6. APPENDICES

Section 6A. Detailed modelling methods and assumptions

Outline of appendix

This appendix covers the detail of modelling methods and assumptions used as part of the review:

1. Evidence on the effect of change in the Superannuation Guarantee (SG) on wages growth
2. Evidence on the spending growth needed in retirement
3. Evidence for the review's adequacy benchmark
4. The review's retirement income cameo model (assumptions and methodology)
5. Model of Australian Retirement Incomes and Assets (assumptions and methodology)
6. SPROUT (Rice Warner model/ISA): assumptions and methodology)
7. Modelling financial stress

Evidence on the effect of changes in the Superannuation Guarantee on wages growth

The SG mandates employers make contributions into employees' personal superannuation accounts. The SG is currently at 9.5 per cent of ordinary time earnings and is legislated to increase to 10 per cent on 1 July 2021. Further increases, by 0.5 percentage points each year, will follow until the SG reaches 12 per cent on 1 July 2025. How these changes will affect living standards both during and before retirement will depend on the extent to which the costs of higher SG payments reduce wages growth.

The weight of evidence suggests the majority of SG increases are paid for through lower growth in wages. This evidence includes:

- Two domestic studies assessing the effect of the SG on wages in Australia, using different data sources and identification strategies
- Economic theory and international evidence of the effects of 'mandated benefits' that provide employees strong direct benefits like superannuation
- The explicit intent of the SG policy at its outset for a trade-off between wages and superannuation contributions, which has not been significantly affected by subsequent developments in Australian wage-setting arrangements.

History of the Superannuation Guarantee and wages in Australia

The forerunner of the SG, and start of compulsory superannuation, was 'award superannuation'. Superannuation through award wages started in 1985, negotiated between the federal Labor government and the Australian Council of Trade Unions (ACTU).[322]

Compulsory award superannuation was explicitly a trade-off with wages:

[322] The Accord began in 1983 and limited wage increases to the level of inflation (Parliament of Australia, 1983).

'In return for tax cuts and 3% Award-based Superannuation the ACTU accepted a 2% discount of the wage rise based on the CPI.' (Australian Council of Trade Unions, 1990)

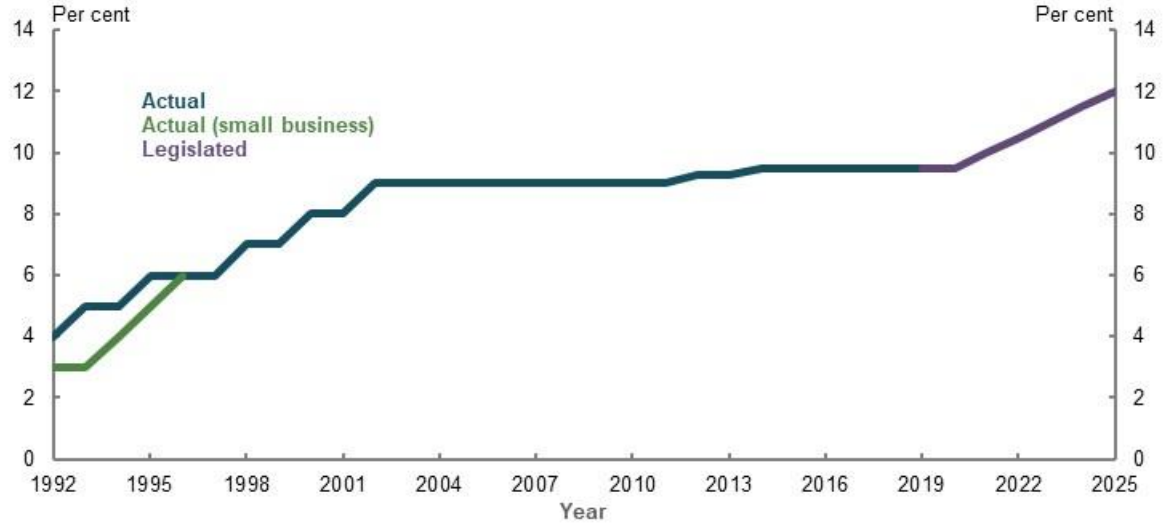
This increased the coverage of superannuation to 55 per cent of employees in 1988, up from 32 per cent in 1974 (ABS, 2009a).

Part of the motivation for shifting some remuneration from current wages to superannuation was to temper inflationary pressures in the face of exchange rate depreciation and declines in the terms of trade (Australian Council of Trade Unions, 1990); (Millane, 2020). This tempering would only occur if higher superannuation resulted in reduced wages growth.

A comprehensive employer SG was pursued after the Australian Industrial Relations Commission rejected further increases to award superannuation (Millane, 2020). The Government described the introduction of the SG as *'forgoing a faster increase in real take-home pay in return for a higher standard of living in retirement'* (Dawkins, 1992, p. 17). Starting in 1992, the payments were initially 3 per cent of ordinary time earnings (4 per cent for employers with payrolls greater than $1 million).

From its introduction, the rate of the SG was legislated to increase over time. All employees were paid a rate of 6 per cent in 1996, which increased to 9 per cent in 2002. Small increases in 2013 and 2014 brought the rate to its current level of 9.5 per cent. The next increase in the SG to 10 per cent is legislated to occur on 1 July 2021, with further increases bringing the rate to 12 per cent by mid-2025 (Chart 6A-1).

Chart 6A-1 Rate of the SG, actual and legislated rates



Source: (Commonwealth of Australia, 1992) (ATO, 2020g).

The explicit trade-off between superannuation and wages in the Accord ceased soon after the SG was introduced. Award wages became less common when enterprise bargaining was introduced in 1993, which promoted decentralised wage negotiation between unions and individual employers. About a fifth of employees currently have wages set under awards.

Reflecting policy intent and economic theory, governments, Treasury and other analysis has typically assumed pass-through of SG increases to lower wage growth (Gallagher, 2012; Rothman, 2011; Australia's Future Tax System Review, 2009). For instance, in 2007, Paul Keating remarked that *'the cost of superannuation was never borne by employers. It was absorbed into the overall wage cost'* (Keating, 2007).

This analysis assumed the trade-off was implicit, where employers and workers negotiated to maintain the same overall total pay packet, including superannuation. As a result, the debate about

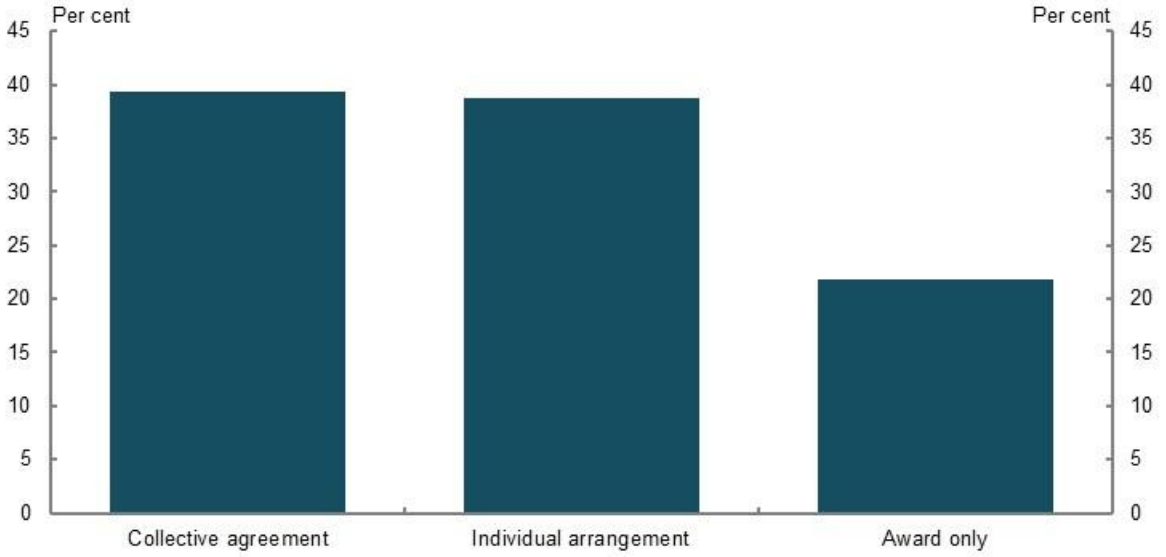
the incidence of the SG (who bears the cost) has shifted to being an empirical question; that is, the incidence must be inferred from observed data.

Wage setting in Australia

The wage-setting process in Australia is likely to facilitate high levels of pass-through of SG costs to wages. Since an overhaul in the early 1990s, the system of comprehensive award wages has evolved into three main wage-setting methods:

- Collective agreements, covering groups of employees at different firms
- Individual agreements, negotiated between employees and employers
- Award wages and the national minimum wage, centrally determined by the Fair Work Commission

Chart 6A-2 Methods of employee wage setting in Australia



Note: Based on survey data collected in May 2018. Excludes 'owner manager of incorporated enterprise'. Source: Analysis of (ABS, 2019h).

Individual agreements

Almost 40 per cent of employees have wages set by individual agreements with their employer (Chart 6A-2).

Since these agreements are individual, no detailed data is available on how SG costs are distributed. However, such agreements are more likely to cover higher-income workers who gain a higher value from superannuation tax concessions. About sixty per cent of employees on individual arrangements earn more than the median wage (ABS, 2019h).

Many individual agreements define a total remuneration package, which includes superannuation, suggesting that the incidence of the SG is contracted onto the employee. For such agreements, it implies full pass-through of SG changes to wages in the short run, with the potential for subsequent reallocation back to the employer through renegotiation.

Analysis also suggests that wages growth for workers on individual agreements is more responsive to changes in economic conditions (Bishop & Cassidy, 2019), which may mean it is also quite responsive to changes in labour costs. Some individual agreements are linked to award wage outcomes, which take into account changes in the SG.

Awards

Award wages are legally binding minimum wages that vary by industry and occupation, with the national minimum wage applying to any employee not covered by a specific award. These awards directly determine the wages of around 20 per cent of employees and around 13 per cent of total wages (Bishop & Cassidy, 2019). The Fair Work Commission centrally determines award wages and the minimum wage.

The Fair Work Commission has considered SG contributions a deferred benefit for employees and has taken changes in the SG into account when determining award wage outcomes. For example:

> *'The SG rate increase to apply from 1 July 2013 is a moderating factor in considering the adjustment that should be made to minimum wages. As a result, though it would not be appropriate to quantify its effect, the increase in modern award minimum wages and the NMW [national minimum wage] we have awarded in this Review is lower than it otherwise would have been in the absence of the SG rate increase.' (Fair Work Commission, 2013)*

As well as explicitly considering the SG in award wages growth, the Fair Work Commission also considers average and median earnings (Fair Work Commission, 2019a). To the extent that SG increases reduce wages growth for employees using other wage-setting processes, this is likely to have second-round effects on wages growth for employees who rely on awards.

Collective agreements

Collective agreements, covering groups of employees at different firms, account for around 40 per cent of employees' wages in Australia (Bishop & Cassidy, 2019). Union involvement in negotiating wages might lead to lower pass-through of superannuation costs to wages if unions enhance the bargaining power of employees. However, there is empirical evidence that pass-through in these agreements is strong (Coates, et al., 2020).

Some employees may be unaffected by changes to the SG, as they already receive superannuation contributions above the SG (for example, university employees). In aggregate, 14 per cent of employees reported receiving superannuation contributions above 9.5 per cent in the 2018 Household, and Labour Dynamics in Australia (HILDA) Survey.

Within these wage-setting frameworks, other factors will also matter. Bargaining power, prevailing profitability, market conditions and wage growth may affect how SG costs are distributed across industries and over time.

Submissions to the review

Submissions were mixed on the effect of the SG on wages growth. This division was most evident in research and policy institutes' submissions, many of which presented evidence they have previously released on the subject.

Likewise, representative bodies were broadly split on whether higher SG payments were a trade-off for lower wages growth, but industry organisations generally agreed that there was a trade-off.

Submissions presented no new empirical evidence. The *International literature* and *Australian evidence* sections below assess the existing research referenced in the submissions.

One submission used a macroeconomic overlapping generations model to explore the impacts of changes to the SG. The submission referred to a paper (Kudrna & Woodland, 2013) whose central assumption resulted in a full pass-through to wages, but the submission drew attention to an alternative scenario in that paper with a much lower impact on wages. The alternative scenario

assumed that higher domestic savings in Australia due to a higher SG rate could significantly reduce the domestic real interest rate. This reduced borrowing costs, increased domestic investment in the economy and in turn boosted wages.

In contrast, the paper's central assumption that the real interest rate affecting investment in Australia is instead set internationally is more typical in similar macroeconomic models, such as (Kudrna, et al., 2015) and (Kudrna & Tran, 2018).

Economic theory

The SG is a 'mandated benefit' for employees. Since employers must pay SG amounts, they face the legal incidence of the payment. However, employees receive all the benefits. Superannuation therefore differs from other taxes on employment, such as payroll taxes, which provide no direct benefits to employees.

While employers bear the legal incidence of the SG, the 'economic incidence' (who ultimately bears the cost) will depend on how employers and employees respond to the benefit; for instance, how much employees value the superannuation benefit, how much the demand for labour changes in response to a change in wages, as well as structural features of the labour market such as minimum wages and wage-setting processes.

In general, employers will respond to an increase in employment costs with a combination of four possible changes:

1. Increase the prices of their products or services
2. Reduce employee wages (or wages growth)
3. Reduce the amount of labour demanded
4. Reduce their profits

Even if wages are unaffected, lower labour demand and higher prices are also costs borne by workers.

In a stylised labour market framework (Summers, 1989), mandated benefits increase the cost of hiring workers and therefore reduce the demand for labour. Since employers must pay the additional cost of the benefit on top of a given wage, they demand a lower quantity of labour at each wage level than previously. In addition (and by contrast to the example of payroll taxes), employees increase their supply of labour, since for a given take-home wage they now receive the additional benefit.

It is ambiguous if the new equilibrium wage rate results in more of the costs of a mandated benefit falling on employees or employers. That will depend both on how employers and employees adjust their demand and supply of labour in response to changes in the wage rate and how much employees value the benefit. In general, wages will fall more if employees' willingness to work is unresponsive to changes in the wage rate and if they place a high value on the benefit.

Since, in practice, superannuation has strong direct benefits for employees (payments accumulate in employees' accounts to be withdrawn in retirement), this suggests a relatively strong theoretical pass-through of SG costs to wages.

In a simple, theoretical example, with a perfectly competitive labour market and employees who are indifferent to the mix of superannuation and wages in their remuneration, there might be full pass-through; that is, wages would fall by exactly the value of superannuation payments. However, in practice, employees may value superannuation less than take-home wages, since access to superannuation is restricted, and the relative benefits of associated tax concessions will depend on

employees' time discount factors and the somewhat opaque effects of superannuation savings on pension benefits.

In addition, wages are not set according to supply and demand schedules in a perfectly competitive environment, but depend on wage-setting processes, minimum wages, bargaining power and matching considerations. Detailed analysis of the theoretical economic incidence of Australian superannuation is discussed in Freebairn (1998).

International literature

Consistent with theory, international evidence suggests that mandated benefits similar to superannuation (those with strong direct benefits for employees) have high pass-through to wages.

Of the two broad methodologies used to study such measures, those employing micro-econometric approaches, using data at the firm or employee level, are preferred in comparative studies. For instance, the European Commission's (2015) literature survey noted that macro-econometric approaches have difficulty estimating the long-run incidence of mandated benefits. Macro-econometric studies rely on cross-country and time series variation in taxes on labour and are therefore less able to control for contemporaneous changes in other factors that might affect wages growth.

The other main difference across international studies is in the degree to which the program being studied gives a direct benefit to employees. Programs that provide weak direct benefits to employees, such as payroll taxes, are found to have lower pass-through to wages than those with strong direct benefits. (Bozio, et al., 2019) found average pass-through was only around 15 per cent across a range of studies looking at programs with weak links to employee benefits, but averaged 103 per cent across studies of programs with strong direct benefits. This is consistent with differences posited by theory that employees increase their willingness to work when mandated benefits with direct benefits for the employee are included.

Pass-through to wages tends to be larger in the long run. A meta-analysis by (Melguizo & González-Páramo, 2013), which incorporates the results of a large number of studies, found that a little less than half of the costs are passed through in the short run, but three-quarters are passed through on average in the long run. This may be because the legal incidence of these programs is on employers, and wage setting and labour demand do not adjust as much in the short run.

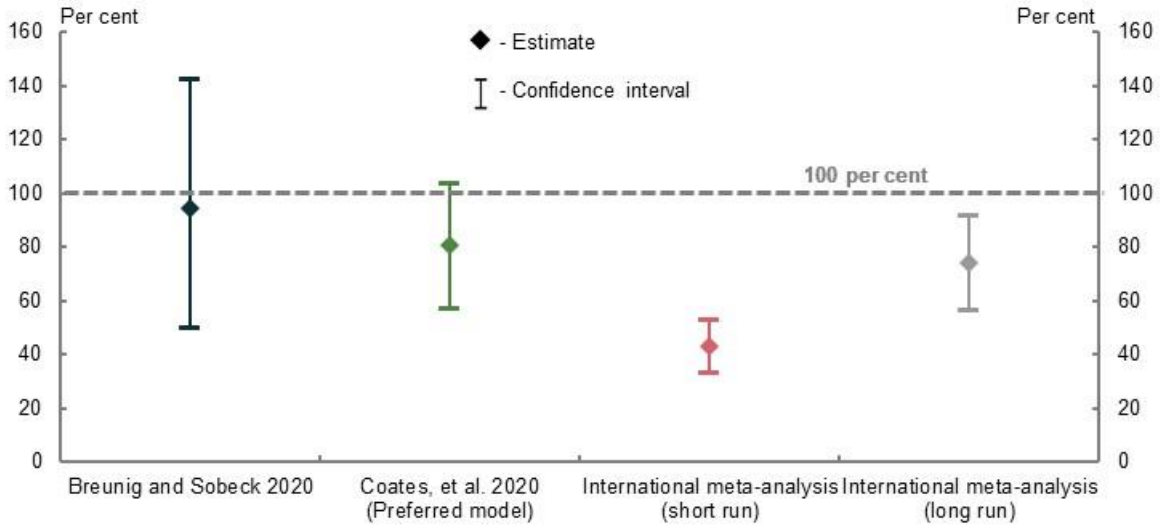
Wage-setting institutions are also important. Both highly centralised and highly decentralised wage-setting regimes, similar to award wages and individual agreements in Australia, tend to exhibit the highest degrees of pass-through to wages (European Commission, 2015). Employers are also found to be more able to shift costs that apply economy-wide, such as superannuation, than firm-specific costs. (Melguizo & González-Páramo, 2013) also estimate that pass-through is higher for employees in the public sector, which may reflect differences in wage negotiation for these workers.

Australian evidence

A small number of empirical studies have examined the effect of the SG on wages in Australia. High-quality micro-econometric research[323] estimates most or all of the economic incidence of SG changes fall on employees through lower wages growth. This is consistent with both theory and international evidence of the effect of mandated benefits on wages, given superannuation has strong direct benefits for employees (Chart 6A-3).

[323] (Coates, et al., 2020) (Breunig & Sobeck, 2020).

Chart 6A-3 Estimates of the pass-through to wages from the SG and mandated benefits, 95 per cent confidence intervals



Note: 100 per cent implies all of the costs of SG or mandated benefits changes are passed through as reductions in wages growth. Breunig and Sobeck (2020) estimate relates to the SG change for 2002-03. The Coates, et al., 2020 estimate uses the authors' preferred model. International meta-analysis of mandated benefits is based on 52 empirical studies looking at the incidence of labour taxes and social security contributions (Melguizo & González-Páramo, 2013). Source: Review analysis.

Similar to international studies, the two broad empirical approaches are macro-econometric and micro-econometric. Micro-econometric studies are able to control for many more contemporaneous determinants of wages growth and are able to identify pass-through over longer timeframes, so these studies are preferred in the literature.

Two recent studies from research institutes used almost identical macro-econometric approaches: the McKell Institute (Taylor, 2019) and the Centre for the Future of Work at the Australia Institute (Stanford, 2019). They both found no significant pass-through of SG costs to wages. These studies use time series regressions, and assess the linear effect of SG changes on contemporaneous aggregate wages growth. Their approach raises a number of issues:

- **The number of time series observations is limited.** This means their estimates have low precision and they are not able to account for longer-run pass-through into wages. This is important as labour market frictions and international evidence suggests pass-through is higher in the long run.
- **Only a limited number of control variables can be used.** This may cause bias in their estimates of the effect of the SG if other factors that influence aggregate wage growth have not been controlled for, known as omitted variable bias. For instance, compositional factors, such as the changing industry composition of the labour force, have not been controlled for.
- **The specification may be affected by reverse causation.** It may have historically been easier to increase the SG when prevailing wages growth was strong, confounding their results.
- **Their conclusions can change significantly with small changes in model specification.** This is shown by the Grattan Institute's replications of the time series models (Nolan, et al., 2019); (Coates, et al., 2020). Reasonable alternative specifications can support a trade-off between the SG and wages growth.

The Stanford (2019) study also presents unconditional correlation analysis between:

- average wage growth and the industry share of the wage bill paid in superannuation in Australia, and
- unit wage costs and rates of employer social contributions across countries

This unconditional correlation analysis has methodological issues. It fails to control for any differences in labour market conditions across industries and countries. It also suffers from definitional issues; for instance, superannuation is paid as a share of ordinary time earnings, not the total wage bill, and no account is made for differences in social contributions' direct benefit to employees across countries.

Two recent papers have employed micro-econometric techniques using different data sources and conclude that the majority (70-100 per cent) of SG costs are paid for by employees through lower wages growth.

The Grattan Institute (Coates, et al., 2020) identifies the correlation between the SG and wages growth in a pooled sample of 80,000 enterprise agreements registered from 1991 to 2018. They find that 80 per cent of SG increases are passed through to lower aggregate wages within the period of the enterprise agreement, typically two to three years. The dataset does not allow for observation of long-run effects, but authors noted long-run pass-through is likely to be even higher based on similar international studies.

The data used in Coates, et al. (2020) covers those on collective agreements in the federal industrial relations system. These agreements represent an 'intermediate' level of wage setting, which international evidence suggests has a lower level of pass-through (European Commission, 2015).

The authors exploit significant cross-sectional and time variation in agreements and substantial amounts of data to control for additional factors that are likely to affect wages growth. This includes more macroeconomic drivers of wages growth, such as underemployment and per capita GDP growth. In addition, they account for factors that would explain differences in wage growth across agreements: fixed effects for sector and industry, along with things such as industry-level unemployment rates. This addresses concerns about omitted variable bias.

The extensive list of control variables included in Coates, et al. (2020) and the high level of robustness their results show to changes in model specification, strongly suggests the effect they identify is due to SG changes. In addition, alternative specifications that exclude agreements paying more than the SG give stronger effects, equal to full pass-through, suggesting that their partial pass-through estimates are tempered by agreements not affected by the SG.

The second micro-econometric analysis, from the Tax and Transfer Policy Institute (Breunig & Sobeck, 2020), which was commissioned by the review, estimated that changes to the SG causally lower wages growth. The authors found pass-through was between 70 and 100 per cent.

Their identification strategy compares wages growth for workers receiving more than the SG-legislated rate to those receiving the legislated rate. Increases to the legislated rate of the SG should only affect the latter group, allowing a comparison of wages growth between them.

Their data includes individual tax return data from the Australian Taxation Office (ATO) from 2002-03 to 2016-17, covering all three different wage-setting arrangements. A relative strength of this study, compared to Coates et al. (2020) study, is that the dataset covers all wage-setting agreement types.

Breunig & Sobeck (2020) find that employees receiving superannuation contributions above the SG rate have persistently lower wages growth over their sample. They identify that in years the SG was increased, the difference in wages growth narrowed, providing evidence that changes to the SG are passed through to lower wages growth.

The causality of these results relies on the assumption that the difference in wages growth between employees who receive exactly the SG and others is constant over time (in the absence of SG changes). They are able to use individual fixed effects to control for persistent differences between them over time, which accounts for substantial heterogeneity between people. Their results are robust to a number of methodological and sample selection changes, and add to the empirical evidence that the majority of SG costs are passed through to wages.

Possible future effects

In predicting future impacts of the SG on wages, the rate of pass-through would depend on workers' bargaining power and the domestic labour market. However, there is no clear evidence that future changes to the SG will have lower pass-through to wages than previous increases.

Lower aggregate wage growth may reduce pass-through in the short run. Wages tend to be sticky; nominal wage decreases are rare and there is some evidence of clumping of wage increases around expected inflation (Debelle, 2019).

Given average wage growth has been low over recent years, it could be argued that these nominal rigidities may be more binding. In 2018, around half of wage increases were between 2 and 3 per cent, up more than 40 per cent since 2012 (Debelle, 2019).Compared to these recent wage outcomes, there is potential for even lower wage growth or even wage freezes arising in the short term resulting from the COVID-19 Pandemic. This may mean more of the short-term incidence of SG increases legislated to occur in 2021 could, in some instances, initially fall on employers. Where employers bear more of the SG increase this could lead to changes in the demand for labour and/or investment. The impact of the COVID-19 Pandemic on the economy over the next few years is very uncertain. However, the modelling undertaken for the review is aimed at assessing the long-term implications of different SG rates. Variations in the business cycle and shorter-term volatility are unlikely to impact on long-term economic trends. Over the long term, the research suggests most of the impact of SG changes will be passed on to workers.

While lower wages growth in the year of introduction could reduce pass-through of changes to the SG, evidence suggests this will not be maintained and the long-run economic incidence of the SG will be mostly on employees. This suggests any additional compensation from SG increases when nominal wages are held constant will be recouped through lower wages growth when wage freezes are lifted.

Some evidence suggests pass-through could be higher in the future. International estimates suggest labour demand has become more flexible over recent years, due to technology improvements increasing the substitutability of domestic labour and compositional shifts towards flexible contracts for low-skilled jobs (European Commission, 2015). Such factors reduce bargaining power of employees and would increase the pass-through of superannuation costs to employees. In line with this, (Breunig & Sobeck, 2020) found evidence that pass-through from the most recent changes to the SG were higher than in the past.

There is limited evidence that other changes would reduce pass-through.

- Employees will probably not value superannuation less than in the past, given tax concessions and access arrangements have remained broadly unchanged.
- Increases in employee bargaining power that could shift the costs of SG changes towards employers have not been apparent.
  - The general environment of weak wages growth is a priori evidence against this; similarly, the total share of income paid to workers has been falling for some time (La Cava, 2019).
  - Trade unions have been found to have a similar influence on aggregate wages growth as in the past (Bishop & Chan, 2019).
  - The current economic environment associated with COVID-19 Pandemic has resulted in elevated levels of unemployment and underemployment. This could reduce worker bargaining power in the short-term making it more likely for pass through to wages to occur.

Evidence on the spending growth needed in retirement

The rate of spending growth in retirement is critical to determining whether the retirement income system delivers adequate outcomes. The issue has not been addressed substantially in previous reviews, nor have governments made a goal explicit. Submissions to the review identified this as an important issue for measuring adequacy.

Projections undertaken for the review have deflated retirement income by the Consumer Price Index (CPI). This approach is based on the following evidence:

- The expenditure patterns of current retirees. While there are differing opinions within the community (Box 6A-1), the weight of evidence points to retirees' spending being maintained or falling relative to prices.
- The indexation of available retirement income products in Australia, which mostly increase with prices.
- International practices, which, on balance, use prices for indexing retirement benefits.

Expenditure patterns of current retirees

Box 6A-1 Stakeholder views on expenditure patterns

Stakeholders expressed three broad positions on expenditure patterns of Australian retirees.

1. Expenditure falls as people age. Some submissions noted research using the Australian Bureau of Statistics (ABS) Household Expenditure Survey and bank transaction data compiled by Milliman (an actuarial consulting firm), which suggests that, in Australia, spending by retirees falls in real terms as they age.
2. Expenditure falls but is constrained by retirees' income. Some submissions argued that it is not appropriate to use actual expenditure data to determine retirees' spending needs as many retirees have low incomes, which places a limit on spending. These submissions argued retirees may refrain from spending due to factors such as a fear of outliving their assets.
3. Expenditure increases as retirees age. Submissions that supported this view cited international evidence and spending research using HILDA data. Some international studies have suggested that increases in health spending more than offsets lower expenditure in other areas as people age. HILDA data suggests limited reduction in spending as people age. However, other stakeholders noted that HILDA is limited as it does not capture some spending categories.

Examining the expenditure patterns of current retirees provides the best evidence for determining the income needs of future retirees. The review has used a number of data sources to measure the expenditure patterns of retirees:

- Data from the ABS Household Expenditure Survey on the expenditure of the population between 1988-89 and 2015-16. This data can be used to track the spending patterns of generations as they age.
- Research from the Reserve Bank of Australia (RBA) on demographic trends and household spending (Cokis & McLoughlin, 2020).
- Spending pattern analysis compiled by Milliman, an actuarial consulting firm.

The HILDA Survey also tracks household expenditure. The review uses the HES instead of HILDA to track household expenditure because:

- HILDA records a smaller proportion of total household expenditure due to fewer expenditure categories than HES. Large areas of discretionary spending such as recreation and personal care are not surveyed in HILDA (Table 6A-1).
- ABS data can be preferable to HILDA as it is not affected by issues where people drop out of HILDA over time and includes greater span of years (Taylor, 2018).
- Survey methodology differences mean HES records some expenditure more accurately. HILDA expenditure data is based on participants' recollection of weekly expenditure, while HES is based on recorded expenditure.

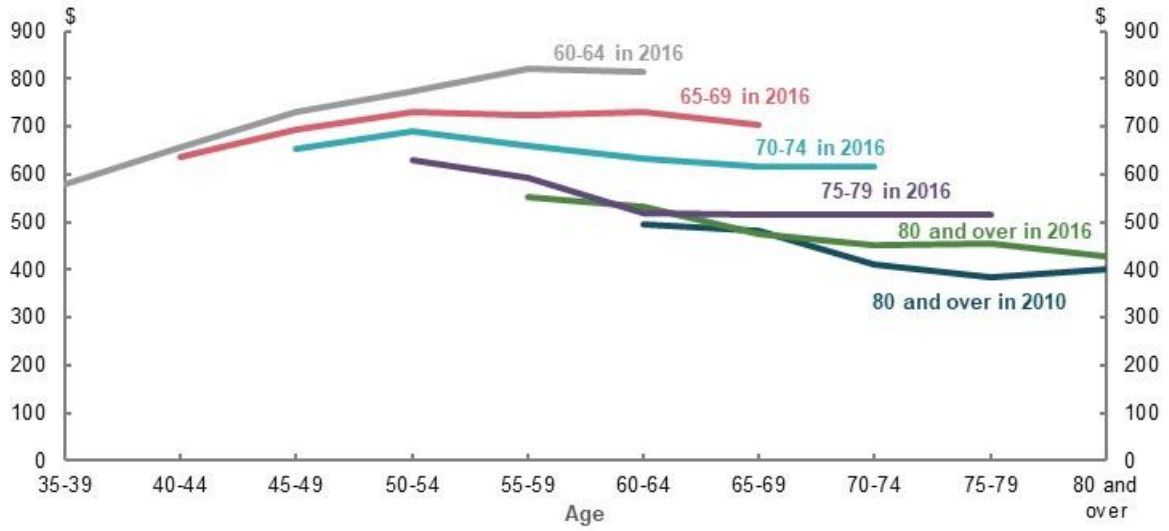
Table 6A-1 HILDA and HES expenditure categories

Household Expenditure Survey	HILDA
Alcoholic beverages	Alcohol
Clothing and footwear	Clothing and footwear (women/men/children)
Communication	Telephone rent and calls/internet charges
Current housing costs Mortgage repayments principal	Rent and mortgage repayments/repairs, renovation and maintenance to home
Domestic fuel and power	Electricity, gas and other heating fuel bills
Education	Education fees
Food and non-alcoholic beverages	Groceries/Meals eaten out
Household furnishings and equipment	n/a
Household services and operation	n/a
Medical care and health expenses	Fees paid to health practitioners/medicines, prescriptions and pharmaceuticals/private health insurance
Miscellaneous goods and services	n/a
Personal care	n/a
Recreation	n/a
Tobacco products	Cigarettes and other tobacco products
Transport	Public transports and taxis/Motor vehicle repairs and maintenance/motor vehicle fuel

Note: HILDA categories are bundled by type. Source: (ABS, 2017e); HILDA Survey data (Wave 18).

Analysis suggests that retirees have flat or falling spending relative to prices as they age. Regardless of the age cohort examined, retirees show the same trend of declining spending (Chart 6A-4).

Chart 6A-4 Median household weekly expenditure



Note: Values are in 2018-19 dollars, indexed to CPI. Household expenditure is equivalised. Cohorts use five-year birth ranges based on the age of the household reference person. Household weekly expenditure excludes voluntary superannuation contributions and capital housing costs. The principal and interest components of mortgage repayments are included in weekly expenditure. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988-89 to 2015-16.

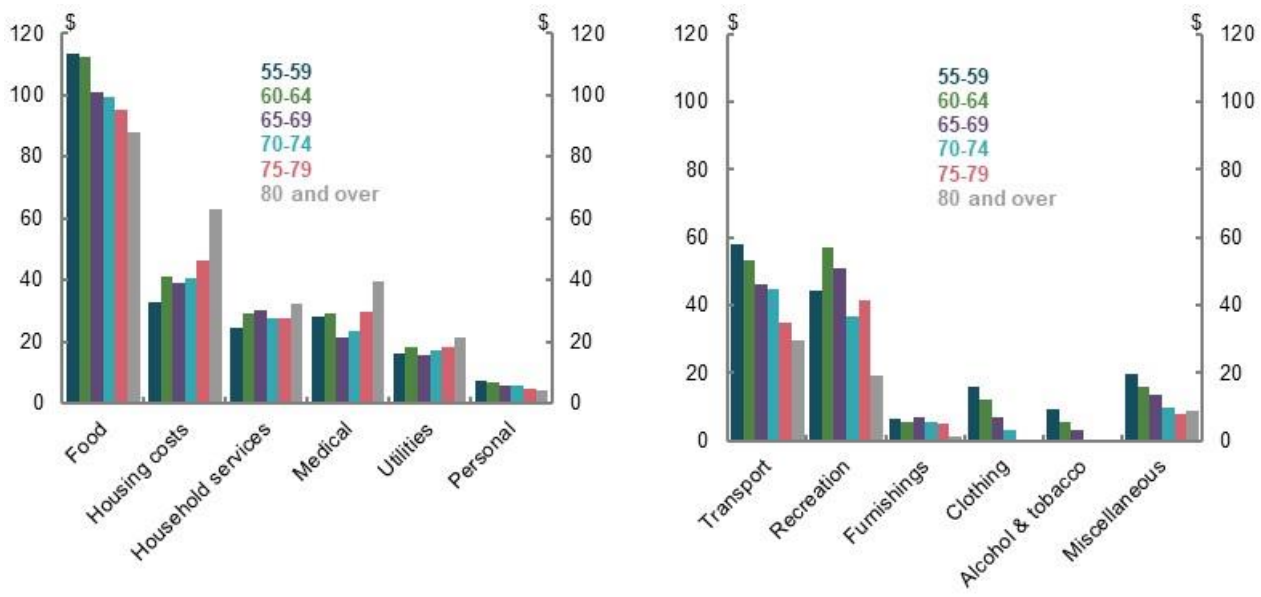
Expenditure falls because retirees spend less on discretionary items.[324] In particular, retirees spend less in real terms on transport, clothing and recreation. Falling spending in these categories is consistent with retirees being less active as they age (Chart 6A-5).

On average, total spending on essential items remains roughly constant in real terms. The main essential item on which spending falls is food, likely due to eating out less and having additional time to make food at home. International studies suggest that quality and quantity of food consumed by retirees do not decline despite reduced expenditure (Aguiar & Hurst, 2005).

Households typically spend a declining share of their budgets on discretionary items as they age. For example, for households aged 80 or older in 2015-2016, 19 per cent of their spending was on discretionary items, compared to 41 per cent in 1988-89 when they were aged 55-59.[325]

[324] Essential spending incorporates expenses that are essential to maintaining basic wellbeing and includes food, housing costs, household services, medical expenses, utilities and personal care. Discretionary spending incorporates items over which households have a greater degree of choice and includes transport, recreation, furnishings, clothing, alcohol and tobacco, and other miscellaneous spending.
[325] Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988-89 to 2015-16.

Chart 6A-5 Median household weekly spending, following one cohort over time



Note: Cohorts constructed using five-year birth ranges. Cohort '80 and over' in 2015-16, aged '75-79' in 2009-10 and so on. Values are in 2018-19 dollars, indexed to CPI. Household expenditure is equivalised. Household expenditure excludes voluntary superannuation contributions and capital housing costs. Housing includes the principal and interest components of mortgage repayments. Miscellaneous includes education costs, which were included as a separate category in the 2015-16 Household Expenditure Survey. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988-89 to 2015-16.

Health expenses

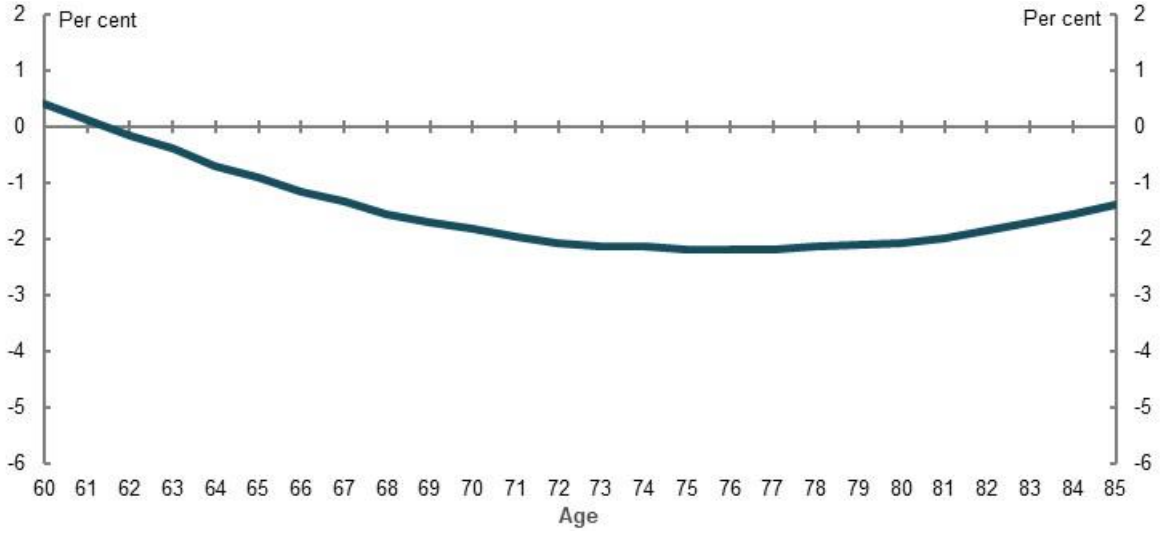
Stakeholders raised concerns about health expenses increasing through retirement, and therefore requiring higher income in late retirement to meet these rising costs.

Some submissions cited a study of American retirees suggesting spending patterns in late retirement change due to medical expenses (Blanchett, 2014).

The broad findings of the study can be summarised as follows:

- As retirees age, their **spending relative to prices falls for all ages older than 62**.
- Spending falls fastest for retirees in the middle ages of retirement.
- Spending falls, but more slowly, for people aged in their 60s.
- **People aged in their 80s still have falling expenditure**, but rising health costs mean this fall is not as significant as falls in mid-retirement age spending. For example, average spending declines by about 1.5 per cent at age 85 compared to about 2 per cent at age 75 (Chart 6A-6).

Chart 6A-6 Annual real change in total expenditure, by age



Source: (Blanchett, 2014).

In Australia, there is evidence that medical expenses grow modestly from a low level as people age. In 2015-16, medical expenses made up 9 per cent of median expenditure at ages 80 and over (or $40 per week), compared to 5 per cent of median expenditure at ages 55-59 (or $28 per week) (Chart 6A-5). Government services provide significant in-kind support to Australians as they age, limiting the increase in out-of-pocket expenses to retiree households (see *4. Sustainability*). Further, the slight increases in health costs tend to be more than offset by declining expenditure in other categories of spending (Chart 6A-5). The increase in medical expenses as a share of expenditure in part reflects that overall expenditure is falling.

Evidence from other countries on health spending of retirees should be interpreted with caution. Results will depend on the health care system for the particular country. Australia's universal health care system provides significant support to retirees (see *2A. Achieving a minimum standard of living in retirement*).

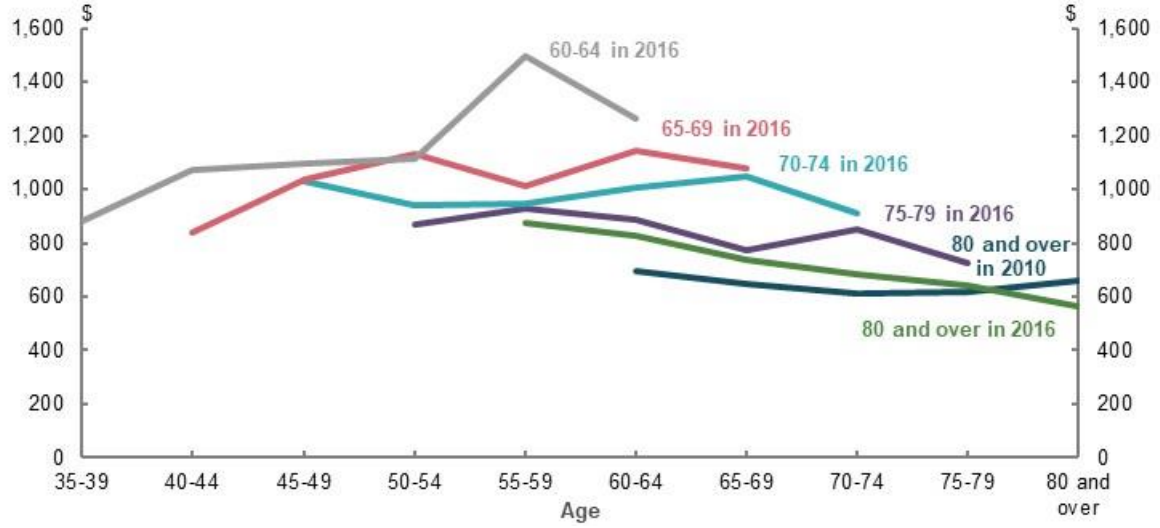
Expenditure patterns of high-wealth retirees

To understand the spending retirees may wish to have, the review considered expenditure of the top 20 per cent of wealthiest retirees. These households have income that is consistently higher than their expenses. They also have wealth that is similar to the projected real wealth for median earners under a mature superannuation system.

Given these groups face fewer budget constraints, their spending patterns over time are more likely to reflect genuine preference rather than necessity.

For high-wealth retirees, spending falls or remains flat with age in a pattern broadly similar to other retirees (Chart 6A-7). Falling real spending is despite their income rising significantly in real terms (Chart 6A-8). It suggests falls in expenditure during retirement are not due to income constraints.

Chart 6A-7 Median household weekly expenditure, top 20 per cent of households by income

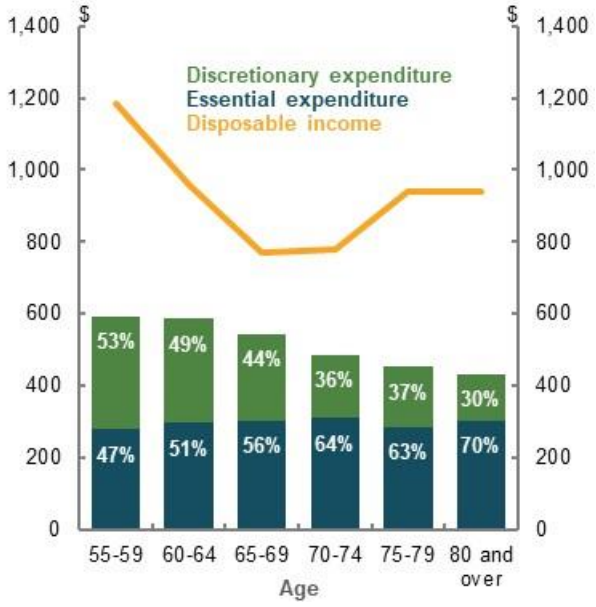


Note: Data includes Household Expenditure Survey 1988-89 to 2015-16. Household expenditure is equivalised. Includes households in the top 20 per cent of income earners. Pseudo-cohorts have been constructed using five-year birth ranges. Values are in 2018-19 dollars, indexed to CPI. Household weekly expenditure excludes voluntary superannuation contributions and capital housing costs. Principal and interest components of mortgage repayments are included in weekly expenditure. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988 to 2015-16.

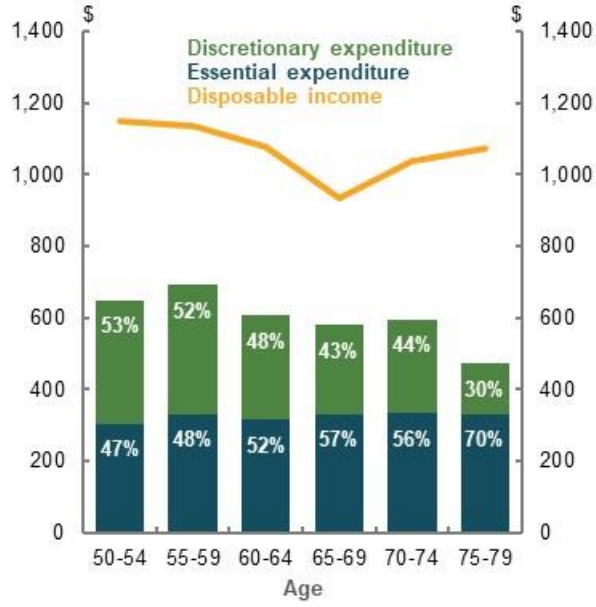
Total spending on essential items is stable with age for these households, with most of the decrease coming from lower discretionary spending consistent with patterns of all retirees (Chart 6A-8).

Chart 6A-8 Median household weekly expenditure and disposable income, top 20 per cent of households by income

Cohort aged 80 and over in 2016



Cohort aged 75-79 in 2016



Note: This chart shows equivalised weekly household expenditure and income by age for two birth cohorts. Expenditure is split into essential and discretionary categories. Data includes Household Expenditure Survey 1988-89 to 2015-16. Includes households in the top 20 per cent of income earners. Pseudo-cohorts have been constructed using five-year birth ranges. Values are in 2018-19 dollars, indexed to CPI. Household weekly expenditure excludes voluntary superannuation contributions and capital housing costs. Principal and interest components of mortgage repayments are included in weekly expenditure. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988-89 to 2015-16.

Spending patterns of future retirees

It is possible that expenditure patterns could change for future retirees. Some submissions argued that higher wealth in future or higher spending patterns among younger generations could change expenditure needs in retirement.

For example, the previous analysis showed a broad consistency in retirement spending patterns by age for retirees today, regardless of wealth. However, spending growth was faster among households aged 65 and over between 2003-04 and 2017-18 relative to the spending growth of working-age households (Chart 6A-9).

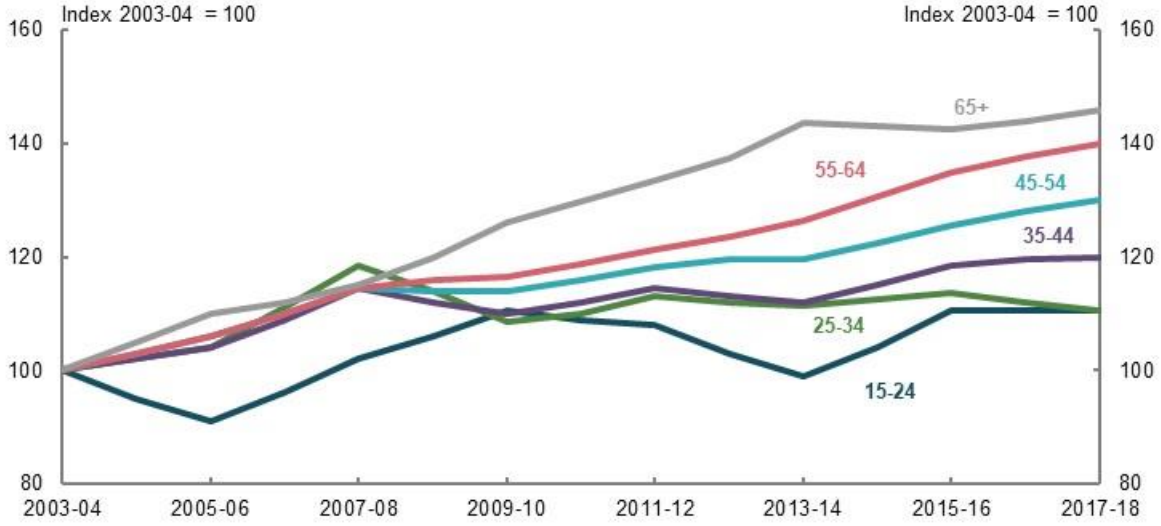
Rising living standards mean each generation has higher income and spending than the one before it.[326] For example, households aged 65 and over in 2017-18 spent over 40 per cent more than households in the same age range in 2003-04 (Chart 6A-9).

Nevertheless, when tracking spending by a given generation as they age, the pattern of falling expenditure during retirement has remained (Chart 6A-4).

Age-based differences in income and assets growth over the last decade may also explain faster spending growth of older households:

- Income growth for older households increased faster than that for working-age households due to rising asset values combined with the 2009 Age Pension increase (see *1D. The changing Australian landscape* and *4. Sustainability*).
- Younger households, which typically have fewer assets, had their spending growth constrained by slow wage growth.

Chart 6A-9 Growth in real household consumption by age



Note: Age is based on age of reference person and relates to year of survey. Household consumption is deflated with the aggregate household consumption deflator. Source: (Cokis & McLoughlin, 2020).

Indexation of international schemes

Most OECD retirement income systems index retirement income to prices rather than wages (OECD, 2019b), (OECD, 2015). Among OECD countries, 57 per cent of earnings-related indexed schemes and 59 per cent of social safety net schemes are predominantly indexed to prices (Table 6A-2).

[326] Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 1988-89 to 2015-16.

Table 6A-2 Indexation of retirement income schemes, selected OECD countries

Indexation	Safety net (per cent)	Earnings-related[i] (per cent)
Predominantly wages	32	25
Predominantly prices	59	57
Other	9[ii]	18[iii]

Note: [i]includes defined benefits, points, notional or non-financial defined contribution schemes. Does not include countries with defined contributions schemes such as Australia or those with no mandatory earnings-related pension scheme as these are not indexed. [ii]includes 50/50 prices/wages split for Switzerland, and discretionary for Austria and Luxembourg. [iii]includes 50/50 prices/wages split for Switzerland, Czech Republic and the Slovak Republic, and discretionary choice for Austria and Luxembourg. 'Predominantly' indicates more than 50 per cent of the indexation is weighted to the given method. Earnings-related data from 2019, Safety net data from 2015. Source: Analysis of (OECD, 2019b) (OECD, 2015).

International organisations tend to use price deflation for system-level assessments. OECD guidance is for pension plans to be indexed to prices. OECD modelling of replacement rates also uses price indexation (OECD, 2015). Likewise, the World Bank has used price deflation to calculate future retirement expenditure (World Bank, 1994).

Indexation of retirement products in Australia

Most financial retirement products in Australia are indexed to prices. This includes both private annuity products and indexation of defined benefit schemes.

The Australian market for retirement products is still developing, including only limited annuity products and existing defined benefit schemes (Table 6A-3).

Table 6A-3 Australian retirement income products

Provider	Product	Indexation
Annuities		
Challenger	Guaranteed lifetime annuity	CPI or other fixed percentage
Challenger	Term annuity	CPI or other fixed percentage
CommInsure	Guaranteed lifetime annuity	CPI or other fixed percentage < 8 per cent
Mercer	Group self-annuity	Approximately stable in real terms until 12 years after purchase, then growing in real terms due to a capital return and 'living bonus'
Defined benefit schemes		
Commonwealth	Commonwealth Superannuation Scheme	CPI
Commonwealth	Defence Force Retirement and Death Benefits	CPI or Pensioner and beneficiary living cost index
Commonwealth	Public Sector Superannuation Scheme	CPI option
Government social security		
Commonwealth	Age Pension	Wages*

* The Age Pension is indexed to the higher growth of CPI and Pensioner and Beneficiary Living Cost Index and then benchmarked to male total average weekly earnings. Source: (Challenger, 2020), (Commonwealth Bank, 2020), (Mercer, 2017), (Commonwealth Superannuation Corporation, 2020).

Evidence for the adequacy benchmark

Following is an outline of the evidence for the replacement rate benchmark of 65-75 per cent used in the review.

Replacement rate benchmarks estimate the proportion of working-life income that allows retirees to maintain their standard of living. Retirees who meet the benchmark are assumed to have the capacity to maintain living standards between working life and retirement. Exceeding or falling below the benchmark indicates that living standards may have increased or fallen, respectively, in retirement.

Replacement rate benchmarks are less than 100 per cent because people in retirement can maintain living standards with lower income than during their working lives. This is because:

- People do not need to save when in retirement. They are in the phase of life where they can draw down their wealth and spend the income they are receiving.
- Most retirees have lower housing costs because they have paid off their mortgage (see *2A. Achieving a minimum standard of living in retirement* and *1D. The changing Australian landscape*).
- Other costs also fall, such as the costs associated with raising children and participating in the labour force (*2A. Achieving a minimum standard of living in retirement*).
- Retirees pay less tax than those with comparable incomes in working life, through targeted mechanisms such as the seniors and pensioners tax offset and tax-free superannuation.
- Government services such as health care provide more support to retirees as a proportion of their income compared to people in the workforce (*2A. Achieving a minimum standard of living in retirement*). These services reduce retirees' reliance on income to fund spending.
- Retirees may also benefit modestly from producing more things at home (Been, et al., 2015); for example, cooking meals at home rather than eating out.

There is no universally agreed replacement rate benchmark. The review has used a replacement rate benchmark of 65-75 per cent, based on:

- International and domestic replacement rate benchmarks
- The proportion of income working-age people spend on consumption
- Survey data on how much income Australians say they need for retirement
- Replacement rates achieved by current retirees, where survey evidence suggests their wellbeing is maintained or improved on entering retirement

Common replacement rate benchmarks

Some of the replacement rate benchmarks used by a variety of organisations are as follows:

- The 70 per cent benchmark used by the OECD as a general rule of thumb (Antolin, 2009), although not officially endorsed.
- The Actuaries Institute suggests 65-75 per cent is the benchmark range generally applied internationally and in Australia (Actuaries Institute, 2020).
- The UK Pensions Review used a gross replacement rate benchmark of 80 per cent for the lowest income earners, 67 per cent for median earners, falling to 50 per cent for higher-income earners (Pensions Commission, 2004).
- Submissions to the review suggested benchmarks of 65 per cent or 70 per cent (Industry Super Australia, 2020) (Grattan Institute, 2020). Some submissions proposed benchmarks that varied by

income, such as at least 85 per cent for lower-income earners, falling to 60 per cent for higher-income earners (Mercer, 2020).

The above rates vary due to differences in calculation methods, including the impact of tax and estimates of consumption needs in retirement. Overall, it is broadly agreed that:

- Most retirees can maintain their consumption with lower levels of income in retirement than in working life
- Lower-income earners need higher replacement rates to achieve a minimum standard of living in retirement
- Higher-income earners need lower replacement rates

Estimates using income and consumption data

Following is evidence on the proportion of working-life disposable income Australians spend, adjusting for some costs Australians tend not to have in retirement. This provides figures analogous to a net replacement rate target.[327]

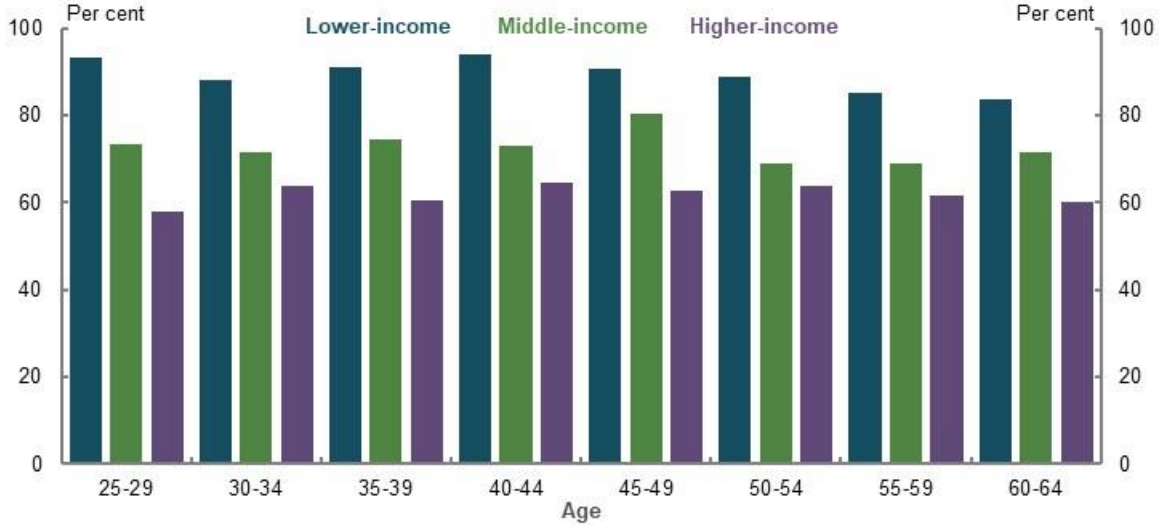
A conservative approach has been taken to calculating the proportion of working-life income Australians spend. Mortgage and education costs have been excluded but other significant costs are not accounted for, including those associated with raising children, lifestyle changes and effects from producing more at home. As the calculations use disposable income, the analysis does not account for differences in tax paid in retirement. It should therefore be considered an upper estimate of an appropriate replacement rate, as it does not factor in all areas where retirees have lower costs than working-age Australians.

On average, middle-income households spend about 75 per cent of their disposable income after excluding their mortgage and education costs, and accounting for savings (Chart 6A-10). This proportion is roughly constant for all age groups. Consistent with benchmarks used by others, results differ by income:

- Just under 100 per cent for lower-income earners.
- About 75 per cent for middle-income earners.
- About 60 per cent for higher-income earners.

[327] Net replacement rates are calculated using disposable, or after-tax, income. Gross replacement rates take into account the effect of lower taxes in retirement by comparing pre-retirement income (before tax) with retirement income. Since retirement income is generally taxed at lower rates, gross replacement rate benchmarks tend to be lower.

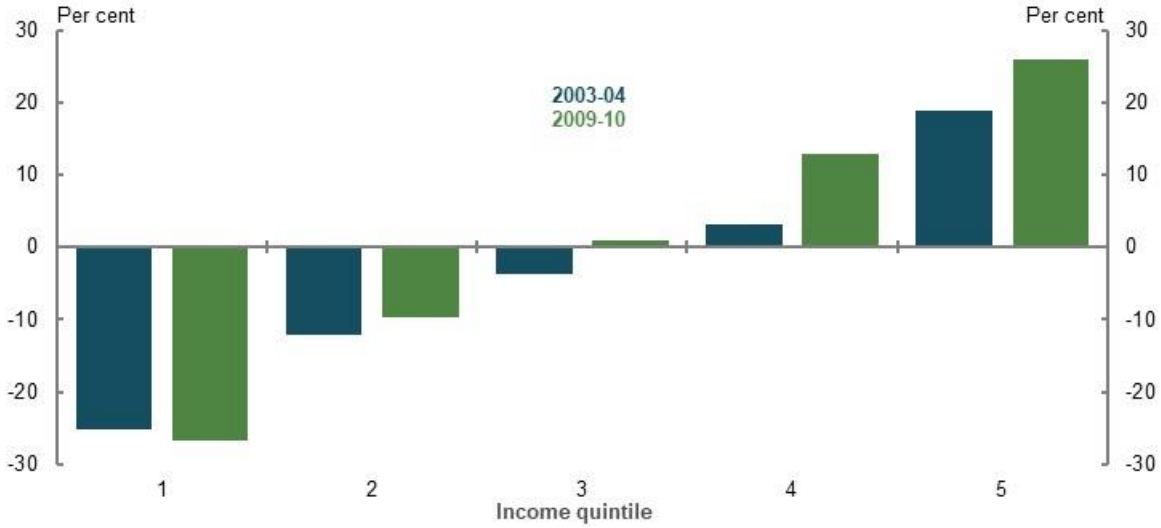
Chart 6A-10 Modified expenditure as a proportion of disposable income



Note: Lower-income earners are defined as those in the bottom 30 per cent of all earners, higher-income earners in the top 20 per cent and middle-income earners are those in between. Modified household expenditure as a proportion of household disposable income, employed working-age population. Modified expenditure is calculated as total expenditure on goods and services, less mortgage and education costs, as a percentage of disposable income. Households with expenses greater than double household income excluded from the data. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 2015-16.

Savings rates are higher for higher-income earners, which creates a larger wedge between income and consumption (Finlay & Price, 2014) (Chart 6A-11).

Chart 6A-11 Household saving ratio by income quintile



Note: Saving ratio shows the relationship between household saving and spending. Data is from 2003-04 and 2009-10 Household Expenditure Surveys. Source: (Finlay & Price, 2014).

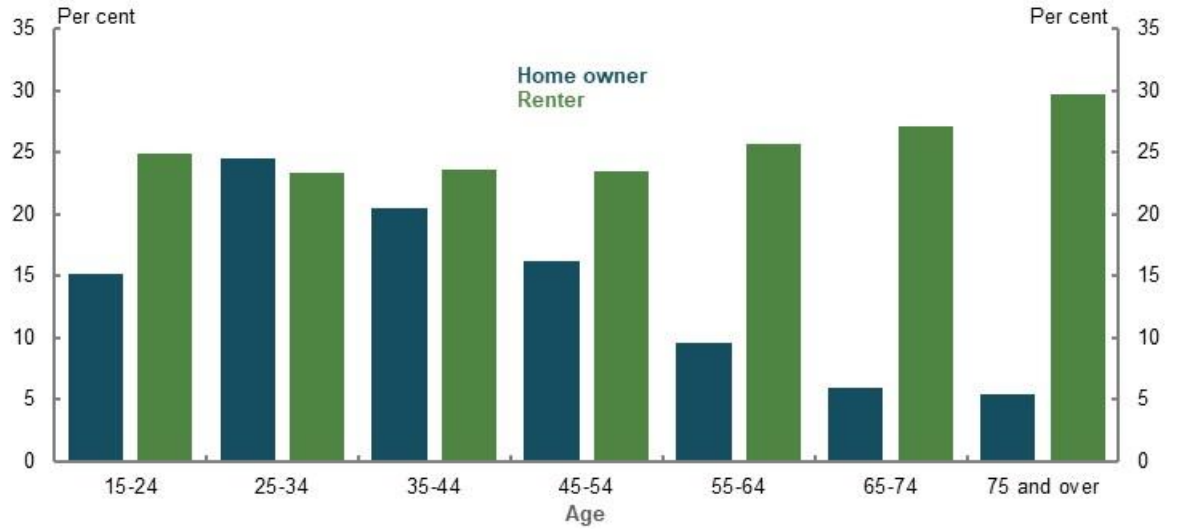
Housing costs

The review considered the impact of housing costs, particularly given their important role in maintaining living standards between working life and retirement.

Home ownership reduces spending in working life (through repaying a mortgage) and lowers housing costs in retirement. Housing costs are about a quarter of household disposable income for home owners between ages 25-34, but only around 5 per cent of household disposable income for home owners aged 65 and over (Chart 6A-12).

Renters do not benefit from lower housing costs later in life. Housing costs remain about a quarter of a renter's household disposable income over their lives, even increasing slightly once they reach retirement age.

Chart 6A-12 Housing costs as a percentage of household disposable income, by age and tenure



Note: Data is from 2015-16. Housing costs include mortgage interest and principal repayments and general rates for home owners, and rental payments for renters. Age refers to age of reference person in household. Source: (Daley, et al., 2018b).

The review also considered the lifetime costs of purchasing a home, particularly given increases in Australian housing prices over recent years, (see *1D. The changing Australian landscape*).

The proportion of lifetime income needed to purchase a house has grown significantly. On average, households purchasing homes in 2020 will devote almost 18 per cent or their total working-life income to repaying their mortgages, an increase of around 12 percentage points since the 1980s (see *1D. The changing Australian landscape*).

The higher share of lifetime income needed to buy a home has important implications for replacement rates. Increases in the proportion of working-life income required to purchase a home reduce spending during working life. Consequently, any replacement rate benchmark today should be lower than it was previously, due to rising housing costs.

Since owner-occupied housing gives benefits across someone's life, it is appropriate that the additional costs of acquiring a home affect consumption in retirement as well as in working life.

The cost of children

The cost of raising children is an important difference between working-life and retirement spending.

Raising children is a significant lifetime expense, typically during working lives. One study estimated the weekly costs of raising children of certain ages for low-paid families was $203 for the first child or $340 a week for two children in 2016, or between $10,000-18,000 per year[328] (Saunders & Bedford, 2018). Another study found that households need significantly less income in retirement after accounting for the costs of raising children (Scholz & Seshadri, 2009).

The working-life income target is based on the last 10 years before retirement. During this time, people are less likely to be incurring costs associated with raising children (ABS, 2019s). The review's replacement rate benchmark therefore makes no adjustment for the costs of children.

[328] First child costs were calculated based on a 10-year-old boy, second child costs on a 6-year-old girl.

Historical replacement rates

The outcomes for recent retirees can provide an indication of the performance of the retirement income system under past policy settings. Yet due to data limitations, replacement rates for recent retirees are difficult to calculate and should be considered indicative only. Analysis from *2C. Maintaining standards of living in retirement* shows:

- Middle- and higher-income earners, on average, achieved replacement rates about 65 per cent or higher
- Most recent retirees maintain their financial wellbeing and improve their general wellbeing in retirement (although financial wellbeing of some retirees does decline, particularly due to involuntary retirement)

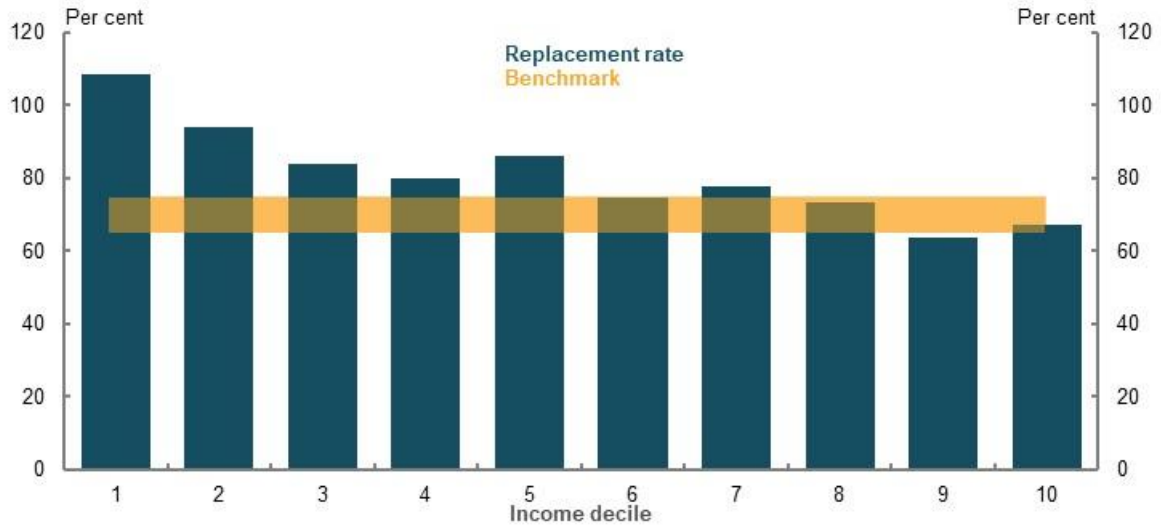
Taken together, these results suggest that replacement rates achieved by an average person who retired recently can be a guide for an appropriate benchmark.

2C. Maintaining standards of living in retirement presents analysis on the replacement rates of a cohort of retirees aged 65-74 in 2017-18.

Analysis following specific people over time also shows outcomes for recent retirees tend to be adequate. The longitudinal dataset, HILDA, was used to calculate the replacement rates of people who have retired since 2010. The longitudinal methodology compares incomes six and three years before and after retirement, respectively, to calculate replacement rates.

While the longitudinal approach better reflects the experience of people who retire, it also has data limitations. The number of years available and sample size of the HILDA Survey means that calculations are based on a small number of years before and after retirement. Longer periods would have been more accurate due to being less affected by events like transitioning to retirement or uneven drawdown of superannuation. Longitudinal surveys are also affected by people dropping out of the survey, and this could also bias results.

Chart 6A-13 Longitudinal analysis of replacement rates of retirees since 2010

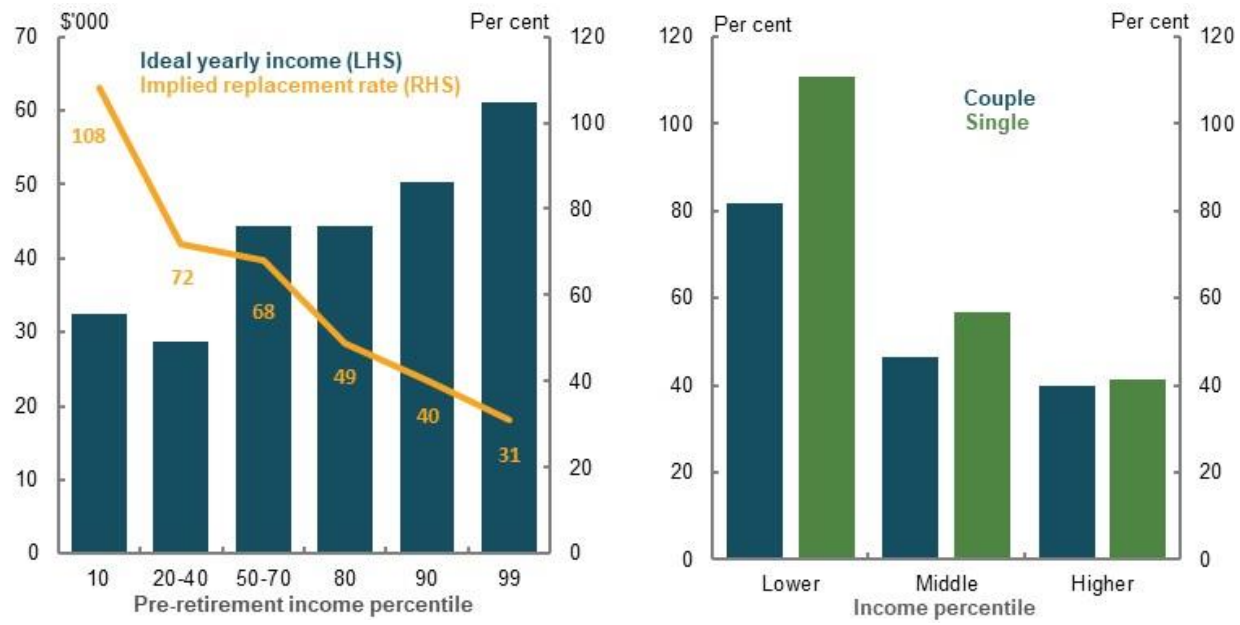


Note: Replacement rates calculated six years before retirement and three years after retirement. Includes people who retired from 2010, based on the latest observable point that people retired. Income is equivalised disposable household income. Based on median outcome within decile. Source: Analysis of HILDA Survey data (Waves 1 to 18).

Expectations for retirement

The level of income people think they will need for an adequate retirement can help determine a replacement rate benchmark (Chart 6A-14).

Chart 6A-14 Replacement rates implied by survey data



Note: Investment trends percentiles based on income of 45-year-olds in the review's retirement income model. Income is household pre-tax income aligned with percentiles in review cameo modelling. Question is 'When you are retired, what level of income do you think you will need to have a comfortable lifestyle in retirement?' HILDA income percentiles are based on disposable income using the review's categories for lower-, middle- and higher-income earners. HILDA question is 'How much after-tax income do you think you (and your partner) will you require in retirement in order to have a standard of living which you regard as satisfactory?' Source: Investment Trends, 2019; Analysis of HILDA Survey data (Waves 15).

In the Investment Trends survey, Australians believed an ideal retirement income was $44,000 per year for a middle-income household, equivalent to a gross replacement rate of 68 per cent. For HILDA, the response of middle income earners implies a replacement rate of about 60 per cent for singles and 46 per cent for couples.

This approach has some weaknesses:

- Surveys ask questions differently, which can influence the results.
- Retirement income planning is complicated. Australians may not know the lifestyle changes that happen in retirement or differences in taxation and social security transfers.

Overall, these results suggest replacement rates in the range of 65-75 per cent are appropriate. Lower-income earners prefer replacing about 100 per cent of their income in retirement. Higher-income earners prefer lower replacement rates than middle-income earners.

ASFA comfortable standard as an adequacy objective

The following is an overview as to why the review did not use the ASFA comfortable standard as an adequacy target. Some submissions from the superannuation industry endorsed the ASFA comfortable standard as a retirement income adequacy goal. The standard has several shortcomings as an adequacy objective:

- It was initially designed as, and continues to reflect, a standard for the top 20 per cent of income earners. Further, it constitutes a standard of living higher than that experienced by most Australians during their working lives.

- It does not account for the trade-off between working life and retirement living standards. Universal policy settings that result in a standard of living in retirement that exceeds working-life standards are unlikely to improve lifetime wellbeing. A retirement goal is not appropriate if achieving it would come at the cost of a substantially lower standard of living in working life.
- It would be difficult for a median-income earner to achieve. A median earner working a 40-year career would need the SG rate to continue escalating to 16.5 per cent to achieve the standard.

History of the ASFA standard

Contemporary budget standards were first developed in Australia in 1997 to facilitate research into the adequacy of social security payments, such as the Age Pension (Saunders, 2006). The first Australian budget standards included a 'low-cost' poverty avoidance measure and a 'modest but adequate' measure that reflected the spending of the median retiree.

In 2003, ASFA and Westpac commissioned an update to add a comfortable retirement standard, intended for wealthy, self-funded retirees. The new 'comfortably affluent and sustainable' standard reflected the spending patterns and lifestyles of the top 20 per cent of income earners:

> *'The comfortably affluent standard reflects a standard of living among older, healthy and fully active self-retired Australians that allows them to engage actively with a broad range of leisure and recreational activities without having to require a rapid or substantial disbursement of assets. It represents a lifestyle that is common amongst those in the top (income) quintile of the aged population.'*
> *(Saunders, et al., 2004)*

Subsequent updates in 2009 and 2018 amended the standard to reflect changes in expenditure patterns and redefined it as a 'comfortable' standard (ASFA, 2009).

Appropriateness of the standard for current retirees

An important part of assessing if the ASFA comfortable standard is an appropriate benchmark is how it compares to the consumption (standard of living) of working Australians and current retirees.

Analysis of ABS expenditure data suggests the ASFA comfortable standard provides a higher living standard than most people in the workforce enjoy today (Daley, et al., 2018b):

- The top 30 per cent of working-age couples and the top 20 per cent of working-age singles currently spend as much as the ASFA comfortable standard.
- The top 30 per cent of retired couples and the top 10 per cent of retired singles spend as much as the ASFA comfortable standard.

Appropriateness of the standard for future retirees

Another way to assess the ASFA comfortable standard is to look at what system changes would need to be made to achieve it and the effect these changes would have.

ASFA's modelling suggests 50 per cent of Australians can achieve the comfortable standard. They suggest women meet the ASFA standard from the 70th income percentile (ASFA, 2020a).

ASFA modelling has several assumptions that differ from those used by the review. In particular, ASFA assumes significantly longer working lives, with careers from ages 19 to 67, and a larger gap between the investment rate of return after fees and taxes, and wage growth.

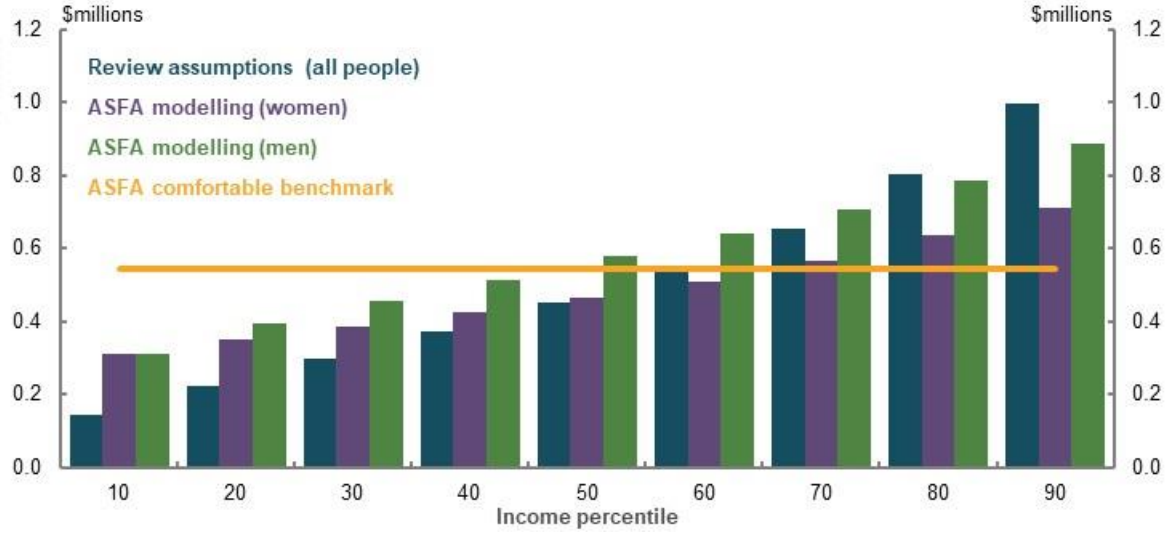
They also use different income profiles than the review's analysis of ATO data, including:

- Working-life income sourced from ATO data peaks at about age 45 and tends to decline thereafter as people transition to retirement (Chart 6A-17). However, profiles presented in (ASFA, 2020b) show income peaking about age 45 but broadly staying at these levels for later ages. This means later in life and across most deciles, incomes used in ASFA modelling can be higher on average than is observed in ATO data.
- ASFA shows the bottom-decile people earning $40,000 a year (ASFA, 2020b), approximately the national minimum wage for a full-time worker. This level of income is significantly higher than the lower-income earnings in the review's cameo modelling, with average incomes of about $22,600 and $36,000 for people in the 10th and 20th percentiles, respectively.

Higher income assumptions make it easier to achieve a given retirement income target.

Median-income earners fall significantly short of the ASFA comfortable standard under the review's assumptions. Specifically, a median earner has a balance $140,000 below the balance required to achieve the ASFA comfortable standard of $545,000 in wage-deflated terms (Chart 6A-15).

Chart 6A-15 Superannuation balances at retirement, review and ASFA modelling



Notes: Values are 2019-20 dollars, deflated by average weekly earnings. Based on ASFA estimate of $545,000 required to reach the 'ASFA comfortable standard' in wage-deflated terms. Source: (ASFA, 2020a) and cameo modelling undertaken for the review.

Based on the review's modelling, individual behaviour or system changes would be needed for the median-income earner to achieve the ASFA comfortable standard. For example, a median-income earner would need the SG rate to continue rising at 0.5 per cent per year until reaching 16.5 per cent to achieve the ASFA comfortable standard. This would provide a replacement rate of 95 per cent, well above what is necessary for people to maintain their standard of living in retirement.

Retirement income cameo model — assumptions and methodology

Overview

The review used lifetime cameo models to analyse future retirement outcomes for people starting work today.[329] The models simulate retirement income and taxation outcomes for hypothetical

[329] The cameo model commences in 2019-20 for people aged 27.

individuals or couples for each year of their working life and retirement. This includes wage earnings, superannuation contributions, asset earnings and taxation across hypothetical lifetimes, as well as superannuation drawdowns, non-superannuation financial wealth and Age Pension entitlements across a hypothetical retirement period.

The lifetime cameo models used for the review were adapted from an existing Treasury model, the Excel Model of Retirement Incomes (EMORI). EMORI was extended by the review to include new data, capabilities and assumptions. Following is a description of the EMORI framework, data inputs and modelling assumptions used for the review's analysis.

Specifications for the review's central case cameo model are outlined below (Table 6A-4).

Table 6A-4 Major central case modelling assumptions

Assumption	Central case	Basis	Sensitivity testing[i]
Life expectancy	92 years	Projections from 2015 Intergenerational Report (IGR)	Longer life expectancy
Length of working life	40 years	Median in HILDA, checked against labour force trends and MARIA modelling	Testing of different career lengths, checked against careers of retirees today
Incomes	By age and income	Tax return data	n/a
Nominal wages growth	MYEFO 2019-20 for forward estimates Long run ~4%[ii]	Projections from IGR 2015; average weekly ordinary time earnings growth averaged 4% over past 20 years	0.5% lower
Investment returns (before fees and taxes)	7.5% pre-retirement phase 6.2% retirement phase	Forward-looking investment return targets	Higher/lower investment returns
Voluntary superannuation contributions	Salary sacrifice contributions only	ATO income and tax data	No voluntary saving
Superannuation drawdowns	Optimal drawdown to exhaust at life expectancy	Aligns with system purpose	Minimum and observed drawdown rates
Management of longevity risk	Purchase of a deferred pooled longevity product	Aligns with system direction	No longevity protection Different pricing
Replacement rate calculation	Average annual whole of retirement disposable income divided by average annual disposable income 10 years before retirement[iii]	Analysis of spending needs	Alternative deflators and calculation periods
Home ownership	Home owner	Home ownership rates for middle and higher-wealth retirees exceed 95 per cent	Renter

Note: [i]For sensitivity testing, refer to *2C. Maintaining standards of living in retirement.* [ii]Long run inflation of 2.5 per cent and productivity growth of 1.5 per cent gives nominal wages growth just over 4 per cent. See (Commonwealth of Australia, 2015). [iii]Replacement rates are deflated using the review's mixed deflator. Refer to *Income deflation* below for specifications. Particular settings or sensitivities are analysed as deviations from the central case.

Different versions of the cameo model

The review developed two extended versions of the retirement income cameo model: one that models outcomes for individual employees (the all-employees model); and one that models outcomes for singles employees and coupled employees (the household model). The all-employees version included data from both singles and couples and treats each person as an individual, regardless of their marital status.

The household version used the income profiles for couples and singles. For simplicity, members of couples were assumed to be the same age, start their career at the same age, retire at the same age and remain coupled across their adult life.

The review also created a gender-specific cameo model, given the importance of assessing retirement system outcomes by gender. This model is based on the all-employees model with inputs modified to reflect the circumstances of women, detailed in *Modelling gender* specifications below.

Life expectancy

People are expected to live to age 92 based on the cohort life expectancy of someone born in 2015 and similar to the expected age of death for someone aged 60 in 2055 (Commonwealth of Australia, 2015).

Sensitivity analysis of different life expectancy assumptions can be found in *2C. Maintaining standards of living in retirement*.

Income, earnings and saving during working life

This section outlines the income, savings behaviour and earnings on assets used in cameo modelling.

Income over a working life

Working-life incomes were based on salary and wages across ages reported in individual tax returns. Incomes were based on all wage and salary earners with positive income in 2016-17. People who appear to be self-employed were excluded from the model because they have different contribution patterns. Outcomes for the self-employed are considered in *3D. SG coverage*.

For the all-employees model, wage and salary estimates were sourced from Treasury's microsimulation model of the personal income tax system (TAXMOD), which uses data from a 16 per cent sample of individual tax returns from 2016-17. This microsimulation model makes adjustments to future contribution patterns to account for policy changes not reflected in the 2016-17 data (such as changes in contributions caps and SG rate increases).

Wage earners were sorted into income percentiles for each single year of age. Total individual remuneration (salary and wages plus total employer superannuation contributions) was used to identify income percentiles at each age. The average wage, and average SG and salary sacrifice contribution rates, were calculated for each age and income percentile.

A person's position in the income distribution was fixed for their whole life, as a simplifying assumption.

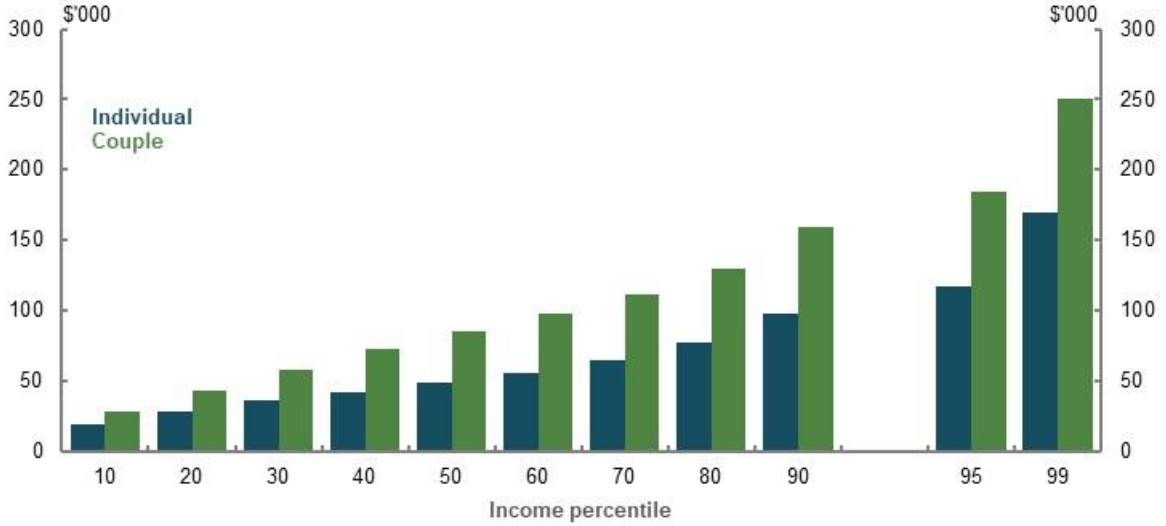
The household model used 2016-17 ALife data.[330] This provided a larger dataset than the 16 per cent sample used in TAXMOD for modelling sub-populations and allowed matching of members of a couple. For the household model, households were sorted into income percentiles based on total household remuneration and the age of the primary earner. The secondary earner of the couple was assumed to be the same age as the primary earner. Wages and superannuation contributions were calculated in the same way as the whole-of-population model.

The household model was only used for specific analysis of singles and couples. If not otherwise specified, the 'retirement income cameo model' refers to the whole-of-population version of the model.

[330] ALife is the ATO longitudinal information files prepared by the ATO. It includes data from personal income tax returns, superannuation member contribution statements and self-managed superannuation fund annual returns. This data started with all individuals who lodged a tax return in 2016-17, excluding the self-employed.

The cameo models create 11 representative lifetime wage profiles by income percentile. Couples have higher average incomes than individuals at an equivalent point on the individual income distribution (Chart 6A-16).

Chart 6A-16 Projected average annual disposable income over last 10 years of working life, by income



Note: Values in 2019-20 dollars, deflated using the review's mixed deflator. Income is average annual disposable income from ages 57-66 for relevant household types. Couple income is at a household level. Source: Cameo modelling undertaken for the review.

Incomes are grown by projections of average weekly ordinary time earnings. Wage growth was based on economic parameters at the 2019-20 Mid-Year Economic and Fiscal Outlook. Nominal wages were assumed to grow by around 4 per cent per year in the medium to long term. Adjustments were made to wages growth to reflect changes to the SG rate in relevant scenarios. The interaction between changes in the SG rate and wages are explored in *Evidence on the effect of changes in the Superannuation Guarantee on wages growth,* above.

Data used in the retirement income cameo model shows that earnings change over a lifetime. Relative to wages, incomes grow at the start of people's careers, peak mid-career and decline thereafter. For example, a median earner's income at age 27 is 67 per cent of average weekly ordinary time earnings, at age 43 income peaks at around 88 per cent of average weekly ordinary time earnings , and then income gradually declines as people near retirement.

While wages decline as a proportion of average weekly ordinary time earnings as people near retirement, this does not mean wages decline in real terms (deflated by CPI). Real incomes tend to remain broadly stable in real terms from around 50, as nominal incomes grow in line with price inflation but slower than wage growth. From the 20th percentile and higher, average real income in the 57-66 age range (where the benchmark is set) exceeds real income at age 45. This suggests that the 57-66 age range represents the peak of consumption opportunities.[331]

The income data used in the model included both full- and part-time workers. Lower income percentiles are expected to have a higher proportion of part-time workers.

[331] Cameo modelling undertaken for the review.

Testing income profiles against longitudinal data

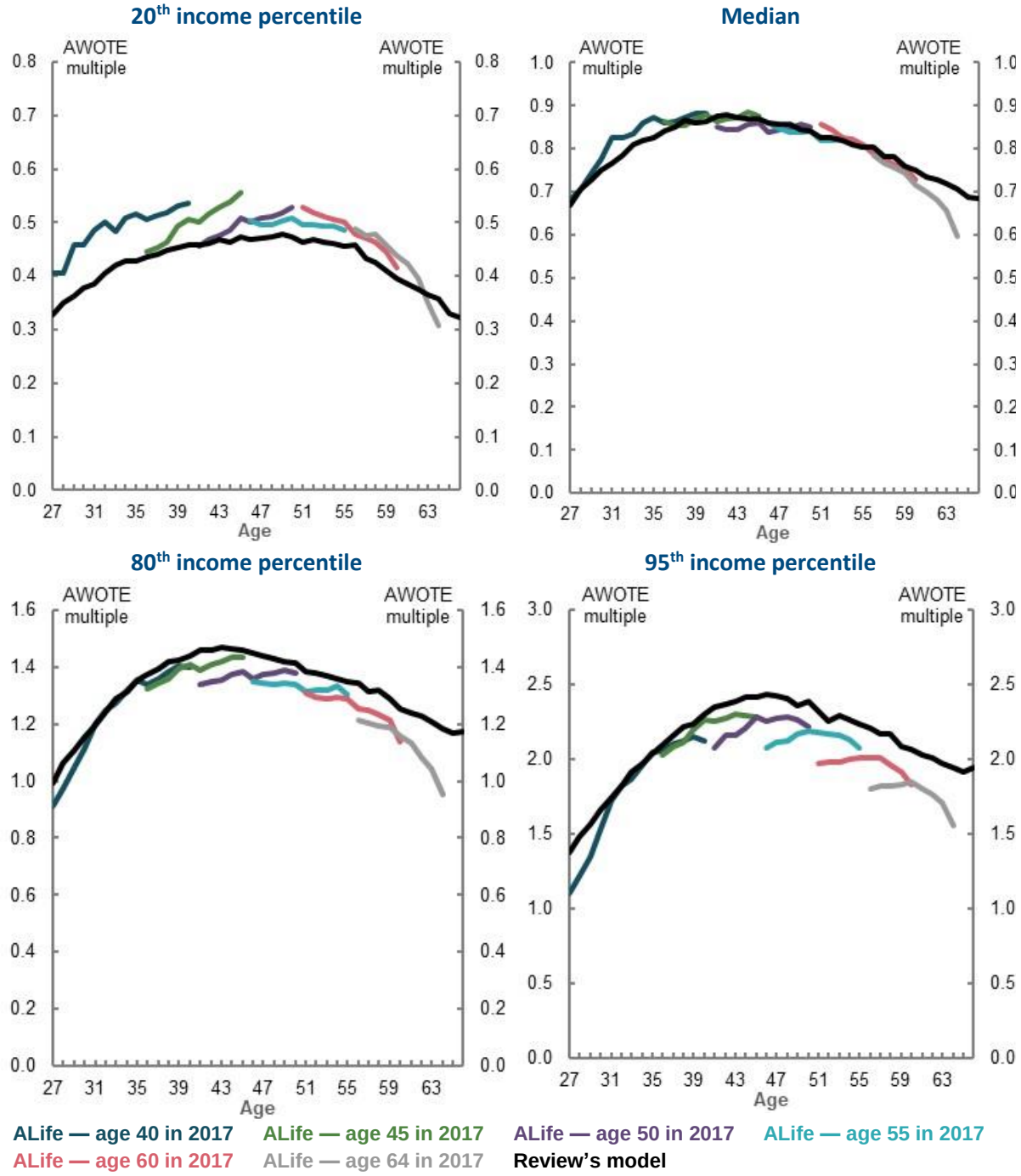
The retirement income cameo model uses a single year of income tax data as a basis for projecting income over a lifetime.

The review tested these income profiles against longitudinal income data from ALife (Chart 6A-17). Comparisons show that the change in income over a lifetime is broadly similar between the cross-sectional income profiles used in the review's model and the longitudinal ALife data.

The comparison shows that the review's model may underestimate lifetime incomes for those at lower-income percentiles, and overestimate lifetime incomes for very high income percentiles. This is because people may not earn very high or low incomes for a significant period. For example, someone working part-time to care for children may have a period of lower income followed by higher income as they return to full-time work. Alternatively, higher-income periods may be due to people earning a bonus in a particular year or period.

The impact of allowing for individuals to move across the income distribution is considered in the next section.

Chart 6A-17 Comparison of ALife wage profiles to the review's model, selected percentiles



Note: Incomes measured as a proportion of average weekly ordinary time earnings (AWOTE). Individuals in ALife with positive wage and salary income were sorted into income percentiles by age cohort. Data is median employment income by age cohort and income percentile. ALife income profiles were increased uniformly by 7 per cent so that average lifetime income is similar for a median person in both datasets. This allows for comparability between datasets which are based on slightly different populations. Source: Analysis of ATO Longitudinal Information Files, 2016-17 and cameo modelling undertaken for the review.

Allowing for movement between income percentiles

Modelling uses cross-sectional data and has a person's position in the income distribution fixed for their whole life. This is a simplifying assumption for modelling. People can move between income percentiles due to variations in type and length of employment. For example, a person working part time while studying may go on to work full time in better paid work.

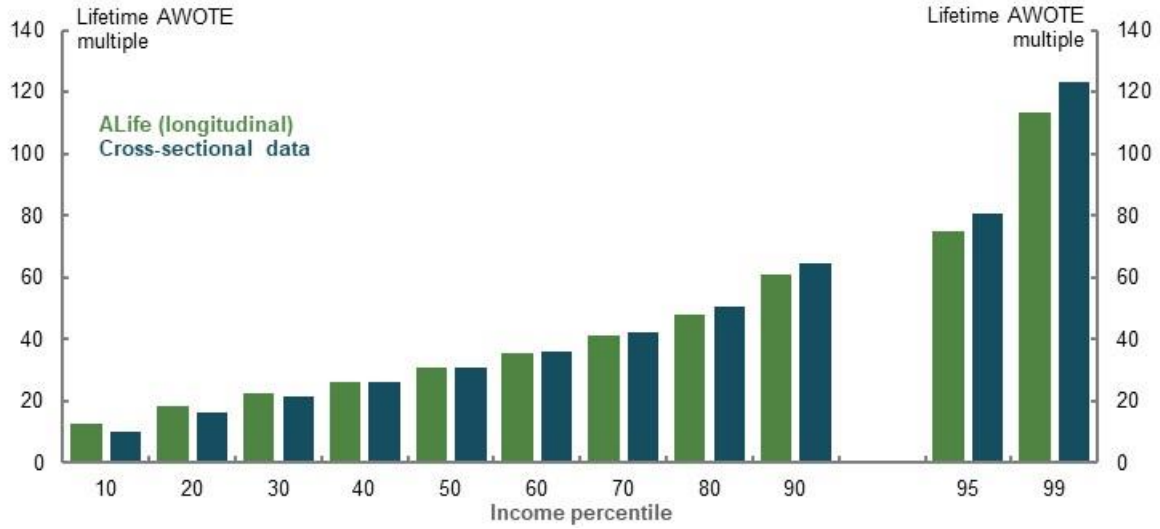
The Productivity Commission found that close to 90 per cent of people moved between at least three income deciles between 2000-01 and 2015-16. However, less movement occurs for people in the top and bottom of the income distribution. Fifty per cent of people in the bottom decile of income earners in 2000-01 ended in the bottom 20 per cent of earners in 2015-16. Similarly, 41 per cent of people in the top-income decile ended in the top 20 per cent of earners in the same period (Productivity Commission, 2018b, pp. 95-98).

A longitudinal analysis using ALife was undertaken to test the impact of assuming people do not move across the income distributions over their lifetimes. Longitudinal data in ALife follows specific people over time, allowing for analysis of incomes earned over a certain period.

ALife does not cover enough years to analyse a whole career. Lifetime incomes were estimated by combining the incomes of similar cohorts to form a representative career; for example, combining the career of median-income earners aged 27 with median earners aged 42.

ALife data showed a small effect in allowing for movement between income percentiles. Incomes of people in the 10th percentile are modestly higher in ALife compared to cross-sectional data, with the largest falls at the 90th decile and above (Chart 6A-18). As a result, replacement rates are slightly lower for lower-income earners, and slightly higher for higher-income earners when allowing for movement between income percentiles. There was little impact on middle-income earners, who are the focus of the review's replacement rate analysis.

Chart 6A-18 Total working-life incomes, longitudinal or cross-sectional data



Note: ALife lifetime income is based on the age cohorts 40, 45, 50, 55, 60 and 64 in 2017. ALife income profiles were increased uniformly by 7 per cent so that average lifetime income is similar for a median person in both datasets. This allows for comparability between datasets that are based on slightly different populations. Lifetime income in cross-sectional data sums income from ages 27 to 66 for each percentile. Source: Analysis of ATO Longitudinal Information Files (ALife), 2016-17, and cameo modelling undertaken for the review.

Adjusting incomes near retirement

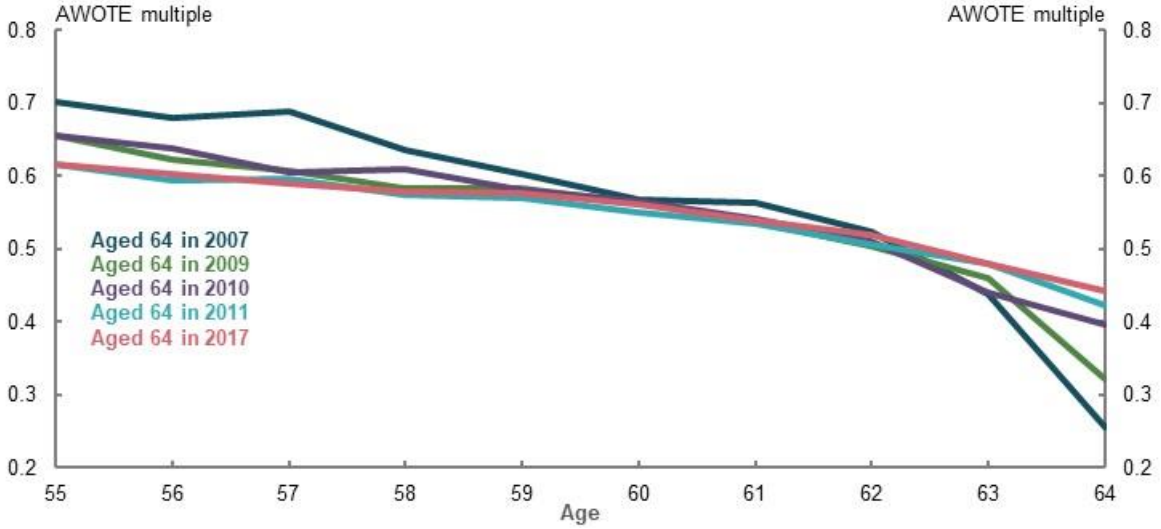
The review adjusted incomes near retirement to account for the likely impact of higher labour force participation in the future. Without this change, modelling would reflect current workforce participation for older Australians. Older age participation is likely to continue rising given trends, especially for women, in past years (see *1D. The changing Australian landscape*).

Average annual incomes gradually decline as a proportion of average weekly ordinary time earnings as people near retirement. This fall happens as people shift to fewer hours or reduced pay during the transition to retirement.

For men, income profiles towards the end of working life are largely unchanged over time. However, evidence suggests that incomes for women near retirement are changing (Chart 6A-19).

- **Over the 10 years before age 64, the total income earned by cohorts of women has fallen as a proportion of average weekly ordinary time earnings.** Total incomes earned in the 10 years to 64 were about 2.8 per cent lower for the cohort of women aged 64 in 2017 than for 2007. This flattening could be due to higher participation of women with lower incomes.
- **Over the five years before age 64, total income earned by cohorts of women has risen, particularly at age 64.** This increase is likely due to a change in Age Pension eligibility age, which affected the retirement timing of women in the late 2000s and early 2010s. The increase in total incomes in the five-year period is about 3 per cent between 2007 and 2017 cohorts.

Chart 6A-19 Longitudinal analysis of female incomes, median earner



Note: Incomes measured as a proportion of average weekly ordinary time earnings. Includes people with a non-zero salary and wage at least eight times in the 10 years from 2008 to 2017. Percentiles based on the 10-year average of wages. Source: Analysis of ATO Longitudinal Information Files (ALife), 2016-17.

As the income just before retirement is important for assessing adequacy outcomes, the review used the 10 years before retirement as the basis for calculating replacement rates.

The review used cross-sectional income data from tax returns as the basis for income in modelling calculations. This data does not have as large a drop-off in incomes near retirement as longitudinal data (Chart 6A-20).

Incomes in the model are adjusted upwards after age 60 so that the rate of decline in a person's wage as a proportion of average weekly ordinary time earnings is halved commencing at age 61 until retirement. As well as accounting for general increases in labour force participation, this upwards adjustment makes an allowance for legislated increases to the Age Pension eligibility age from 65 in 2016-17, to 67 by 2023-24.

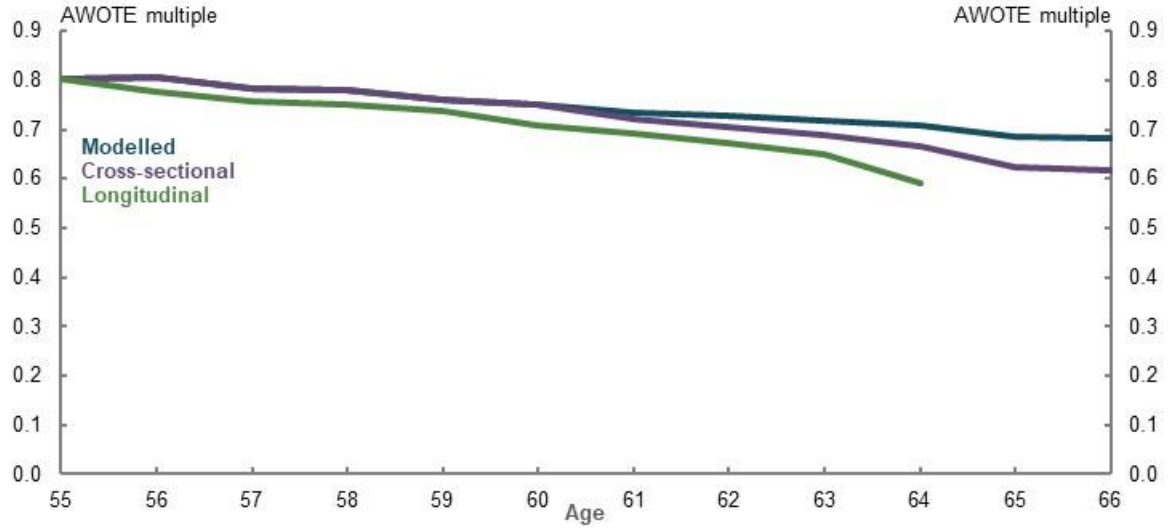
- For median earners, this adjustment increases incomes in the given years before Age Pension eligibility age by 5 per cent; one and a half times the five-year impact experienced by median-income women explored above (of 3 per cent).
  - This adjustment is larger than historically observed but broadly appropriate as it projects anticipated increases in labour force participation over a 40-year timespan. This adjustment reduces replacement rates relative to unadjusted incomes.
- The upwards adjustment of incomes is larger for lower-income earners (Table 6A-5).

Table 6A-5 Incomes in years near retirement, average upwards adjustment by income percentile

Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
Adjustment (per cent)	14.5	10.6	8.1	6.1	5.0	4.5	4.4	3.9	3.8

Note: Upwards adjustment compares average income earned between ages 60-66 using cross-sectional data from Treasury's TAXMOD, which draws on the 2016-17, 16 per cent sample file and incomes modelled by the review. Source: Analysis of ATO Longitudinal Information Files (ALife), 2016-17, and cross-sectional data from the 2016-17, 16 per cent sample file and incomes modelled by the review.

Chart 6A-20 Analysis of incomes in years before retirement, median earner



Note: Incomes measured as a proportion of average weekly ordinary time earnings (AWOTE) in the relevant year. Cohorts aged 64 in reference year. Includes people with a non-zero salary and wage at least eight times in the 10 years from 2008 to 2017. Percentiles based on the 10-year average of wages. Longitudinal data scaled uniformly to match cross-sectional income at age 55 for comparison. Source: Analysis of ATO Longitudinal Information Files (ALife), 2016-17, and cross-sectional data from the 2016-17, 16 per cent sample file and incomes modelled by the review.

Income deflation

The present value of disposable income in a given year was calculated using a mixed deflator. This methodology is referred to as the review's mixed deflator in all applicable modelling in the report. The present value of income using the review's mixed deflator is always given in 2019-20 dollars.

Income is deflated by wages up until retirement age. During retirement, income is deflated by prices building on wage deflation during working life.

Income for the replacement rate calculations

Replacement rates for the review were calculated as:

$$Replacement\ rate\ (\%) = \frac{\text{Retirement income}}{\text{Working-life income}} \times 100$$

The above equation uses the:

- **Retirement income:** the present value of average annual income over the whole period of retirement
- **Working-life income:** the present value of average annual income in the last 10 years of working life

These incomes were deflated using the review's mixed deflator. All values are based on disposable incomes (that is, after-tax incomes).

Retirement income

Income averaged over the whole of retirement was used to calculate retirement income for the review's replacement rates. Using income across a person's whole retirement is appropriate because it reflects their circumstances over all the years of their retirement.

Replacement rates are sometimes measured using only the first year of, or a fixed number of years in, retirement (Rothman, 2007, pp. 3-4). Measures based on a short period after retirement risk skewing results if incomes rise or fall significantly during retirement. For example, a short period may overstate retirement if assets were quickly drawn down during retirement.

Retirement incomes were deflated by prices. As noted previously, price increases best represent the growth in spending needs of retirees (see *Evidence on the spending growth needed in retirement* above).

Working-life income

Working-life income was based on the average income in the last 10 years before retirement, deflated by wages. Determining an appropriate period to use for working-life income involves balancing two issues:

- **Periods closer to retirement better represent retirement expectations.** The proportion of people who have sought financial advice significantly increases for those aged in their mid-50s (Snoke, et al., 2009). This is when people are likely to set expectations for the standard of living they want to maintain in retirement. People's lives also begin to become similar to what they will experience during retirement, particularly for those with children. Incomes earned in early or mid-career are unlikely to significantly affect people's assessment of their retirement needs.
- **Periods too close to retirement include years when incomes trail off significantly in adjusted terms.** Close to a given retirement age, many are transitioning to retirement. A small period close to retirement may therefore not reflect a person's actual standard of living in working life that they wish to replace in retirement.

Some commentators suggest working-life income should be based on a period further away from retirement to reflect the peak of income in middle age. This approach was not favoured as:

- Financial stress peaks around age 50 for middle-income earners, reflecting high costs such as those related to raising children. This suggests the period is not reflective of the standard of living people will aim to replace in retirement.
- The 57-66 age range represents the peak of consumption opportunities. Real incomes tend to remain broadly stable in real terms from around 50, as nominal incomes grow in line with price inflation but slower than wage growth. From the 20th percentile and higher, average real income in the 57-66 age range (where the benchmark is set) exceeds real income at age 45.

Working-life income is deflated by wages. Most stakeholders preferred wages for pre-retirement deflation. The Actuaries Institute guidance recommends using wage-based deflation of working-life income as it is more understandable for people planning for their retirement:

> *'… it is preferable for future benefits to be deflated using a wage-based deflator in order to allow plan members to assess their purchasing power at retirement relative to their salary at retirement.' (Actuaries Institute, 2018)*

For consistency, the same working-life income target is used in all sensitivity analysis of retirement ages. For example, someone retiring earlier than 67 has their working-life income target based on the incomes they would have earned in the 10 years to 67. Falling incomes in later ages can mean

that average incomes in the 10 years to age 67 are lower than incomes in the 10 years to, say, age 62. This method avoids setting a higher retirement income target because someone retired earlier.

Personal income tax

People pay personal income tax according to current policy, including all legislated future tax changes out to 2024-25.

Personal income tax policies modelled include rates and thresholds; the Medicare Levy; and tax offsets including the low income tax offset, low and middle income tax offset (expiring 30 June 2022), and seniors and pensioners tax offset.

Some policy settings are not automatically indexed over time. Given this assumption is unrealistic in the long term, tax steps, thresholds and offsets are indexed to wages growth beyond the medium term (from 2030-31).

Where people are liable for personal income tax, those tax liabilities are paid from:

- Wage and salary income before retirement
- Earnings on non-superannuation wealth after retirement

Length of working life

The review assumes a career of 40 years as its central assumption. This is based on analysis of ABS and HILDA data (see *2C. Maintaining standards of living in retirement*).

Analysis also compared the length of working life for those who retire in 2060 in the Model of Australian Retirement Incomes and Assets (MARIA) with the review's cameo model assumption.

Median years in the workforce in MARIA for women retiring in 2060 is about 38 years, while median years in the workforce for men is around 44 years (Table 6A-6). The combined median years in the workforce for those retiring in 2060 is just over 40 years.

Table 6A-6 Years in the workforce for those retiring in 2058 to 2060, MARIA modelling

Gender	Average	Median	Standard deviation
Female	36.4	38.0	12.7
Male	41.9	44.0	13.8
All	39.0	40.9	13.5

Note: Years in workforce are included part- and full-time work. Source: Treasury estimates for the review using MARIA.

Proportion of the population with little workforce attachment

Those in the population with little workforce attachment are not well captured by the income cameo modelling as they may not lodge tax returns. Given this group tends to earn low incomes over their lifetime, assessing whether the system delivers an appropriate minimum standard is a better adequacy indicator for this group.

The Priority Investment Approach (PIA) dataset and actuarial model, administered by the Department of Social Services, was used to identify the size of this cohort.

The proportion of Australians aged 27 at 30 June 2018 expected to receive no income from employment[332] and also receive an income support payment for 15 years or more before they reach Age Pension eligibility age is 9.6 per cent (Table 6A-7).

[332]Employment may include both wage earners and self-employed people.

Table 6A-7 Proportion of Australians projected to receive income support, aged 27 on 30 June 2018

Projected groups	Number of people[ii]	Per cent of total[iii]
Years before reaching Age Pension eligibility age and projected to receive income support[i]:		
All people receiving income support		
10 years or more	73,256	20.3
15 years or more	52,252	14.5
Only those projected not to have employment earnings		
10 years or more	51,035	14.1
15 years or more	34,563	9.6
Total in age group	361,047	100

Note: The analysis uses raw data extracted from the Centrelink Enterprise Data Warehouse. Results were produced using the PIA dataset 'as at' 30 June 2018 and 'as known at' 30 September 2018. 'As at' date is the date at which data is cut off. [i]Does not indicate the continuous receipt of income support. A recipient may receive income support for a full year or part of a year, which in both instances is recorded as having received income support for that year. [ii]Includes all Australians aged 27 as at 30 June 2018 who are projected to be in a particular group. This calculation excludes people expected to die before Age Pension eligibility age. [iii]Calculated by dividing the total number of Australians aged 27 as at 30 June 2018 who are projected to be in that group by the total number of Australians aged 27 as at 30 June 2018 who are projected to survive to Age Pension eligibility age. Source: Priority Investment Approach to Welfare Actuarial Modelling.

Superannuation accumulation

This section outlines modelling assumptions affecting the accumulation of superannuation.

Superannuation Guarantee

SG payments are modelled in line with legislated increases. The SG rate is 9.5 per cent to 2020-21, increasing half a percentage point every financial year before reaching 12 per cent in 2024-25.

Modelling assumes people receive SG payments at the legislated rate, aligned with legal requirements for paying employees.

Voluntary salary sacrifice contributions

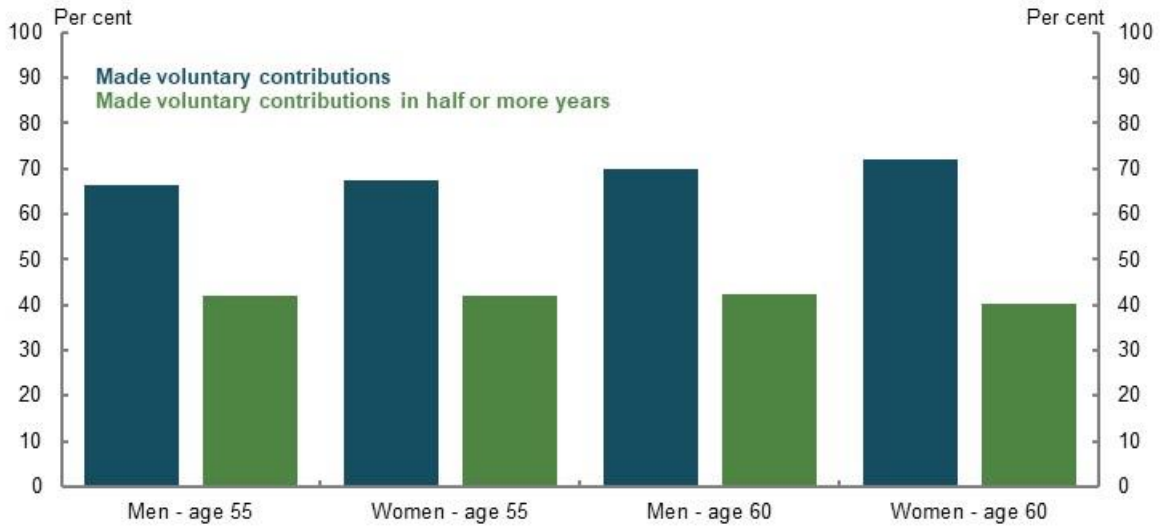
The retirement income cameo model assumes people make voluntary salary sacrifice contributions to superannuation. Salary sacrifice rates by income percentile and age are sourced from Treasury's microsimulation model of the personal income tax system (TAXMOD).

This microsimulation model makes adjustments to future salary sacrifice contribution patterns to account for policy changes not reflected in the 2016-17 data (such as changes in contributions caps and SG rate increases). Personal deductible contributions are not incorporated into the model.

This data shows most salary sacrifice contributions — more than three-quarters — are made after the age of 55 in the retirement income cameo model.

Analysis of the ALife shows that most people make voluntary contributions at some point in the years approaching retirement. Focusing on cohorts aged 55 and over, about two-thirds of people in the 50th percentile for superannuation balance in 2010 made a voluntary contribution in the eight-year period covered by ALife (Chart 6A-21). More than 40 per cent made voluntary contributions in four or more of the eight years.

Chart 6A-21 Proportion of people who made voluntary contributions over an eight-year period, by age and gender
50th percentile



Note: 50th percentile is calculated based on superannuation balance in 2010. Contributions are over an eight-year period from 2010 to 2017 by age and gender. Age refers to age of the cohort in 2010. Source: Analysis of data provided by the ATO for the review.

Non-concessional contributions

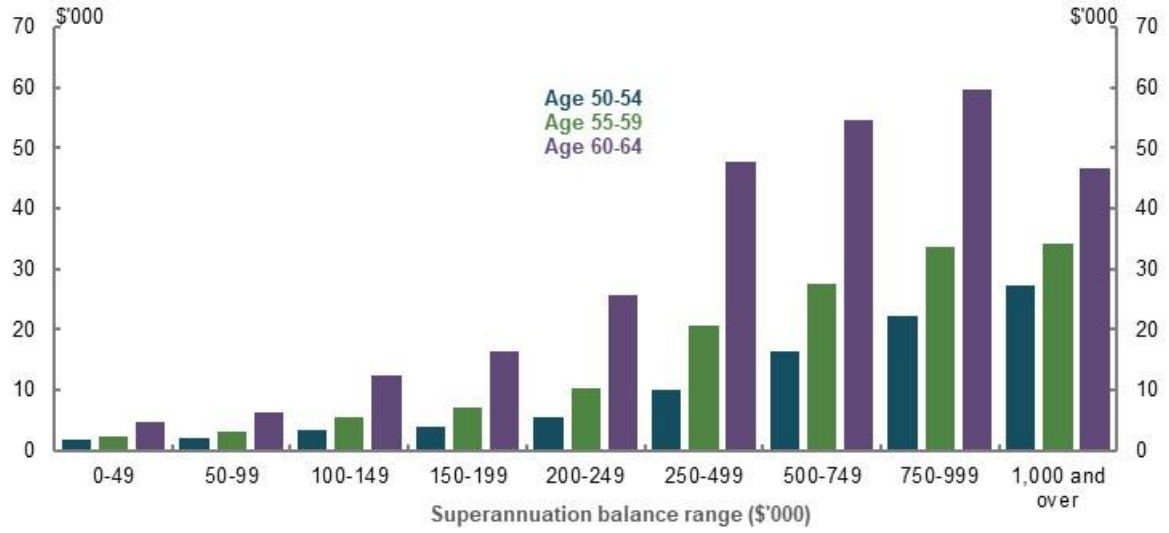
Non-concessional contributions are those made out of after-tax income. Individuals can currently contribute after-tax income to superannuation subject to a yearly cap of $100,000, provided their total superannuation balance is under $1.6 million.

These contributions form a significant part of total contributions to superannuation. In 2016-17, more than 40 per cent of contributions to superannuation were non-concessional contributions.

However, non-concessional contributions are not modelled. The interactions between savings outside superannuation and non-concessional contributions are unclear (for example, large non-concessional contributions may come from existing savings). As modelling does not capture this interaction, a conservative approach is taken to exclude savings through non-concessional contributions.

Excluding non-concessional contributions will underestimate both the replacement rates and lifetime superannuation tax concessions, especially for higher-income earners. In 2017-18, non-concessional contributions were highly skewed to older, higher-wealth retirees (Chart 6A-22).

Chart 6A-22 Average non-concessional contributions, by age and superannuation balance



Note: Non-concessional figures are taken by subtracting personal superannuation contributions in the individual income tax returns (ITR) from the personal contributed amount in the member contribution statements (MCS). Excludes contributions where age was unknown or no MCS provided. Age as at 30 June 2018. Source: Analysis of ATO individual income tax returns and member contributions statements, 2017-18.

Superannuation policy

Following is an outline of the superannuation policy included in the modelling.

Taxation of superannuation contributions

Contributions to superannuation are taxed according to current policy, including the 15 per cent contributions tax; low income super tax offset; the Division 293 tax; and excess contributions tax.

Concessional superannuation contributions are also subject to the concessional contributions cap, and individuals may carry forward unused concessional cap if their total superannuation balance in the previous financial year was less than $500,000.

As per non-indexed personal income tax thresholds, all non-indexed superannuation tax thresholds are indexed in line with average weekly ordinary time earnings beyond the medium term (2030-31 onwards).

Taxation of superannuation earnings

In the pre-retirement phase, the tax rate on superannuation earnings is 15 per cent. However, some assets receive different tax treatment, such as net capital gains that attract a discount and franked dividends. A 7 per cent effective tax rate on superannuation earnings in the pre-retirement phase has been assumed for the retirement income cameo model. This assumption has been prepared using a top-down framework across a long-term horizon, and is intended to be broadly representative of a range of investments.

Earnings in the retirement phase are tax-free, noting that the transfer balance cap restricts the balance people are able to transfer into the pension phase.

Fees

Superannuation balances are assumed to attract a $74 fixed annual investment fee in 2019-20 indexed to average weekly earnings. An annual variable investment fee of 0.85 per cent of the account balance also applies. Superannuation fees are payable in both the accumulation and retirement phases.

These investment fees are consistent with assumptions used in Treasury's MARIA and are based on historical data.

Insurance

Fixed annual insurance premiums are $214 in 2019-20 and indexed to average weekly earnings. Premiums are paid in the pre-retirement phase only and subtracted from superannuation balances. This premium is consistent with estimates used in Treasury's MARIA and are based on historical data.

The transfer balance cap

From 1 July 2017, people have been able to transfer their superannuation balance into the retirement phase subject to the transfer balance cap ($1.6 million in 2019-20 and indexed periodically in $100,000 increments in line with CPI).

Modelling assumes that superannuation balances over the transfer balance cap are transferred outside superannuation. Earnings on these amounts are taxed at marginal rates. Only retirees at the 90th, 95th and 99th percentiles are affected by this assumption in the model. This assumption has a conservative impact on retirement incomes, compared to leaving assets in superannuation but in the accumulation phase, as:

- Higher-income earners affected by the cap are typically paying higher taxes outside superannuation, which reduces their retirement incomes
- Asset drawdown rates are lower outside superannuation than inside superannuation for the purposes of review modelling

Investment returns

Assets inside and outside superannuation are assumed to generate investment returns of 7.5 per cent during the accumulation phase and 6.2 per cent during the retirement phase. These returns are before fees and taxes.

These investment returns:

- Are based on advice commissioned from the Australian Government Actuary
- Are conservative relative to historical returns
- Align with, or are conservative compared to, industry growth and defensive targets

These investment return assumptions are based on fund investment objectives and typical superannuation portfolios. A lower earnings rate in the retirement phase reflects a lower risk appetite, with retirees typically holding more defensive assets (Chart 6A-23).[333]

The Australian Government Actuary determined typical investment objectives (after fees and taxes) by examining the investment objectives of default portfolios in major Australian superannuation funds. Default investment options were used as the basis for determining fund investment objectives, as these tend to be used by a large proportion of superannuation members.

The determination of accumulation phase investment objectives took into account default portfolios from the top 10 MySuper funds, covering more than 60 per cent of MySuper assets. The investment strategies of these portfolios were checked for broad consistency with the asset allocations reported by the Productivity Commission (Table 6A-8).

The determination of retirement phase investment objectives adopted a similar approach. However, the retirement earnings rate assumption relies more on fund investment strategies, as the idea of a 'default portfolio' is less applicable during the pension phase.

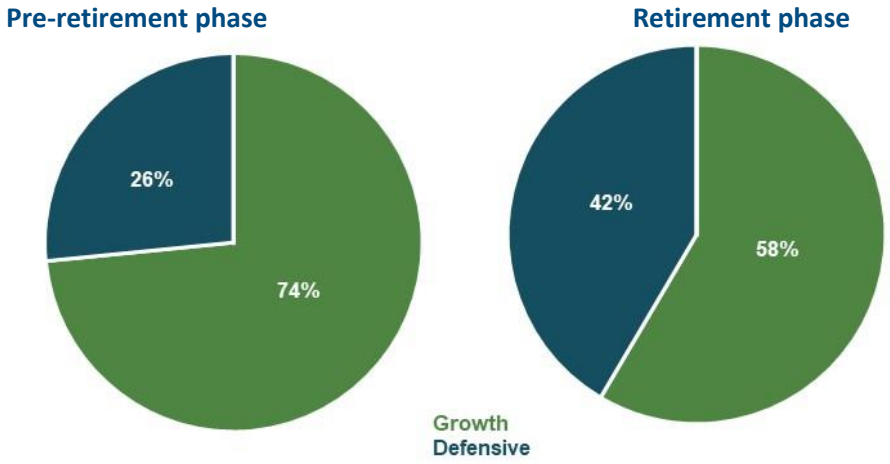
[333] This is partially offset by lower tax rates during the pension phase.

Table 6A-8 Asset allocation in pre-retirement and retirement phases

Allocation type	2007		2017	
	Pre-retirement (per cent)	Retirement (per cent)	Pre-retirement (per cent)	Retirement (per cent)
Defensive	19.9	32.2	18.2	32.8
Growth	71.6	63.1	65.3	49.8
Other[i]	8.6	5.1	17.0	17.5
Total[ii]	100.0	100.0	100.0	100.0

Note: Original data grouped. 'Growth' includes private equity, Australian and international listed equities, property and infrastructure. 'Defensive' includes Australian and international fixed income, and cash. [i]'Other' incorporates a blend of 50 per cent Australian and international equity and 50 per cent Australian and international fixed income. [ii]Categories may not sum to 100 due to rounding. Source: Analysis of *(Productivity Commission, 2018a)*.

Chart 6A-23 Asset allocation in pre-retirement and retirement phases



Note: Based on asset allocation in 2017. See note to Table 6A-8 for more. 'Other' incorporated as 50/50 growth and defensive assets. Source: Analysis of (Productivity Commission, 2018a).

The investment return assumptions in cameo modelling are broadly in line with other targets for both typical pre-retirement and retirement phase portfolios (Table 6A-9 and Table 6A-10).

Table 6A-9 Pre-retirement phase/growth portfolio investment returns

Organisation	Gross investment return (per cent)	Net investment return (per cent)
Review assumption	7.5	6.0[i]
MARIA (Treasury 2019) assumption	7.5	
Rice Warner Australian shares (gross of imputation credits) assumption	7.9	-
Rice Warner international shares assumption	7.5	-
Chant West growth fund 5-year past performance	-	8.0[ii]
Chant West growth fund 10-year past performance	-	7.9[ii]
Chant West growth fund 15-year past performance	-	7.0[ii]
Chant West growth fund target	-	6.0[ii]
Future Fund target	-	6.5-7.5

Organisation	Gross investment return (per cent)	Net investment return (per cent)
Grattan Institute assumption	7.5	-
Mercer assumption	-	6.5

Note: All returns are nominal. Gross investment returns are provided before fees and taxes. Net investment returns are provided after fees and taxes. Results assume CPI of 2.5 per cent, which is in the middle of the RBA's target. Chant West growth fund and Future Fund targets are CPI plus 3.5 per cent and CPI plus 4 to 5 per cent, respectively. [i] Review net investment return assumes 0.85 per cent variable investment fee, 7 per cent effective tax rate and fixed investment and insurance fees of $74 and $214, respectively, both indexed to average weekly earnings.[ii] After investment fees and taxes, before administration fees and adviser commissions. Source: Treasury estimates for the review using MARIA (see Model of Australian Retirement Incomes and Assets), Rice Warner estimates for the review (see *Superannuation, Pension and other Retirement OUTcomes*, below) *(Chant West, 2020)*, *(Grattan Institute, 2020)*, *(Mercer, 2020)*, *(Future Fund, 2020)*.

Table 6A-10 Retirement phase/defensive portfolio investment returns

Organisation	Gross investment return (per cent)	Net investment return (per cent)
Review (including MARIA modelling for the review) assumption	6.2	5.35[i]
MARIA (Treasury 2019) assumption	6.5	-
Chant West conservative fund 5-year past performance	-	5.0[ii]
Chant West conservative fund 10-year past performance	-	5.7[ii]
Chant West conservative fund 15-year past performance	-	5.5[ii]
Grattan Institute assumption	6.5	-
OECD assumption		5.0[iii]
Mercer assumption	-	6.0

Note: All returns are nominal. Gross investment returns are provided before fees and taxes. Net investment returns are provided after fees and taxes. All results calculated assuming CPI of 2.5 per cent, which is in the middle of the RBA's target. This may differ to individual organisation estimates for CPI. [i]Review net investment return assumes 0.85 per cent variable investment fee. [ii]After investment fees and taxes, before administration fees and adviser commissions. [iii]OECD investment returns calculated assuming a 90 per cent annuity factor, applied to 5.5 per cent *gross investment returns.* Source: Treasury estimates for the review using MARIA (see *Model of Australian Retirement Incomes and Assets*), (Chant West, 2020), (Grattan Institute, 2020), (OECD, 2019b), (Mercer, 2020).

Savings outside superannuation

This section outlines assumptions regarding savings outside superannuation.

Home ownership

For cameo analysis, it has been assumed that people own their own home at retirement. Home ownership affects Age Pension eligibility due to different means testing thresholds and renters being eligible for Commonwealth Rent Assistance.

The home ownership assumption is based on ownership rates for middle and higher-wealth retirees, which exceed 95 per cent.

Renting is highly skewed to lower-wealth groups, with three-quarters of renters in the bottom two wealth deciles. As a result, the assessment of whether retirees are meeting a basic minimum standard is the most important assessment of adequacy for renters (*3A. Achieving a minimum standard of living in retirement*).

Modelling includes sensitivity analysis on home ownership, given its importance for retirement outcomes (*2C. Maintaining standards of living in retirement*). The review also examined the impact of trends in home ownership (*3C. Home ownership status*).

Financial assets outside superannuation

For cameo analysis, financial assets outside superannuation were estimated at the point of retirement. Data on financial assets held outside superannuation was sourced from the 2017-18 Survey of Income and Housing. This data was used to rank individuals and households with positive wage and salary income into asset percentiles. Ratios of average financial assets outside superannuation were then calculated as a percentage of average lifetime earnings (using the historical ABS average weekly ordinary time earnings series).

For a given retiree, financial assets outside superannuation were projected in future years by multiplying the financial assets outside superannuation ratio for the relevant percentile by projected average lifetime earnings.

Personal use goods

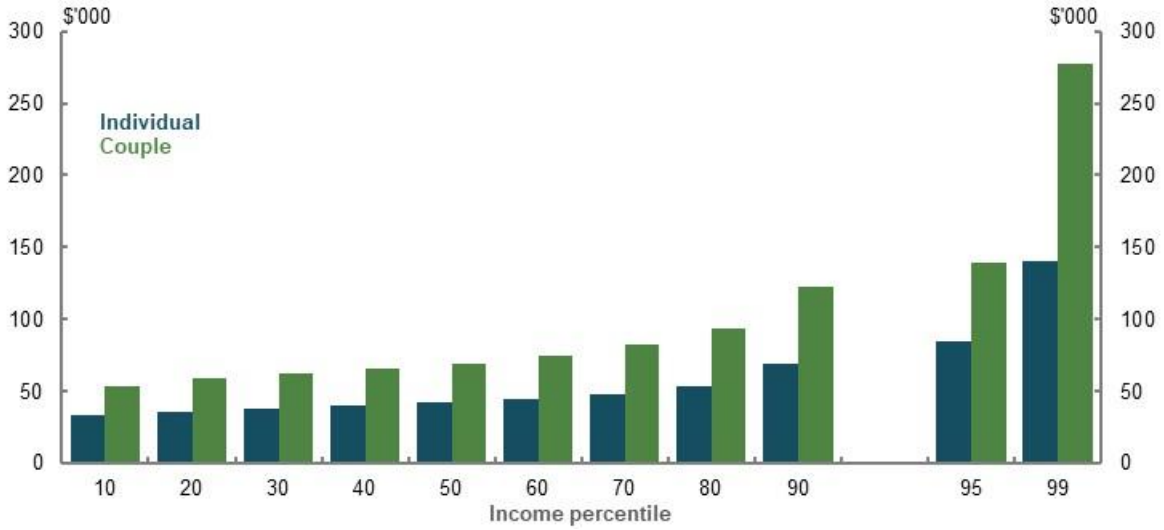
Cameo modelling assumed that households hold personal use assets (such as cars and furniture). These assets are assumed not to generate income but may reduce Age Pension entitlements.

Data on personal use goods was sourced from 2015-16 Department of Social Services data. The level of assets was projected using the same methodology as financial wealth outside superannuation.

Income during retirement

Retirement income comprises three main sources: drawdown of superannuation, earnings from non-superannuation wealth, and the Age Pension (if eligible). The models used by the review projected average annual retirement income from these three sources by income percentile (Chart 6A-24).

Chart 6A-24 Projected annual retirement income



Note: Average annual retirement income averages annual disposable income from the whole of retirement. Couple income averages annual disposable income from the whole of retirement at a household level. Source: Cameo modelling undertaken for the review.

Income from superannuation

On reaching retirement, people are assumed to use their superannuation by:

- Using 5 per cent of their balance at retirement to purchase a longevity risk product (see *Longevity protection product*, below)

- Converting the remaining 95 per cent into an account-based pension
- Transferring superannuation assets above the transfer balance cap outside superannuation

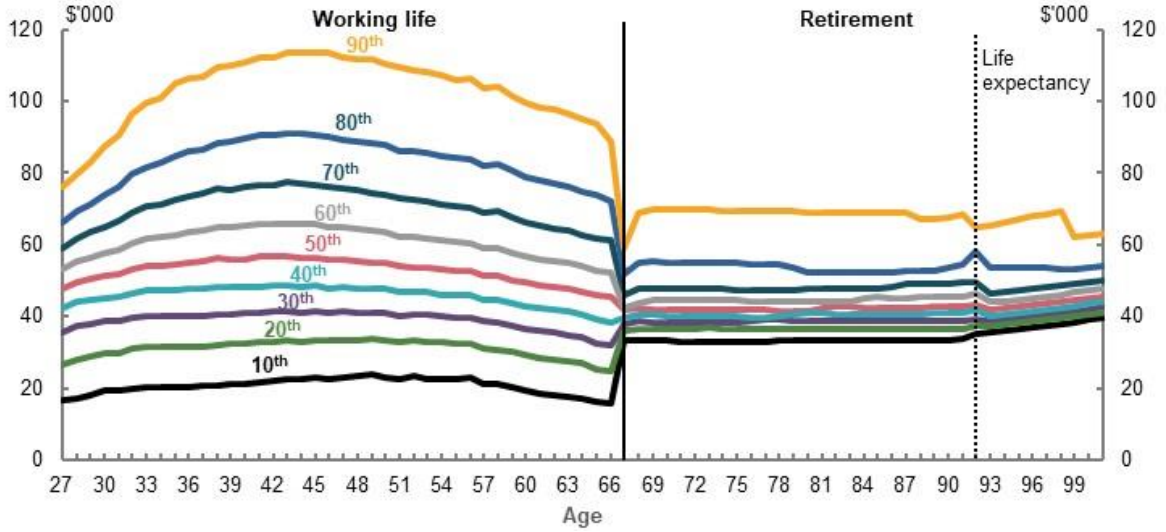
Account-based pension

Superannuation assets are drawn down at a rate to:

- Exhaust superannuation assets (excluding their longevity protection product) at age 92, which is equal to cohort life expectancy in the 2015 Intergenerational Report averaged for men and women[334]
- Produce a constant real income stream inclusive of any Age Pension eligibility and non-superannuation wealth income (Chart 6A-25)

Ensuring superannuation wealth is for retirement income aligns with its intended purpose and avoids leaving large bequests. Additionally, this assumption tests the capacity of the system to deliver retirement incomes rather than the incomes delivered under lower drawdown rates (for drawdown sensitivity analysis and bequests, see *2C. Maintaining standards of living in retirement*).

Chart 6A-25 Projected disposable income by age and income percentile



Note: Values are in 2019-20 dollars using the review's mixed deflator. Source: Cameo modelling undertaken for the review.

The drawdown rates used by the review are just one way to achieve this goal. Individual preferences or people's financial circumstances could mean they prefer other drawdown rates.

The drawdown rates are calculated based on the review's modelling of wealth at retirement, expected asset returns, and Age Pension eligibility. These rates increase with age to produce constant real income as balances reduce (Table 6A-11 and Table 6A-12).

The drawdown rates are designed to exhaust superannuation balances at age 92 for most people. People in the top 80th and higher percentiles can have balances that are not completely exhausted by this age. The drawdown rates account for the Age Pension to produce a consistent income stream in real terms. The Age Pension makes up a growing proportion of retirement income with age (Chart 6A-29).[335]

[334] Higher-income earners have a small amount of superannuation remaining after age 92.
[335] This does not apply to income percentile 95 and 99, for whom Age Pension eligibility remains zero over the entire retirement period. This is due to high assets outside superannuation, which are not drawn down.

Table 6A-11 Individual drawdown rates by income percentile

Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
Assets at retirement ($'000)									
Superannuation	145	220	300	375	455	555	660	810	1,000
Other assets	5	5	10	15	25	40	75	150	450
Drawdown rates by age (per cent)									
67	8.4	9.5	10.0	10.2	10.0	8.1	7.3	6.3	4.9
68	8.6	9.5	10.0	10.3	10.5	8.7	7.7	6.6	5.1
69	8.8	9.4	10.0	10.4	10.6	9.4	8.1	6.9	5.3
70	9.0	9.3	10.0	10.4	10.7	10.2	8.5	7.2	5.5
71	9.2	9.1	10.0	10.5	10.8	11.0	9.1	7.6	5.7
72	9.5	9.0	10.0	10.5	10.9	11.2	9.7	8.0	6.0
73	9.8	9.2	9.9	10.6	11.1	11.3	10.4	8.4	6.2
74	10.2	9.5	9.9	10.6	11.2	11.5	11.3	9.0	6.5
75	10.6	9.8	9.8	10.6	11.3	11.7	11.9	9.6	6.8
76	11.1	10.2	10.0	10.5	11.4	12.0	12.2	10.3	7.2
77	11.6	10.5	10.3	10.5	11.5	12.2	12.6	11.2	7.6
78	12.2	11.0	10.8	10.6	11.6	12.4	12.9	12.3	8.1
79	12.9	11.6	11.2	11.1	11.7	12.7	13.3	13.4	8.6
80	13.6	12.2	11.8	11.6	11.7	13.0	13.8	13.9	9.2
81	14.5	13.0	12.5	12.3	12.3	13.3	14.3	14.5	9.9
82	15.6	14.0	13.4	13.0	13.1	13.6	15.0	15.2	10.8
83	16.8	15.1	14.6	14.1	14.1	14.0	15.7	16.1	11.8
84	18.3	16.5	15.9	15.5	15.3	15.3	16.5	17.1	13.1
85	20.2	18.3	17.7	17.2	17.0	16.9	17.5	18.4	14.8
86	22.7	20.6	20.0	19.5	19.3	19.1	19.2	20.0	16.9
87	26.1	23.9	23.3	22.7	22.6	22.3	22.4	22.2	19.9
88	31.0	28.7	28.1	27.4	27.5	27.2	27.0	25.2	23.2
89	39.0	36.7	36.1	35.2	35.5	35.3	35.1	29.6	27.0
90	54.5	52.6	51.9	50.6	51.7	51.5	51.3	39.3	32.9
91	100.0	100.0	99.0	95.1	100.0	100.0	100.0	60.9	43.5
92			100.0	100.0				25.1	18.1
93								28.3	19.7
94								32.5	23.0
95								38.4	27.8
96								47.4	35.9
97								62.9	52.0
98								100.0	100.0

Note: Drawdown rates by age and income percentile are based on net wealth at retirement. Net wealth is wage deflated and in 2019-20 dollars, denominated in thousands and rounded to the nearest $5,000. Rates may fall below minimum drawdown rates by age in early retirement years. The review models the maximum of minimum drawdown rates and efficient drawdown rates by year. Income percentiles 95 and 99 are assumed to draw down at the same rate as the 90th percentile. Drawdown rates are designed for individuals retiring in 2060 based on current Age Pension rates and thresholds in those years. Age Pension thresholds are indexed to CPI. Source: Cameo modelling undertaken for the review.

Table 6A-12 Couple drawdown rates by income percentile

Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
Assets at retirement ($'000s)									
Superannuation	295	500	655	780	920	1,075	1,250	1,485	1,700
Other assets	10	15	30	30	80	120	275	445	1,170
Drawdown rates by age (per cent)									
67	8.9	9.9	10.1	8.8	8.1	6.9	6.1	5.4	4.4
68	8.7	10.0	10.2	9.4	8.6	7.3	6.4	5.6	4.6
69	8.6	10.0	10.3	10.2	9.1	7.7	6.7	5.8	4.8
70	8.4	10.1	10.4	10.5	9.7	8.1	7.0	6.0	5.0
71	8.6	10.1	10.5	10.7	10.5	8.6	7.4	6.3	5.2
72	8.8	10.1	10.6	10.8	11.0	9.2	7.8	6.6	5.4
73	9.0	10.1	10.7	10.9	11.0	9.9	8.2	6.9	5.6
74	9.3	10.0	10.8	11.1	11.2	10.8	8.7	7.3	5.9
75	9.7	10.0	10.9	11.3	11.5	11.8	9.4	7.7	6.2
76	10.1	9.9	10.9	11.4	11.7	12.1	10.1	8.1	6.5
77	10.6	9.9	11.0	11.6	12.0	12.4	10.9	8.6	6.8
78	11.1	10.4	11.0	11.8	12.2	12.7	12.0	9.3	7.2
79	11.7	10.8	11.1	11.9	12.5	13.1	13.1	10.0	7.7
80	12.4	11.5	11.3	12.1	12.9	13.6	13.6	10.8	8.2
81	13.3	12.2	12.0	12.3	13.2	14.1	14.2	11.9	8.7
82	14.2	13.1	12.8	12.7	13.6	14.7	14.9	13.2	9.4
83	15.4	14.2	13.9	13.7	14.0	15.5	15.8	14.9	10.2
84	16.8	15.6	15.3	15.0	15.0	16.4	16.8	16.1	11.2
85	18.6	17.4	17.0	16.8	16.6	17.5	18.0	17.3	12.4
86	21.0	19.7	19.3	19.1	18.9	18.9	19.6	18.8	13.9
87	24.3	23.0	22.6	22.4	22.2	22.0	21.6	20.7	15.9
88	29.2	27.8	27.5	27.2	27.1	26.9	24.5	23.3	18.5
89	37.2	35.9	35.5	35.3	35.2	35.0	28.6	27.0	22.3
90	53.0	51.9	51.7	51.5	51.4	51.2	37.4	32.8	27.2
91	100.0	100.0	100.0	100.0	100.0	100.0	57.0	43.2	33.3
92							23.8	16.6	18.0
93							26.7	18.1	19.2
94							30.7	20.0	20.7
95							36.2	22.5	22.7
96							44.7	25.9	25.2
97							59.9	30.8	28.8
98							100.0	38.7	35.6
99								54.3	51.7
100								100.0	100.0

Note: Drawdown rates by age and income percentile are based on net wealth at retirement. Net wealth is wage deflated and in 2019-20 dollars, denominated in thousands and rounded to the nearest $5,000. Rates may fall below minimum drawdown rates by age in early retirement years. The review models the maximum of minimum drawdown rates and efficient drawdown rates by year. Income percentiles 95 and 99 are assumed to draw down at the same rate as the 90th percentile. Drawdown rates are designed for couples retiring in 2060 based on current Age Pension rates and thresholds in those years. Age Pension thresholds are indexed to CPI. Source: Cameo modelling undertaken for the review.

Longevity protection product

The modelling assumed retirees dedicate a small proportion of their balance at retirement (2060 in the central case) to purchase a longevity protection product. These products are more efficient for managing the risk of retirees outliving their savings than other strategies, like slowly drawing down assets (Chart 6A-26).

It was assumed that individuals allocate 5 per cent of their superannuation balance at retirement to the purchase of a longevity protection product. The product used in the modelling for the review was a deferred pooled annuity product, such as a deferred group self-annuity.

The model did not incorporate more complex features of these products, such as withdrawal options, death benefits or co-morbidity for couples.

Product payments and pricing

The longevity product commences CPI-indexed payments from age 92. The product was assumed to have investment returns of 6.2 per cent before fees and taxes.

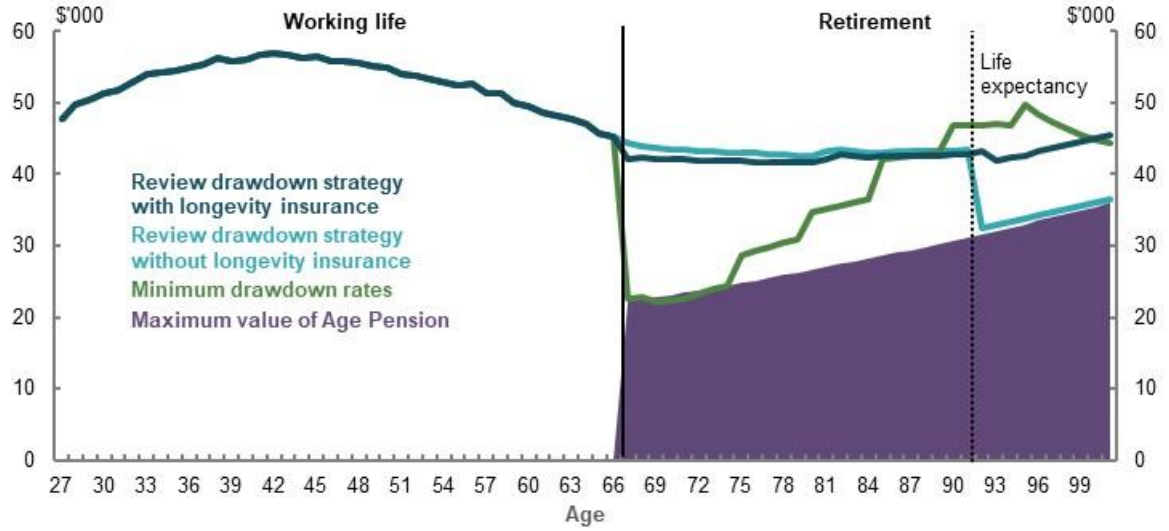
Investment fees were assumed to be 2.5 per cent per year, which are significantly higher than the 0.85 per cent variable investment fees assumed for funds invested in a typical superannuation account. Net earnings for the longevity product (3.7 per cent) were conservatively assumed to be lower than money invested in a typical fund (5.35 per cent).

Underlying mortality rates for retirees in 2060 were calculated by the Australian Government Actuary and accounted for increases in life expectancy.

Mortality rates for women were used in all models to be conservative compared to gender-specific mortality rates. Mortality rates for women are lower than for men, and therefore result in lower mortality credits.

The product is subject to Age Pension means testing in accordance with current means test rules for lifetime income streams.

Chart 6A-26 Projected disposable income by longevity product, median earner



Note: Values are in 2019-20 dollars, deflated using the review's mixed deflator. Source: Cameo modelling undertaken for the review.

Longevity product sensitivity analysis

The longevity product type used by the review was a simple hypothetical product to provide longevity protection and facilitate the drawdown of superannuation assets.

This product is one of many longevity products that could provide retirement income and longevity protection. To ensure its appropriateness, analysis compared this longevity product type to other possible retirement products, including:

- A deferred group self-annuity beginning at age 85, with 5 per cent of superannuation balance at retirement to purchase the product, and 95 per cent allocated to an account-based pension.
- A group self-annuity beginning at 67, with 40 per cent of superannuation balance at retirement to purchase the product, and 60 per cent allocated to an account-based pension.
- 100 per cent allocation of assets at retirement to a group self-annuity beginning at 67.

The review's retirement income portfolio tends to give lower incomes than similar products (Table 6A-13). Non-deferred products provide slightly higher replacement rates and retirement outcomes, as they pay out mortality credits for longer. However, higher incomes come at the cost of reduced capital flexibility. The review's central case assumption represents one way to balance longevity protection, high retirement incomes and capital flexibility.

Table 6A-13 Projected median earner retirement outcomes, different annuity products

Longevity product (asset split)	Replacement rate (per cent)	Average annual retirement income ($)
Review portfolio — account-based pension and deferred group self-annuity (DGSA) beginning age 92 (95/5 split)	87	42,100
Account-based pension and DGSA beginning age 85 (95/5 split)	89	43,100
Account-based pension and group self-annuity (60/40 split)*	90	43,600
Group self-annuity (0/100 split)*	91	44,000

Note: Products are hypothetical and used only for the basis of estimating retirement outcome differences. Values are in 2019-20 dollars, deflated using the review's mixed deflator and rounded to the nearest $100. *Group self-annuities in these scenarios are not deferred, and commence at retirement. Non-deferred products are assumed to have investment fees of 0.85 per cent consistent with review central case retirement phase specifications. Source: Cameo modelling undertaken for the review.

Box 6A-2 Comparing review drawdown assumptions with other retirement modellers' approaches

Consistent with the intent of the retirement income system, most retirement income projections assume superannuation assets are fully or predominantly used to generate retirement income by life expectancy (Table 6A-14). Key differences are the rate at which assets are drawn down and how longevity risk is managed.

Table 6A-14 Drawdown and longevity product assumptions in superannuation by organisation

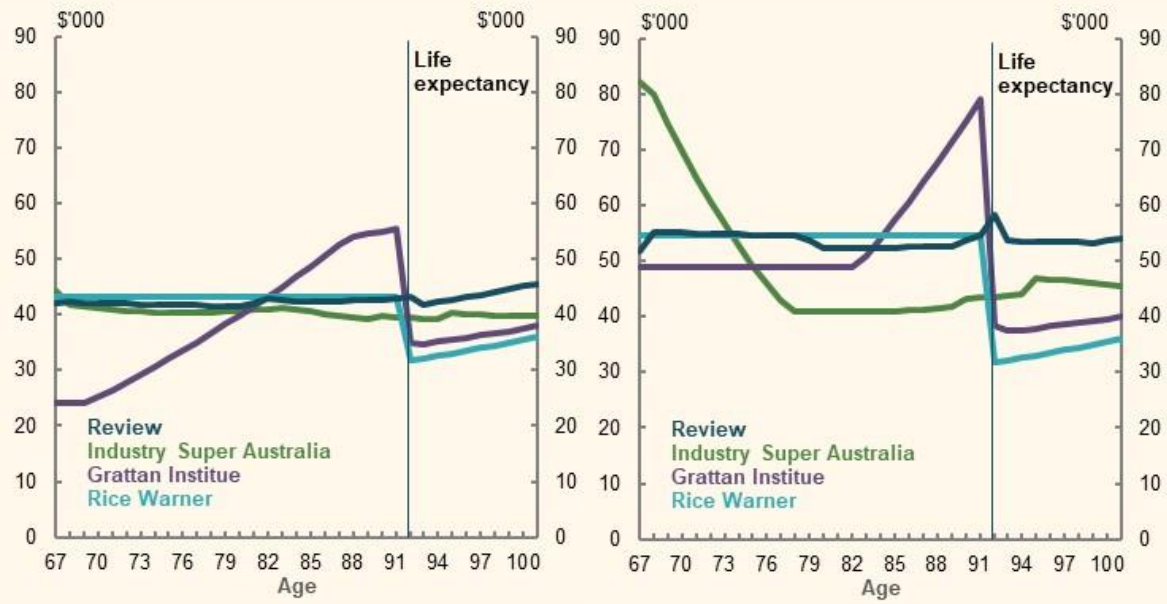
Organisation	Drawdown strategy	Longevity protection on top of Age Pension
Review	Exhaust 95 per cent of superannuation by age 92, drawing at a rate to deliver stable real income (including Age Pension).	Longevity product from age 92 purchased with 5 per cent of balance at retirement.
Industry Super Australia	Draw down at rate of 10 per cent, or minimum drawdown rate once it is higher (from age 90).	Remaining superannuation balance (around 15 per cent in real terms of balance at retirement).
Grattan Institute	Exhaust 90 per of superannuation assets by age 92, generating constant real income from superannuation only. Incomes grow in real terms. Spend earnings from other 10 per cent of superannuation.	Around 10 per cent of superannuation assets remain at age 92.
Rice Warner	Exhaust all superannuation assets by age 92, drawing down at a rate to deliver stable real income (including Age Pension).	None

Source: (Rice Warner, 2019d) (Grattan Institute, 2020) (Industry Super Australia, 2020).

Different drawdown approaches by organisation yield different retirement income profiles (Chart 6A-27). Differences from the review approach are as follows.

- **Longevity**. Without purchase of a longevity protection product, incomes can dip sharply in later ages (see Rice Warner and Grattan retirement income profiles below). Retirees are assumed to draw down at high rates without having longevity protection (Rice Warner, 2019d) or using a self-insured approach (Industry Super Australia, 2020). Industry Super Australia's approach generates bequests of around 15 per cent of starting balance in real terms.
- **Income stability**. Grattan's approach means incomes peak in real terms immediately before life expectancy. Up to life expectancy, Rice Warner's income is stable and the highest of all approaches, reflecting the absence of longevity protection. The Industry Super Australia's approach generates stable incomes for lower- and middle-income earners because of the way it interacts with the Age Pension. For higher-income earners, income declines significantly over time in real terms.

Chart 6A-27 Projected retirement income profiles with drawdown profiles by organisation



Note: Values are in 2019-20 dollars deflated using the review's mixed deflator. Profiles have been generated using the review's retirement income cameo model with drawdown strategy and longevity product specifications have been changed to reflect the review's best approximation of organisation assumptions. Grattan Institute retirement income post-age 92 equal to earnings from remaining assets and Age Pension as eligible. Other assumptions are the same as used in the review, notably the level of non-superannuation assets at retirement (excluding Rice Warner who assumes no non-superannuation assets). Source: Cameo modelling undertaken for the review.

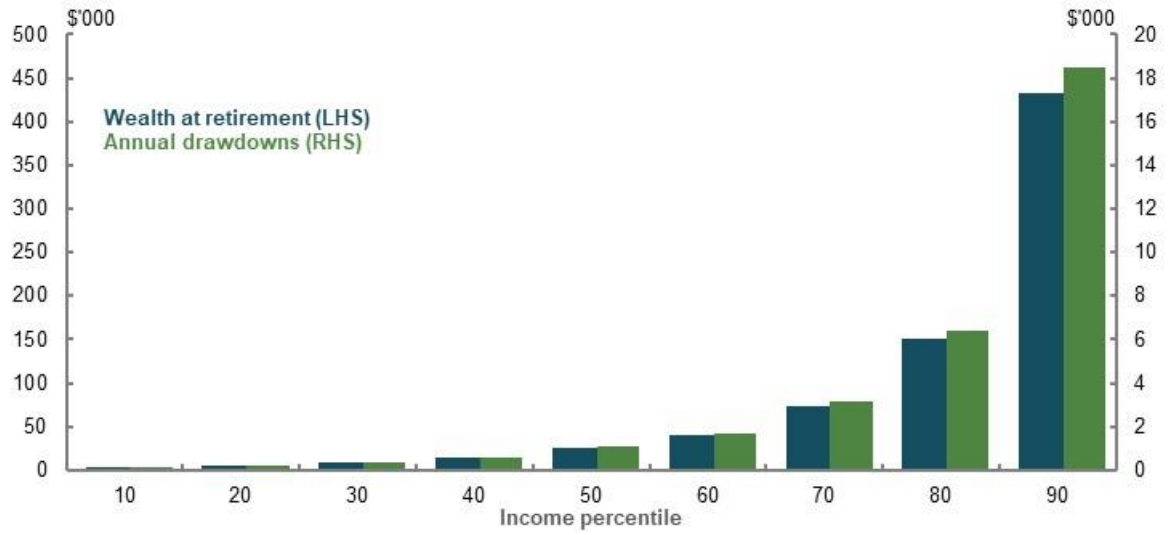
Non-superannuation income

The modelling assumed that people spend the earnings from their non-superannuation savings but do not draw down the capital (Chart 6A-28). This is based on two reasons:

- Non-superannuation savings do not receive the same concessional taxation as superannuation and are not explicitly for retirement income. The same arguments underpinning why superannuation should be used for retirement income (see *2C. Maintaining standards of living in retirement*) do not necessarily apply to retirees' assets outside superannuation.
- Many retirees maintain their level of assets over time (see *5A. Cohesion*).

Non-superannuation assets are assumed to have the same investment returns as superannuation (see *Investment returns* above).

Chart 6A-28 Projected non-superannuation wealth and income in retirement



Note: Values are in 2019-20 dollars using the review's mixed deflator. Source: Cameo modelling undertaken for the review.

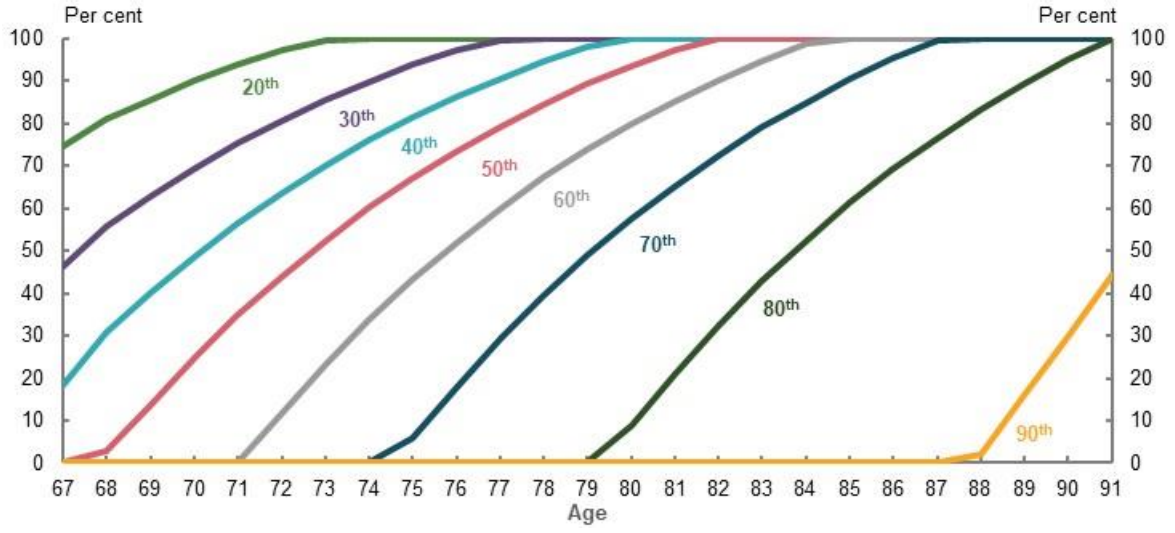
Age Pension

People can receive the Age Pension according to current policy, including the scheduled increase to the Age Pension eligibility age. Future rates and thresholds in the social security system were modelled based on current indexation rules and projections for wages and prices at the 2019-20 Mid-Year Economic and Fiscal Outlook (see *Economic parameters*, below).

For simplicity, modelling calculated the Age Pension per year rather than per fortnight. This assumption does not substantially affect results.

Most people are modelled to receive some Age Pension during their retirement. Middle-income earners (40th-70th income percentiles) are projected to receive at least half of the maximum rate for most of their retirement (Chart 6A-29). These outcomes are due to the income, savings and drawdown assumptions incorporated in the review's modelling.

Chart 6A-29 Projected proportion of maximum rate of Age Pension, by age and income



Note: 10th percentile receives 100 per cent of the maximum rate of Age Pension over their entire retirement, regardless of drawdown strategy. Income percentiles 95 and 99 do not receive any Age Pension due to high amount of non-superannuation assets. Source: Cameo modelling undertaken for the review.

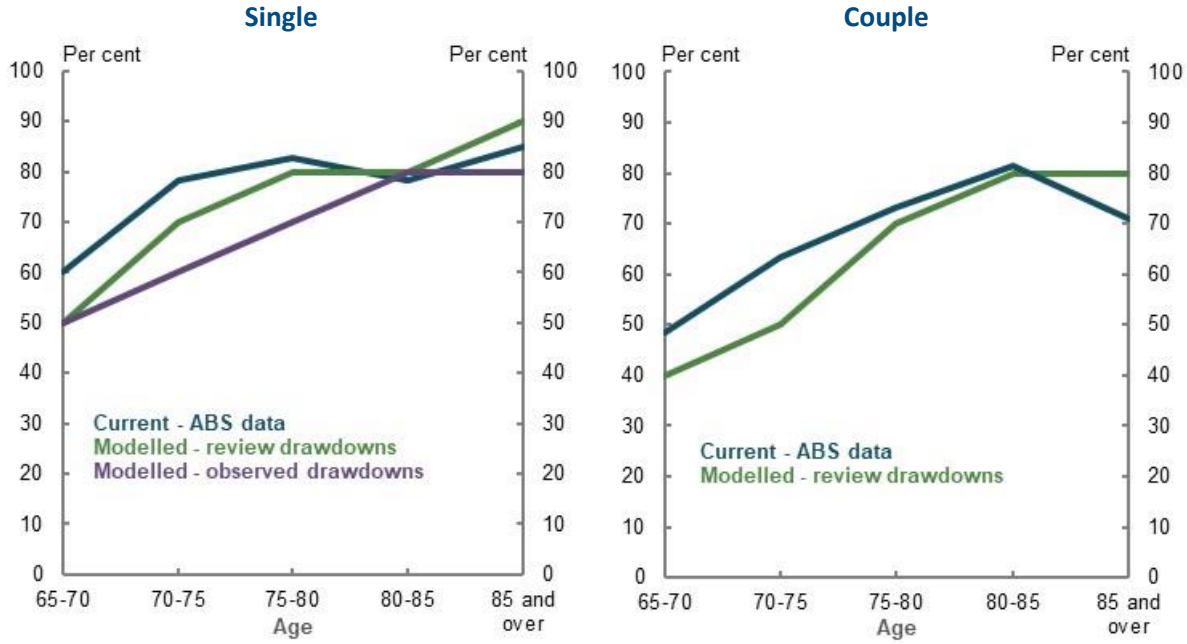
Population receiving some Age Pension — current and future retirees

Analysis was undertaken to compare the proportion of current and future retirees' Age Pension receipt by age (Chart 6A-30):

- Most income levels in review cameo modelling receive some Age Pension by age 85 under the review assumptions. In particular, percentiles up to the 90th percentile for singles and 80th percentile for couples.
- Data from the ABS Survey of Income and Housing 2017-18 shows about 85 per cent of singles and 70 per cent of couples today receive some Age Pension at age 85.

Differences between review results and data on current retirees are due to the maturing of superannuation, which is expected to result in fewer people receiving the Age Pension early on in their retirement. However, the review's drawdown assumptions mean the proportion of people expected to receive the Age Pension in review modelling was 5-10 percentage points higher than the ABS numbers over age 85.

Chart 6A-30 Proportion of retirees receiving some Age Pension by age group



Note: ABS data estimates the proportion of retirees receiving some Age Pension by age group today. Modelled proportions for 'single' category based on individuals (all-employees model). Modelled proportions project the proportion of individuals within the model expected to receive some Age Pension by age and income percentile, based on drawdown strategy. For modelled proportions, reference age is taken from the end of each ABS age group (i.e. at ages 70, 75, 80, 85 and 92) for people retiring in 2060. Modelled data is not a population estimate as it only captures employees. For further information see *Different versions of the cameo model*. Observed drawdowns use observed average drawdown rates by superannuation balance percentile, 2010-2014.Source: Cameo modelling undertaken for the review, analysis of (ABS, 2019s).

Economic parameters

Economic parameters, including wage, GDP and CPI growth, are based on the forecasts published and projections prepared for the 2019-20 Mid-Year Economic and Fiscal Outlook.

This includes long-run growth rates for CPI of 2.5 per cent, nominal GDP of 5.25 per cent, and nominal wage growth of around 4 per cent (Commonwealth of Australia, 2015).

CPI growth of 2.5 per cent represents the middle of the RBA band for targeting inflation. In the long term, real wage growth is driven by productivity (The Treasury, 2017a, p. 16). The 45-year average of

productivity growth is 1.5 per cent (Productivity Commission, 2020a, p. 3). Over the past 20 years, annual nominal wage growth in average weekly earnings averaged 3.6 per cent (ABS, 2020d).

Modelling gender

This section outlines the two cameo models used by the review to project outcomes by gender:

- a standard gender cameo model, used to analyse outcomes across the gender distribution
- an adjusted gender cameo model, used to analyse the effects of full-time and part-time work, and career breaks

Standard gender cameo model

A gender-specific cameo model was developed to examine differences in projected retirement outcomes for women and men. This model used the same underlying assumptions as the whole-of-population model used by the review, with the exception of the characteristics set out in Table 6A-15.

Table 6A-15 Gender model assumption differences to central case assumptions

Assumption	Central case	For men	For women
Life expectancy	92 years	91 years	93 years
Length of working life	40 years	42 years	38 years
Incomes	Tax return data, by age and income	Tax return data for men, by age and income	Tax return data for women, by age and income
Voluntary contributions to superannuation	Salary sacrifice contributions only	Salary sacrifice contributions made by men	Salary sacrifice contributions made by women
Superannuation drawdown strategy	Optimal drawdown to exhaust at life expectancy	Optimal drawdown, adjusted for men's wealth and life expectancy	Optimal drawdown, adjusted for women's wealth and life expectancy

Life expectancy

The 2015 Intergenerational Report contained life expectancy projections by gender (Table 6A-16).

Table 6A-16 Projected life expectancy, by gender

	Life expectancy at birth (2015) (years)	Further life expectancy at age 60 (2055) (years)
Men	91.5	31.5
Women	93.6	33.3

Source: (Commonwealth of Australia, 2015).

The gender model used life expectancy of 91 years for men and 93 years for women, to maintain the two-year difference between men and women projected by the Intergenerational Report.

Length of working life

The average number of years in the workforce for women is currently 38 years, compared to 42 for men (Table 6A-17) (see *2C. Maintaining standards of living in retirement*). This difference was incorporated into the gender model.

Table 6A-17 Gender model working-life assumptions, by gender

	Starting age	Career break	Retirement age	Total working life
Men	25	n/a	67	42 years
Women	27*	Two years, ages 30-31	67	38 years

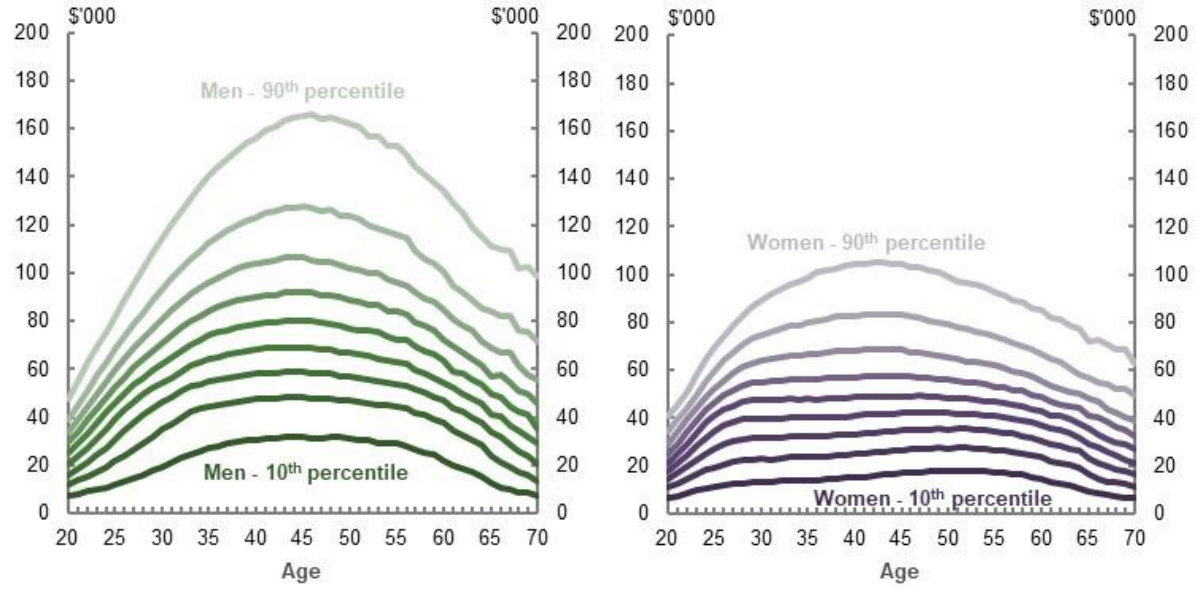
*To ensure consistency in system parameters, women start work at age 27 in 2021-22, while men start work at age 25 in 2019-20 to both reach retirement age in the same year.

Incomes

In constructing the gender model, incomes are based on 2016-17 ATO individual tax return data.

Men and women were sorted into percentiles based on total remuneration, age and gender. The amount of income earned at a given percentile differs significantly for men and women, with men earning more at each percentile (Chart 6A-31).

Chart 6A-31 Average salary and wages income, by age and gender-based income percentile



Note: Data from 2016-17. Percentiles are based on total remuneration (salary and wages, compulsory superannuation contributions and salary sacrifice contributions) at each age and gender in 2016-17. Lines show the increase in 10-percentile increments from the 10th gender-based percentile (darkest line) to the 90th gender-based percentile (lightest line). Salary and wages income is net of any salary sacrificed contributions. Source: Analysis of data provided by the ATO for the review.

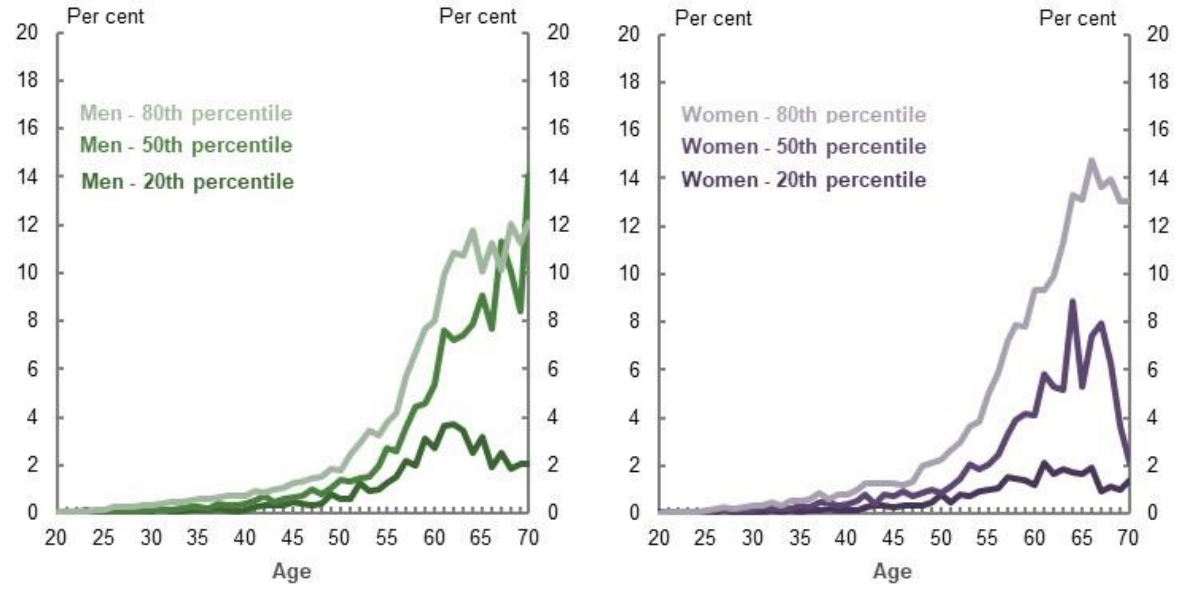
When modelling gender, it was assumed that the gender gap in wages that existed across the population at a given age in 2016-17 would persist.

Voluntary superannuation contributions

As with other modelling, the gender model assumed men and women make salary sacrifice contributions to their superannuation. The proportion of salary contributed to superannuation was adjusted by gender using 2016-17 ATO individual tax return data.

The proportion of income salary sacrificed at each percentile differs between men and women (Chart 6A-32).

Chart 6A-32 Proportion of salary and wage income that is salary sacrificed in 2016-17, by age and gender-based income percentile



Note: Percentiles are based on total remuneration (salary and wages, compulsory superannuation contributions and salary sacrifice contributions) at each age and gender in 2016-17. Lines show the increase in 20-percentile increments from the 10th gender-based percentile (darkest line) to the 80th gender-based percentile (lightest line). Source: Analysis of data provided by the ATO for the review.

Only voluntary superannuation contributions made through salary sacrifice arrangements were modelled when analysing gender. Women are more likely to make personal deductible voluntary contributions and after-tax voluntary contributions than men, particularly in the ages approaching retirement. These contributions narrow the gender gap in superannuation balances at older ages. Excluding these types of contributions means the modelling underestimates women's superannuation balances and retirement incomes relative to men's (see *3B. Gender and partnered status*).

Superannuation drawdowns

As men and women were assumed to have different salaries, salary sacrifice contribution rates and working-life lengths, they were also assumed to have different amounts of superannuation and wealth at retirement. This, combined with different life expectancies, means men and women were assumed to have different optimal drawdown strategies (Table 6A-18 and Table 6A-19).

Table 6A-18 **Men's drawdown rates by income percentile**

Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
Assets at retirement ($'000)									
Superannuation	195	320	410	490	580	695	810	975	1,065
Other assets	5	5	10	15	25	40	75	180	550
Drawdown rate by age (per cent)									
67	9.1	10.1	10.3	9.6	8.6	7.3	6.7	5.8	4.6
68	9.0	10.2	10.4	10.3	9.2	7.7	7.0	6.0	4.8
69	8.8	10.2	10.4	10.7	9.8	8.2	7.3	6.2	5.0
70	8.6	10.3	10.5	10.7	10.5	8.7	7.7	6.5	5.2
71	8.7	10.3	10.6	10.8	11.2	9.3	8.2	6.8	5.4
72	8.9	10.3	10.7	11.0	11.3	10.1	8.7	7.1	5.6
73	9.2	10.3	10.8	11.1	11.4	10.9	9.3	7.5	5.9
74	9.6	10.3	10.9	11.3	11.5	11.9	10.0	7.9	6.2
75	10.0	10.3	11.0	11.5	11.8	12.1	10.8	8.4	6.5
76	10.4	10.2	11.1	11.6	12.1	12.4	11.8	8.9	6.8
77	11.0	10.3	11.1	11.8	12.3	12.7	12.7	9.6	7.2
78	11.6	10.7	11.1	12.0	12.6	13.1	13.2	10.4	7.7
79	12.3	11.4	11.2	12.2	13.0	13.5	13.7	11.3	8.2
80	13.1	12.1	11.9	12.3	13.3	14.0	14.3	12.4	8.8
81	14.0	13.0	12.8	12.7	13.7	14.6	15.0	13.9	9.5
82	15.2	14.1	13.9	13.7	14.2	15.3	15.8	15.5	10.3
83	16.6	15.5	15.2	15.0	15.0	16.1	16.8	16.5	11.3
84	18.4	17.3	17.0	16.8	16.6	17.1	18.0	17.8	12.5
85	20.8	19.6	19.3	19.1	18.9	18.7	19.6	19.4	14.0
86	24.1	22.9	22.6	22.4	22.2	22.0	21.7	21.5	16.0
87	28.9	27.7	27.4	27.2	27.0	26.8	24.7	24.5	18.8
88	36.9	35.8	35.5	35.3	35.1	35.0	31.2	28.8	22.7
89	52.8	51.9	51.7	51.5	51.4	51.2	43.3	36.0	28.6
90	100	100	100	100	100	100	73.1	48.6	35.3
91							32.2	17.3	17.3
92							38.1	18.8	18.3
93							46.9	20.5	19.4
94							62.4	22.7	20.8
95							100	25.5	22.6
96								29.2	24.7
97								34.5	27.7
98								42.8	35.6
99								58.0	51.7
100								100	100

Note: Values are in 2019-20 dollars, deflated by average weekly earnings. Figures are denominated in thousands and rounded to the nearest $5,000. Drawdown rates by age and income percentile are based on net wealth at retirement. Rates may fall below minimum drawdown rates by age in early retirement years. The review models the maximum of minimum drawdown rates and efficient drawdown rates by year. Drawdown rates are designed for people retiring in 2060 based on Age Pension rates and thresholds in those years.

Table 6A-19 Women's drawdown rates by income percentile

Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
Assets at retirement ($'000)									
Superannuation	110	165	220	280	340	410	500	620	775
Other assets	5	5	10	15	25	40	75	150	435
Drawdown rates by age					**(per cent)**				
67	9.2	8.6	9.4	9.9	10.1	10.3	8.6	6.9	4.8
68	9.5	8.4	9.4	9.9	10.2	10.4	9.2	7.2	5.0
69	9.9	8.5	9.3	9.9	10.2	10.5	9.9	7.6	5.3
70	10.3	8.7	9.2	9.9	10.3	10.6	10.7	8.1	5.5
71	10.7	8.9	9.0	9.9	10.3	10.7	11.0	8.6	5.7
72	11.2	9.2	8.9	9.8	10.4	10.8	11.1	9.2	6.0
73	11.7	9.5	9.0	9.8	10.4	10.9	11.3	9.9	6.3
74	12.2	9.9	9.2	9.7	10.4	11.0	11.5	10.7	6.7
75	12.9	10.3	9.5	9.6	10.4	11.1	11.7	11.7	7.1
76	13.6	10.7	9.9	9.5	10.4	11.2	11.9	12.3	7.5
77	14.4	11.2	10.3	9.9	10.3	11.3	12.1	12.7	8.0
78	15.3	11.8	10.8	10.3	10.2	11.3	12.4	13.1	8.5
79	16.4	12.4	11.4	10.8	10.6	11.4	12.6	13.5	9.2
80	17.6	13.1	12.0	11.4	11.1	11.4	12.8	14.0	10.0
81	19.1	13.9	12.7	12.1	11.7	11.5	13.1	14.6	10.9
82	20.8	14.8	13.5	12.9	12.5	12.2	13.3	15.2	12.1
83	23.0	15.9	14.5	13.8	13.5	13.1	13.6	15.9	13.5
84	25.6	17.2	15.7	14.9	14.6	14.2	14.0	16.8	15.3
85	29.0	18.8	17.1	16.3	16.0	15.6	15.3	17.9	17.8
86	33.5	20.7	19.0	18.1	17.7	17.4	17.0	19.2	19.9
87	39.8	23.3	21.4	20.5	20.1	19.7	19.4	20.9	22.2
88	49.0	26.7	24.7	23.8	23.3	22.9	22.6	23.0	25.4
89	64.0	31.7	29.5	28.6	28.2	27.8	27.5	27.2	30.2
90	91.9	39.7	37.5	36.6	36.2	35.9	35.6	35.2	37.7
91	100	55.1	53.3	52.5	52.2	51.9	51.7	51.4	53.2
92		100%	100	100	100	100	100	100	100

Note: Values are in 2019-20 dollars, deflated by average weekly earnings. Figures are denominated in thousands and rounded to the nearest $5,000. Drawdown rates by age and income percentile are based on net wealth at retirement. Rates may fall below minimum drawdown rates by age in early retirement years. The review models the maximum of minimum drawdown rates and efficient drawdown rates by year. Drawdown rates are designed for people retiring in 2060 based on Age Pension rates and thresholds in those years.

Adjustment of gender model to isolate effects of full- and part-time work and career breaks

The review's standard gender model made no distinction between those working full-time and part-time and, as discussed above, applied a uniform career break for women at ages 30-31.

A modified version of the gender model was used to analyse the effect of gender pay gaps and career breaks (Table 6A-20). All other assumptions were held constant with the standard gender model, outlined above.

Table 6A-20 Variation of standard gender model assumptions for analysis of full- and part-time work and career breaks

Assumption	Population central case assumption	Male assumption	Female assumption
Start age	27	27	27
Life expectancy	92 years	91 years	93 years
Incomes	Tax return data, by age and income	Constant real income, ABS data on men's total average weekly earnings	Constant real income, ABS data on women's total average weekly earnings
Length of working life	40 years	40 years	40 years, minus career breaks as per scenario
Superannuation drawdowns	Optimal drawdown to exhaust at life expectancy	Optimal drawdown to exhaust at male life expectancy matched to ABS average wage	Optimal drawdown to exhaust at female life expectancy matched to ABS average wage
Voluntary savings	Salary sacrifice contributions and non-superannuation wealth	No voluntary contributions to superannuation or non-superannuation wealth	No voluntary contributions to superannuation or non-superannuation wealth

Note: Working-life length for women is dependent on the number of career breaks assumed. See Box 6A-3.

Incomes

For analysis of gender pay gaps in full- and part-time work, it was assumed that men and women earn the current average total weekly earnings, in real terms, for their entire working lives. (Table 6A-21).

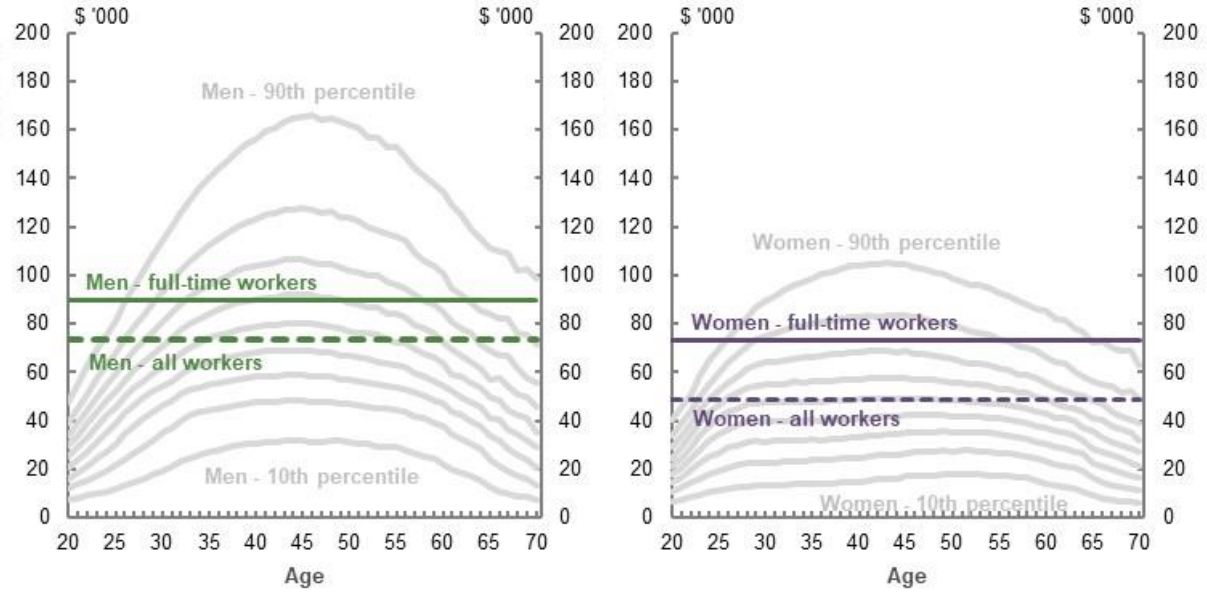
This is a simple assumption, and presents a different distribution of income across the life cycle than the standard gender model (Chart 6A-33). Results using this model are therefore less reliable in determining, in *absolute* dollar terms, the outcomes of men and women at retirement. However, the adjusted model is suitable for comparing the *relative* outcomes between men and women.

Table 6A-21 Average total weekly earnings

	Full-time employees ($)	All employees (including part-time) ($)
Men	1,839.00	1,498.20
Women	1,528.50	1,028.10

Note: Data from November 2019 using seasonally adjusted figures. Source: (ABS, 2020d)

Chart 6A-33 Comparison of average total weekly earnings (annualised) with average salary and wages income, by age and gender-based income percentile



Note: Data from 2016-17. Percentiles are as per Chart 6A-31. See note in Chart 6A-31 for further explanation. Annualised incomes for full-time and all workers have been extrapolated from average weekly earnings from May 2017, to show the comparison with 2016-17 ATO data. They are different to the figures from November 2019 used in the gender version of EMORI. Annualised average total weekly earnings is inclusive of salary sacrifice contributions while average salary and wages income in 2016-17 is net of salary sacrifice contributions. Source: Data provided by the ATO for the review; analysis of (ABS, 2020d).

Length of working life

In this adjusted model, the default working life for men and women was 40 years. This allowed for a more direct comparison of the effect of pay gaps on retirement outcomes, without the related effect of different lengths of working life.

A number of career break scenarios were tested using this adjusted model. The assumptions underpinning these scenarios are in Box 6A-3. Outside of the career break adjustments, women were assumed to be working full-time (see *Incomes*, above).

Box 6A-3 Modelling career breaks

There is no one-size-fits-all approach when modelling career breaks as people's lived experiences vary significantly. On average, women are more likely to take career breaks, take longer career breaks, take career breaks for caring reasons, and take them earlier than men (REST Super, 2017).

When do career breaks occur?

The career break modelling has **assumed mothers have either one child at age 30, or two children at ages 30 and 33.** This reflects population statistics that suggest, on average, women have 1.8 children and the median age of mothers giving birth is 31.4 (ABS, 2019e). This approach broadly aligns with career break cameos presented in submissions by two superannuation funds with large female memberships (HESTA, 2020, p. 29) (First State Super, 2020b, p. 40).

A career break for a woman who cares for a parent from age 55 was also modelled. One submission suggested that 25 per cent of women in their 50s care for a spouse or a parent (Carers NSW, 2020, p. 5).

How long are career breaks?

The modelling in the review has assumed women take two years off work to care for a child. Survey research by REST Super found, on average, women take 22.5 months off work for each 'caring' career break

(REST Super, 2017). In addition, research by Wilkins found significant variability in the length of caring breaks (Table 6A-22).

Table 6A-22 Length of career breaks for caring

Timing of return to paid employment after birth	Proportion of mothers (per cent)
Less than 6 months	16.7
Between 6 and 12 months	20.9
Between 12 and 24 months	18.3
24 months or more	44.1

Note: Limited to women aged under 45 whose youngest child was between ages two and five at the time of the survey. Timing of return to paid employment was for most recent birth. Includes mothers who had never worked before birth, or had not returned to paid employment. Source: (Wilkins, 2017, pp. 51-57).

What effect do career breaks have on earnings?

The modelling in the review has assumed:

- **Women miss out on promotions and salary increases while on leave**, in line with evidence presented in submissions and other reports (e.g. (AustralianSuper, 2018, p. 17)). A 2004 study found high-school-educated women forgo around 31 per cent of their lifetime earnings when they have a child and an additional 13 per cent when they have a second child (Breusch & Gray, 2004). Women are assumed not to benefit from promotions and salary increases during years on leave — earnings in the year after a career break are the same in nominal terms as the year prior to the career break, implying a wage decrease in real terms. Wages remain constant in real terms post-career break and do not return to pre-career break levels.
- **Where women work part-time to care for children, they do so until their youngest child is five years old, at 60 per cent of what their wage would otherwise have been** if they were working full-time. Wilkins found women were most likely to be working two years after the birth of a child and working part-time. Two years after the birth of a child, a mother's weekly earnings were around 55 per cent of her pre-child earnings. Part-time work is also far more common for women before and after their second child (Wilkins, 2017, pp. 51-57).

Retirement income

Retirement income incorporated Age Pension (as eligible), superannuation and non-superannuation draw downs. Superannuation drawdowns by gender were based on the standard gender cameo model drawdown strategy as per Table 6A-18 and Table 6A-19 for the income percentile with the closest average working-life wage to annualised ABS average weekly earnings as in Table 6A-22). Non-superannuation assets were also matched using this methodology.

Voluntary savings

To show the isolated effect of the gender pay gap and career breaks, voluntary contributions to superannuation and non-superannuation savings were not included in the adjusted version of the gender model.

Benchmarking the review's cameo model

To project outcomes many decades into the future, simplifications are necessary. This makes it important to test models to see how they compare to people's current superannuation balances and other modelling.

Testing focused on the modelled population, which included people who have:

- Wage income and are covered by the SG.

- A reasonably long attachment to the workforce.
  - The review's cameo model did not capture the population with minimal workforce participation. The 2018 Priority Investment Approach model projects that about 10 per cent of people will have no employment income while receiving income support for 15 years or more before Age Pension eligibility age in 2058. Assessment of adequacy outcomes against the minimum standard is more appropriate for this group.

Testing shows that the model is a good fit for the balances achieved by Australians working today and produces similar results to other long-term modelling.

- **Projected superannuation balances are similar to what working Australians have in their superannuation today** after adjusting for historical rates of the SG.
- **Projections of balances at retirement generally align with the comparable cohort in other long-term models** by Treasury (MARIA) using the 2019-20 MYEFO economic parameters and Rice Warner. These similarities are despite key differences in methodology, input data and age of retirement.
- **Voluntary contributions are conservative compared to what people do**, mainly due to excluding non-concessional contributions, which made up more than 40 per cent of total superannuation contributions in 2016-17 at $54 billion.

Superannuation balances at retirement

The review compared the superannuation balances at retirement in its modelling to other long-term models by Treasury and Rice Warner. Each model uses different methodologies and data for its projections. Comparing different models is useful for testing the robustness of their results.

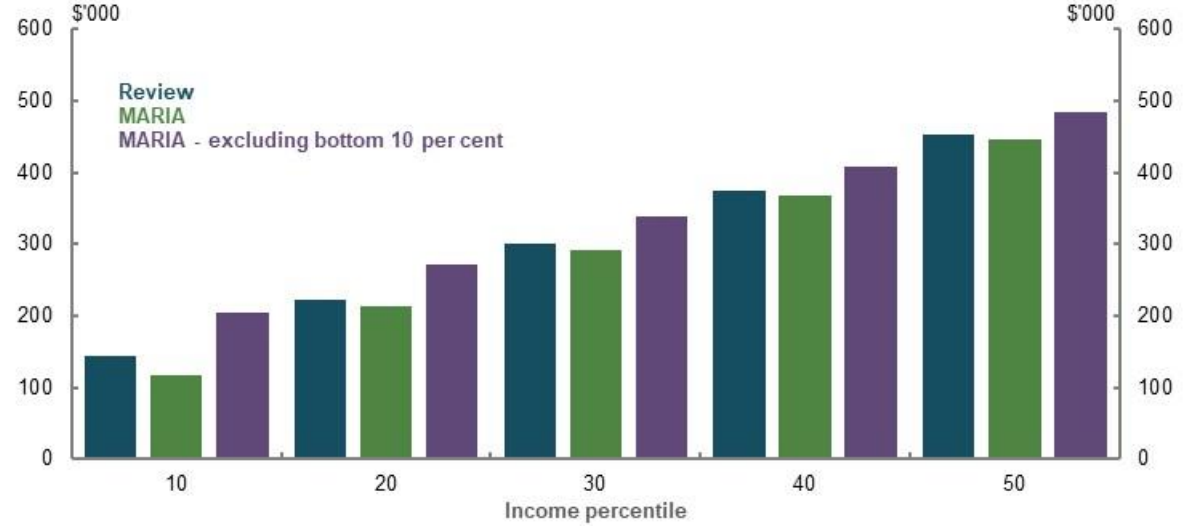
Review modelling assumed a 40-year career starting at age 27 and retiring at age 67. Evidence shows that a 40-year career is typical for a person starting work today (*2C. Maintaining standards of living in retirement*). While not everyone works to age 67, many people start in the workforce before age 27, so those retiring earlier may still work at least 40 years.

Treasury's long-term population model, MARIA, dynamically models the accumulation of superannuation for the Australian population over 25 years as they move into and out of the workforce (see *Model of Australian Retirement Incomes and Assets*, below).

MARIA was compared to the cameo model by selecting a cohort who retire in around 40 years' time and have some workforce participation. For this reason, the bottom 10 per cent of balances are excluded when comparing to the relevant cohort of people retiring in MARIA. This proportion is based on analysis from the 2018 Priority Investment Approach actuarial model and Department of Social Services data showing the proportion of people projected to have no employment income while receiving income support for 15 years or more before Age Pension eligibility age.

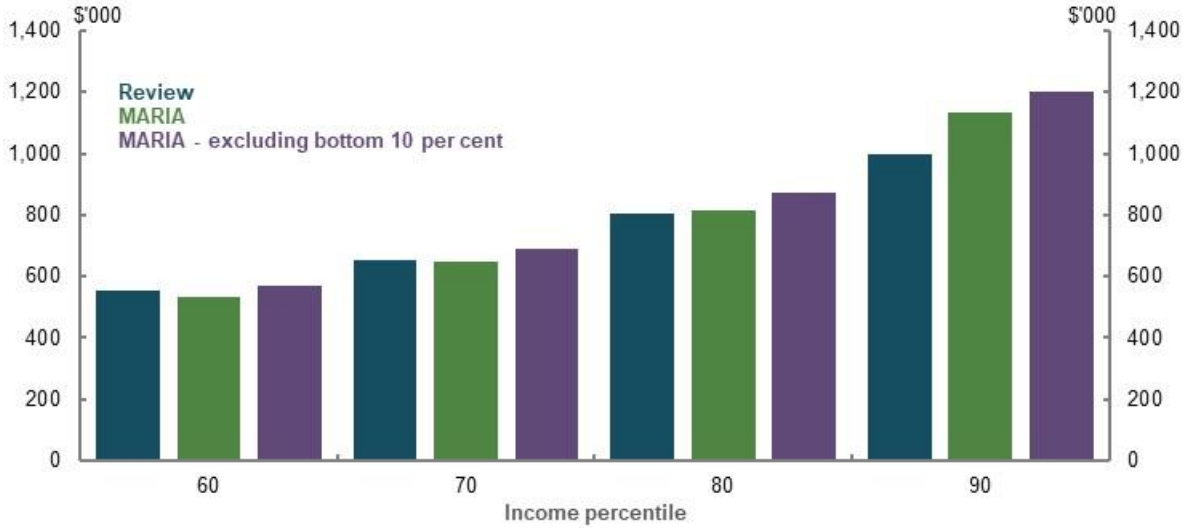
The review's cameo model produces results similar to models with more sophisticated projections of careers and population-level outcomes (Chart 6A-34 and Chart 6A-35).

Chart 6A-34 Comparison of superannuation balances at retirement, median income and below



Note: Values are in 2019-20 dollars, deflated by average weekly earnings. Balances at 2058-59 for review, and 2057-58 to 2059-60 for MARIA. Source: Treasury estimates for the review using MARIA, cameo modelling undertaken for the review.

Chart 6A-35 Comparison of superannuation balances at retirement, above median income

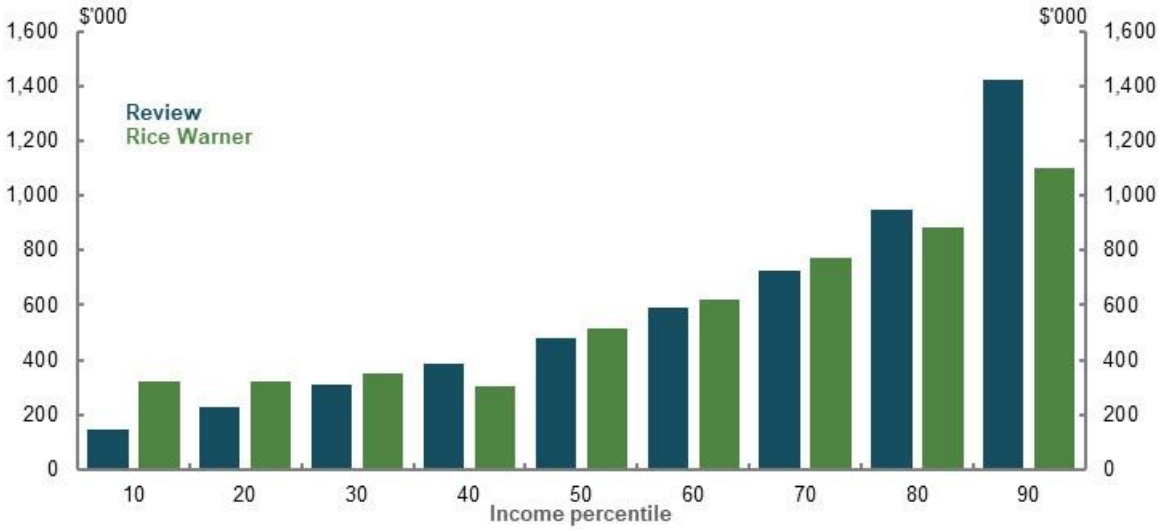


Note: Values are in 2019-20 dollars, deflated by average weekly earnings. Balances at 2058-59 for review and 2057-58 to 2059-60 for MARIA. Source: Treasury estimates for the review using MARIA, cameo modelling undertaken for the review.

Rice Warner's long-term model SPROUT, like MARIA, is a population-based projection. Due to differences in modelling populations, analysis compares the total assets at retirement including superannuation and non-superannuation. SPROUT bases its population on the ABS Survey of Income and Housing (see *Superannuation, Pension and other Retirement OUTcomes*, below) while the review cameo modelling focuses on employees eligible for the SG.

Comparisons to Rice Warner results show that the total assets balances at retirement in review modelling are broadly comparable across most percentiles, although lower in the bottom 20 per cent, and higher for the top 10 per cent (Chart 6A-36).

Chart 6A-36 Comparison of total assets at retirement



Note: Values are in 2019-20 dollars, deflated by average weekly earnings. Total assets at retirement for review and Rice Warner are for an individual aged 67 and between 65-69, respectively. Balances are for people retiring in 2058-59.
Source: Analysis of Rice Warner estimates for the review and cameo modelling undertaken for the review.

Accumulation of superannuation balances

Following is a comparison of the results over different ages in the review's retirement income model of people's current superannuation balances. It compares:

- The superannuation balance by income percentile from the model and deflated by wages to 2016-17 dollars. Projections use historical SG rates, but otherwise use review assumptions.
- Superannuation balances by income percentile and age from ATO data for people with wage income above $5,400 (the annual value of the $450-a-month threshold) and positive superannuation balances.

It is not appropriate to compare model results to the superannuation balances of the entire population. This approach does not account for the share of the population that the model is designed to work for, because:

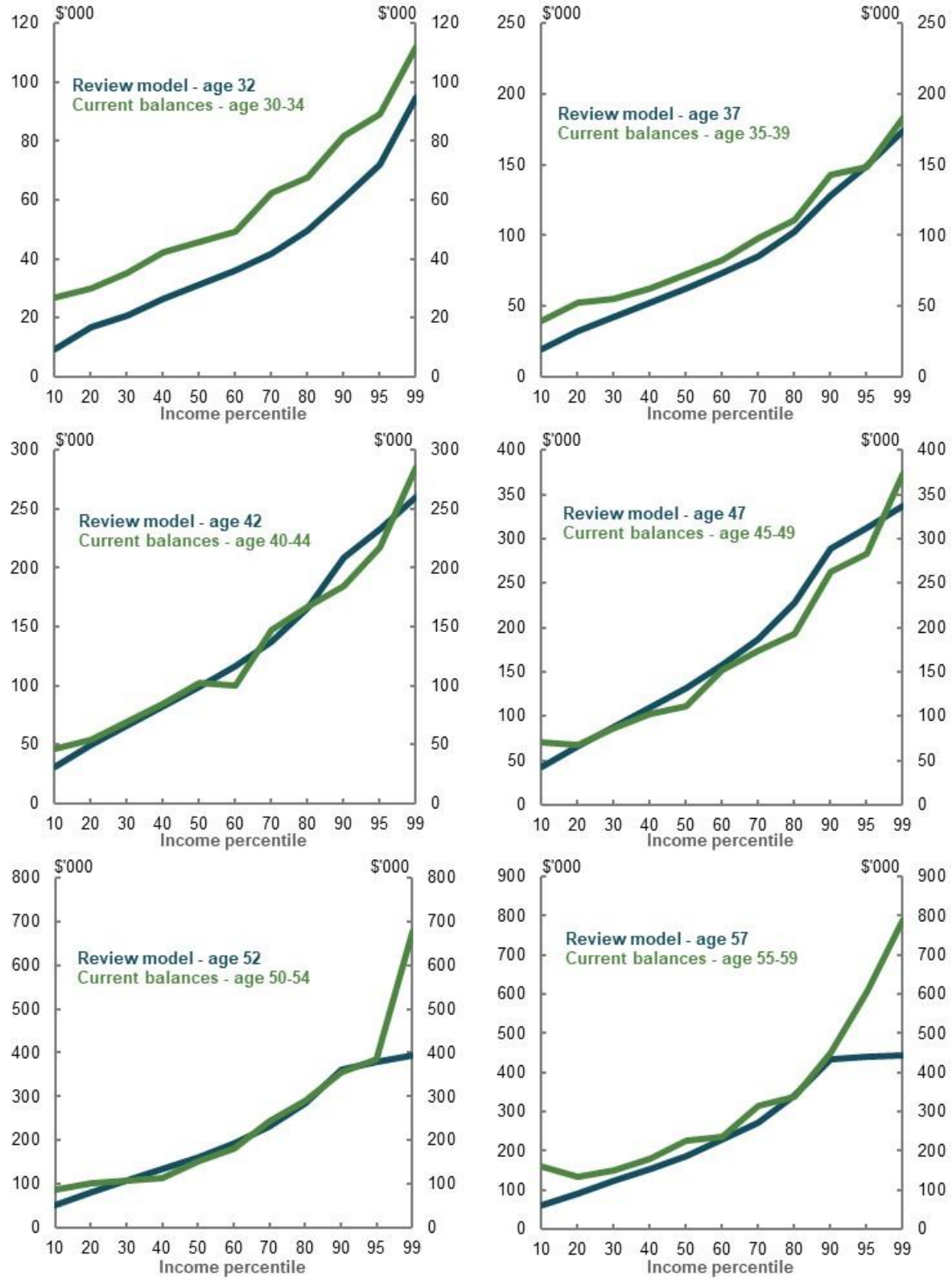
- Historical rates of the SG were lower.
- Comparing balances in later ages, such as age 60, ignores that some people may have withdrawn superannuation after preservation age. People with low balances often make large lump-sum withdrawals, making analysis of lower-income earners particularly fraught.
- Self-employed people have significantly different savings patterns to workers.
- Some people have little or no attachment to the workforce.

Overall, results show that the review's cameo model produces similar results to the superannuation balances of people today (Chart 6A-37).

The late starting age assumption means that the review's cameo model projects lower superannuation balances than those seen in the ATO data for people in their early 30s. However, this gap closes by the late 30s, when many people take career breaks, such as for raising children.

Differences in the model and data are largest for older ages at higher incomes. Recent policy changes may explain a large part of this gap. Older, richer workers were able to benefit from the much higher concessional contributions caps before changes in the 2010s and other historical policy, such as large contributions before 2007 (see *1B. Design of Australia's retirement income system*).

Chart 6A-37 Projected and current superannuation balances, by age and income percentile



Note: Values are in 2016-17 dollars. Modelled values deflated by average weekly earnings. Current balances calculate average superannuation balance based on five-year age ranges by income percentile. Source: Analysis of ATO individual income tax returns and member contributions statements, 2 per cent sample, 2016-17; cameo modelling undertaken for the review based on historical rates of the SG received by each cohort.

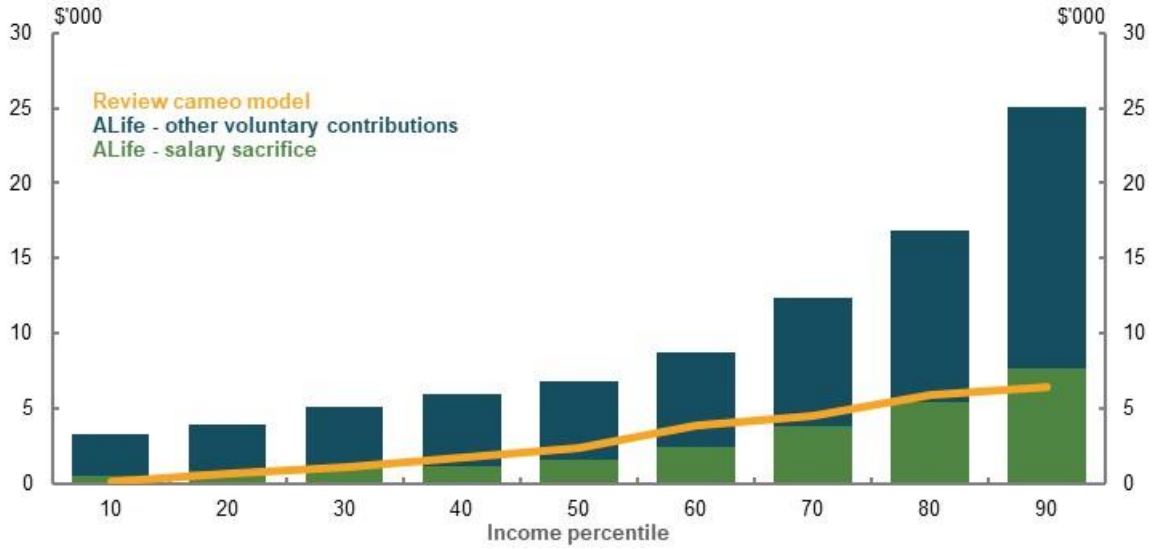
Voluntary contributions

To benchmark assumptions regarding voluntary contributions, the review compared its assumptions with longitudinal data from the ATO's ALife dataset. Average voluntary contributions in ALife over an eight-year period for the cohort aged 55 in 2010 are significantly higher than those in the review's model (Chart 6A-38).

Review modelling only includes salary sacrifice contributions based on the latest year of tax data. ALife analysis that follows individuals over time shows salary sacrifice contributions are broadly similar between the two datasets despite different populations of analysis (ALife analysis includes everyone with incomes while the review cameo model is for employees only).

Voluntary contributions in review modelling are significantly lower than actual contributions people make, on average, because of the exclusion of personal deductible and of non-concessional contributions. These contributions are significant at about 40 per cent of all contributions to superannuation in 2016-17 (see *Non-concessional contributions* above).

Chart 6A-38 Value of annual voluntary contributions by superannuation balance deciles



Note: Values are in 2019-20 dollars, deflated by average weekly earnings. ALife data follows cohort aged 55 in 2010 over an eight-year period. Average includes men and women. Voluntary contributions include salary sacrifice, personal deductible and non-concessional contributions. Deciles for ALife are created based on superannuation balance as at 2010. Percentiles for review model are by income. Review average annual voluntary contributions calculate average amount salary sacrificed over an eight-year period commencing in 2047-48 for people aged 55. Source: Analysis of ATO Longitudinal Information Files (ALife), cameo modelling undertaken for the review.

Model of Australian Retirement Incomes and Assets

The Model of Australian Retirement Incomes and Assets (MARIA) is Treasury's long-term, population-level, dynamic microsimulation model of Australia's retirement income system.

MARIA begins with 2015-16 base data, which captures the Australian population aged 25 and over at that point in time. The base data is sourced from administrative data collected by the ATO, the Department of Social Services and the Department of Veterans' Affairs. It is supplemented with survey data from the HILDA Survey and the ABS Survey of Income and Housing. The model is run from 2015-16 to 2059-60 on a representative sample of this complete dataset. Each year, new records are randomly taken from the base data to represent new 25-year-olds and migrants entering the population.

MARIA uses Treasury analysis to develop input parameters that simulate the characteristics of each individual for every year of the model run, based on their characteristics in the previous year. These characteristics include:

- Household composition
- Labour force participation
- Income
- Compulsory and voluntary superannuation contributions

Some characteristics are not modelled dynamically year-on-year, but rather imputed at the point of retirement. These characteristics include home-ownership status and non-superannuation savings (discussed further below). The imputation is based on factors such as age, education level, work experience and superannuation balance.

Key output

MARIA's key output is defined contribution superannuation amounts held by individuals, both accumulation throughout working life and drawdown in retirement. MARIA can therefore also project the aggregate defined contribution funds under management in the superannuation system. MARIA does not model superannuation funds themselves, or any assets held by funds to support defined benefits or for regulatory capital purposes. MARIA also does not model multiple account holdings.

MARIA projects Age Pension expenditure and coverage based on the simulated superannuation assets, imputed non-superannuation assets and deemed income of individuals and their partners.

Some modifications have been made to MARIA to support the review which include:

- Developing long-run estimates of the value of superannuation tax concessions (benchmark variations)
- Improvements to the imputation of assets outside superannuation at retirement
- Adjusting the superannuation earnings assumption to align with assumptions used in the review's cameo modelling

Long-run estimates of Superannuation tax concessions

Long-run estimates of the value of superannuation tax concessions (benchmark variations) are estimated using MARIA on a revenue forgone basis. These estimates broadly replicate the methodology and benchmark used in the Tax Benchmarks and Variations Statement (The Treasury, 2020). The estimates include:

- Combined estimates of capital gains and earnings tax concessions provided to superannuation funds (reflecting a combined C1 and C4 estimate from the Tax Benchmarks and Variations Statement)
- Contributions tax concession estimates (reflecting a combined C2 and C3 estimate from the Tax Benchmarks and Variations Statement)

Unlike the Tax Benchmarks and Variations Statement, the long-run estimates in MARIA have been constructed on an additive basis to facilitate analysis of trends. The value of superannuation tax concessions is estimated by adding contributions and earnings to taxable income in two stages and applying the progressive income tax rates at each stage. The value of the earnings tax concession is the difference between the total value of concessions and value of contributions tax concessions.

Beyond the medium term, several personal income tax thresholds and offsets that comprise the benchmark are assumed to be indexed to wage growth.

Modelling of savings outside superannuation at retirement

MARIA models the accumulation of superannuation on a dynamic basis over an individual's working life. However, savings held outside superannuation are not projected using a dynamic model, but instead imputed at retirement using survey data. These imputed values are then used to project pension entitlements. MARIA adjusts imputed values to reflect that an increase in saving in superannuation is likely to reduce savings outside superannuation over the coming decades.

The method of imputing these assets was improved as part of the analysis provided to the review. Nominal growth in the value of financial assets outside superannuation was changed to increase in line with wages growth (rather than CPI). The factor used to reduce growth in aggregate financial savings outside superannuation as the superannuation system matures was also lowered. This change reduced the projected proportion of the eligible population receiving a pension and therefore reduced projected pension expenditure.

Adequacy analysis

MARIA is designed to model long-term trends in superannuation accumulation and the fiscal impacts of retirement income policy settings. MARIA is not suitable for analysis of replacement rates. In this review, replacement rate analysis has been undertaken using a hypothetical lifetime cameo model, as detailed above.

Baseline assumptions

Demographic and economic growth rates in MARIA have been calibrated to the assumptions prepared for the 2019-20 MYEFO. Key parameters include population growth (which is projected to gradually decline over the long-term to 2060), nominal GDP growth (also projected to gradually decline over the long-term to 2060), participation rates (which vary by age and gender), wages (assumed to grow at around 4 per cent) and prices (assumed to grow at around 2.5 per cent).

Near-term increases in the SG are assumed to pass through to people via reduced salary sacrifice contributions and wage growth. It is assumed employees who make voluntary contributions (including salary sacrifice and personal deductible contributions) will adjust these contributions in response to changes in the SG rate.

MARIA modelling for this review uses the same investment returns assumptions as the adequacy modelling, which were developed by the Australian Government Actuary. These assumptions are investment returns before fees of 7.5 per cent in the pre-retirement phase and 6.2 per cent in the retirement phase.

Fees, insurance and drawdown assumptions are based on historical data.

Modelling in MARIA is undertaken in nominal dollars. The choice of most useful deflator to present modelling results depends on the context of use.

Table 6A-23 MARIA assumptions

Assumption	Long-term assumption	Basis
Population growth	Compound average annual growth rate of ~ 1 ¼ per cent, trending down	2019-20 MYEFO, historical data
Nominal GDP	Compound average annual growth of ~ 5 ¼ per cent, trending down	2019-20 MYEFO, historical data
Nominal wages	Compound average annual growth of ~ 4 per cent	2019-20 MYEFO, historical data
Inflation	Compound average annual growth of ~ 2 ½ per cent	2019-20 MYEFO, historical data
Investment earnings	7.5 per cent pre-retirement phase 6.2 per cent retirement phase	Advice from the Australian Government Actuary
Investment earnings tax	15 per cent (accumulation only)	Legislation
Effective investment earnings tax	Variable[336]	Calculated within model
Fees	Annual fees are calculated as $74 (indexed to average weekly earnings) plus 0.85 per cent of the account balance	Historical data
Insurance premiums	$214 (indexed to average weekly earnings)	Historical data
Superannuation drawdown rate	Observed drawdown rates	Historical administrative data from pension recipients and SMSFs.
Wage pass-through	SG increases pass-through 100 per cent to individuals via reduced salary sacrifice contributions and wage growth	Evidence base detailed above

Scenario assumptions

Three scenarios were completed to support the review:

- A scenario in which the SG rate stays constant at 9.5 per cent (rather than rising gradually to 12 per cent in the near future).
- A scenario in which superannuation drawdown is based on CPI-indexed annuitised income stream, such that people target the exhaustion of their superannuation assets at age 92.
- A scenario in which the long-run impact of a large short-run shock to the retirement income system is modelled. This scenario is covered in detail in Box 4A-4 of *4. Sustainability.*

Constant Superannuation Guarantee

The SG policy scenario examined the fiscal impact of maintaining the SG rate at 9.5 per cent compared with proceeding with the legislated increase in the SG rate to 12 per cent. MARIA was used to estimate the change in Age Pension expenditure, superannuation taxes and income taxes on wages and salaries. The fiscal modelling assumed there would be full pass-through of the changes in the SG rate to employees through wages growth and reduced salary sacrifice.

Costs associated with an increase in SG can be borne by wages, company profits, employment or prices. For modelling purposes, the average tax rate paid on company profits is more similar to the average tax rate paid by workers, compared to assuming the remaining 20 per cent has no tax

[336] MARIA takes into account the concessional tax treatment of earnings, such as the CGT discount, and that some capital gains are not realised. This means the effective earnings tax is around half of the statutory 15 per cent tax rate. However, it varies slightly because fees are tax-deductible and have a fixed component.

implications. Not assuming full pass-through in the context of the model is unrealistic as it would mean that 20 per cent of the impact is not passed through to any part of the economy and would not be taxed in any form. Modelling of budget effects therefore assumes 100 per cent pass-through (see 2D. Policy scenario: Implications of maintaining the SG rate).

MARIA is not designed to model the impact of the SG policy scenario on the broader economy. In particular, MARIA is not suitable for modelling of the impact of maintaining the SG rate at 9.5 per cent on the economy-wide measures of wage growth used to index the Age Pension payment rate. Age Pension expenditure projections from MARIA do not incorporate the impact of higher wage growth on the indexation of Age Pension amounts.

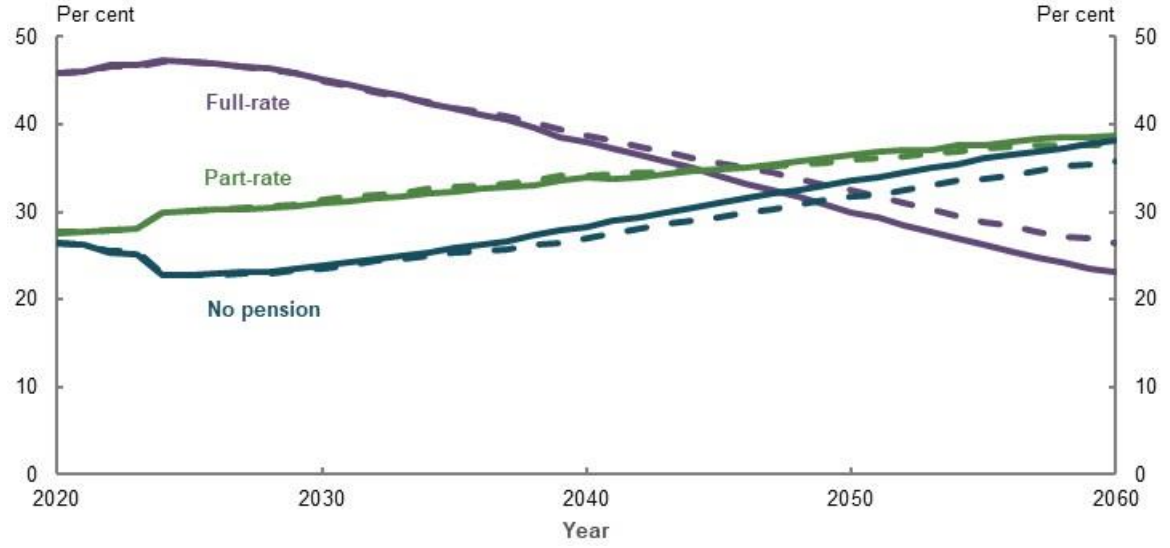
Differences between MARIA and the review's modelling framework for savings outside superannuation meant Age Pension expenditure projections do not capture the impact of higher savings outside of superannuation on means testing. Effects are expected to be small because the extra savings are likely to be predominantly made by high-income earners.

Annuitised drawdown

Under the baseline, retired people modelled in MARIA draw down superannuation from account-based pensions at rates based on observed drawdown rates. In this scenario, all retirees are assumed to draw down using CPI-indexed, annuitised income streams to age 92. An annuitised drawdown assumption better matches that employed by the review's cameo model (detailed above).

This scenario leads to retiree assets being depleted quicker, increasing Age Pension entitlements and therefore the share of the retiree population receiving a pension (Chart 6A-39).

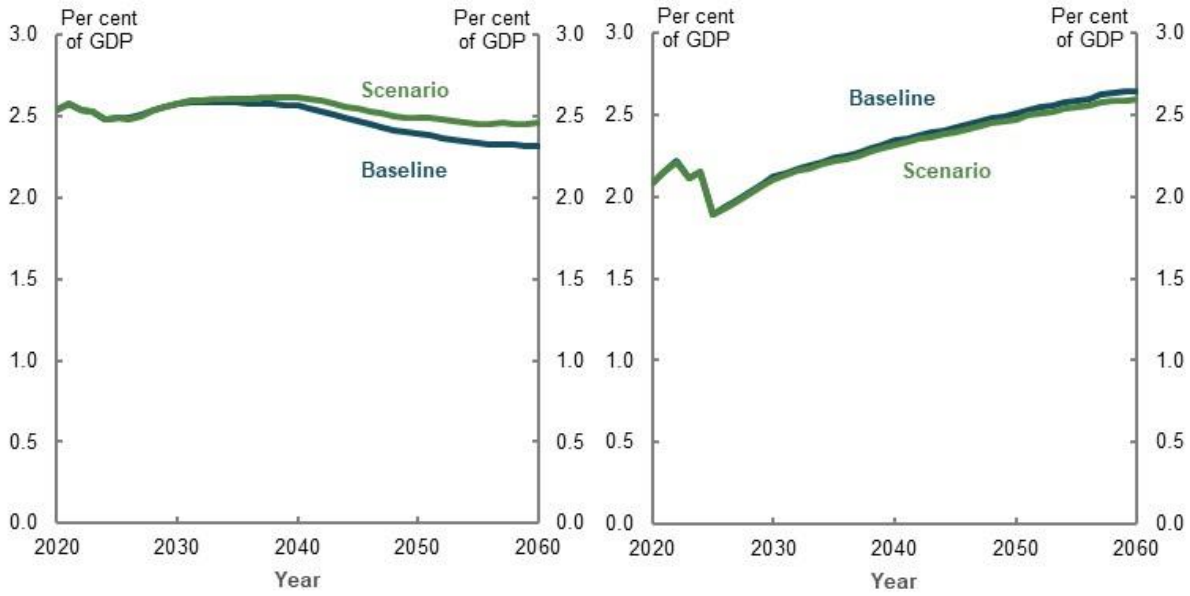
Chart 6A-39 Projected Age Pension population — baseline (solid) and annuitised drawdown scenario (dashed)



Note: Age Pension population includes those eligible for age, carer, disability support and service pensions. Source: Treasury estimates for the review using MARIA.

More age pensioners means slightly higher Age Pension spending as a percentage of GDP (Chart 6A-40). Total tax concessions are projected to be slightly lower, although the magnitude is negligible. A higher rate of drawdown reduces the stock of retiree assets producing tax-exempt earnings, which reduces earnings tax concessions.

Chart 6A-40 Annuitised drawdown scenario — key aggregates



Note: Age Pension expenditure includes service pensions. Source: Treasury estimates for the review using MARIA.

The modelled income streams in this scenario do not reflect all aspects of an annuity. Rather, these income streams should be interpreted as account-based pensions that are drawn down at rates approximating an annuity.

The preferential means testing and different prices of annuities are not modelled in the scenario. This means Age Pension expenditure projections for the drawdown scenario may be lower than for an annuity product.

Further, most people in the model do not live to age 92 (when they target the exhaustion of their superannuation) because they are in a cohort that is expected to have lower life expectancy than this. These people have superannuation assets that would be left in a bequest rather than fully drawn down.

Superannuation, Pension and other Retirement OUTcomes

Superannuation, Pension and other Retirement OUTcomes (SPROUT) is a long-term, group-based, population-level microsimulation model jointly owned by Rice Warner and Industry Super Australia. SPROUT projects output for groupings of the population based on gender, quinquennial age groups (20-24, 25-29 and so on), singles and couples, and point-in-time income and wealth percentiles (10, 20, 30, 40, 50, 60, 70, 80, 90, 99 and 100).[337] Modelling at the group level, SPROUT differs from MARIA, which models at the individual level.

SPROUT starts with base data from the 2017-18 ABS Survey of Income and Housing and comprises four sub-models: the population model, the membership model, the asset model, and the parameter and assumption model.

- The **population model** takes account of population growth (including migration), workforce entry and exit, and death.

[337] Data are cumulative to the top of the percentile, exclusive. For example, percentile 100 includes individuals ≥ the 99th percentile but < the 100th.

- The **membership model** uses the population model to project the number of superannuation accounts by industry sector, age, gender, account function (primary, secondary and unneeded), membership status (active, inactive and retired) and wealth quantiles.
- The **asset model** projects the asset values of each account produced by the membership model.
- The **parameter and assumption model** drives all the above models with underlying economic and demographic assumptions.

Key output

SPROUT produces output on the following variables for each financial year:

- Total superannuation assets under management, including by accumulation and pension phase
- Annual contributions, fees and gross earnings
- Total Age Pension expenditure
- Annual withdrawals (lump sums or as income payments), and total and average death benefits
- Average superannuation balances and average assets outside superannuation
- Tax concessions on contributions and earnings
- Total retiree population, and the total population of Age Pension age (including full/part-rate proportions, and home owner/renter proportions)
- Number of people who retire and the estimated average superannuation balance at retirement
- Average drawdown in retirement (per cent and dollars), and average total retirement income

Baseline assumptions

Demographic and membership assumptions

The population aged 15 and over is projected to grow at an average annual rate of 1.2 per cent per year, with the growth rate decreasing over the projection period, consistent with ABS projections (ABS, 2018g). New entrants into the superannuation system and retirements are derived by applying participation rates from labour force projections published by the Productivity Commission (2005).

Labour force turnover is assumed to be 8.5 per cent per year, derived from the ABS (2019r). Sixty per cent of those who change employment are assumed to keep their current fund. Of those who change employment and change funds, 20 per cent are assumed to not consolidate their accounts. This assumption gradually falls to 10 per cent over the projection period.

Retirement benefit-type assumptions (e.g. lump sum, pension within the fund, Commercial Pension Product, Industry Pension Product, self-managed superannuation funds) vary by industry segment and stem from Rice Warner's *Super Insights* database.

Mortality assumptions are derived from the ABS (2018g), which assumes a degree of improvement in mortality over time. Rates of permanent disablement are also assumed.

Superannuation assumptions

Investment earnings and tax assumptions are made at the asset-class level (Table 6A-24). Investment earnings assumptions are developed by considering the assumptions used by Treasury, asset consultants, superannuation funds and various other institutions. Given the current low interest rate environment, it is assumed that after 10 years, fixed interest rates will rise by 2 percentage points

and the cash rate will rise by 1 percentage point. These assumptions aggregate to produce a compound annual average system-level gross return (before fees and taxes) of 6.7 per cent in 2059.

The headline tax rate on pre-retirement phase investment earnings is 15 per cent (retirement earnings are tax-free), but adjustments are made at the asset-class level for capital gains discounts and imputation credits.

Table 6A-24 SPROUT investment earnings and tax assumptions

Asset class	Annual gross investment return (per cent)	Annual earnings tax rate (per cent)
Australian equities (gross of imputation credits)	7.9	-3.6
International equities	7.5	13.4
Unlisted equities	10.1	13.0
Listed property	7.0	14.3
Direct property	7.0	14.1
Infrastructure	7.8	14.0
Australian fixed interest	3.5	15.0
International fixed interest	2.7	15.0
Cash	3.0	15.0

Note: Fixed interest and cash asset class investment return figures do not include upward adjustments applied after 10 years. Gross investment returns before fees and taxes. Source: Rice Warner.

Asset allocations are assumed at the industry-segment level using allocations published by APRA (2020b) and the ATO (2019d). Drawdown rates are based on observed historical data.

Fee assumptions are derived from an analysis of Rice Warner's database. Dollar-based fees increase with inflation and asset-based fees for industry funds are projected to fall to 50 basis points over the first 10 years of the projection, and stay constant thereafter. The asset-based fees for other industry segments (except retirement savings accounts, eligible rollover funds and self-managed superannuation funds) fall such that the gap to industry funds is held constant over time (Table 6A-25). These assumed reductions are due to expected economics of scale (including consolidation of funds), consolidation of accounts and general technological improvements.

Table 6A-25 SPROUT fees assumptions

Segment	Starting fixed fee ($)	Short-term percentage fee (per cent)	Long-term percentage fee (per cent)
Corporate	71	0.76	0.47
Employer master trusts	64	0.86	0.58
Industry	88	0.79	0.50
Public sector	32	0.68	0.39
Personal master trust	63	1.33	1.04
Post-retirement products	38	1.23	0.94
Retirement savings accounts	0	0.88	0.59
Eligible rollover funds	0	1.95	3.69
Self-managed superannuation funds	1,800	0.62	0.33

Source: Rice Warner.

The model accounts for the legislated increase in the SG to 12 per cent by 1 July 2025. However, it is assumed that the cumulative increase of 2.5 percentage points will result in an increase of only 2.2 per cent in total employer contributions. This is due to the potential for the SG increase to be absorbed by reduced salary sacrifice contributions. Increases in the SG are *not* assumed to compress wage growth. Contributions are taxed at 15 per cent, with allowances made for Division 293 tax and the low income superannuation tax offset.

Economic assumptions

Nominal GDP growth assumptions vary year-to-year, with the rate of growth slowing over time (consistent with slowing population growth). Inflation and wage growth assumptions are constant over time (Table 6A-26).

Table 6A-26 SPROUT economic assumptions

Assumption	Parameter
Nominal GDP	Compound annual average growth of ~ 5.2 per cent per year, trending down.
Inflation	2.5 per cent, per year
Wage growth	3.5 per cent, per year

Source: Rice Warner.

Scenario assumptions

SPROUT was used to run a range of scenarios where assumptions differed to those used in the baseline.

- The **lower earnings** scenario saw earnings rates on all asset classes reduced by 1 percentage point from the baseline presented in Table 6A-24.
- The **lower wages** scenario saw the wage growth assumption reduced by 1 percentage point to 2.5 per cent per year.
- The **constant SG** scenario saw the SG held constant at 9.5 per cent, instead of increasing to 12 per cent by 1 July 2025.
- The **changes to the Age Pension assets test taper rate scenario** saw the assets test taper rate lowered from $3 per fortnight for every $1,000 in assets, to $2.25 per fortnight for every $1,000 in assets.

The **lower fees** scenario was more involved (Table 6A-27). As is the case in the baseline, fixed fees are indexed to inflation, and percentage fees for industry funds are projected to fall to 0.5 per cent over the first 10 years of the projection, and stay constant thereafter. However, unlike the baseline in which a constant gap is maintained between the percentage fees of industry funds and other segments, the fees scenario sees:

- The industry, employer Master Trust and corporate segments match the percentage fee of the public sector funds over the short term
- The public sector, employer and personal Master Trust, corporate and post-retirement product segments match the industry segments fall to 0.5 per cent (Table 6A-27)

Overall, this scenario sees aggregate fees in the superannuation system fall to around 0.52 per cent of assets by 2059 from 0.86 per cent in 2019, instead of 0.64 per cent from 0.96 per cent as in the baseline.

Table 6A-27 SPROUT lower-fees scenario assumptions

Segment	Starting fixed fee ($)	Modified starting fixed fee ($)	Short-term percentage fee (per cent)	Modified short-term percentage fee (per cent)	Long-term percentage fee (per cent)	Modified long-term percentage fee (per cent)
Corporate	71	32	0.76	0.68	0.47	0.50
Employer master trusts	64	32	0.86	0.68	0.58	0.50
Industry	88	32	0.79	0.68	0.50	0.50
Public sector	32	32	0.68	0.68	0.39	0.50
Personal master trust	63	38	1.33	1.23	1.04	0.50
Post-retirement products	38	38	1.23	1.23	0.94	0.50
Retirement savings accounts	0	0	0.88	0.88	0.59	0.59
Eligible rollover funds	0	0	1.95	1.95	3.69	3.69
Self-managed superannuation funds	1800	1800	0.62	0.62	0.33	0.33

Source: Rice Warner.

Modified baseline scenario

A simulation of SPROUT was also run that incorporated some of the parameter inputs from MARIA. The adjustments included:

- A change in the wage growth assumption to 4 per cent from 3.5 per cent
- The same population assumptions as used in MARIA

The modified baseline sees SPROUT's superannuation assets as a percentage of GDP[338] higher than SPROUT's baseline, but still much lower than MARIA (Table 6A-28).

The higher wages growth assumption in the modified baseline leads to much higher contributions, almost matching MARIA's contributions. However, while the modified baseline lifts total earnings (as the asset base is lifted), the more conservative net earnings assumptions in SPROUT still constrain growth in superannuation assets relative to MARIA.

MARIA has higher superannuation system growth, but also higher pension expenditure as a percentage of GDP compared to SPROUT. Fundamental differences in the way non-superannuation assets are modelled partly explain these differences in results. SPROUT projects non-superannuation assets to grow much more quickly than MARIA, which acts to reduce Age Pension expenditure as a percentage of GDP more than the equivalent modelling in MARIA, in both the baseline and the modified baseline.

Other contributing factors may include the fact that MARIA includes service pensioners, and differences in participation rates.

[338] This comparison is aided by the similarity in the models' GDP assumptions. By 2059, there is only a 0.4% difference in nominal GDP assumptions.

Table 6A-28 SPROUT — modified baseline

Output in 2059	MARIA	SPROUT	SPROUT — modified baseline
Superannuation assets (per cent of GDP)	245.7	169.0	187.6
Contributions (per cent of GDP)	7.6	6.2	7.5
Net earnings (per cent of GDP)	13.5	10.0	11.2
Age Pension expenditure (per cent of GDP)	2.3	1.9	2.0

Note: MARIA Age Pension expenditure estimates includes service pensions. Source: Treasury estimates for the review using MARIA, analysis of Rice Warner estimates for the review.

Modelling financial stress

2B. Policy scenario: Implications of increasing Commonwealth Rent Assistance models the impact of certain changes to the design of Commonwealth Rent Assistance on the financial stress of retired renters. Since financial stress is self-reported, and measured using answers to questions about financial hardship and 'missing out' experiences, the effect of changes to Commonwealth Rent Assistance on financial stress must be estimated from historical data.

The review used a statistical model to estimate the relationship between financial stress and income to predict how financial stress rates might change if Commonwealth Rent Assistance was increased. To account for other drivers of financial stress, the model includes key financial and demographic variables that also influence financial stress rates. The model is unable to control for unobserved differences across households that may affect financial stress. The limitations of this are discussed below.

Effect of higher Commonwealth Rent Assistance

Following is an outline of how the effect of a 40 per cent increase in the maximum rate of Commonwealth Rent Assistance on financial stress for households was estimated.

Data

Data is from the 2015-16 release of the ABS Household Expenditure Survey. Retired households are defined as those with the reference person 65 years or older without any earners. Financial stress is defined in the same way as the ABS: those who report four or more financial stress or 'missing out' experiences. All households with positive income are included in the regression.

Methodology

A cross-section multinomial probit model is estimated using observations for each household i:

$$Financial\ stress_i = \Phi(\alpha + \vartheta Retired\ renter\ income_i + X\beta_i + \varepsilon)$$

where:

- $Financial\ stress_i$ is a binary variable if a household reported financial stress, as defined as four or more financial stress or 'missing out' experiences.
- $Retired\ renter\ income_i$ is the weekly disposable income in dollars if the household rents and is classified as retired.
- $X\beta_i$ is a vector of control variables, which includes the weekly disposable income of other households in dollars, binary variables for household and tenure type (if the household is a single renter or a couple renter), binary variables if the household has a mortgage, dependants or anyone with a disability. Also included is household wealth in dollars, interacted with a vector of binary variables for the household wealth quintile of each household.

The coefficient of interest is ϑ, the conditional correlation of financial stress to changes in the income of retired renters. The regression is weighted using population weights.

Results

The coefficients all have the expected effect. Higher incomes and wealth lead to lower financial stress, while having dependants, a mortgage, or a household member with a disability are correlated with higher rates of financial stress Table 6A-29.

Table 6A-29 Renter retiree income and financial stress

Variable	Coefficient	Standard error	p. value
Intercept	-0.376	0.108	0.000***
Retired renter income	-0.00116	0.000240	0.000***
Other household income	-0.000353	0.0000511	0.000***
Single renter	-0.0859	0.0967	0.375
Couple renter	0.270	0.0925	0.004***
Dependants	0.127	0.0635	0.046**
Mortgage	0.345	0.0745	0.000***
Disability	0.575	0.0507	0.000***
Wealth quintile 1	-0.00000202	0.00000208	0.332
Wealth quintile 2	-0.00000258	0.000000414	0.000***
Wealth quintile 3	-0.00000169	0.000000211	0.000***
Wealth quintile 4	-0.00000130	0.000000140	0.000***
Wealth quintile 5	-0.000000851	0.000000103	0.000***
N	10,019		
Nagelkerke Pseudo R^2	0.280		

Note: Regression population weighted; ***, **, * denote statistical significance at the 1, 5 and 10 per cent levels, respectively. Source: Review estimate based on ABS Household Expenditure Survey 2016-17.

To assess the average effect of a 40 per cent increase in the maximum rate of Commonwealth Rent Assistance, the marginal effect of retired renter income on financial stress was multiplied by the additional income provided. For the scenario tested, the marginal effect was calculated using 2015-16 data by the additional income in 2020 of $27.92 per week (rounded to $28 for reporting in the rest of the review).

As probit models are not linear, marginal effects must be estimated at specific values of the other explanatory variables. Marginal effects of changes to retired renter income as a result of the Commonwealth Rent Assistance increase were estimated separately for single renters and couple renters using the median values of the other explanatory variables (Table 6A-30).

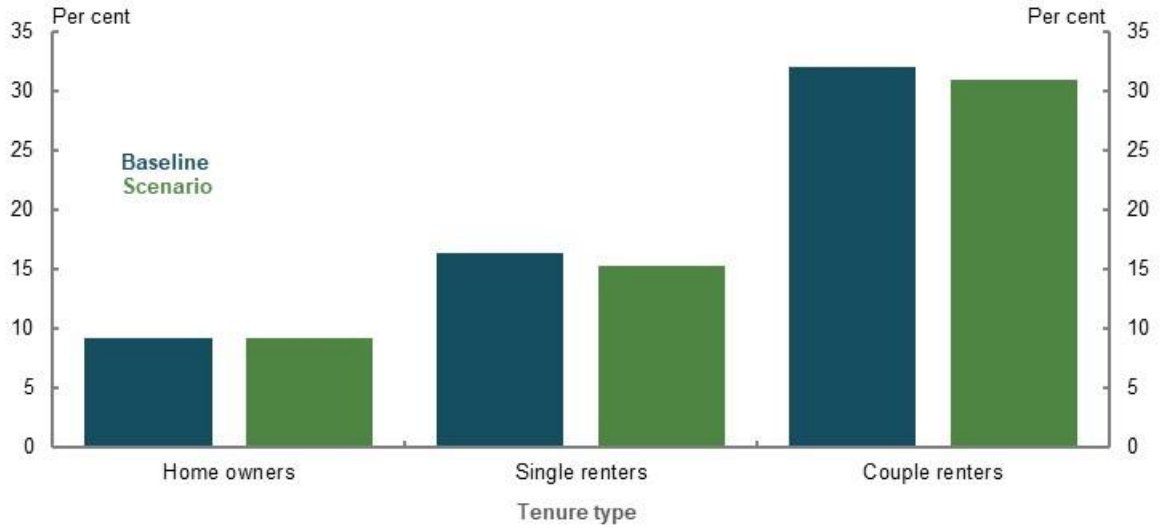
Table 6A-30 Effects of changes to Commonwealth Rent Assistance on financial stress

Retiree type	Marginal effect	Effect of a $28 increase
Single renter	-0.0003975	-0.0110982
Couple renter	-0.000421	-0.0117543

Note: Effect estimated using marginal effect multiplied by 2020 change in maximum rate of Commonwealth Rent Assistance of $27.92. Source: Review estimate based on ABS Household Expenditure Survey 2016-17.

These results suggest that the effect of $28 more weekly income from higher Commonwealth Rent Assistance payments would reduce the conditional likelihood of financial stress for both groups of renters by about 1.1 percentage points (Chart 6A-41). Effects for renters in aggregate were calculated using the weighted average of these two effects.

Chart 6A-41 Financial stress rates of home owners and renters in retirement



Note: This analysis uses a multinomial probit model to explain household financial stress. Marginal effects were estimated using the income of renters in 2015-16 by family type, and then applied to data in 2019-20 to calculate the effect of the Commonwealth Rent Assistance rate increase. Control variables include wealth, disability status, household and tenure type. Home owners are unaffected. Source: Analysis of ABS Household Expenditure Survey Confidentialised Unit Record File, 2015-16.

These estimates are unable to account for unobserved differences across households that may affect financial stress. To the extent that these, or any other omitted variables, are correlated with income, this will bias the results. Further modelling with longitudinal data sources, such as the HILDA Survey, may allow for these factors to be controlled for.

Section 6B. An example to illustrate the trade-offs of merging the income and assets tests

This appendix details an example of a merged means test, which involves removing the current assets test and replacing it with an aged-based capital consumption component in the income test. This is similar to a proposal suggested by the Centre for Law, Markets and Regulation (2020).The example includes the following parameters to illustrate some of the trade-offs involved in merging the income and assets tests (see Box 6B-1 for more detail):

- Calculates deemed capital consumption as a person's assessable assets divided by their life expectancy.
- Doubles the current income test free area to create the 'means free area' and exempts some personal use assets.
- Retains all other rules within the current means testing arrangements.

Adequacy and sustainability trade-offs emerge when setting parameters for the merged means test. This scenario is estimated to lead to a fiscal saving. However, it would also reduce the adequacy of retirement incomes for many people, especially those with assessable assets at middle- and higher-wealth deciles. A different design would have different impacts, including on the number of people qualifying for and the cost of the Age Pension, as well as incentives to work and save.

Box 6B-1 Example of a merged means test with an age-based capital consumption component

This example removes the current assets test and replaces it with an aged-based capital consumption component in the income test. It assumes the following parameters:

Deemed income and capital consumption

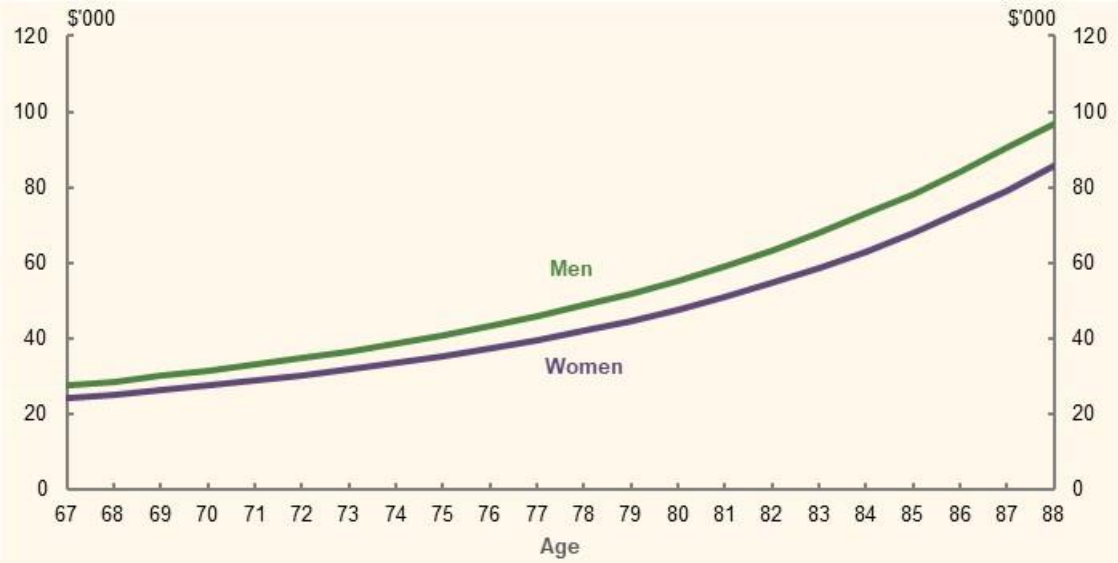
A component of deemed capital consumption was added to income from all assessable assets to determine a retiree's means for a given period. This example retains the existing rules for assessing income (including deeming rates) under the current income test.

Deemed capital consumption can remain constant for all ages or vary by age. This example used an age-based approach to ensure a retiree's assets are assessed on the basis of the period over which they are expected to be used for self-support. This is expected to change the profile of some retirees' Age Pension payments in retirement, as well as the complexity of the means testing arrangements.

Specifically, deemed capital consumption is equal to a retiree's assessable assets divided by their life expectancy. A minimum life expectancy of five years is imposed to ensure retirees do not face overly punitive Age Pension withdrawal rates at older ages. The example has abstracted away from other factors, such as health issues, which can reduce life expectancy and lead to high withdrawal rates in the early years of retirement.

In practice, this approach means a 67-year-old woman with $500,000 of assessable assets and a life expectancy of 21 years would have a deemed capital consumption of around $24,000 or just under 5 per cent of her assessable assets (Chart 6B-1). In contrast, an 87-year-old woman with the same level of assessable assets would have a deemed capital consumption of around $80,000 or 17 per cent of her assessable assets. As men have lower life expectancies than women, they would have a higher deemed capital consumption at all ages.

Chart 6B-1 Deemed capital consumption for $500,000 of assessable assets, by age and gender



Note: Assumes the person is single. Source: Calculations using assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

Merged means test free area

Abolishing the assets test means that retirees no longer have access to the 'assets test free area'. This example increases the income test free area to ensure retirees with a relatively modest amount of assessable assets are not disadvantaged compared with the current arrangements.

The merged means test free area modelled is $9,048 per year for singles and $16,016 per year for couples, combined. This is equal to double the current income test free areas.

With the designed allowance for deemed capital consumption, the merged means test free areas imply assets free areas of around $140,000 for single retirees at age 67 and around $250,000 for coupled retirees at age 67, who are currently assets tested and have little income.

Scope of assessable assets

The scope of assessable assets will affect the number of people subject to the merged means test, as well as the extent to which retirees with similar levels of retirement savings receive similar outcomes.

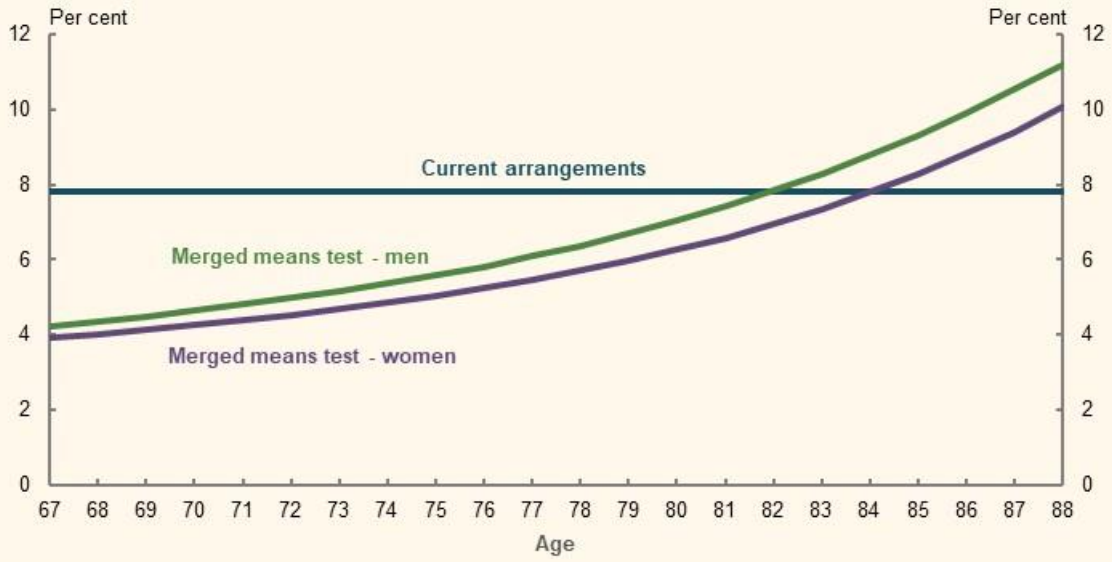
This example continues to exempt the family home from the means test (see *3C. Home ownership status*). Each single person would also have up to $30,000 of personal use assets (e.g. cars, household furniture and other personal items) exempt from the means test. The corresponding threshold for couples combined is $50,000. This recognises that people should not be expected to draw down on personal use assets, such as household goods, to meet their retirement income needs. While such personal use assets could be reflected in an increased free area, this approach would provide a more targeted exemption.

Merged means test taper rate

The taper rate determines the effective marginal tax rate of income earned and assets held over the merged means test free area. For consistency with the current income test taper rate, this example would reduce a recipient's Age Pension payment by $0.50 per fortnight for every $1 of total means over the merged means test free area. As a result, the merged means test jointly determines a retiree's effective marginal means test taper rate on assets above the free area by the rate of deemed capital consumption, deemed investment and other earnings, and $0.50 test taper rate. As deemed capital consumption is based on life expectancy, the effective marginal taper rate on assets over the free area would increase with age. Despite this, the effective marginal taper rate on assets over the free area would be lower than the current arrangements prior to age 84 for women and age 82 for men (Chart 6B-2).

For example, a woman aged 67 would have a deemed capital consumption of around 5 per cent and a deemed investment earnings of 3 per cent per year under the merged means test. With the $0.50 means test taper rate, her Age Pension payment would be reduced by 3.9 cents for every $1 of assets over the free area. In contrast, the same woman aged 87 would have a 16 per cent rate of deemed capital consumption and, their Age Pension payment would be reduced by 9.4 cents for every $1 of assets over the free area. However, in this example, the life expectancy weighted effective marginal taper rate on assets as at age 67 would be lower than the current assets test taper rate of 7.8 per cent.

Chart 6B-2 Effective marginal taper rate for assets over the merged means test free area, by age and gender



Note: Assumes a deeming rate of 3 per cent. Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020 and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

Who the example applies to

The merged means test was modelled to apply to all pensions received by people over Age Pension eligibility age. This is consistent with how the current dual means test is applied. As such, the merged means test has flow-on effects to other pension payments.

Key differences from the current dual means test

Given the design of deemed capital consumption and merged means test taper rate, **this example represents a combination of reducing the implied assets test free areas and making the effective marginal assets test taper rate age-dependent and lower for a significant number of retirees**, as compared with the current dual means test. As a result, retirees would receive different Age Pension payments, depending on the amount of assessable assets they hold and their life expectancies.

Impact of the merged means test example

Age Pension payment for retirees of different means and age

The merged means test would consistently determine a retiree's Age Pension payment on the totality of their means. This would ensure a retiree with a higher combined means receives less Age Pension than another person with a lower combined means (Table 6B-1).

Table 6B-1 Cameo: Annual Age Pension payment for two people with different means

	Person 1	Person 2
Age	67	67
Life expectancy (years)	20.7	20.7
Under current arrangements		
Employment income ($)	0	20,000
Assessable assets ($)	500,000	500,000
Age Pension payment ($)	6,085	6,085
Under a merged means test with age-based capital consumption		
Assessable assets after deduction of personal use assets ($)	470,000	470,000
Deemed income ($)	9,539	9,539
Deemed capital consumption ($)	22,705	22,705
Employment income ($)	Nil	20,000
Less Work Bonus ($)	N/A	7,800
Total means ($)	32,244	44,444
Less free area ($)	9,048	9,048
Assessable means ($)	23,196	35,396
Age Pension payment ($)	12,954	6,854

Note: Values are in 2019-20 dollars. Assumes the people are single home owners who each have $30,000 of personal use assets, have no other income other than employment income, and deemed income from financial assets. Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020 and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

The merged means test looks beyond the current status of the retirees' assessable assets to consider their capacity for self-support based on their life expectancies. For two retirees with the same level of assessable assets, it would ensure the older one, with a lower life expectancy and greater capacity for self-support, receives less Age Pension than the younger one with a higher life expectancy and smaller capacity for self-support (Table 6B-2).

Table 6B-2 Annual Age Pension payments for two people, one aged 67 and the other aged 87

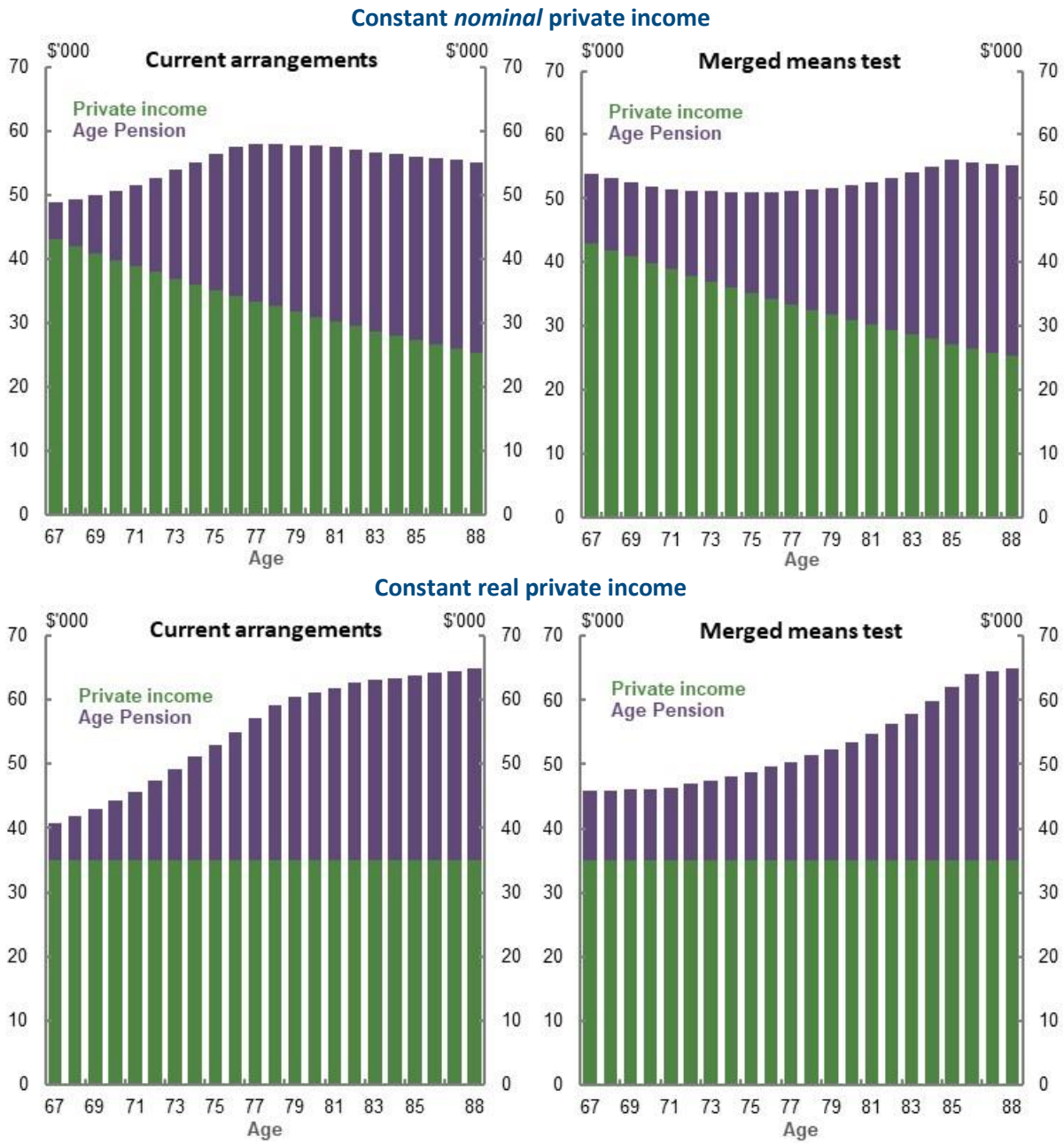
	Person 1	Person 2
Age	67	87
Life expectancy	20.7 years	6.3 years
Under current arrangements		
Assessable assets ($)	500,000	500,000
Age Pension payment ($)	6,085	6,085
Under a merged means test with age-based capital consumption		
Assessable assets after deduction of personal use assets ($)	470,000	470,000
Deemed income ($)	9,539	9,539
Deemed capital consumption ($)	22,705	74,603
Total means ($)	32,244	84,142
Less free area ($)	9,048	9,048
Assessable means ($)	23,196	75,094
Age Pension payment ($)	12,954	Nil

Note: Values are in 2019-20 dollars. Assumes the people are single home owners who each have $30,000 of personal use assets, have no other income other than employment income, and deemed income from financial assets. Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020 and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

Consistency of Age Pension income

The merged means test would assist some retirees to achieve a more consistent profile of total income earlier in retirement. This is because deemed capital consumption increases as the retiree ages and their life expectancy decreases (Chart 6B-1). In particular, a retiree who draws down at rates using an account-based pension to have constant nominal private income would experience a more consistent/flatter profile of total income in retirement (Chart 6B-3). Whereas, a retiree who draws down at rates using an account-based pension to have constant real private income would still have an increasing profile of total income in retirement. This suggests a retiree's drawdown strategy would be an important factor influencing the effect of a merged means test.

Chart 6B-3 Age Pension and private income in retirement for $500,000 of assessable assets, by age



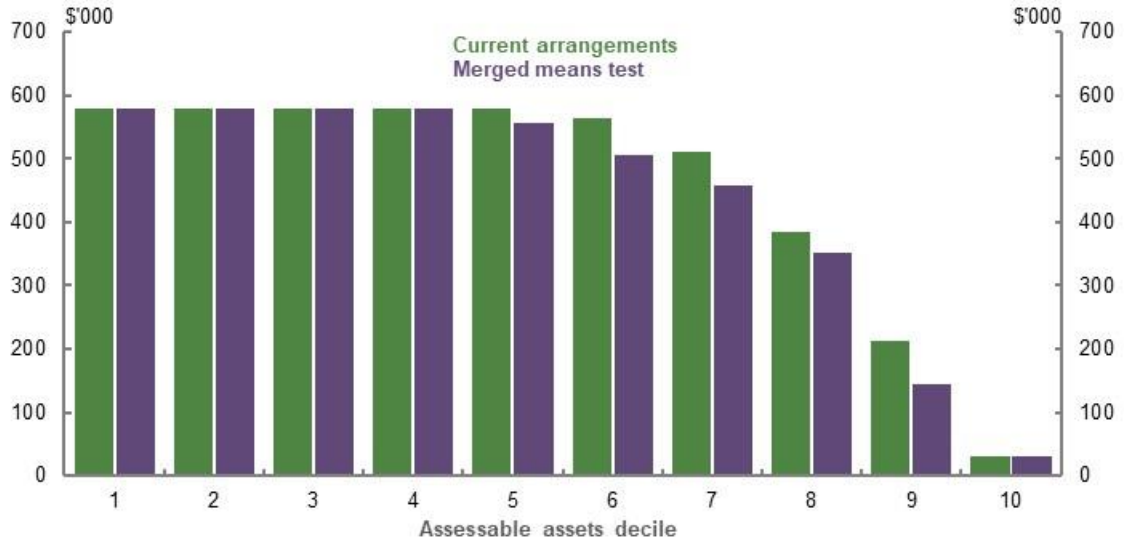
Note: Values are in 2019-20 dollars, deflated by CPI. Assumes the person is a single home owner who begins retirement on 1 July 2019. Constant nominal private income means the person consumes $43,000 of their assessable assets each year. Constant real private income means the person consumes $35,000 of their assessable assets at age 67, with the amount consumed increasing by 2.5 per cent (i.e. inflation) each year. The person has around $10,000 of assessable assets remaining at age 88 under both drawdown strategies. Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020 and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

People with different levels of assessable assets

Under the modelled approach, retirees with assessable assets at the middle and higher deciles would receive less Age Pension income over their retirement (Chart 6B-4). Under this example, the age-based deemed capital consumption and the reduced assets test free area have the greatest impact on people with more assessable assets.

Design parameters determine the number of and extent to which people's Age Pension payments are affected by introducing a merged means test. Alternative design parameters, which use a higher free area or lower income test taper rate than the example outlined, could reduce the number of people who receive fewer total Age Pension payments due to a merged means test.

Chart 6B-4 Total Age Pension payments over 22 years with constant real private income, by assessable assets decile at retirement

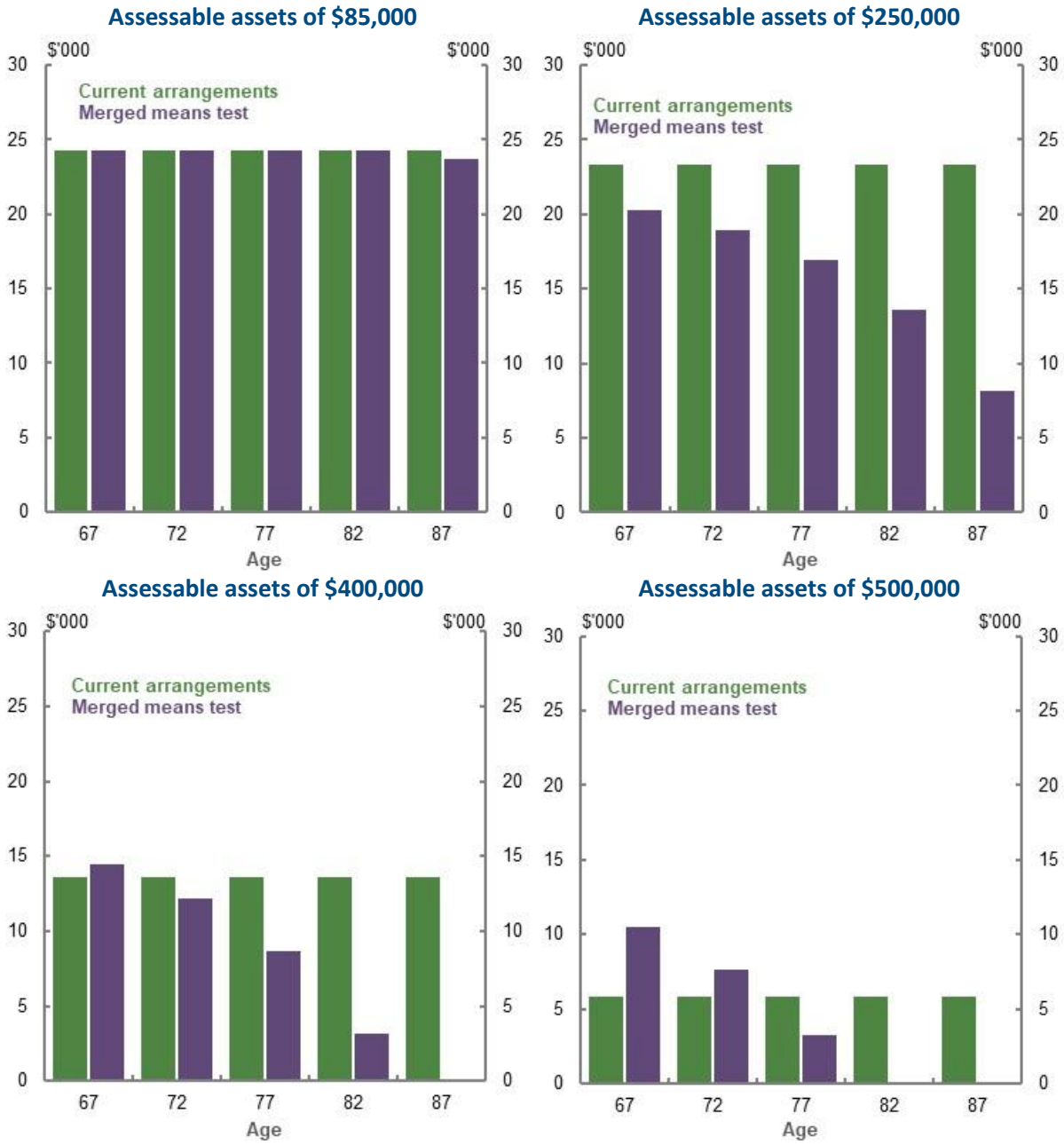


Note: Same as Chart 6B-3. Assumes assessable assets is equal to net wealth excluding the family home and $30,000 of personal use assets. Deciles calculated using assessable assets of people aged 60 to 67 in 2017-18 (ABS, 2019s). Assessable assets of each decile is equal to the average net wealth of the persons with the lowest and highest net wealth in the decile. Period of retirement is 22 years, which is roughly equal to the life expectancy of a woman aged 67 (Australian Government Actuary, 2019). Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020, (ABS, 2019s) and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

If a merged means test was introduced, existing retirees would face the merged means test for only part of their retirement. The effect of the merged means test on these people would depend on their level of assessable assets and age (Chart 6B-5). Those adversely affected under this model would largely be older retirees. This is because deemed capital consumption increases with age, resulting in an older person having a greater assessable means than a younger, but otherwise equivalent, person.

Other people adversely affected under this model would be younger retirees currently captured by the means test (who effectively have some of their income or assets disregarded under the current dual means test). In contrast, younger retirees who currently just missed out on the Age Pension under the assets test may benefit from the lower effective marginal taper rate on assets. They may become eligible to receive a part-rate Age Pension in the earlier years of retirement.

Chart 6B-5 Annual Age Pension payment in 2019-20, by assessable assets and age group



Note: Same as Chart 6B-3. For each chart, assessable assets are the same for each age group. $85,000 and $250,000 are in the 3rd and the 5th deciles, while $400,000 and $500,000 are close to the lower and upper ends of the 7th decile, in the distribution of assessable assets for people aged 60 to 67 in 2017-18 (ABS, 2019s). Retirees with assessable assets above the 7th decile currently receive little to no Age Pension payment, and are therefore not considered in the analysis. Source: Calculations based on Age Pension rates and thresholds as at 1 May 2020 and assumptions for the example of a merged means test. The life expectancy used to calculate the deemed capital consumption is sourced from the Australian Life Tables 2015-17 (Australian Government Actuary, 2019).

Sustainability of the retirement income system

This merged means test example would reduce the fiscal cost of the Age Pension by around $8.2 billion between 2019-20 and 2022-23; around $2 billion per year (Table 6B-3). This fiscal saving is largely due to reduced Age Pension expenditure to older people or people with substantial assessable assets. In future, as the average level of assessable assets at retirement increases due to

the maturing superannuation system, the annual fiscal saving would increase. The fiscal saving would also reflect the flow-on effect to other payments that retirees receive from the Government.

Table 6B-3 Change in fiscal cost due to merging the Age Pension income and assets tests

	2019-20	2020-21	2021-22	2022-23
Fiscal cost due to current population ($ billion)	-3.9	-4.1	-4.4	-4.7
Fiscal cost due to new grants ($ billion)	2.1	2.2	2.3	2.4
Total cost ($ billion)	**-1.9**	**-2.0**	**-2.1**	**-2.2**

Note: This is a counter-factual analysis as if the Age Pension income and assets tests were merged from 1 July 2019. Forward estimates are in nominal terms. Source: Department of Social Services (DSS) modelling for the review.

Incentives and simplicity

The merged means test would alter the taper rate on assets. The effective marginal taper rate on assets over the free area would be lower than the current effective marginal assets taper rate of 7.8 per cent for men before age 82 and for women before age 84 (Chart 6B-2). This would reduce the effective marginal tax rate and increase the incentive to save for retirement.

The merged means test's taper rate may encourage greater asset drawdowns in the later years of retirement by:

- Nudging people to recognise the decreasing amount of time they have to consume their remaining savings
- Affecting Age Pension payments such that people respond to this incentive

A merged means test could simplify some aspects of the current dual means test. But, as the deemed capital consumption varies with age, many retirees would likely continue to find the means test complex. Another issue contributing to the complexity of the system is that there would also continue to be significant differences between this merged means test example and the means test for aged care.

Moving to a new merged means test would significantly alter arrangements for some current retirees. The impacts could be very substantial for some retirees (Chart 6B-5). It may be unfair to reduce Age Pension payments for people who did not have the opportunity to plan for such a change. As such, transitional arrangements would likely be required. Transitional arrangements would add complexity and likely come at a fiscal cost.

Section 6C. Outcomes of research

The review commissioned five research projects on the retirement income system. These projects covered four research questions, and were conducted by three research institutes:

> Question 1: What is the relationship between wages growth and changes to the Superannuation Guarantee? — conducted by the ANU Tax and Transfer Policy Institute.
>
> Question 2: What is the relationship between voluntary savings and changes to the Superannuation Guarantee? — conducted by Monash Centre for Financial Studies.
>
> Question 3: How effective are superannuation tax concessions in encouraging additional savings? — conducted by Monash Centre for Financial Studies and the ANU Tax and Transfer Policy Institute.
>
> Question 4: What is the impact of the Age Pension assets test on savings behaviour pre-retirement? — conducted by Bankwest Curtin Economic Centre.

The research papers are available on the review's website. Following is a brief summary of the research outcomes prepared by the authors of the papers.

Box 6C-1 What is the relationship between wages growth and changes to the Superannuation Guarantee?

Robert Breunig and Kristen Sobeck, Crawford School of Public Policy, Australian National University.

The SG was introduced to boost people's private retirement savings. Since its introduction, the SG rate has increased over time and currently sits at 9.5 per cent of wages. The SG is legislated to rise to 10 per cent in 2021 and then increase, in steps, to 12 per cent by mid-2025. Pausing these increases is under active debate. In particular, current debates centre around the economic incidence of an increase in the SG. Do employers bear the cost of legislated increases to the SG rate by increasing their labour costs? Alternatively, is the disposable income (take-home pay) of employees reduced to account for the increased cost to employers of the increase in the SG? This research aims to contribute to a better understanding of these questions.

While employers are legally bound to pay the SG rate, some employers, like the public service and academia, choose to pay a higher rate. This research uses administrative tax data to exploit the differences in wages paid to employees who receive different amounts of superannuation in order to estimate where the burden (the economic incidence) of the SG lies. One approach will be to compare wage growth during periods where the SG does not change. If employers bear the burden of SG, then wage growth should be the same for the two groups: those paid at SG and those paid above the SG.

We also exploit changes in the SG to estimate the incidence of SG. In particular, employees who already receive more than the SG from their employers are unaffected by legislated increases to the SG ('above SG group'). As a result, their wage growth should not change when the SG changes. By contrast, workers employed by firms that only pay the SG are affected by increases ('at SG group'). If workers bear the burden of the increase, then wage growth should slow down for the 'at SG group' when the SG increases, relative to the 'above SG group'. We thus estimate the economic incidence of increases in the SG by comparing differences in wage growth between the two groups in: (1) periods where the SG is constant to (2) when the SG is increased.

Formally, estimation of the economic incidence is achieved by applying a difference-in-difference approach. The results show that in periods when the SG was constant, wage growth in the 'above SG group' is consistently lower than wage growth in 'at SG group'. In periods when the SG is increased, wage growth for the 'at SG group' slows down, consistent with the idea that workers bear (at least part of) the economic incidence of increases to the SG. Further calculations show that **workers bear between 71 per cent to more than 100 per cent of the cost of increases to the SG through lower wage growth, depending on the time period considered.**

Our research findings align with one (Coates, et al., 2020) of the three existing Australian studies which measure the economic incidence of increases in superannuation. The two other studies, by Stanford (2019) and Taylor (2019) do not find that a trade-off exists between higher superannuation and lower wages and in some instances present the case for a positive relationship between higher superannuation and wages. They rely on time series data to establish correlation between wage growth and changes in the SG rate. As we have seen with the current debates about pausing increases to the SG, it tends to be politically easy to raise the SG rate when wage growth is robust, and convenient to pause changes to the SG rate when wage growth is slow. The correlations established in the macroeconomic studies may well be picking up the political economy of when SG increases are politically feasible and when they are not, rather than a causal relationship of SG increases on wage growth.

We argue that our approach, using microdata at the individual level, is better suited to analysing the economic incidence of increases to superannuation because focusing on changes across groups of individuals (or firms), reduces the impact of confounding macroeconomic effects (because all individuals experience the same macroeconomic conditions at the same time). Our results are also consistent with economic theory and the international, empirical economic literature.

In conclusion, policymakers will need to balance their goal of boosting superannuation balances, through an increase in the SG rate, with the costs and benefits of doing so. The current settings of the Age Pension are such that an increased superannuation balance is not directly correlated with an increase in retirement living standards. An increase in the SG rate may, however, reduce future Age Pension expenditure. At the same

time, as our results suggest, workers bear the cost of increases in the SG rate through lower wage growth. Subsequently, the Government will forgo the tax revenue from labour income taxed at people's marginal personal income tax rates, for greater superannuation contributions that are taxed concessionally. Lower wage growth also implies less disposable income available to workers and their families to consume today, or to save through alternative means.

Box 6C-2 What is the relationship between voluntary savings and changes to the SG?

Ummul Ruthbah and Nga Pham, Monash Centre for Financial Studies, Monash University.

The purpose of this study is to examine how the compulsory employer superannuation system interacts with voluntary savings. The study focuses in particular on the extent to which the existence of compulsory superannuation — and increases in the compulsory superannuation rate — might affect voluntary savings.

Our study, like others before it, finds evidence of substitution between compulsory and private household saving in Australia; in other words, increases in compulsory saving are associated with decreases in private household saving. However, the substitution effect is significantly less than one — hence, for every dollar increase in compulsory superannuation, the associated decrease in private saving is less than one dollar. This suggests that the compulsory superannuation system in Australia generates a net overall saving increase. By contrast, international evidence on whether savings in pension accounts create positive net saving is mixed.

In this report, we examine the impacts of the SG on private household saving(s) using three different measures of SG for comparative analysis:

- An SG dummy variable, taking the value of one if any member of the household received a compulsory superannuation contribution from employers.
- The SG policy rate in percentage terms.
- The compulsory employer contribution in dollar terms.

We use two measures of saving(s). The first is a flow concept, where *saving* is defined as the difference between household disposable income and final household consumption (including rental payments and mortgage repayments). The second measure uses the household's wealth as a proxy for accumulated savings, or the stock of savings. Both are measured in terms of dollars.

Data for the study was sourced from the HILDA Survey, Restricted Release 18, which collects information about households' disposable income and expenditure annually, and household wealth-related data at four-year intervals. Due to data availability of expenditure, our analysis period is from 2005 to 2018.

Our models control for households' various socio-demographic-economic characteristics, and consider the possible non-linearity between household saving and household income, size and age, as reflected in prior studies. The Government's 2007 'Simpler Super' reform is included in our model as a dummy variable.

We find that **the voluntary private saving of households receiving SG are not significantly lower than the voluntary private saving of households without SG.** However, increasing the SG rate reduces voluntary private household saving. The findings are consistent with behavioural models, which suggest that when the SG rate increases, people have less incentive to save by themselves because they know employers are saving more on their behalf. We also find that changing the rate of SG has no significant effect on the saving behaviour of households that receive additional employer superannuation contributions over the prescribed SG rate as non-cash benefits. The signs of all other control variables are in line with the conventional saving models.

We find that **increasing the SG rate from 9 per cent to 9.25 per cent increases household wealth by 17.5 per cent, and from 9 per cent to 9.5 per cent increases net household wealth by 53.7 per cent during 2006-18.** These effects are larger for households where at least one member is receiving SG.

We find that **each dollar of compulsory employer contributions reduces private household saving by 43 cents.** This compares with the findings of Connolly (2007) of a 38-cent reduction. The difference may be explained by our contrasting methodologies and timeframes. Depending on the period under consideration, our estimated *'crowding-out'* effect gets smaller when measured within shorter and later time windows. The substitution rate is less than one, which means SG overall increases wealth for households.

A large part of the decline in net household saving is accounted for by increased mortgage repayments — which for most people means increased savings in housing assets. **Mortgage repayments increase by 24 cents in response to each additional dollar of compulsory employer contribution (Figure 6C-1).**

We find that **a $1 rise in compulsory employer contributions increases net household wealth by $2.21, over a four-year period**. Household wealth includes superannuation balance, property (net of debt), and non-superannuation and non-property wealth.

Most of the increase in wealth associated with an increase in compulsory employer contributions occurs in superannuation and property (housing). We find that **a $1 increase in compulsory employer contributions boosts the superannuation account balance by $1.51, and housing wealth by $1.21** (due to higher mortgage repayments). In contrast, there was a decline of approximately $0.51 in non-superannuation and non-housing wealth.

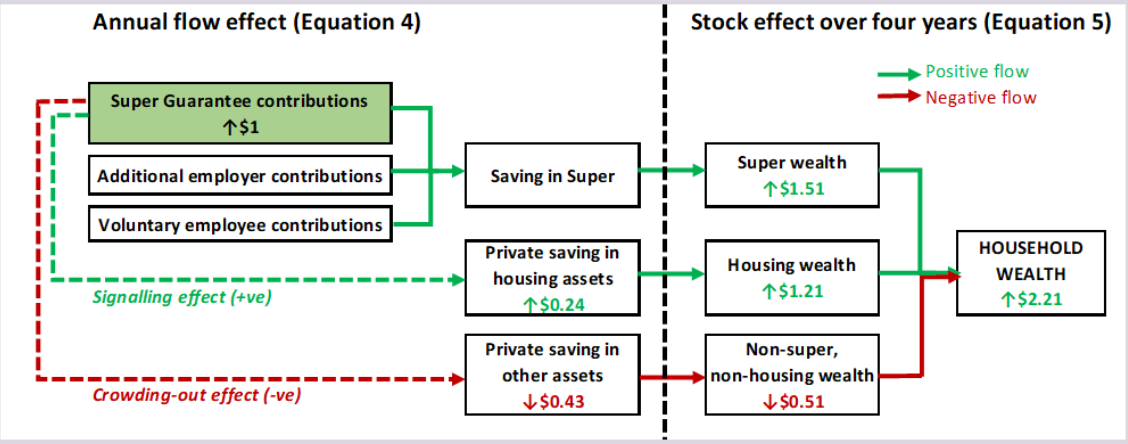
Our analysis of the impact of compulsory employer contributions on households' investment in property assets supports the existence of a 'signalling effect' — which suggests compulsory superannuation provides a degree of confidence for households to increase debt to invest in property, resulting in lower net household saving. This occurs with the knowledge that they can access superannuation savings to extinguish debt in the future and that the residential home is not counted in the Age Pension assets test under current rules.

Our report also shows how the saving behaviour of households varies across different demographic and economic groups. We find that home owners save 26 cents less for each dollar increase in compulsory employer contributions compared to non-home owners.

We employed the Heckman sample selection model to test our findings. The results were consistent, although with slightly different magnitudes. Overall, the results suggest that households with saving(s) behave differently to those without saving(s) in response to changes in eligibility for compulsory employer contributions or changes in SG rates.

In conclusion, the study has two main findings. First, we demonstrate that compulsory superannuation, while associated with a significant reduction in private household saving, leads to net additional household wealth. Second, we find that compulsory superannuation encourages and leads to the reallocation of household wealth into property from other forms of investment.

Figure 6C-1 The relationships between compulsory employer contributions, household saving and wealth



Box 6C-3 How effective are superannuation tax concessions in encouraging additional savings?

Kristen Sobeck and Robert Breunig, Crawford School of Public Policy, Australian National University.

Superannuation tax concessions for voluntary savings are designed to boost people's superannuation balances. Are these policies effective at encouraging people to make larger contributions to their superannuation accounts? If so, do the larger contributions represent new savings (and reduced consumption) or a reallocation of existing savings towards more tax preferred savings instruments? This research evaluates one such policy, the Australian Government's co-contribution policy, to contribute to a better understanding of these questions.

The Government co-contribution was introduced in the 2003-04 financial year and matches the post-tax personal superannuation contributions made by low- and middle-income earners, dollar for dollar. The income eligibility criteria for the policy have changed significantly since its introduction. In particular, in the 2012-13 financial year, the income eligibility threshold was decreased from $61,920 to $46,920. As a result, there were some people who were eligible for the policy in the 2011-12 financial year, but who no longer qualified in 2012-13 when the threshold changed. This research compares the savings behaviour of these people — who were initially eligible and then ineligible (the treatment group) — to the savings behaviour of similar people who earned slightly more, between $61,921 and $76,920, and were never eligible for the policy (the control group), in order to evaluate the policy's effectiveness.

Formally, the comparison of the two groups' savings behaviour was evaluated using a difference-in-difference design which considered three savings outcomes. First, the research considered the impact of reducing the eligibility threshold on the likelihood that a person would stop making contributions. The results show that decreasing the eligibility threshold reduced the percentage of people who made a contribution by 0.9 percentage points. Second, the research evaluated the impact of the change in the policy on the value of superannuation contributions made. The estimates show that the value of retirement contributions decreased by 6.2 per cent when the eligibility thresholds for the matching program were reduced. Finally, among people who made a post-tax superannuation contribution, the research considered whether the reduction in superannuation contributions resulted in lower savings levels or a reallocation of savings to other forms of savings. The results conclude that when people cease to be eligible for the matching policy, they increase other forms of personal savings by about 11 per cent. The drop in post-tax superannuation savings combined with the increase in personal savings points to a reallocation effect. However, the effect is not one-to-one and there is a drop in overall savings. The results show that **a $1 increase in post-tax superannuation contributions leads to a $0.77 reduction in personal savings.**

These results are consistent with the international literature and limited Australian literature available. While the literature tends to diverge with respect to the effectiveness of the matching rate for matching policies, with a few exceptions, most studies find a positive (negative) effect of the existence (elimination) of matching programs on people's participation (consistent with the findings of this research). While the international evidence regarding the new savings versus reallocation of savings is not entirely conclusive, there is a much stronger consensus that asset reallocation in response to tax incentives occurs, particularly for voluntary (as opposed to compulsory) savings incentives (OECD, 2018b); this also aligns with the conclusions of this research.

In conclusion, the Government's co-contribution policy has impacted the savings behaviour of a modest percentage of low- and middle-income people. While the matching program certainly increased the superannuation balances of this small minority, the majority of low- and middle-income people remained unaffected. If boosting superannuation balances is an explicit policy goal, recent international literature suggests that compulsory savings policies tend to be more effective than tax subsidies for retirement savings. While the Australian literature in this area is limited — and more is required — this research provides some evidence in support of this hypothesis and of its relevance in Australia.

Box 6C-4 How effective are superannuation tax concessions in encouraging additional savings?

Ummul Ruthbah and Nga Pham, Monash Centre for Financial Studies, Monash University.

This report examines empirical evidence on the impact of the superannuation tax concessions on voluntary private savings in Australia. Do superannuation tax concessions lead to reductions in other forms of savings? And what are the net outcomes?

We have investigated the impacts of three aspects of Australia's policies on household saving(s).

- Government co-contributions to superannuation for low-income earners, in terms of both the co-contribution rate and the dollar cap for the maximum co-contribution paid by the Government.
- The concessional contributions cap, which places a ceiling on the amount contributed to a person's superannuation account at a concessional tax rate.
- Division 293 tax policy, which introduces an additional tax charged at 15 per cent of a person's taxable contributions for people whose earnings (including contributions) are greater than the Division 293 tax threshold.

We also examined whether these policies had heterogeneous effects across different groups — by age, gender, education, employment status and age group of the household head and location of the household.

The report draws on data from the HILDA Survey, Restricted Release 18. We estimate a panel fixed effect model and a Heckman sample selection model, using data from 2005-2018. In all our models, the unit of analysis is the household as defined by the Australian Bureau of Statistics (ABS).

We use two different measures of saving(s). The first defines saving (a flow variable) as the difference between household disposable income and household final consumption expenditure, available annually in the HILDA Survey. The second measure uses household wealth as a proxy for savings (as a stock variable), collected every four years by the HILDA Survey. Both are in terms of dollars.

We find:

- **The Government co-contribution to superannuation for low- and middle-income earners has an insignificant impact on private household saving.** Increases in the Government co-contribution rate and dollar cap have led to a marginal rise in the superannuation balance of households, without reducing other savings. However, the effects are small. As a result, there is no significant impact on household wealth.
- **The concessional contributions cap has marginal impacts on household saving and wealth.** Although a $1 increase in this cap reduces private saving by a small amount, it does not reduce overall household wealth. Increases in the concessional contributions cap improve household superannuation balances, though there is some delay in the response.
- **While the Division 293 tax reduces private saving by 12.7 per cent for households that are paying the tax, it does not significantly affect the accumulated wealth of these households.** These households have significantly higher superannuation balances than others because an additional 15 per cent tax on individual taxable contributions is still less than what these households would have paid had they saved that amount outside the superannuation account.
- **Households that pay the Division 293 tax have 12.7 per cent less private savings than those who are not liable for paying the tax.** But households that pay the Division 293 tax have significantly higher superannuation balances than others because these are the wealthier households and an additional 15 per cent tax on individual taxable contributions is still less than what these households would have paid had they saved that amount outside the superannuation account. **When compared to households with individual income marginally below the Division 293 tax threshold, we do not find any significant effect of this tax on the wealth or superannuation balances of households who pay the Division 293 tax.**

We also find that the effects of the Government co-contribution and concessional contributions cap on household saving vary by the household head's education, marital status, labour force participation status, age and income quantile. Among the findings:

- Households with married heads save less than households with unmarried heads.
- Households whose heads have at least a diploma save more than households with less-educated heads when they are eligible for superannuation co-contributions and concessions.
- Households in the 3rd and 4th quantiles save more than those in the 1st quantile if they have a member eligible for the Government co-contribution. Nevertheless, these differences are not statistically significant at 5 per cent.

Numerous studies in the literature have examined how savings in superannuation accounts affect other forms of savings. Still, few have measured the effects of concessional tax policies on household saving(s), particularly in Australia.

Evidence of whether superannuation tax concessions generate new private savings — both from Australia and overseas — is mixed. There is evidence that some people reallocate some savings from other sources to pension saving accounts in response to tax incentives provided for pension savings. However, as the reported offset rate between pension savings and other forms of savings varies, the extent of new savings generated by pension tax concessions is unclear.

In the United States, studies in the 1990s were inconclusive on whether Individual Retirement Accounts (IRAs) and 401(k) pension accounts generated additional savings. However, later research seems to confirm evidence of new savings.

Our results show that superannuation policies do not have any significantly effect on household savings in Australia. As a whole, the tax concessions seem to improve household superannuation balances to some extent, and not at the expense of other non-super wealth. Hence, new wealth is generated. However, the impact on wealth is marginal. These findings are consistent with behavioural theories that argue most savers are passive. Holistically, tax incentives may work better when coupled with non-tax based behavioural incentives.

Box 6C-5 What is the impact of the Age Pension assets test on savings behaviour pre-retirement?

Rebecca Cassells, Alan Duncan Silvia Salazar and Richard Seymour, Bankwest Curtin Economics Centre, Curtin University.

The purpose of this report is to provide insights into the impact that the Age Pension assets test has on savings behaviour pre-retirement. Our approach explores the 2007 and 2017 changes in the Age Pension assets test to examine whether, and to what extent, these changes impacted asset portfolio allocation and labour supply behaviour of households approaching retirement.

Using the HILDA Survey, we compare the savings, asset allocation and labour supply behaviour of households that were directly affected by the reform, compared to similar households that remained unaffected. We apply econometric techniques to control for factors other than the introduction of the Age Pension assets test taper reforms that may coincidentally be driving behavioural changes.

Our primary evaluation approach uses a difference-in-differences method to examine the impact of the assets test reforms on behaviour around both the lower assets test threshold (which differentiates full from part-entitlement to Age Pension) and the upper threshold (which separates part-entitlement from zero entitlement). For validation, we apply a second approach using regression discontinuity to examine the degree to which asset accumulation and labour supply behaviours are affected by the lower and upper assets test taper thresholds.

To assess changes in wealth we apply a 'flow' measure of savings, which examines changes in net wealth before and after the reforms. This measure incorporates four separate data points. We also apply a 'stock' measure of changes in the value of assets between two data points.

Overall we find that reforms to the Age Pension assets test was positively correlated with changes in household asset allocation behaviour prior to retirement for households that were very close to the upper threshold of the Age Pension assets test. The upper threshold is the point at which having additional assets in excess of this value would lead to zero entitlement of the Age Pension.

Savings and wealth accumulation — 2007 Age Pension reforms

- In contextualising the impacts of the 2007 reforms it is important to note that the period of assessment coincided with the GFC. This period saw households accumulate lower net savings (change in net wealth) in the post-GFC period than they did in the pre-GFC period.
- There is no statistical difference in the pre-retirement savings of households that were eligible for part-rate Age Pension before the taper rate change as compared to those who were expected to be full-rate age pensioners.
- Households that became eligible as a result of changes to the Age Pension taper rate in 2007 saw their net savings fall by $219,200 less between 2006 and 2010 compared to those that remained ineligible for the Age Pension. This suggests an annual effect of $54,800 over the period.
- Net assessable assets increased by $154,400 more for new part-pension holders between 2006 and 2010, compared to those that remained ineligible for the Age Pension.

  These findings suggest that households that became eligible to receive the Age Pension were more likely to hold higher levels of assessable assets under the Age Pension assets test. **Overall, their savings in the form of assessable assets were 4.0 per cent higher per year between 2007 and 2010.**
- There is no strong evidence of a change in employment propensities among pre-retirement households who fall affected by the assets test compared to those that do not.
- Average hours worked among pre-retirement households were also not significantly affected by changes in the assets test taper.

Initial indications are that the 2017 assets test reforms, which scaled back the generosity of the 2007 reforms by tightening the assets test, show a reverse pattern of reduced savings and asset accumulation, however, these results are not statistically significant. This is due to the timing of the 2017 Age Pension

assets reform relative to the dates of collection of the HILDA Survey wealth modules, which provides limited information on post-reform behaviour.

The regression discontinuity estimations provide confirmation of these impacts. Specifically, the reduction in the upper assets test threshold, as a result of the higher assets test taper rate, is associated with an average reduction in household savings over the five waves of savings and wealth data between 2002 and 2018. The regression discontinuity incorporates both the 2007 and 2017 changes to the assets test.

The separation of two distinct treatment groups is a significant improvement over previous studies.

By applying tighter restrictions to the treatment and control groups, the overall treatment effects associated with the Age Pension assets test reform in our study are found to be significantly smaller than other studies. The classifications of treatment and control groups in both the Whelan et al. (2018) and Cho and Sane (2014) studies are broader and more heterogeneous, with open-ended classification of the control groups. As a result, these studies are unable to pinpoint the effects of the Age Pension assets test reforms. Instead, their models compare the savings and asset accumulation behaviour of households with wealth and savings portfolios that are very different in both size and composition. As such, their empirical findings are likely to overestimate the effects of the Age Pension assets test reforms.

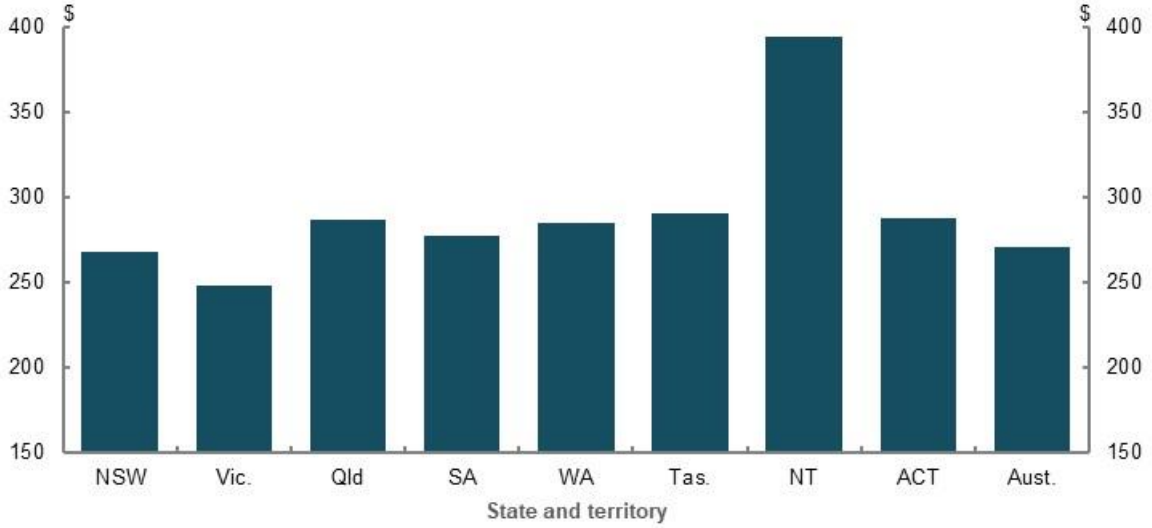
The separation of two distinct treatment groups also allows us to test the empirical outcomes from the difference-in-difference analysis more accurately against the predictions of a simplistic two-period savings model, such as used in Whelan et al. (2018). For example, the model would predict savings to be disincentivised among people expected to become eligible for the Age Pension through the taper rate reduction in 2007, as their assets became subject to the taper (substitution effect) and because of increased pension payments (income effect). This report shows that the impact of changes to the Age Pension taper rate on pre-retirement savings behaviour cannot be explained by this model.

To rationalise the empirical findings requires the underlying theoretical framework to be expanded to accommodate other explanations of savings behaviour. This includes the role of compulsory superannuation as opposed to voluntary savings; the degree to which people have uncertainty or misperception regarding their future pension entitlement, and the drivers of asset portfolio allocation between assessable and non-assessable assets. As such, it warrants further investigation to understand how the change in the assets test taper affects pre-retirement savings.

Section 6D. Supplementary equity charts

Income and wealth distribution

Chart 6D-1 Average weekly social transfers in kind per household, by state and territory

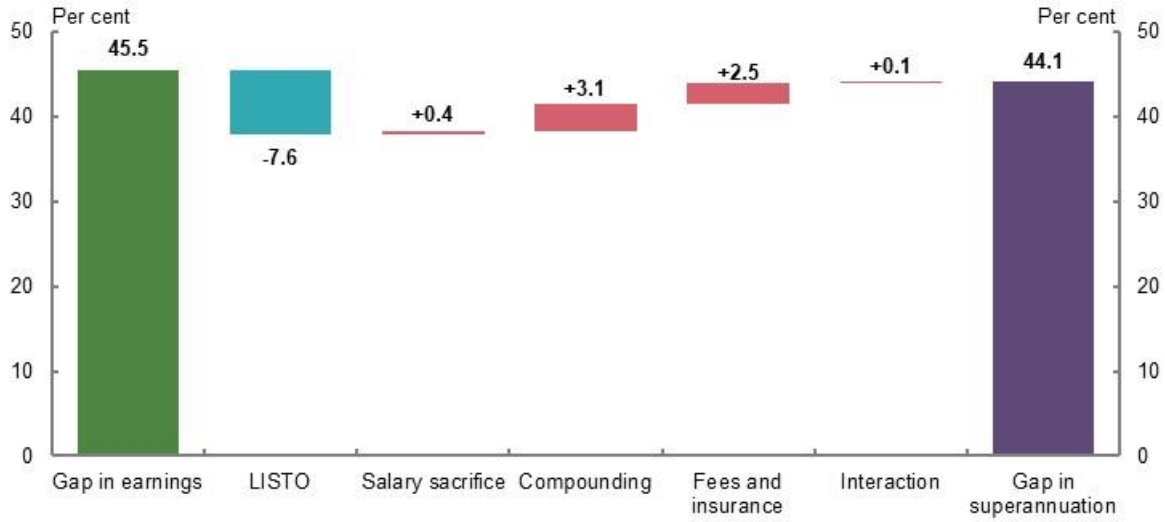


Note: Uses 2015-16 data. Uses 'equivalised' social transfers in kind so results are not biased due to differences in the size of households. Source: (ABS, 2018c).

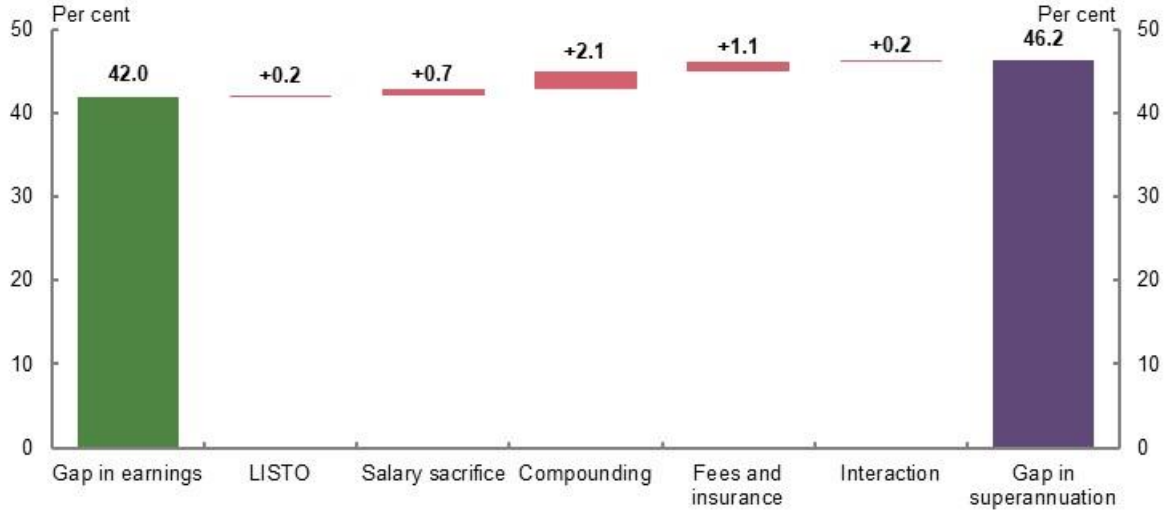
Gender and partnered status

Cameo modelling of factors in working life that drive gender gaps

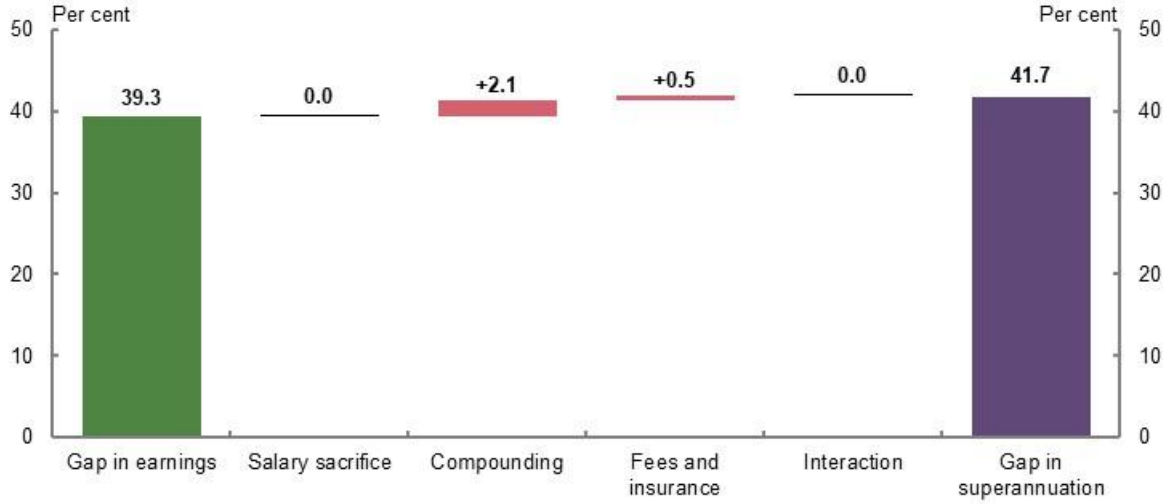
Chart 6D-2 Factors affecting how the gender earnings gap translates into a gender gap in superannuation balances at retirement
10th income percentile



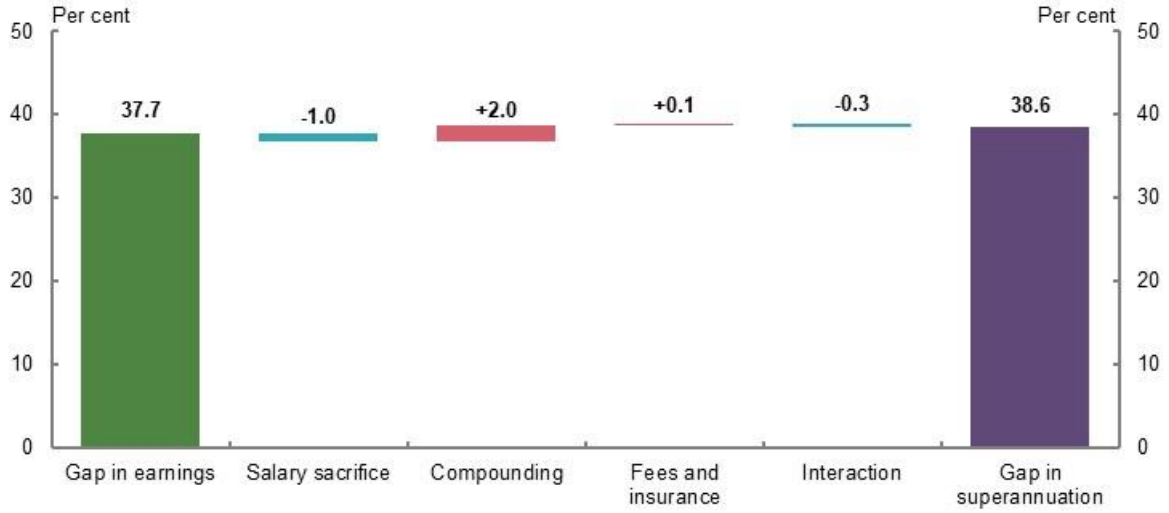
30th income percentile



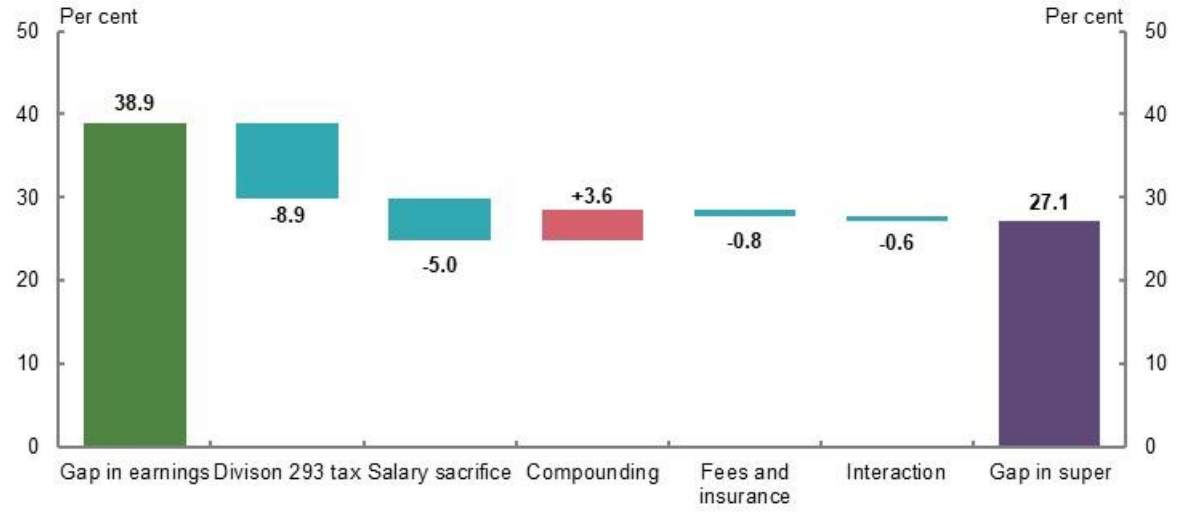
50th income percentile



70th income percentile



90th income percentile

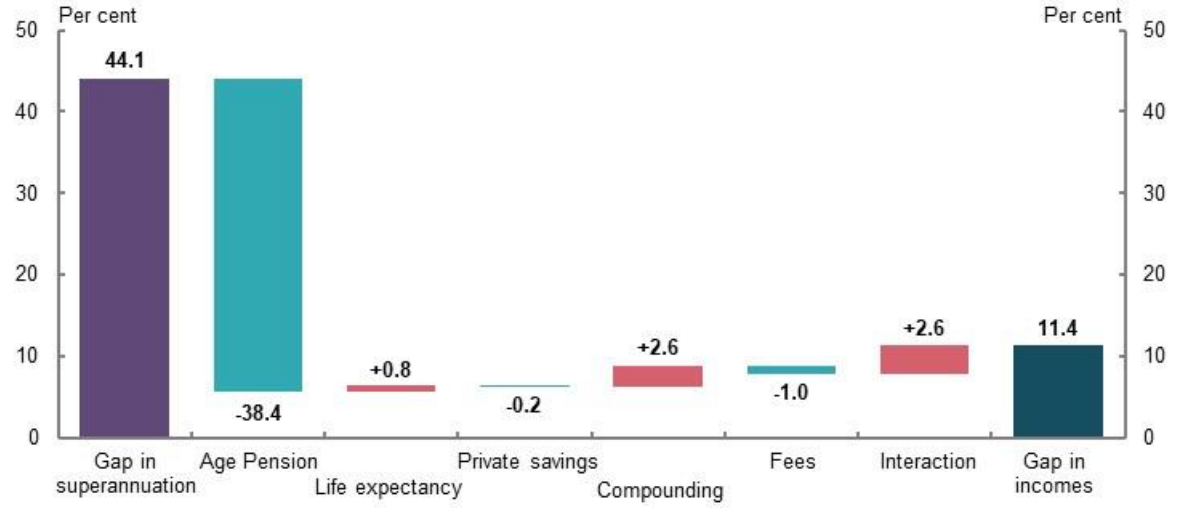


Note: Charts show the impact of removing individual factors on the gender gap in superannuation balances at retirement (e.g. comparing a world where the fees and insurance costs do not exist to standard gender cameo model specifications). 'LISTO' is the low income superannuation tax offset. Removing all the factors listed results in a gender gap in superannuation balances at retirement equal to the gender gap in working-life earnings. 'Compounding' isolates the impact of real investment returns on superannuation balance accumulation during working life. The 'interaction' field indicates the impact of the interaction between elements (e.g. the interaction between removing fees and compounding returns, which is not captured in removing only fees or only compounding returns). This analysis does not include voluntary contributions other than salary sacrifice. Including these contributions would likely reduce the gender gap in superannuation balances at retirement. Calculations are based on values deflated using the review's mixed deflator. Source: Cameo modelling undertaken for the review.

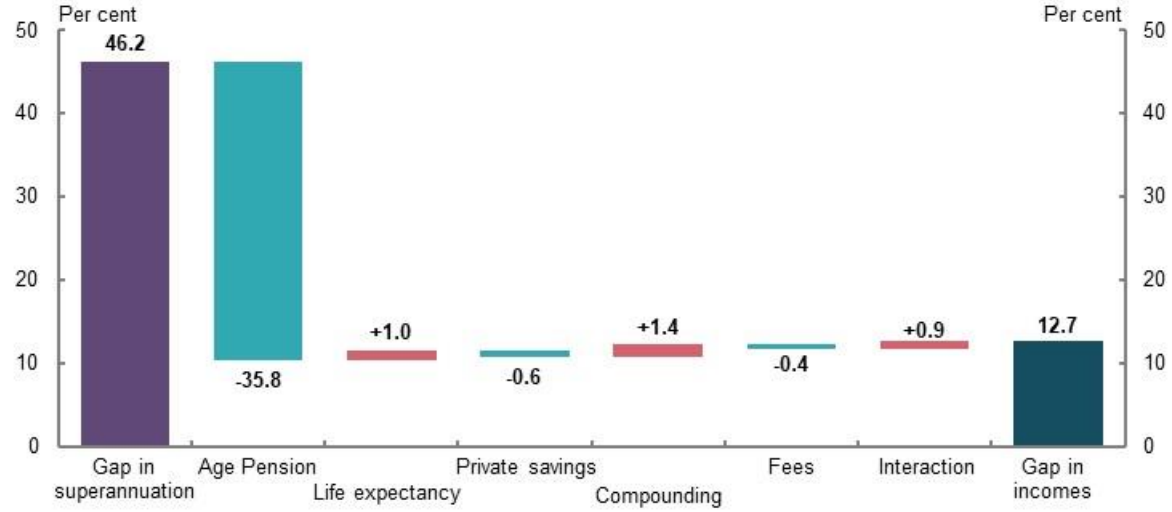
Cameo modelling of factors in retirement that drive gender gaps

Chart 6D-3 Factors that affect how the gender gap in superannuation balances at retirement translates into the gender gap in retirement incomes

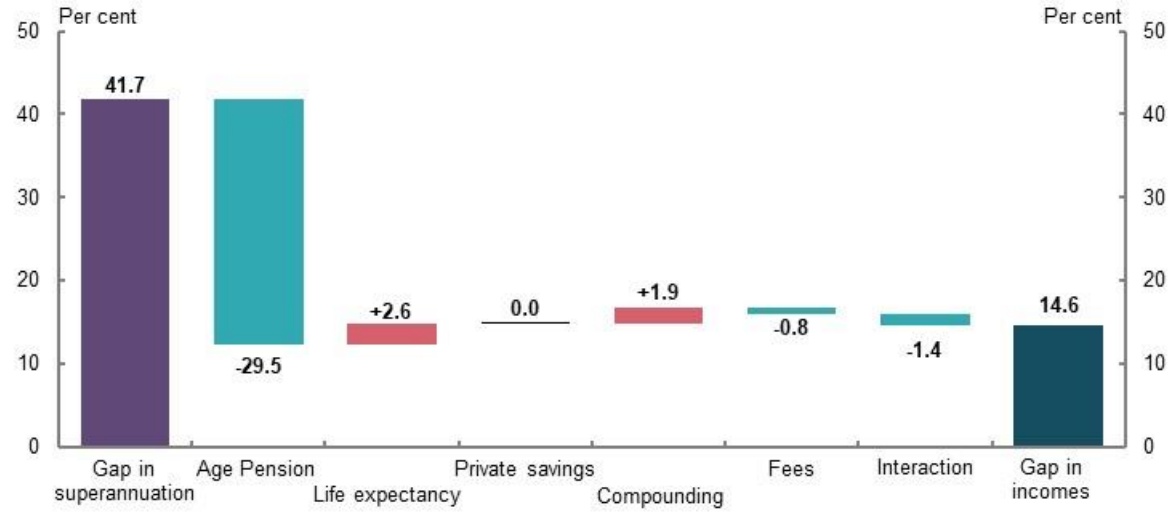
10th income percentile



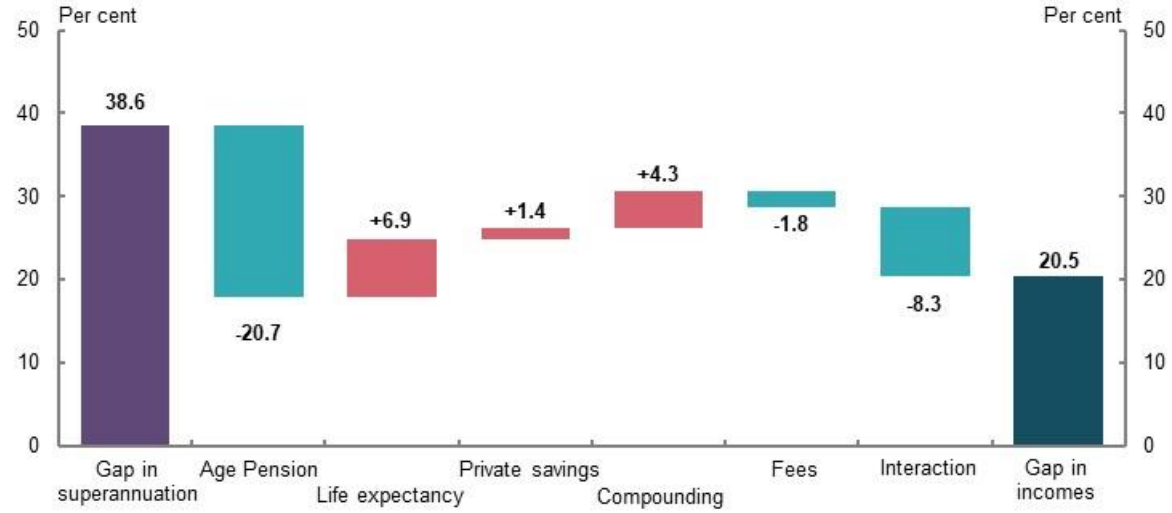
30th income percentile

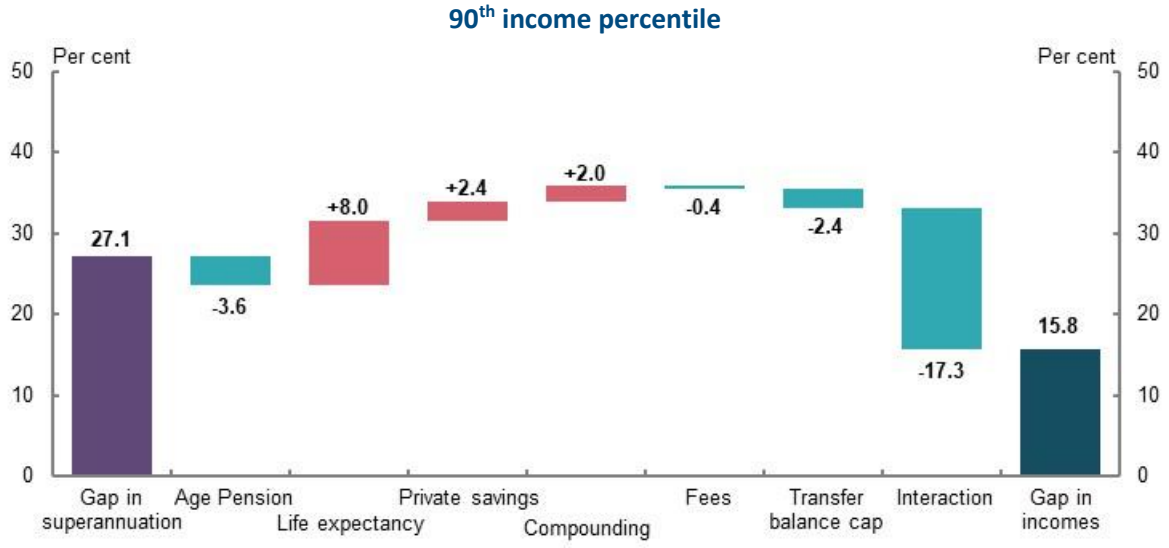


50th income percentile



70th income percentile

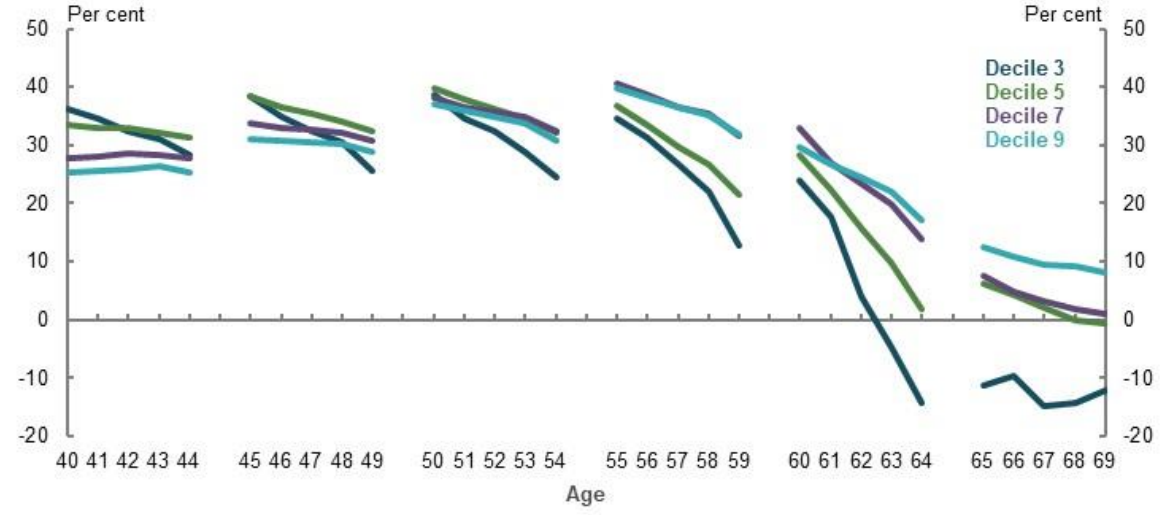




Note: Charts show the impact of removing individual factors on the gender gap in retirement incomes (e.g. comparing a world where the fees in retirement do not exist to standard gender cameo model specifications). 'TBC' is the transfer balance cap. Removing all the factors listed results in a gender gap in retirement incomes equal to the gender gap in superannuation balances at retirement. 'Compounding' isolates the impact of real investment returns on superannuation balance during retirement. 'Life expectancy' isolates the effect of different life expectancies for men and women on retirement income by assuming both genders have the same life expectancy of 92. 'Private savings' refers to non-superannuation wealth. The 'interaction' field indicates the impact of the interaction between elements (e.g. the interaction between removing fees and compounding returns, which is not captured in removing only fees or only compounding returns). The interaction field is larger in these charts than in Chart 6D-2, given the significant interaction each factor has with Age Pension receipt. This analysis does not include voluntary contributions other than salary sacrifice. Including these contributions would likely reduce the gender gap in superannuation balances at retirement. Calculations are based on values deflated using the review's mixed deflator. Source: Cameo modelling undertaken for the review.

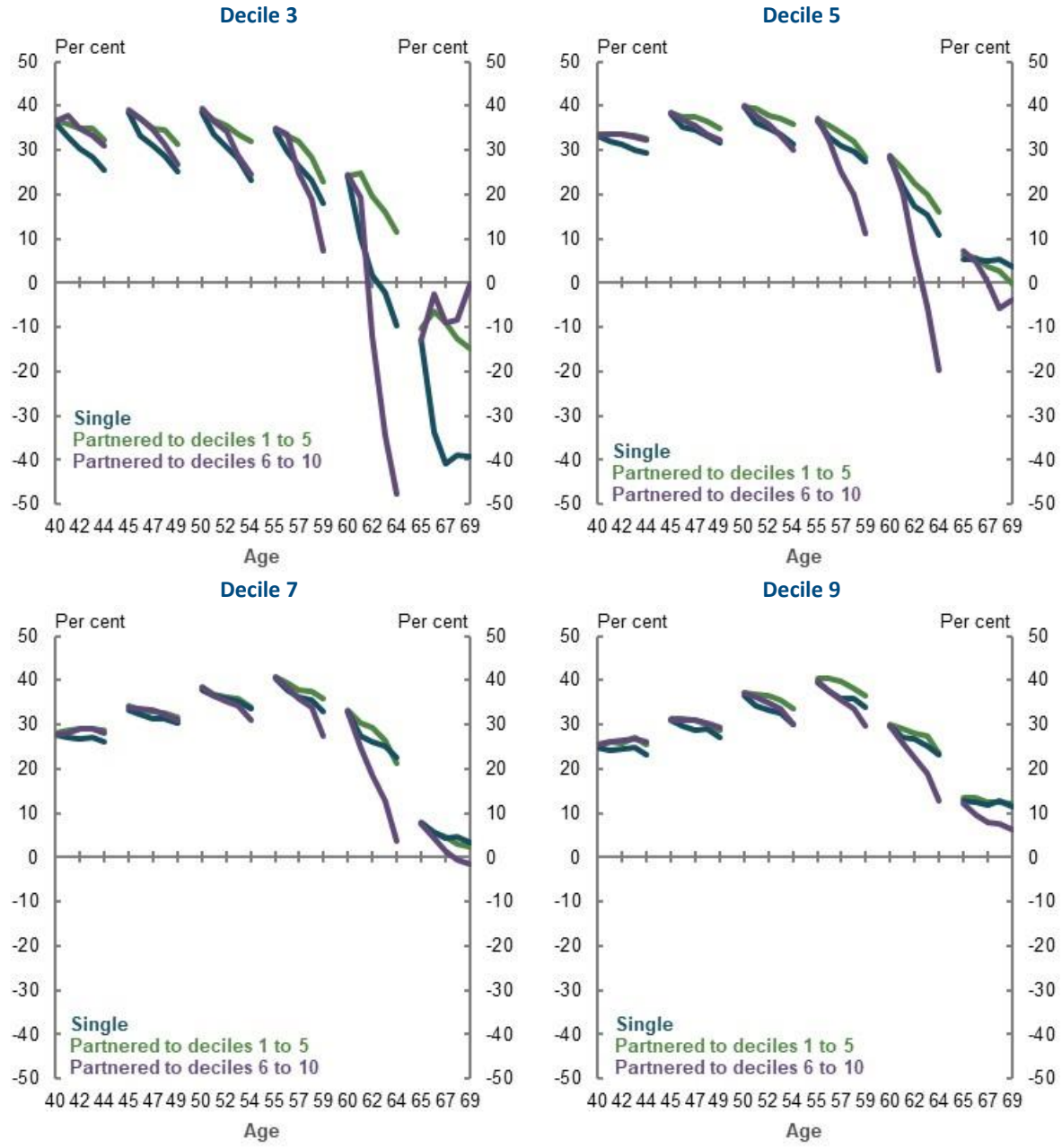
Gender gap in superannuation balances

Chart 6D-4 Gender gap in average superannuation balances, by balance decile and age, 2012-13 to 2016-17



Note: Men and women aged 40, 45, 50, 55, 60, and 65 at 30 June 2013 were sorted into gender-based deciles based on their superannuation balance and age (those with zero balances were excluded). Their balances were then tracked over the following four years to 2016-17. The chart compares the average balance for each male decile with the average balance for each female decile in each year (e.g. comparing men aged 40 in the third balance decile for men, with women aged 40 in the third balance decile for women). Those whose balances reduced to zero in later years are included in the average calculation. A 'negative gap' means that women have higher average superannuation balances than men for that cohort at that age. Calculations of gender gaps are based on nominal superannuation balances from 2012-13 to 2016-17. Source: Data provided by the ATO for the review.

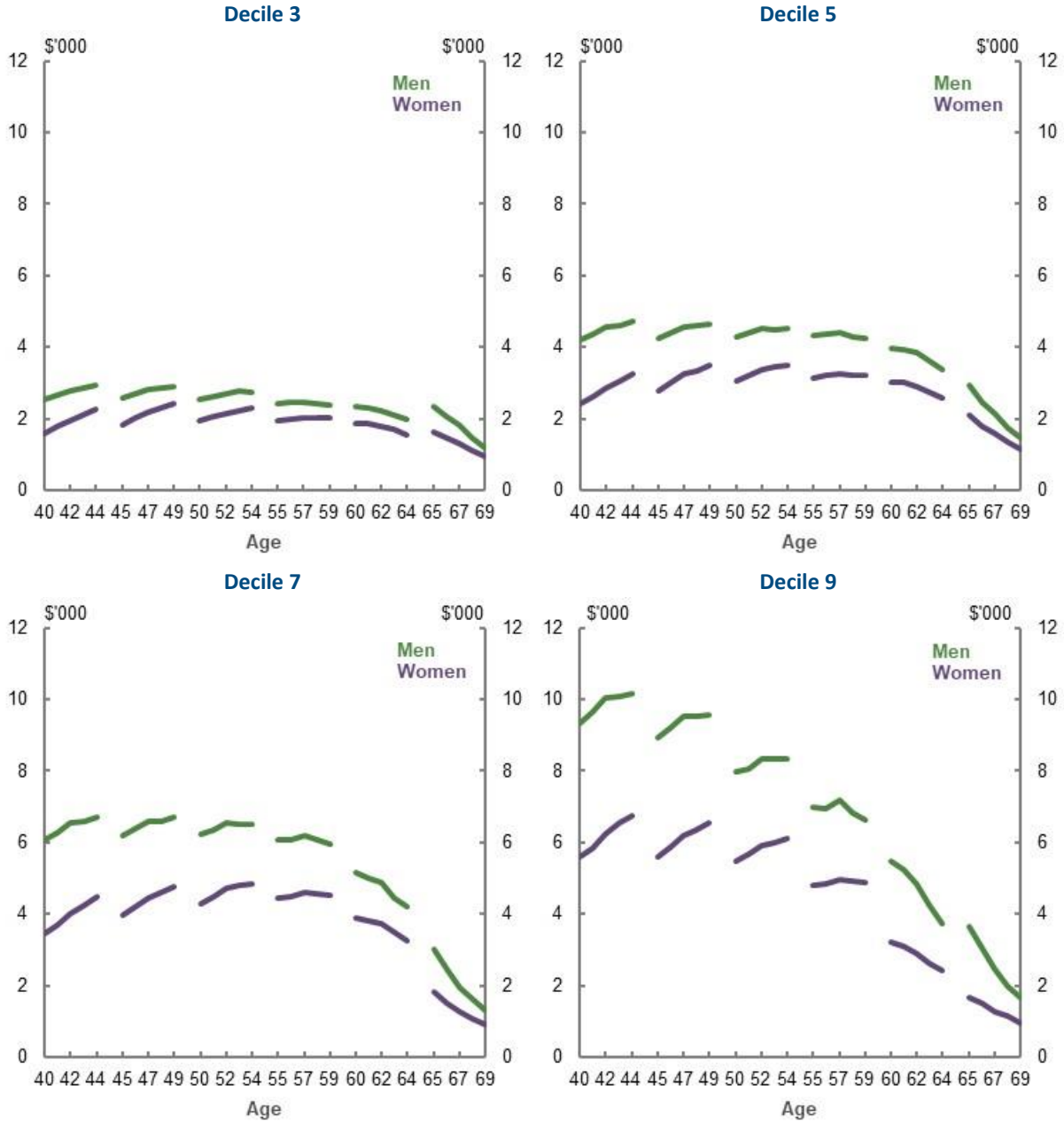
Chart 6D-5 Gender gap in average superannuation balances, by balance decile, age, partnered status, and partner's balance decile, 2012-13 to 2016-17



Note: Men and women aged 40, 45, 50, 55, 60, and 65 at 30 June 2013 were sorted into gender-based deciles based on their superannuation balance and age (those with zero balances were excluded). People were then further sorted into whether they were single, partnered to a person of gender-based balance decile 1 to 5, or partnered to a person of gender-based balance decile 6 to 10. Persons partnered to a person with zero superannuation were excluded. Their balances were then tracked over the following four years to 2016-17. The chart compares the average balance for each male decile with the average balance for each female decile in each year (e.g. comparing single men aged 40 in the third balance decile for men, with single women aged 40 in the third balance decile for women). Those whose balances reduced to zero in later years are included in the average calculation. A 'negative gap' means that women have higher average superannuation balances than men for that cohort at that age. Calculations of gender gaps are based off nominal superannuation balances from 2012-13 to 2016-17. Source: Data provided by the ATO for the review.

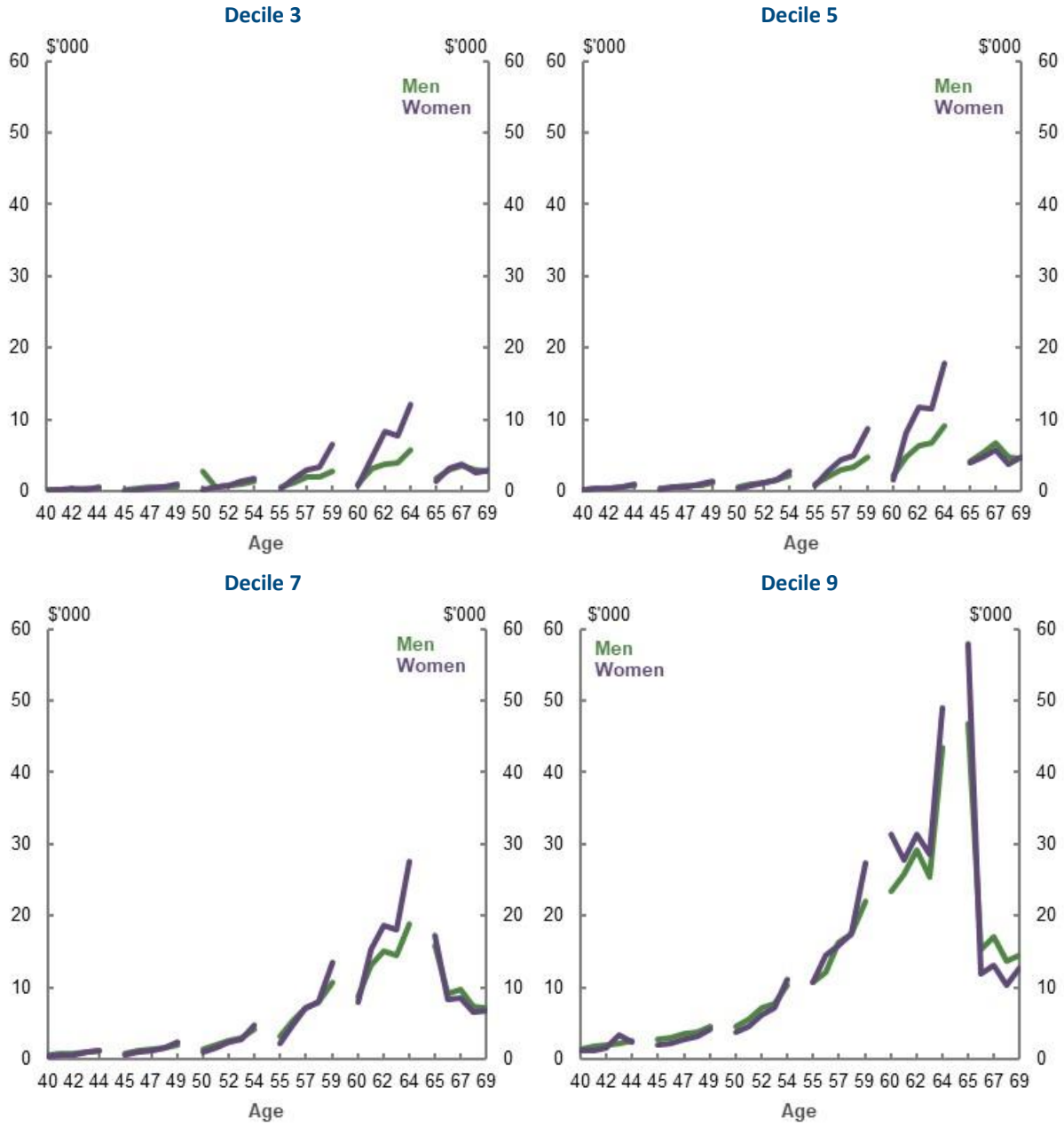
Superannuation contributions by gender

Chart 6D-6 Employer superannuation contributions (excluding salary sacrifice), by gender-based balance decile and age, 2012-13 to 2016-17



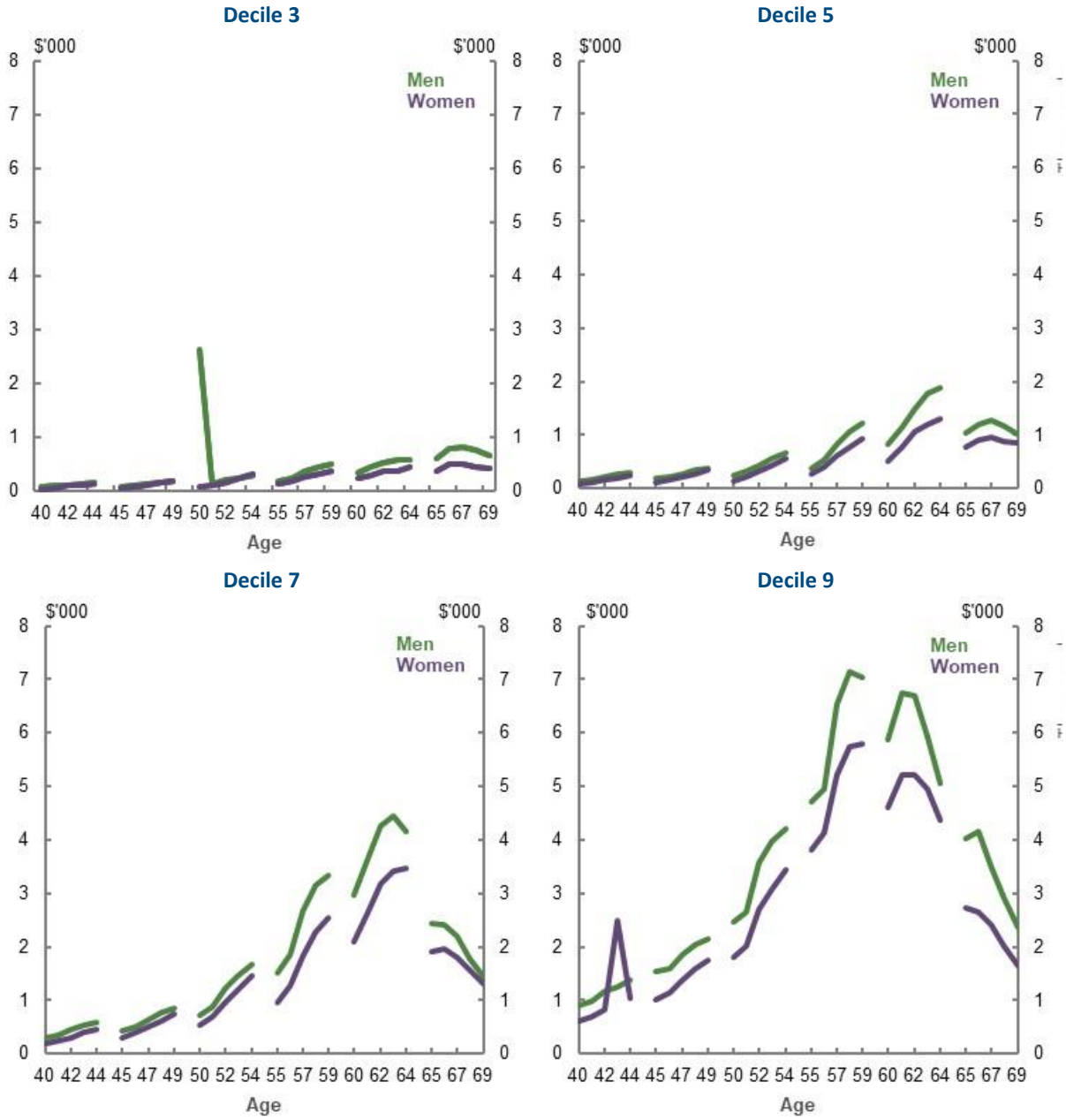
Note for Chart 6D-6, Chart 6D-7, Chart 6D-8, Chart 6D-9 and Chart 6D-10: Men and women aged 40, 45, 50, 55, 60, and 65 at 30 June 2013 were sorted into gender-based deciles based on their superannuation balance and age (those with zero balances were excluded). Their annual superannuation contributions were then tracked over the following four years to 2016-17. The charts compare the relevant type of superannuation contribution in each year for each male and female superannuation balance decile (e.g. comparing employer contributions made by men aged 40 in the third balance decile for men, with employer contributions made by women aged 40 in the third balance decile for women). Those with zero contributions of the relevant type in any given year are included in the calculation of the average contribution amount. Data collection period coincides with changes to superannuation contributions caps during the 2012-13 to 2016-17 period. The '10 per cent rule' for deductible personal superannuation contributions prior to 1 July 2017 also applied across this period (see *1B. Design of Australia's retirement income system*). This may influence the results presented. Contribution amounts are in nominal dollars, from 2012-13 to 2016-17. Source: Data provided by the ATO for the review.

Chart 6D-7 Total voluntary superannuation contributions, by gender-based balance decile and age, 2012-13 to 2016-17



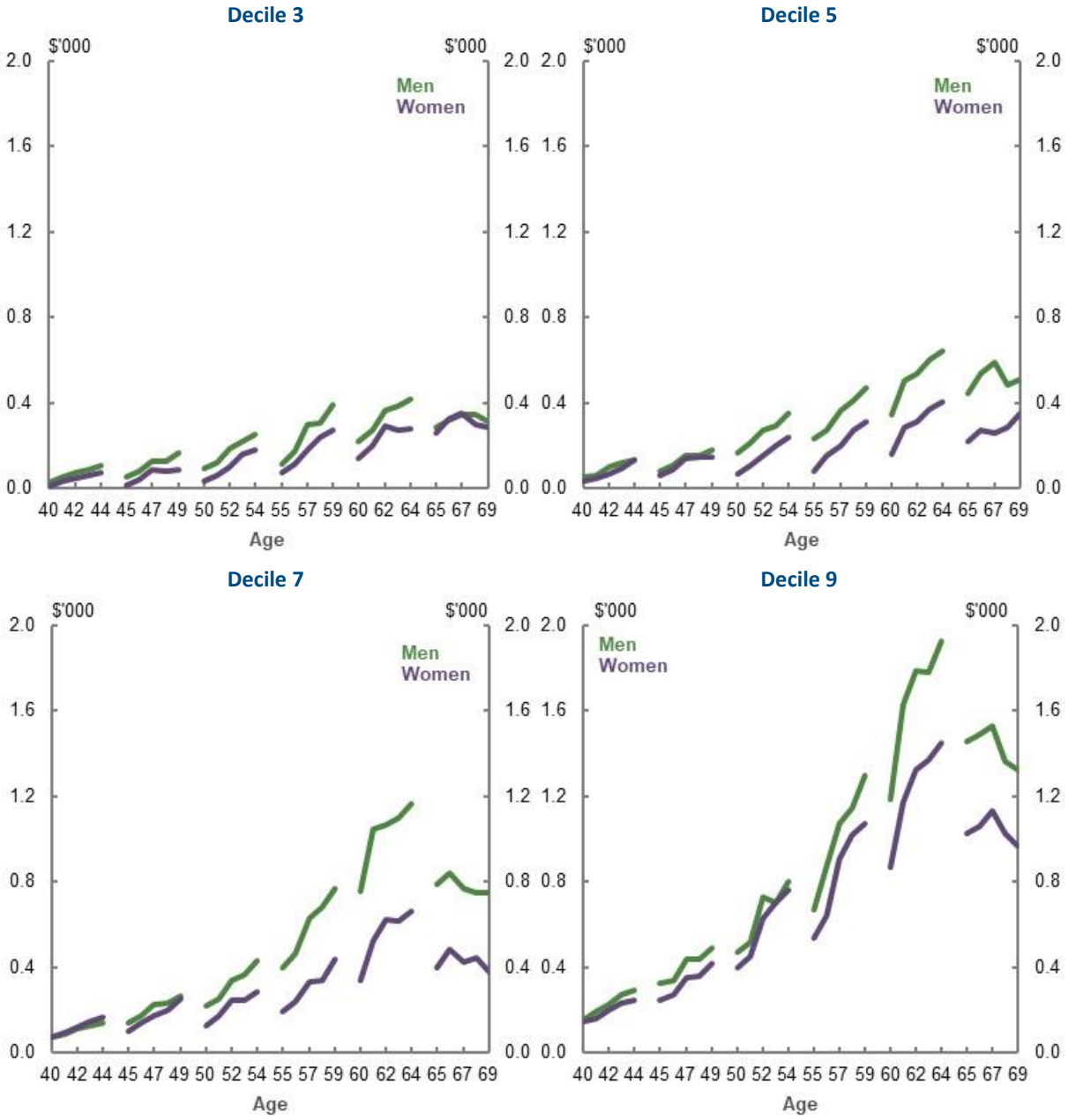
Note: See Chart 6D-6. Source: Data provided by the ATO for the review.

Chart 6D-8 Salary sacrifice superannuation contributions, by gender-based balance decile and age, 2012-13 to 2016-17



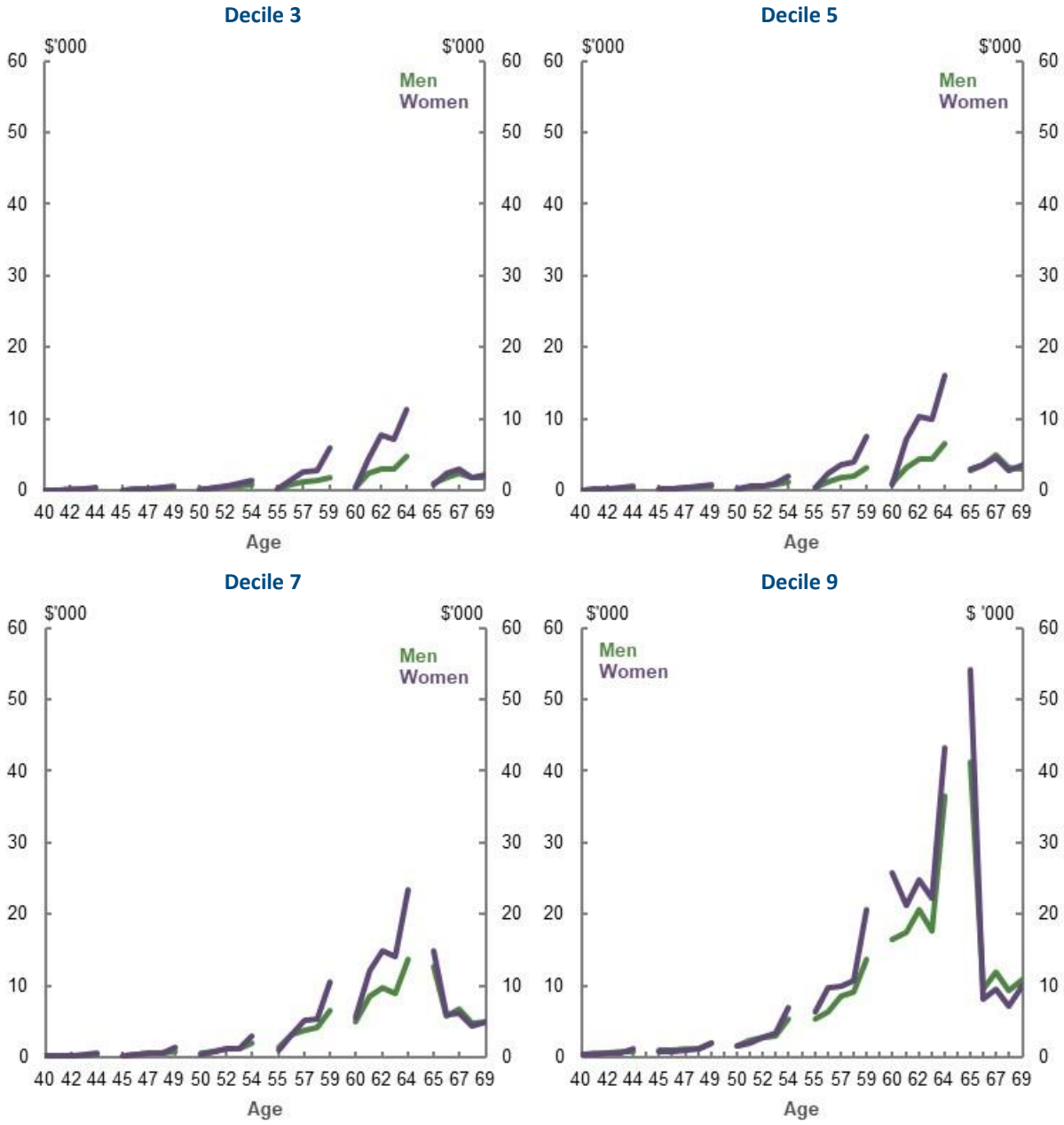
Note: See Chart 6D-6. Source: Data provided by the ATO for the review.

Chart 6D-9 Deductible personal superannuation contributions, by gender-based balance decile and age, 2012-13 to 2016-17



Note: See Chart 6D-6. Source: Data provided by the ATO for the review.

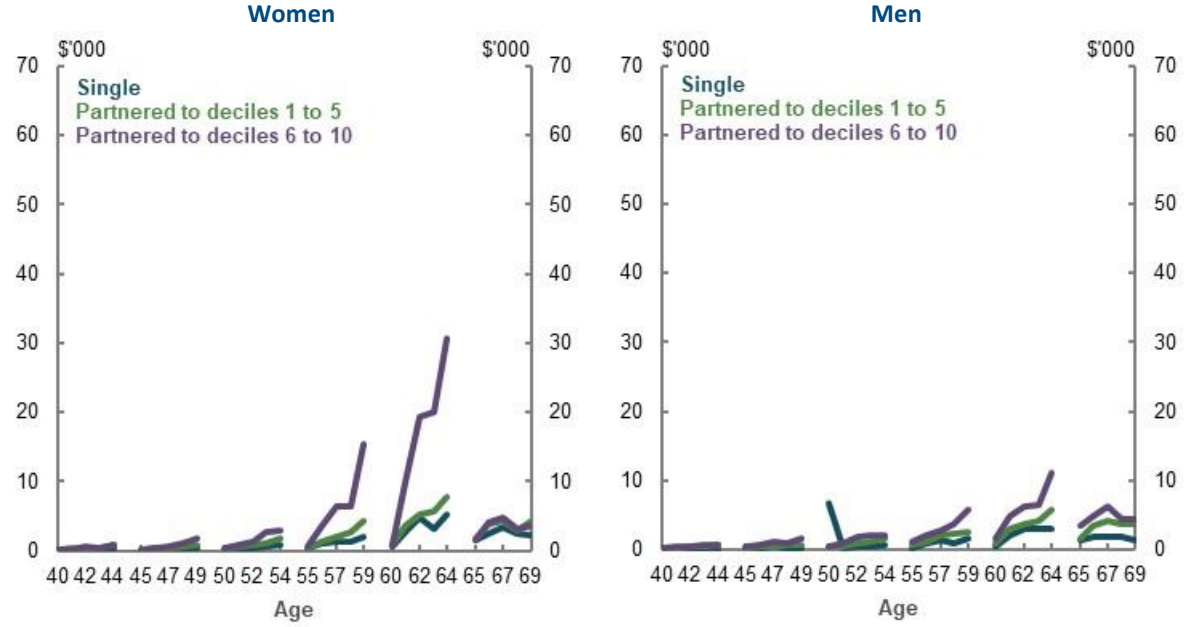
Chart 6D-10 After-tax personal superannuation contributions, by gender-based balance decile and age, 2012-13 to 2016-17



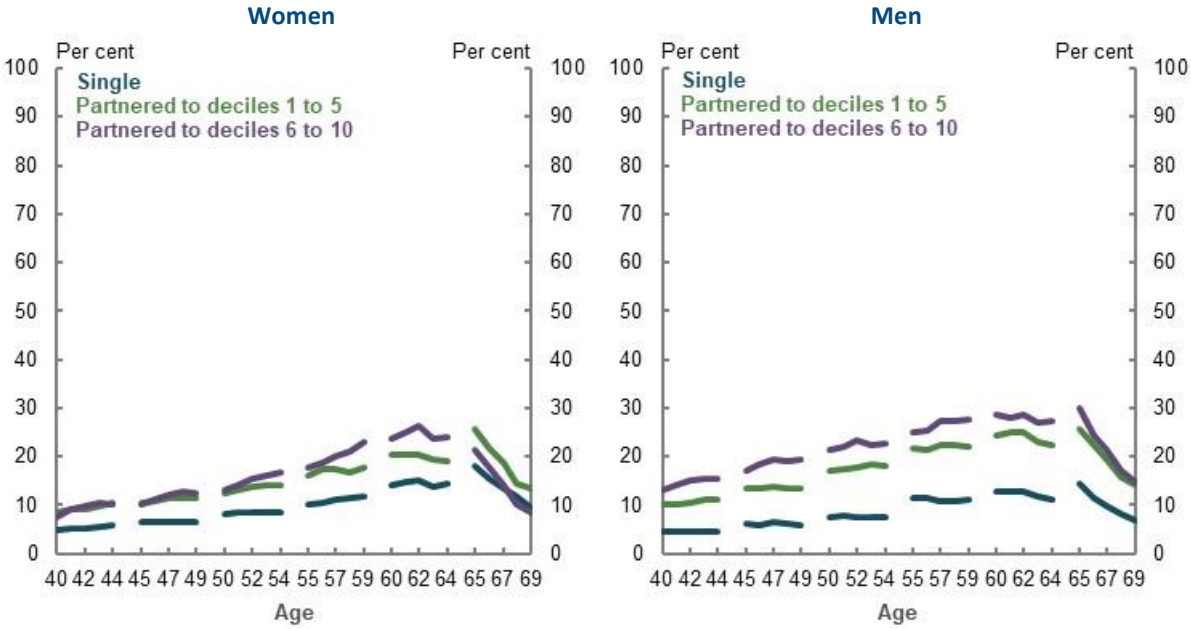
Note: See Chart 6D-6. Source: Data provided by the ATO for the review.

Chart 6D-11 Voluntary superannuation contributions for those in superannuation balance decile 3, by gender, partnered status, and partner's superannuation balance decile, 2012-13 to 2016-17

Average total voluntary contributions



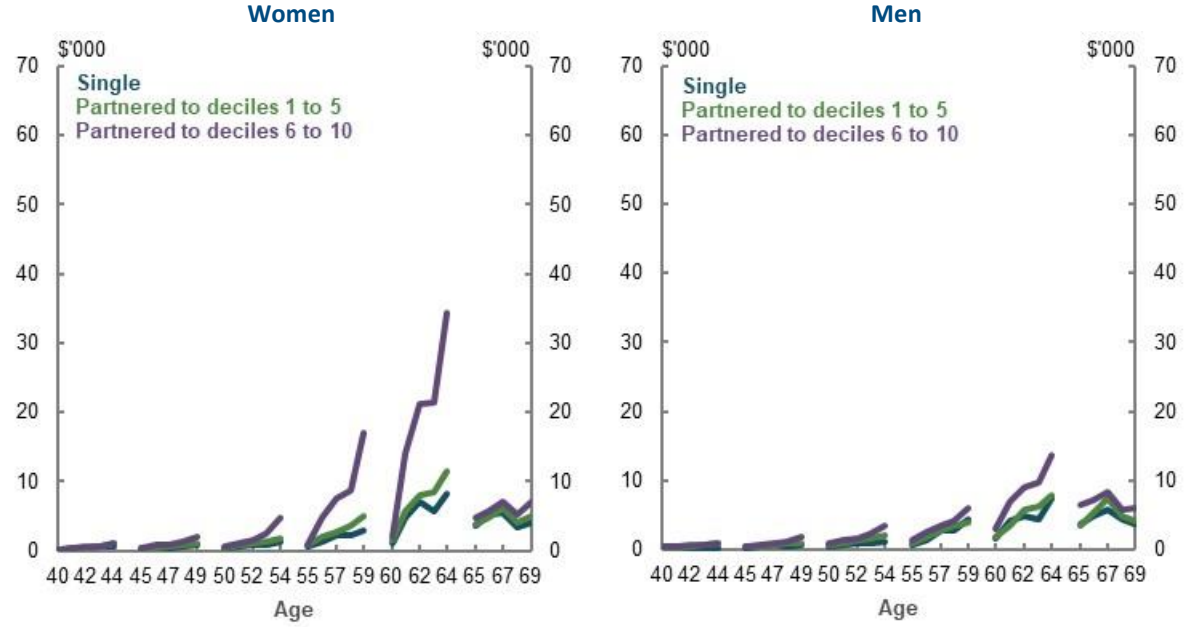
Proportion making voluntary contributions



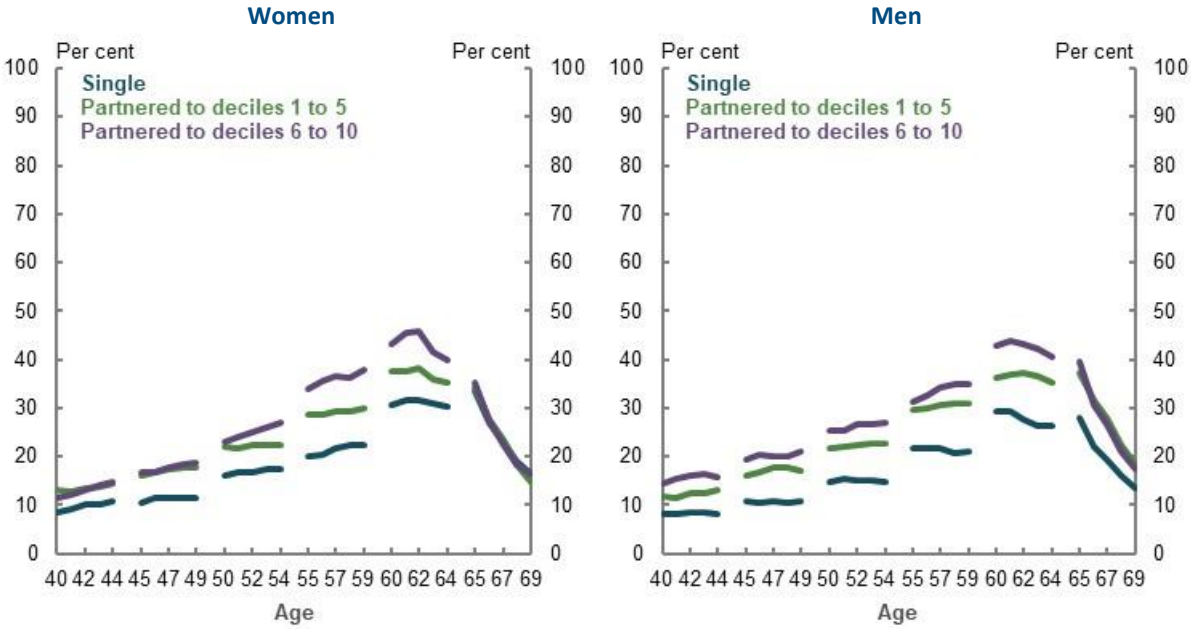
Note for Chart 6D-11, Chart 6D-12, Chart 6D-13 and Chart 6D-14: Men and women aged 40, 45, 50, 55, 60, and 65 at 30 June 2013 were sorted into gender-based deciles based on their superannuation balance and age (those with zero balances were excluded). People were then further sorted into whether they were single, partnered to a person of gender-wise balance decile 1 to 5, or partnered to a person of gender-wise balance decile 6 to 10. Those partnered to a person with zero superannuation were excluded. Balances were then tracked over the following four years to 2016-17. The first set of charts compare the average total voluntary contributions for men and women at the relevant gender-based decile of superannuation balances across singles, those partnered to a person of gender-wise balance decile 1 to 5, and those partnered to a person of gender-wise balance decile 6 to 10. The second set of charts compare the proportion making any voluntary contributions at the relevant decile of superannuation balances across those same categories. Data collection period coincides with changes to superannuation contributions caps across the 2012-13 to 2016-17 period. The '10 per cent rule' for deductible personal superannuation contributions prior to 1 July 2017 also applied across this period (see *1B. Design of Australia's retirement income system*). This may influence the results presented. Contribution amounts are in nominal dollars, from 2012-13 to 2016-17. Source: Data provided by the ATO for the review.

Chart 6D-12 Voluntary superannuation contributions for those in superannuation balance decile 5, by gender, partnered status, and partner's superannuation balance decile, 2012-13 to 2016-17

Average total voluntary contributions



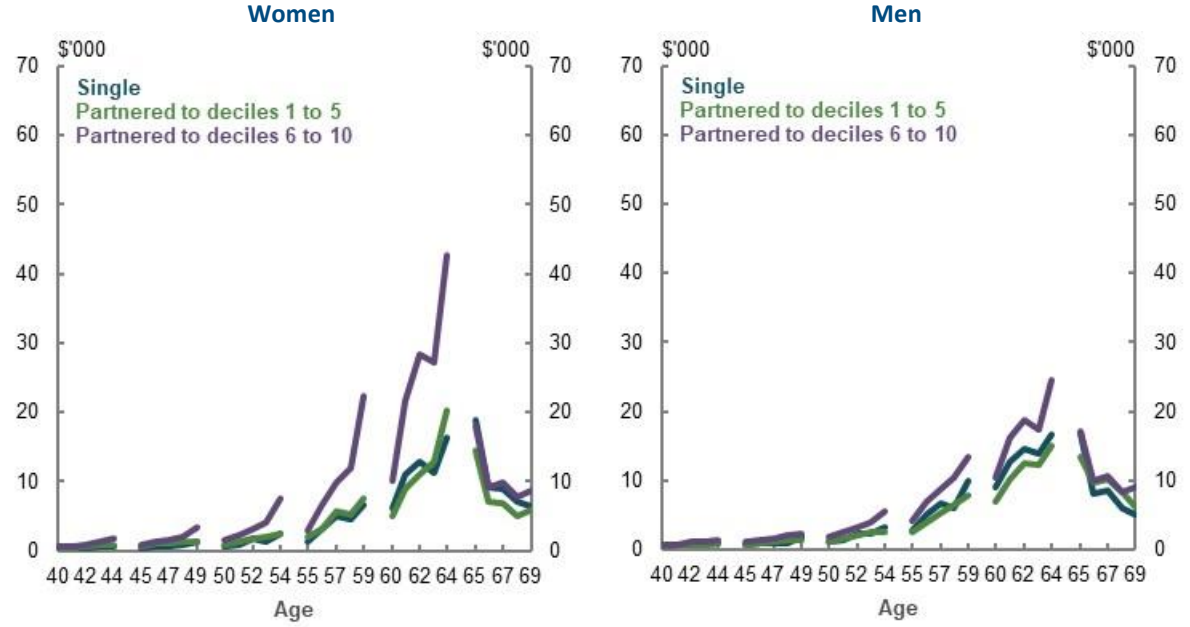
Proportion making voluntary contributions



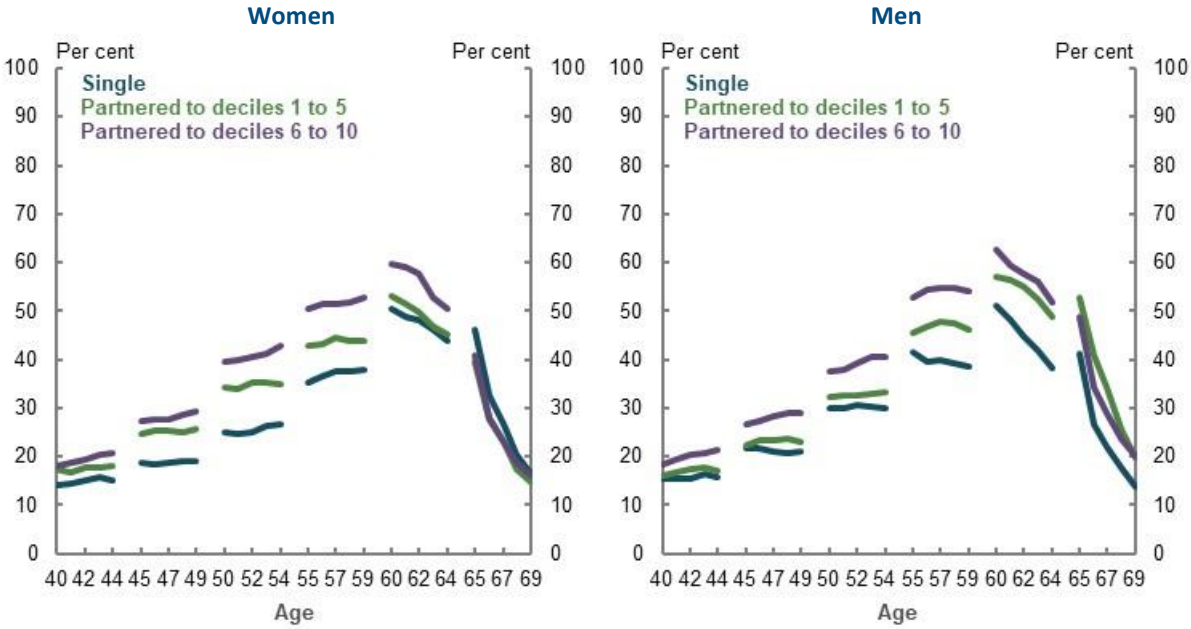
Note: See Chart 6D-11. Source: Data provided by the ATO for the review.

Chart 6D-13 Voluntary superannuation contributions for those in superannuation balance decile 7, by gender, partnered status, and partner's superannuation balance decile, 2012-13 to 2016-17

Average total voluntary contributions



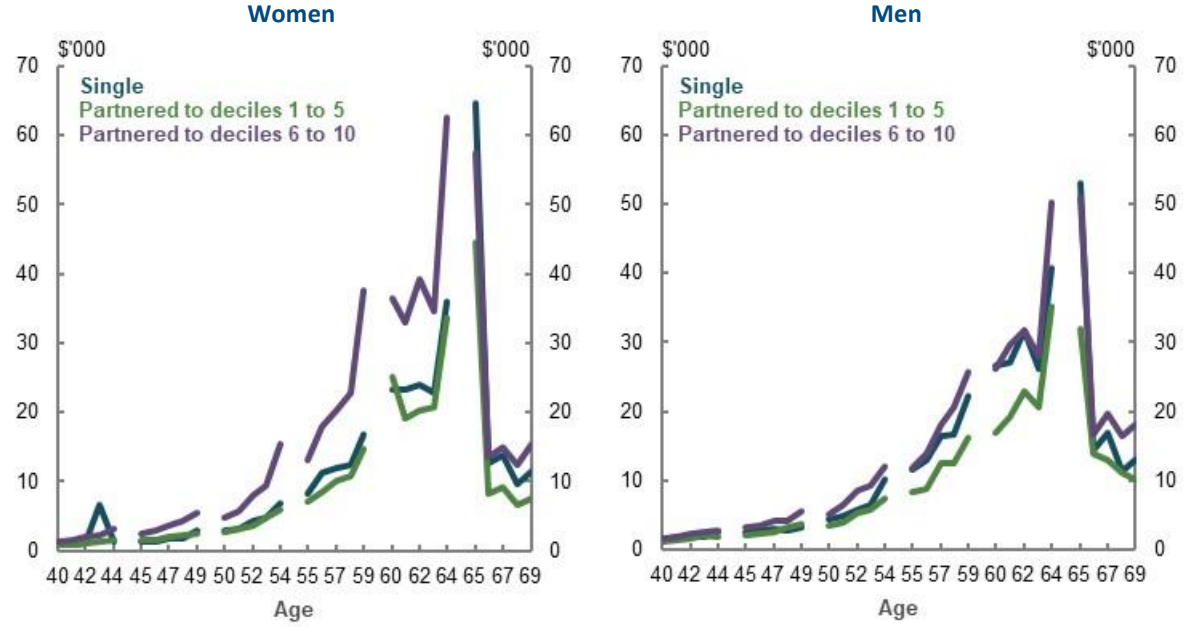
Proportion making voluntary contributions



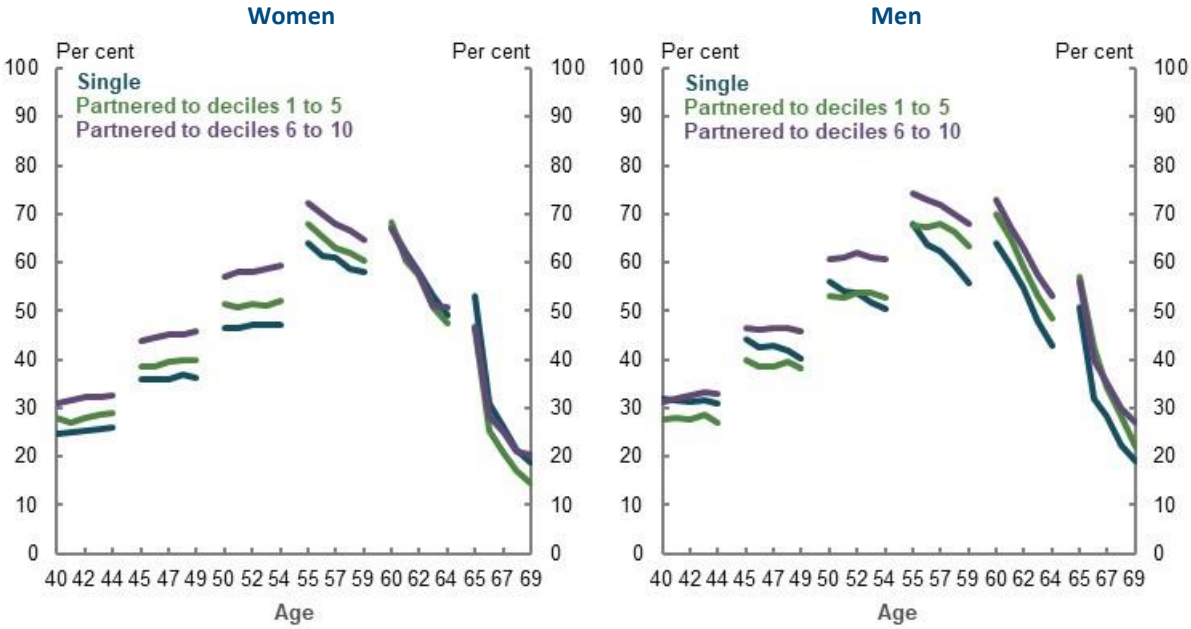
Note: See Chart 6D-11. Source: Data provided by the ATO for the review.

Chart 6D-14 Voluntary superannuation contributions for those in superannuation balance decile 9, by gender, partnered status, and partner's superannuation balance decile, 2012-13 to 2016-17

Average total voluntary contributions



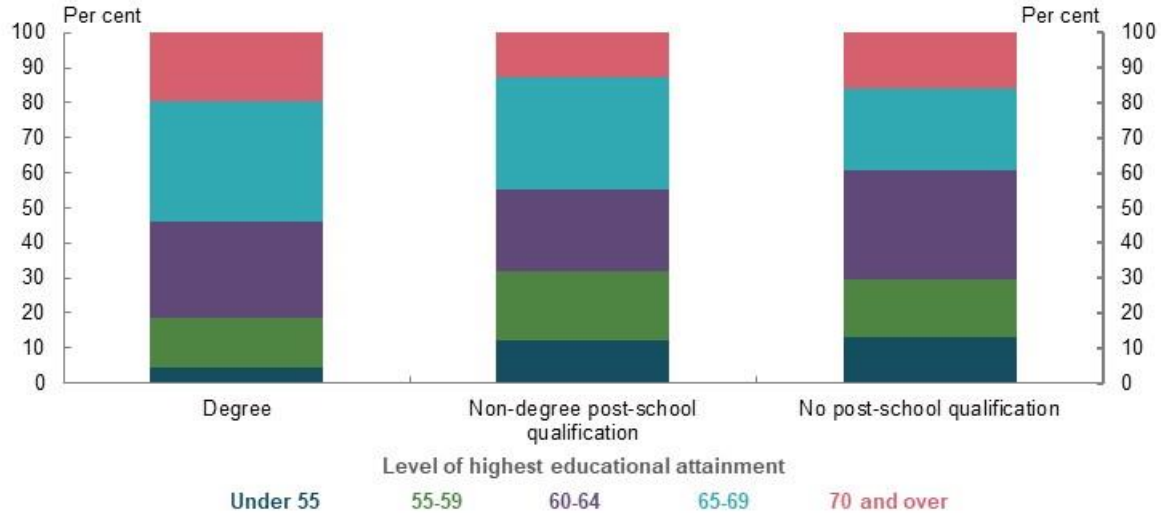
Proportion making voluntary contributions



Note: See Chart 6D-11. Source: Data provided by the ATO for the review.

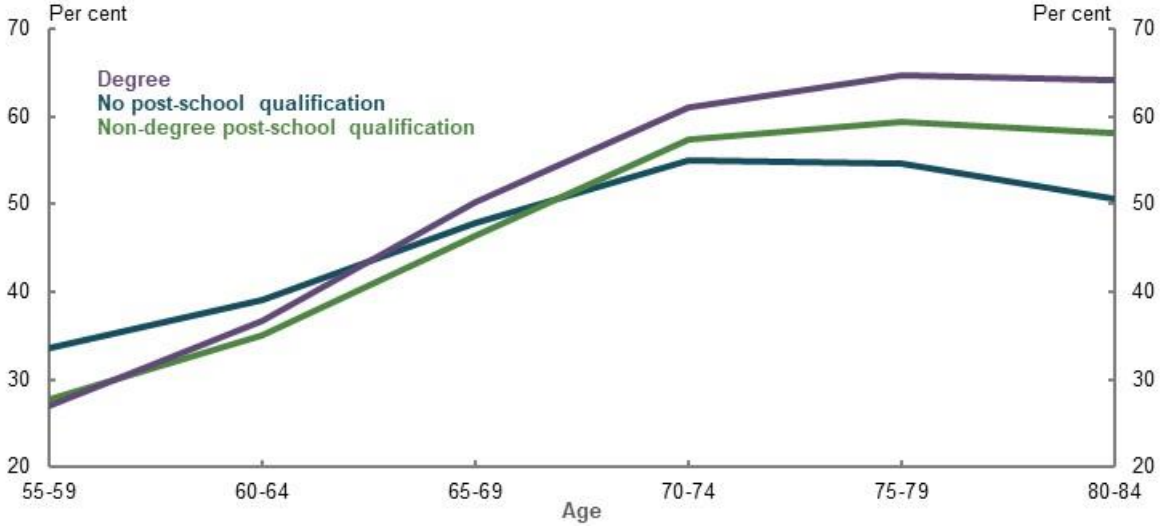
Age of retirement

Chart 6D-15 Per cent of people retiring, by level of highest educational attainment and age



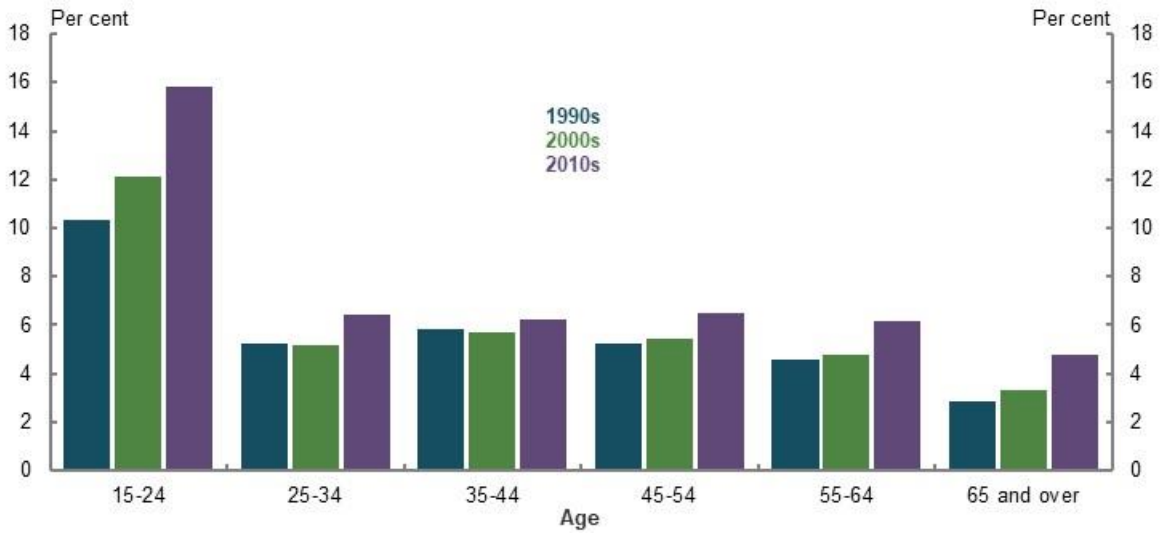
Note: Includes people who retired between July 2013 and June 2019. Degree includes postgraduate degree, graduate diploma and graduate certificate and bachelor degree. Non-degree post-school qualification includes advanced diploma and diploma and certificate 3 and 4. No post-school qualification includes year 12 or equivalent, year 11, year 10, certificate 1 and 2, and year 9 and below. While the chart uses a relatively small sample size and therefore some categories have high relative standard errors, the differences between the three categories of educational attainment are consistent with earlier surveys. Source: Analysis of (ABS, 2020p).

Chart 6D-16 Proportion of employed people working part-time, by level of highest educational attainment and age



Note: Uses 2016 data. Degree includes postgraduate degree, graduate diploma and graduate certificate and bachelor degree. Non-degree post-school qualification includes advanced diploma and certificate 3 and 4. No post-school qualification includes year 12 or equivalent, secondary education — years 10 and above, secondary education — years 9 and below, and certificate 1 and 2. Source: Analysis of (ABS, 2016a).

Chart 6D-17 Average underemployment rate, by age



Note: Underemployment rate is calculated as the number of underemployed people divided by the number of people in the labour force. Uses the average of all monthly underemployment rates in the relevant decade. Source: Analysis of (ABS, 2020q).

Table 6D-1 Projected outcomes of retiring at ages 57 and 62 compared to age 67 for a lower-income earner (20th percentile)

Retirement age and reason for retirement	Income support payment received before age 67	Replacement rate from age of retirement (per cent)	Superannuation balance at retirement ($)	Average annual income — *all years of retirement* ($)	Average annual income — *retirement to age 60* ($)	Average annual income — *age 60 and over* ($)
Retire at 67						
Age Pension eligibility age	N/A	129	222,300	36,400	N/A	36,400
Retire at 62						
Job-related	JobSeeker Payment between ages 64-66	114	185,700	32,100	N/A	32,100
Own ill health	DSP until age 67	126	185,700	35,400	N/A	35,400
Caring responsibilities	Carer Payment until age 67	127	185,700	35,700	N/A	35,700
Retire at 57						
Job-related	JobSeeker Payment until age 67	110	149,500	30,800	10,100	32,800
Own ill health	DSP until age 67	125	149,500	35,300	23,000	36,400
Caring responsibilities	Carer Payment until age 67	128	149,500	35,900	25,400	36,900

Note for Table 6D-1, Table 6D-2 and Table 6D-3: Values are in 2019-20 dollars and rounded to the nearest $100. Superannuation balance at retirement is deflated by average weekly earnings. Retirement income is deflated using the review's mixed deflator. Replacement rate uses average income of the last 10 years of working life and average lifetime retirement income. For consistency, the working life of the person who retires at age 67 is used as the replacement rate denominator for all retirement ages. 'Average annual income –age 60 and over' averages retirement income at ages 60 and over provided an individual is retired in those years. 'Average annual income — retirement age to age 60' averages retirement income at ages 57-59 provided an individual is retired in those years. The cameo assumes that before age 60 (superannuation preservation age), people do not take actions to boost their income until they reach preservation age (such as using early release of superannuation). People who retire before age 67 draw down at the higher of the maximum Age Pension less any JobSeeker Payment, Disability Support Pension ('DSP' on chart) or Carer Payment, plus supplements, they receive, or minimum legislated rates between preservation age and age 67. Superannuation is not assessable in the social security means test prior to Age Pension eligibility age until it is converted into an income stream. This modelling assumes this occurs at age 60 for people who retire before age 60. This results in the middle- and higher-income earner who retires at age 57 not receiving the JobSeeker Payment after age 60. The higher thresholds for the income and assets tests for Disability Support Pension and Carer Payment mean most early retirees continue to receive Disability Support Pension and Carer Payment after age 60. Source: Cameo modelling undertaken for the review.

Table 6D-2 Projected outcomes of retiring at ages 57 and 62 compared to age 67 for a middle-income earner (50th percentile)

Retirement age and reason for retirement	Income support payment received before age 67	Replacement rate from average of retirement (per cent)	Superannuation balance at retirement ($)	Average annual income — *all years of retirement* ($)	Average annual income — *retirement to age 60* ($)	Average annual income — *age 60 and over age* ($)
Retire at 67						
Age Pension eligibility age	N/A	87	452,000	42,100	N/A	42,100
Retire at 62						
Job-related	None	78	367,700	38,000	N/A	38,000
Own ill health	DSP until age 67	80	367,700	38,900	N/A	38,900
Caring responsibilities	Carer Payment until age 67	81	367,700	39,100	N/A	39,100
Retire at 57						
Job-related	JobSeeker Payment until age 60	72	292,400	35,000	11,200	37,200
Own ill health	DSP until age 67	79	292,400	38,300	24,100	39,700
Caring responsibilities	Carer Payment until age 67	80	292,400	38,900	26,500	40,100

Note: See Table 6D-1. Source: Cameo modelling undertaken for the review.

Table 6D-3 Projected outcomes of retiring at ages 57 and 62 compared to age 67 for a higher-income earner (80th percentile)

Retirement age and reason for retirement	Income support payment received before age 67	Replacement rate from age of retirement (per cent)	Superannuation balance at retirement ($)	Average annual income — *all years of retirement* ($)	Average annual income – *retirement to age 60* ($)	Average annual income — *age 60 and over* ($)
Retire at 67						
Age Pension eligibility age	N/A	69	804,700	53,700	N/A	53,700
Retire at 62						
Job-related	None	58	646,900	45,000	N/A	45,000
Own ill health	None	58	646,900	45,000	N/A	45,000
Caring responsibilities	Carer Payment until age 67	58	646,900	45,400	N/A	45,400
Retire at 57						
Job-related	JobSeeker Payment until age 60	53	506,600	41,000	16,800	43,200
Own ill health	DSP until age 60	54	506,600	42,100	30,000	43,300
Caring responsibilities	Carer Payment until age 67	55	506,600	42,800	32,500	43,800

Note: See Table 6D-1. Source: Cameo modelling undertaken for the review.

Table 6D-4 Projected outcomes of retiring at age 70 compared to age 67 for a lower-income earner (20th percentile)

Retirement age	Employment status from ages 67 to 70	Replacement rate from age of retirement (per cent)	Superannuation balance at retirement ($)	Average annual retirement income ($)
67	Retired	129	222,300	36,400
70	Receive three-quarters of normal wage	132	242,100	37,200
70	Receive normal wage	132	244,600	37,200

Note for Table 6D-4, Table 6D-5 and Table 6D-6: Values are in 2019-20 dollars, rounded to the nearest $100. Superannuation balance at retirement is deflated by average weekly earnings. Retirement income is deflated using the review's mixed deflator. Assumes for people who retire at age 70, they do not access superannuation and other savings until age 70 but they receive the Age Pension from age 67 if they are eligible. Most people who continue to work between ages 67-70 will not qualify for the Age Pension at these ages due to the income test. Three-quarters of normal wage assumes an individual earns 75 per cent of the average wage for their age and income percentile between the ages of 67-70. Normal wage uses average wages according central case specifications. *Appendix 6A. Detailed modelling methods and assumptions* includes a detailed explanation of the wage data using this methodology. For consistency, the working life of the person who retires at age 67 is used as the replacement rate denominator for all retirement ages. Source: Cameo modelling undertaken for the review.

Table 6D-5 Projected outcomes of retiring at age 70 compared to age 67 for a middle-income earner (50th percentile)

Retirement age	Employment status from ages 67 to 70	Replacement rate from age of retirement (per cent)	Superannuation balance at retirement ($)	Average annual retirement income ($)
67	Retired	87	452,000	42,100
70	Receive three-quarters of normal wage	92	499,100	44,600
70	Receive normal wage	92	506,000	44,800

Note: See Table 6D-4. Source: Cameo modelling undertaken for the review.

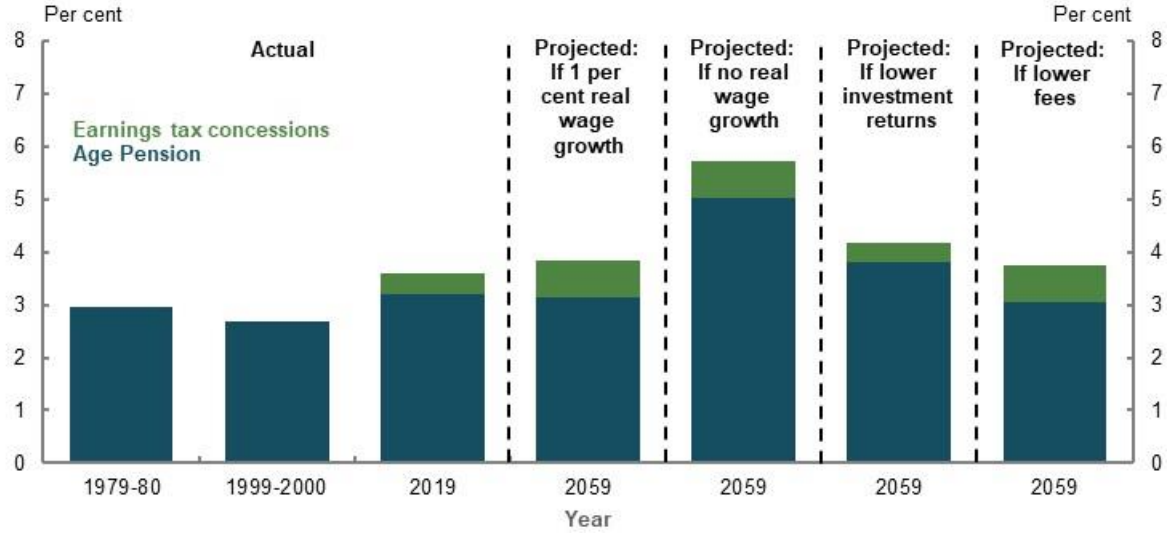
Table 6D-6 Projected outcomes of retiring at age 70 compared to age 67 for a higher-income earner (80th percentile)

Retirement age	Employment status from ages 67 to 70	Replacement rate from age of retirement (per cent)	Superannuation balance at retirement ($)	Average annual retirement income ($)
67	Retired	69	804,700	53,700
70	Receive three-quarters of normal wage	78	891,500	60,600
70	Receive normal wage	79	904,400	61,200

Note: See Table 6D-4. Source: Cameo modelling undertaken for the review.

Intergenerational equity

Chart 6D-18 Past and projected generational transfer cost as a proportion of wages



Note: Generational transfer cost is the annual cost per working-age person of the Age Pension and superannuation earnings tax concessions retirees receive. Assumes CPI growth is 2.5 per cent per year. Wages in 1979-80 refers to 'average weekly earnings per employed male unit' in September 1979; in 1999-2000 and 2019 it refers to 'Earnings; Persons; Full-Time; Adult; Total earnings' in November 1999 and November 2019, respectively. Earnings tax concessions are not included before 2019 due to data limitations. Data points vary between financial and calendar years to align with the time period of the underlying data. See *Appendix 6A. Detailed modelling methods and assumptions* for additional assumptions used in the lower investment returns and lower fees scenarios. Source: Year Book 1981 and 2001 (ABS, 2018g) (ABS, 2019b), (ABS, 2020d); Analysis of Rice Warner estimates for the review.

Section 6E. Consultation process

Approach to the review

The panel has taken a consultative approach to the Retirement Income Review (the review).

A consultation paper was released on 22 November 2019, with the panel inviting public submissions until 3 February 2020. The review received over 430 submissions in response to the consultation paper.

In addition to formal submissions, the panel held two information sessions early in the consultation process. Panel members conducted numerous meetings with key stakeholders and held a technical roundtable to consider the results of scenario modelling.

Consultation

Panel and secretariat meetings

The panel met with the secretariat on over 40 occasions, with meetings being held both face-to-face and via video conference.

Stakeholder meetings

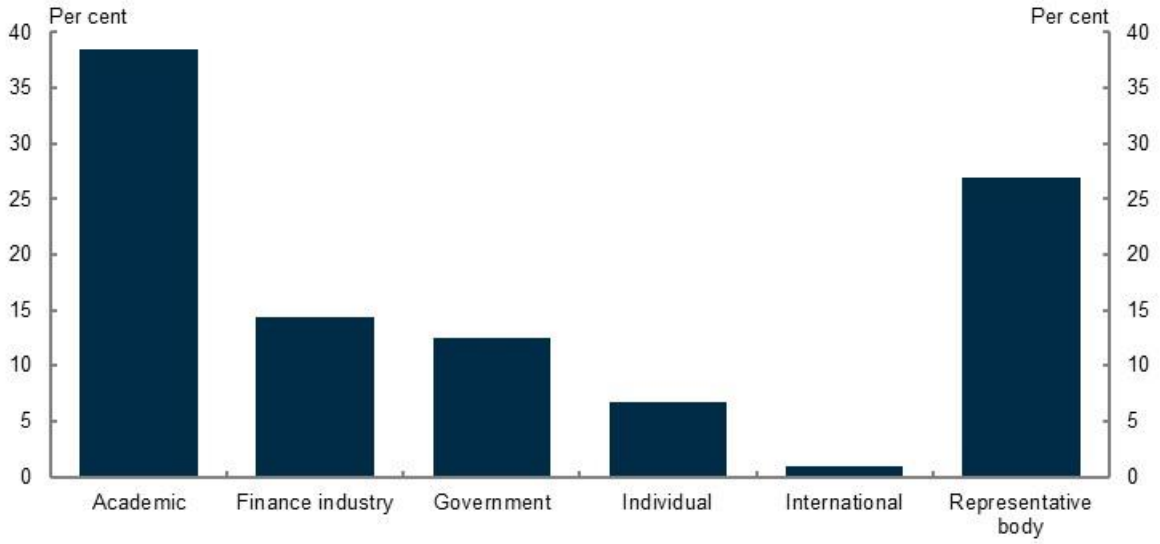
After releasing the consultation paper on 22 November 2019, the panel hosted two information sessions attended by representative bodies, academics and policy and research entities as well as representatives from the financial services industry (Table 6E-1).

Table 6E-1 Information session attendees

Melbourne information session 9 December 2019	Sydney information session 10 December 2019	
ASIC	Aberdeen Standard Investments	QSuper
Australian Institute of Superannuation Trustees (AIST)	Australian Council of Trade Unions (ACTU)	Rest
Cbus	Actuaries Institute	Rice Warner
COTA	AI Group	Self Managed Super Fund Association
EY	AMP	SunSuper
First State Super	ARC Centre of Excellence in Population Ageing Research (CEPAR)	Super Consumers Australia
Grattan Institute	Association of Independent Retirees	UNSW Business School
HESTA	Business Council of Australia	
Hostplus	Challenger	
Industry Super Australia	Chartered Accountants Australia & New Zealand (CAANZ)	
Mercer	Commonwealth Superannuation Corporation	
Milliman	Conexus Institute	
National Seniors Australia	COTA	
SunSuper	Financial Planning Association	
Togethr Trustees	Financial Services Council	
Vanguard	First State Super	
VicSuper	Milliman	
Women in Super	MLC Wealth	

More than 140 meetings were held over the life of the review. Around 100 of these were external meetings (Chart 6E-1), conducted by either the panel or secretariat with stakeholders.

Chart 6E-1 External meetings by stakeholder type



Note: Meetings included those conducted by either the panel or secretariat where they met with an external stakeholder/s on each occasion they met. Source: Data collected by the review.

During the consultation period, the panel conducted more than 40 meetings directly with stakeholders (Table 6E-2).

Table 6E-2 Panel meetings with stakeholders

Stakeholder category	Number
Representative bodies	14
Academics or policy research groups	5
Finance industry entities	8
Regulators or government entities	4
Individuals	10
TOTAL	**41**

In addition to consultation meetings conducted by the panel, the secretariat formally met separately with over 50 stakeholders (Table 6E-3).

Table 6E-3 Secretariat meetings with stakeholders

Stakeholder category	Number
Representative bodies	9
Academics or policy research groups	31
Finance industry entities	1
Regulator or government entities	9
Individuals	1
International organisation	1
TOTAL	**52**

Technical roundtable

On 13 March 2020, the panel conducted a technical roundtable with a number of experts in modelling of the retirement income system (Table 6E-4).

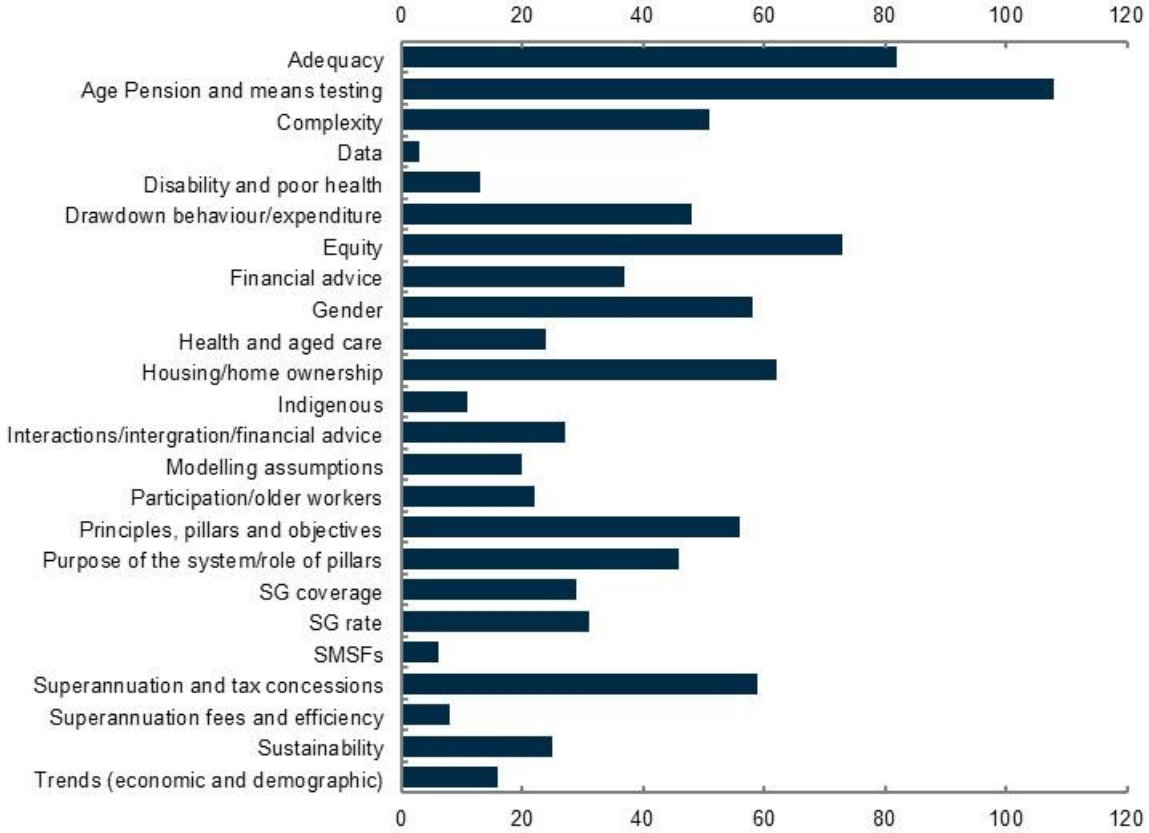
Table 6E-4 Roundtable attendees

Name	Organisation
Hazel Bateman	CEPAR
Nathan Bonarius	PwC
Ross Clare	ASFA
Brendan Coates	Grattan Institute
Jacki Ellis	First State Super
Phil Gallagher, PSM	ISA
Dr David Knox	Mercer
Matthias Oldham	Super Consumers Australia
Michael Rice	Rice Warner
Geoff Warren	ANU

Submissions

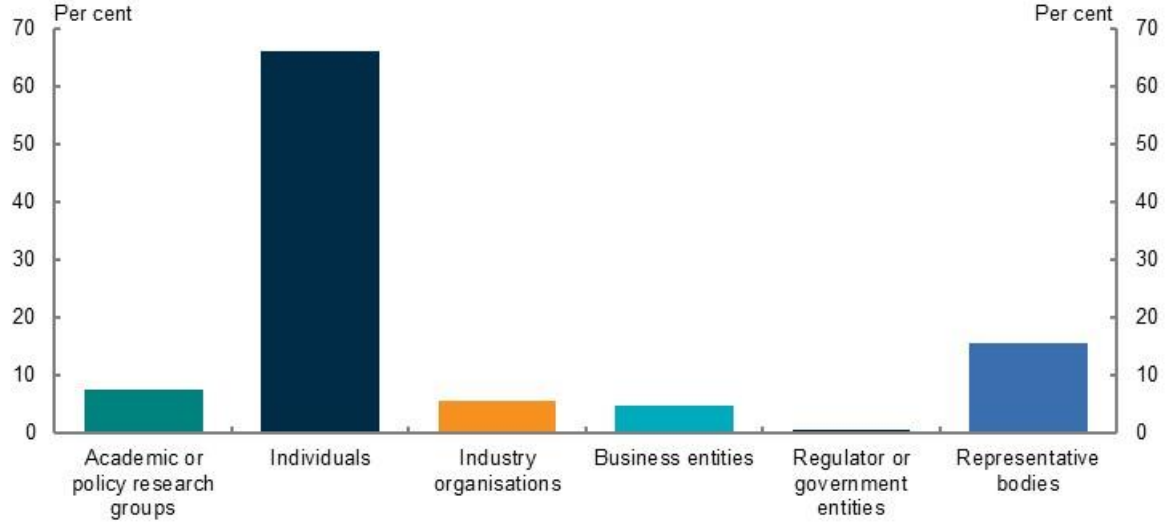
Over 430 submissions made to the review, covering a number of key topics (Chart 6E-3), came from both individuals and various organisations (Chart 6E-3).

Chart 6E-2 Submissions, by topic category



Source: Data collected by the review.

Chart 6E-3 Submissions by stakeholder category



Note: The above chart shows the entities that have made a submission rather than the number of submissions received. In some instances, the one entity provided more than one submission.

Of all submissions received, 143 were made in a confidential capacity and were not published. All non-confidential submissions were published on the Treasury website (Table 6E-5) including 13 submissions that requested anonymous publication.[339]

Table 6E-5 Non-confidential published submissions

Submitters	Submitters
Actuaries Institute	Australian Unity
AIA Australia	Australian Women Against Violence Alliance
Amabile, Peter	Ballantyne, John
AMP Services Ltd	Bartus, Zoltan
Association of Independent Retirees	Bell, Charlie
Association of Independent Retirees — Bunbury Branch	Benson, Graeme
Association of Independent Retirees — Noosa Branch	Berrill and Watson Lawyers
Association of Independent Retirees — Sydney Hills District Branch	Berry, Denise
Australian Council of Public Sector Retiree Organisations	BetaShares Capital Ltd
Australian Council of Social Service (ACOSS)	Birch, Denver
Australian Council of Trade Unions	Brander, Jim
Australian Housing and Urban Research Institute	Brotherhood of St Laurence
Australian Human Rights Commission	Buchanan, James
Australian Institute of Superannuation Trustees	Burt, Dan
Australian Investment Council	Business Council of Australia
Australian Manufacturing Workers' Union	Cain, David
Australian Nursing and Midwifery Federation	Carers NSW
Australian Pensioners' Voice	Carroll, Linda
Australian Services Union	Cbus
Australian Shareholders' Association	CDI Consulting Pty Ltd
Australian Super	Centre for Future Work (Australian Institute)

[339] Submissions can be found at <https://treasury.gov.au/consultation/c2019-36292/submissions>.

Submitters	Submitters
Australian Taxpayers' Alliance	Centre for Law, Markets and Regulation (UNSW)
Centre for Excellence in Population Ageing Branch	Financial Equity Alliance
Challenger Limited	Financial Planning Association of Australia
Chartered Accountants Australia and New Zealand	Financial Services Council
Cherian, George	First State Super
Chief Executive Women	Fix Pension Poverty Campaign
Codron FIAA, Richard	Ford, Christine
Colonial First State	Ford, Frank
Combined Pensioners and Superannuants Australia	Franklin, Simon
Committee for Sustainable Retirement Incomes	Freeman FACS, Andrew
Connecting Every Dot Pty Ltd	Fridman, Boris
Considine, Vera	Fitzpatrick, Sean
Constantinou, Georgia	GA Cossar and Co Pty Ltd
Cook, Chris	Gilligan, Dr Mike and Craig, Dr Stuart
Cook, Chris	Goodrick, Sue
COTA Australia	Gorecki, Piotr
Cottrell, Rob	Graham, Lorraine
Country Press Australia	Grant, Dr Will J
Cox, Andy	Grattan Institute
Cox, David	Grieves, Daniel
CPA Australia	Griffith Centre for Personal Finance and Superannuation (Griffith University)
Cranford, Alex	Gryostat Capital Management
Daniel, Hugh	Hackett-Jones, Richard
Dapre, Robert	Harrison, Ian
Davis AM, Kevin	Hart, Michael
Davis, David	Hawkins, Dr John
de Jong, Piet	Health Services Union
Devitt, Neil	Hebden, Mark
Dines, John	Heffron SMSF Solutions
Diversa Trustees Limited (Sargon)	HESTA Super fund
Dockery, Prof Michael (Bankwest Curtin Economics Centre)	Hewitson, Gillian
DomaCom	Hodgkinson, Norman
Echter, Michael	Holding, Anne
economic Security4Women	Horan, David
Edmonds, David	Household Capital
Edsall, Jem	Housing Industry Association
EveryAGE Counts	Howe PhD, Anna
EY	Hristoforidis, Ian
Fair Go For Pensioners — Coalition Victoria	Hull, Crispin
Fair Go For Pensioners — Newcastle Branch	Hunter, Andrew
Fair Go For Pensioners Queensland	Industrial Relations Victoria (VIC State Government)
Fairweather, John and Shirley	Industry Super Australia
Financial Services Council	IOOF Holdings Ltd
Finance Sector Union	Johnson, Rob

Submitters	Submitters
Johnston, Kerry	Paton, Rob
Kahmann, Ron	Pauley, John
Kalkman, Hendrikus J	Plain English Economics Pty Ltd
Kent, John	Plato Investment Management
Khemka, Dr Gaurav, and Warren, Associate professor Geoff, ANU	Police Federation of Australia
KPMG Australia	Positive Life NSW
Lacey, Jan	Preston, Professor Alison (University of Western Australia)
Langsam, David	PricewaterhouseCoopers
Layt, Mick	Prime Super
Leite, Natalie	Property Council of Australia
Lewington, Geoff	Queensland Nurses and Midwives' Unions
Lewis, Evan	Rasmussen, Lisbeth
Leys, David	Rea, David
Maurice Blackburn Lawyers	Reason, Jenny
Mayo, Wayne	Reid, Robert
McCall, Grant	Rest
McGarrity, Ian	Reynolds Peter
McIntosh, John	Rhodes, Julie
Mercer	Rice Warner
Mission Australia	Richards, Barnard M
MLC Wealth	Ritchens, Denise (Northeast Health Wangaratta)
Monash Centre for Financial Studies (Monash University)	Rohan, Geoff
Money Farms Pty Ltd	Rossiter, Janis
Moore, Chris	Rush FIAA, David
Murray, Dr Cameron K	SA Superannuants
Mutual Pensions Pty Ltd	Sanders, Anthony
National Council of Women Australia	Save Our Super
National Foundation for Australian Women	Scheiwe, Dan
National Council of Women Australia	Seccombe, John
National Foundation for Australian Women	Self-managed Independent Superannuation Funds Association (SISFA)
National Seniors Australia	Selwood, Annie
Norton, Lachlan	Shop, Distributive and Allied Employees' Association (SDA National)
Nurses Professional Association of Queensland	Simpson, Dave
O'Connell, Justin	Skelton, Johnathan
Olenich, Sergio	Skepper, Flynis
O'Neill, Christopher	SMSF Association
Ong ViforJ, Rachel	Social Ventures Australia
Optimum Pensions Pty Ltd	Southam, Paul
Spivey, Richard, and Goodman, Russlyn	Superannuated Commonwealth Officers' Assn (WA) Inc
Stafford, John	SuperEd
Stockbrokers and Financial Advisers Association	Sustainable Australia Party
Pantlin, Tony	Super Consumers Australia

Submitters	Submitters
Parker, Roger	Swanson, Bruce
Swincer, David	Wareing, Graham
Tailored Superannuation Solutions Pty Ltd	Watts, Charlene
TAL Life Limited	Waugh, Madonna
Tasmanian Association of State Superannuants Inc	Weir, Pat
TelstraSuper	Western Australia Self Funded Retirees Inc
The Alliance for a Fairer Retirement System	Western Australian Government
The Association of Superannuation Funds of Australia Limited	White, Alan
The Centre for Independent Studies	White, Eugene
The Conexus Institute	White, Greg
The Housewives of Western Sydney	Whitely, Zac
The McKell Institute Victoria	Wilkinson, Mrs J
Thomas, Ian	Williams, Graham
Thompson, Mark	Winterson, Joshua
Thorp, Dr David	Women in Social and Economic Research
Tietze, Karl	Women in Super
Tindale, Roger	Work and Family Policy Roundtable
Turner	Workplace Gender Equality Agency
UniSuper	Yasmineh, John
van Dyk, Leonota	Yazdani
Van Wyk, Brnic	Young, Donald
Vanguard Investments Australia Ltd	YourLifeChoices
Walta, Ed	Women's Electoral Lobby
Walters, Arthur	Woodhead, Maggie
Wanders, Wayne (The Wealth Navigator)	Woodruff, John

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