default/files/docs/2021/2/Tracking_wellbeing_outcomes_during_the_COVID-19_pandemic_January_2021.pdf
8. Bilsen, J. (2018). Suicide and Youth: Risk Factors. *Frontiers in psychiatry,* 9, 540. https://doi.org/10.3389/fpsyt.2018.00540
9. Borland, J. (2020). Scarring effects: A review of Australian and international literature. *Australian Journal of Labour Economics*, 23(2), 174-187.
10. Chan, N. (2020). *The impact of COVID-19 measures on the size of the NSW adult prison population* (Bureau Brief No. 149). Sydney: NSW Bureau of Crime Statistics and Research.
11. Davidson, P. (2020). *Inequality in Australia, Part 1: Overview*. Supplement: The impact of COVID-19 on income inequality. Australian Council of Social Service and UNSW (Sydney).
12. Dickman, C., & McDonald, T. (2020). Some personal reflections on the present and future of Australia's fauna in an increasingly fire-prone continent. *Ecological Management & Restoration*, 21(2), 86-96.
13. Larsen, K., Pitt, H., & Rivera, A. (2021). Preliminary US Greenhouse Gas Emissions Estimates for 2020. The Rhodium Group. Accessed in April 2021 at https://rhg.com/research/preliminary-us-emissions-2020/
14. Miller, D. D., & Harris, J. (2020). *Evaluating the impact of COVID-19 on NSW schools*. Report to the NSW Department of Education, accessed April 2021 at https://www.newcastle.edu.au/__data/assets/pdf_file/0008/704924/Evaluating-the-impact-of-COVID-19-on-NSW-schools.pdf
15. MYEFO 2020/21. *Budget Strategy and Outlook Budget Paper No. 1 2020-21*, Circulated by The Honourable Josh Frydenberg MP Treasurer of the Commonwealth of Australia and Senator the Honourable Mathias Cormann Minister for Finance of the Commonwealth of Australia. 6 October 2020. Available from: https://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query=Id%3A%22publications%2Ftabledpapers%2Fe95618ae-f179-424d-ae81-66f1f178ff51%22
16. NSW Department of Education. (2020). *Check-in assessments – Years 3, 5 and 9*. Accessed April 2021 at https://www.cese.nsw.gov.au//images/stories/PDF/Check-in-assessment-AA.pdf
17. Pawson, H., Martin, C., Sisson, A., Thompson, S., Fitzpatrick, S. and Marsh, A. (2021). COVID-19: *Rental housing and homelessness impacts – an initial analysis*; ACOSS/UNSW Poverty and Inequality Partnership Report No. 7, Sydney.
18. Phillips, B., Gray, M., & Biddle, N. (2020). *COVID-19 JobKeeper and JobSeeker impacts on poverty and housing stress under current and alternative economic and policy scenarios*. Accessed April 2021 at https://openresearch-repository.anu.edu.au/bitstream/1885/213186/1/Impact_of_Covid19_JobKeeper_and_Jobeeker_measures_on_Poverty_and_Financial_Stress_FINAL.pdf
19. Randolph, b., Liu, E., & Bradbury, B. (2020). *Poverty, property and place: a geographic analysis of poverty after housing costs in Australia*. Australian Council of Social Service and UNSW (Sydney).
20. World Health Organisation (WHO). (2018). *Preventing Suicide: A community engagement toolkit*. Available at: https://apps.who.int/iris/bitstream/handle/10665/272860/9789241513791-jpn.pdf
21. WWF. (2020). *Australia's 2019-2020 bushfires: the wildlife toll – interim report*. Accessed April 2021 at https://www.wwf.org.au/ArticleDocuments/353/Animals%20Impacted%20Interim%20Report%2024072020%20final.pdf

Appendix A – Index construction

Several choices need to be made in order 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 which 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 2020) 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 2020, and sometimes 2019, figure was not available at the time of writing. We discuss our approach to extrapolation in Appendix B.1. In our discussion we have attempted to be clear when we have relied on extrapolated values.

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:

$$\text{Standardised component } x'(t) = \frac{(x(t)-\mu)}{\sigma}$$

The effect of this is that each component has a roughly even influence on the index within their domain. For components which 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 approach above are:

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

We have retained the mean and standard deviation figures from our previous report to maintain consistency in the index values across time. This means they are effective set using data from 2000 to 2018 as the ongoing 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 to 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 1) were set by the authors in consultation by 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 figures

See Table A1 below.

Table A.1 – Australian Actuaries Intergenerational Equity Index results

	Absolute indices			Relative indices		
	25-34 y.o.	45-54 y.o.	65-74 y.o.	25-34 y.o. minus 45-54 y.o.	25-34 y.o. minus 65-74 y.o.	45-54 y.o. minus 65-74 y.o.
2000	73.0	106.0	100.0	-33.1	-27.0	6.0
2001	72.4	103.9	99.9	-31.5	-27.5	4.1
2002	73.6	106.9	99.3	-33.3	-25.6	7.6
2003	74.1	106.5	97.3	-32.4	-23.2	9.2
2004	80.3	112.5	99.8	-32.2	-19.5	12.7
2005	81.8	113.7	98.6	-32.0	-16.8	15.1
2006	82.7	114.7	94.5	-32.0	-11.8	20.3
2007	78.8	113.8	94.8	-35.0	-16.0	19.0
2008	76.8	111.3	94.1	-34.5	-17.4	17.2
2009	75.0	110.5	96.3	-35.5	-21.3	14.2
2010	81.0	112.6	102.4	-31.6	-21.3	10.2
2011	79.8	108.3	100.0	-28.5	-20.1	8.4
2012	78.5	107.7	97.7	-29.2	-19.2	10.0
2013	77.6	108.3	103.6	-30.6	-26.0	4.6
2014	74.3	99.8	106.7	-25.4	-32.4	-6.9
2015	72.2	97.7	113.2	-25.5	-41.0	-15.5
2016	72.8	100.4	116.2	-27.6	-43.4	-15.8
2017	69.2	100.1	115.6	-30.9	-46.3	-15.5
2018	70.2	99.9	116.7	-29.7	-46.5	-16.8
2019	67.1	99.7	116.7	-32.6	-49.5	-16.9
2020	68.3	101.4	113.8	-33.1	-45.5	-12.4

A.9 Model 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 instance, 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 2020			Change required to change AAIEI by 1 point	
		25-34 y.o.	45-54 y.o.	65-74 y.o.	Change	Unit of Change
Economic and fiscal	Employment (weighted underutilisation)	12.1%	9.0%	5.6%	-0.6	percentage points
	Household disposable income	1,081	1,155	957	97	$
	Poverty rates	7.5%	10.5%	10.9%	-0.9	percentage points
	Net wealth	353	1,295	1,618	101	$000
	Government spending	4.30%	3.83%	4.78%	0.15	percentage points
	Government net debt	25%	9%	5%	-9.3	percentage points
Housing	Home ownership rate	35.0%	72.0%	83.1%	1.3	percentage points
	Rental costs	18.2%	19.9%	28.0%	4.0	percentage points
Health and disability	Life expectancy	77.0	70.7	69.0	0.9	years
	Obesity rates	24.1%	38.3%	41.4%	-3.9	percentage points
	Disability rates	6.8%	15.0%	38.2%	-1.4	percentage points
	Suicide rates	15.6	18.3	10.5	-1.5	per 100,000
Social	Rate of robbery victimisation	541	246	83	-225	per 100,000
	Rate of incarceration	385	181	47	-35	per 100,000
	Rate of homelessness	793	585	415	-75	per 100,000
	Gender pay gap	14%	15%	17%	-2.14	percentage points
	Rate of children aged 0–17 years who are in out-of-home care	793	-	-	-256	per 100,000
	Teenage birth rate	805	-	-	-409	per 100,000
Education	Percentage complete Year 12 by age band	80%	63%	39%	4.6	percentage points
	Rate of persons with bachelor's degree qualification or above	42%	31%	18%	3.2	percentage points
Environment	Atmospheric carbon dioxide concentration	411	368	337	-8.52	ppm
	Average mean temperatures	1.17	0.43	0.00	-0.14	degrees
	Murray-Darling Basin rainfall ANOMOLY, April – November	58.18	6.60	1.85	13.84	mm
	Number of species listed as threatened, endangered or extinct	1,900	-	-	79	species

Appendix B – Other technical details

B.1 Data sources

The primary data source for each indicator is unchanged, summarised in the table below.

Table B.1 – Indicators selected for the Australian Actuaries Intergenerational Equity Index sensitivity

	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[12]: • 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

12 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, their impact on affected youth is typically so major that they have been included for the youngest generation in the study only.

B.2 Approach to extrapolation for missing data points

There are various missing numbers in some of the indicators. Some of these related to older time periods – either the series does not extend back to the year 2000, or the values are not collected every year. We have treated these the same as our previous report, generally via simple interpolation.

The timing of releases for various indicators means that not all 2020 values (and sometimes even 2019 values) are not available for direct inclusion in the report. We have taken a pragmatic approach, using available evidence to estimate values. As true indicators becoming available in the future we will overwrite the estimates. The table below summarises our approach across the indicators.

Table B.2 – Approach to extrapolating for missing data

	Indicator	Recent years missing?	Main data source
Economic and fiscal 30% weight	Employment (weighted underutilisation)	n/a	
	Income (Equivalised disposable household income)	2019, 2020	Global trend in income applied to get from 2018 to 2020 based on ABS Household resources data (not age split). 2019 interpolated between the two.
	Poverty rates	2019, 2020	Linear trends over 2012-2018 extended to 2019. Values in 2020 apply ratios based on age-specific results drawn from Phillips et al. (2020).
	Net wealth	2019, 2020	Linear regression estimated a relationship between growth and Australia property index (ABS series 6416.0), and 2019 and 2020 index values used to project wealth growth.
	Government spending by age as a % of GDP	2020	2020-21 Budget used to estimate equivalent changes to the ABS official series. JobKeeper (and related initiatives) separated out and allocated to age groups based on reduction in total hours worked by age (ABS series 6291.0.55.001) in April 2020 compared to a year previous.
	Commonwealth Government net debt	n/a	
Housing 10% weight	Home ownership rate	2019, 2020	Linear trends over 2016-2018 extended to 2019. Values in 2020 set equal to 2019 based on evidence from mortgage lending statistics.
	Rental costs	2019, 2020	Linear trends over 2016-2018 extended to 2019. Global ratio applied for 2020 based on NSW published rental information.
Health and disability 20% weight	Life expectancy	n/a	
	Obesity rates	2019, 2020	We have extrapolated the linear trend from 2012 to 2018 to estimate 2019 and 2020 values. There has been little published since the National Health Survey.
	Disability rates	2019, 2020	We have extrapolated the linear trend from 2003 to 2018 to estimate 2019 and 2020 values. The ABS 2020 disability survey results are unlikely to be available until later in 2021
	Suicide rates	2020	We have taken the average percentage change for NSW and Vic suicide rates (not split by age) and applied these ratios to 2019 values to derive estimates for 2020.
Social 15% weight	Rate of robbery victimisation	2020	Taken the average change seen for NSW and Vic crime statistics over the year (but not split by age) and applied these ratios as a global trend to 2019 values to derive estimate for 2020. Some of this state data has age splits, which supported the use of uniform ratios.
	Rate of incarceration	n/a	

	Indicator	Recent years missing?	Main data source
Social (continued) **15% weight**	Rate of homelessness	2017 to 2020	While we use census rates when available, we extend recent years using trends in the Specialist Homelessness Service presentation rates from the AIHW, which are also split by age. The same approach was used in the previous iteration of the index.
	Gender pay gap	2019, 2020	While the income gap between males and females is available for these years, age splits are not yet available. We have applied the global trend, as ratios, to the 2018 values to carry them forward.
	• Rate of those aged 0–17 years in out-of-home care • Teenage birth rate	2020 missing for the Teenage birth rate	We have fitted an exponential trend over 2014 through to 2019 and the decay rate to the 2019 value to derive the estimate for 2020. We have confirmed that state-level data supports a continued decreasing trend.
Education' **10% weight**	Percentage that completed Year 12	n/a	
	Percentage with bachelors' degree qualification or above	n/a	
Environment **15% weight**	Atmospheric carbon dioxide concentration	n/a	
	Average mean temperatures	n/a	
	Murray-Darling Basin rainfall ANOMOLY, April – November	n/a	
	Number of species listed as threatened, endangered or extinct	n/a	

B.3 Changes to historical time series

The following minor changes and corrections have been made to the index:

- The Bureau of Meteorology (BOM) has slightly altered the time period used for measuring cool-season rainfall over the Murray-Darling Basin, resulting in slightly different rainfall anomalies.
- The gender pay gap measure before 2013 previously took changes in the ratio between male ordinary earnings and female total earnings in the ABS AWE series. We have altered so both use the ordinary earnings series, resulting in a small change in the gap for pre-2013 values.
- Year 12 attainment values were offset by a year – so that the 2000 value was the actual 1999 value and so on. We have corrected the misalignment.
- The homelessness series saw two corrections. First, the rates for 45-54 and 65-74 age bands were too low in 2001 (and the two years before and after, due to the interpolation) due to an error in the population used as the denominator. Second, the extrapolation of the 65-74 age band over the years 2017 to 2020 had an additional ratio applied which gave estimates 2.5 per cent higher than they should have been.

The authors apologise for the errors. The overall impact of these changes and corrections on the index is small – correlations between new and old series are 0.99, and the relative differences between different age indices are within two points from 2005 onwards and the difference at 2018 (the latest year in our previous report) is less than half a point.

B.4 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, e.g. 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) groups 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