3   Projection module: data sources and methodology

As part of its research on *Superannuation Policy for Post-Retirement* the Commission has developed a model — referred to as the Productivity Commission Retirement Model (PCRM) — to assess the effects of increasing the preservation age. The PCRM can be described as a 'behavioural microsimulation' model. Behavioural microsimulation models seek to simulate individual or household level decisions, and are commonly used within an economic framework to assess the impact of policy changes (such as changes in tax and benefits) on governments' fiscal positions and on labour supply. They are particularly useful where there is a wide variety of decision makers, and where complex policy changes are likely to impact these different decision makers in different ways.

The Commission's model consists of three modules:

- *a voluntary retirement module*, which seeks to gauge the behaviour of individuals who have some discretion in how they respond to policy changes

- *an involuntary retirement module*, which seeks to account for those individuals who do not get to exercise choice around the timing of their retirement

- *a projection module*, which seeks to weight the outcomes from the voluntary and involuntary retirement modules, both now and in the future.

This module makes projections about trends in population and household formation and calculates involuntary retirement probabilities — the role of this paper is to detail the data sources and methodology employed in doing so.

Population

The population projections made by the module are based on those published in PC (2013). That paper projects future population by age and sex using assumptions about life expectancy, total fertility rates and net overseas migration (table 3.1). It projects the Australian population to increase to around 38 million by 2059-60 (figure 3.1 left).

These projections assume slightly more modest increases in life expectancy and a slightly lower total fertility rate compared to those underpinning the *2015 Intergenerational Report* leading to a smaller projected population. For these reasons, the *2015 Intergenerational Report* (Australian Government 2015) projects a larger future population (39.7 million by 2054-55).

Table 3.1	**Population projections – key assumptions**
	Assumption
Life expectancy	Death rates are estimated using the Lee-Carter method and drawing on historical trends over the last 30 years. By 2059-60, the life expectancy of males is projected to be 89.1 years (compared with 80.3 years in 2012), and the life expectancy of females is projected to be 91.4 years (compared to 84.6 in 2012).
Fertility	The total fertility rate equal to 1.88 in 2011-12 and is assumed to be equal to 1.85 in the long run. Age-specific fertility rates are calculated by multiplying the total fertility rate by the age-shares of the total rate. The projected age-shares are largely based on the age-shares for 2011-12, but also assume increasing age-shares for older women.
Net overseas migration (NOM)	NOM is equal to 230 000 in 2011-12 and is assumed to be equal to 180 000 in the long run.

Source: PC (2013).

Figure 3.1 **Population projection and household formation, 2012–2055**
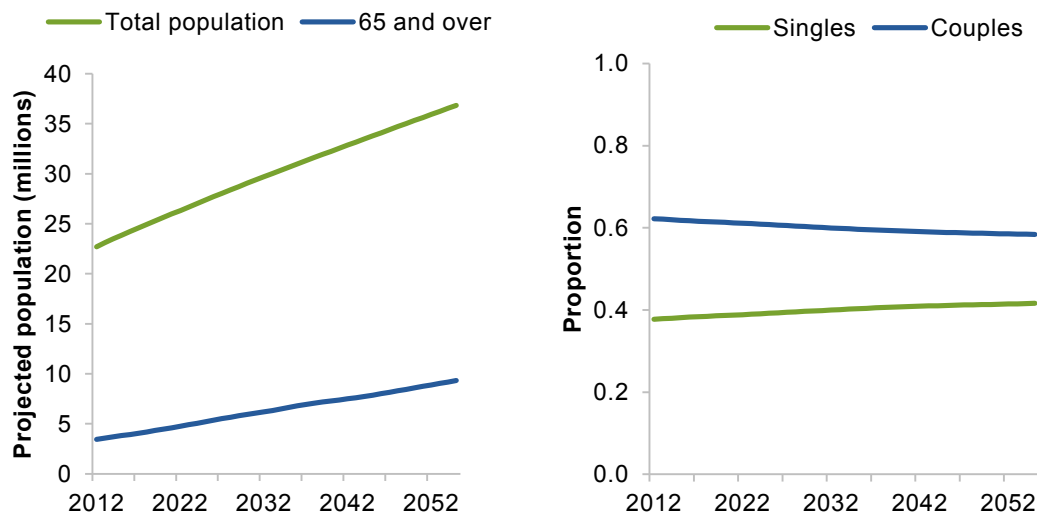
Data source: PC (2013).

Household formation

The PCRM requires projections of the proportion (by age) of individuals who will be in a couple in future years. This is used to determine the split between single and couple households.

The household formation projections used in the model are largely based on a methodology used by the ABS (2015) with some slight variations.[1] The aggregate projections show a slight decrease in the proportion of individuals in a couple household over time (figure 3.1 right).

Involuntary retirement rates

Not all individuals retire at their 'optimal' retirement age. Some may become unemployed and unable to return to the workforce, while others may be forced to retire for health reasons. In order to account for this, involuntary retirement probabilities were calculated.

Involuntary retirement probabilities were constructed using data from wave eleven (2011) of the Household Income and Labour Dynamics (HILDA) survey, and are based on individuals who declared themselves to be completely retired from the workforce (table 3.2). The probabilities were calculated by taking the proportion of individuals who involuntarily retire in a given period relative to those who worked in the previous period (12 months prior).[2]

Involuntary retirement probabilities were sub-divided into five-year age cohorts starting at age 50 (those aged 70+ years were grouped together), to provide a better understanding of individual retirement behaviour at different ages.[3] Probabilities were further disaggregated for each of 12 representative household types. This was achieved by taking averages of involuntary retirement probabilities by household type and using these averages to weight the aggregate probabilities by age (table 3.2).

A special set of involuntary retirement probabilities were also calculated for 50 year olds. This is to account for individuals who have been out of the workforce for most of their lives, and thus do not have the option to involuntarily retire. These probabilities are calculated from the ABS *Survey of Income and Housing* (SIH) and vary by household type.[4]

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[1] First, the projection period is 2012-2055 (compared with 2011-2036 in the ABS report), and second, living arrangement types are aggregated into two main categories: single headed households and couple headed households.

[2] See supplementary paper 5 for more information on the calculation of involuntary retirement rates.

[3] The involuntary retirement probabilities presented in table 3.2 were smoothed across ages using a Hodrick-Prescott filter with λ equal to 6.25 before being used as a model input.

[4] The involuntary retirement probabilities at age 50 were altered for some households who were not in the lowest wealth quartile. This was to ensure that the highest wealth quartiles had the lowest involuntary retirement probabilities.

Table 3.2   **Estimated annual involuntary retirement probabilities**
Per cent

Household type[a]	50-54 years[b]	55-59 years	60-64 years	65-69 years	70 years and over
Single male – WQ 1	1.13	1.22	3.59	6.62	9.87
Single male – WQ 2	0.36	2.67	1.47	7.23	9.99
Single male – WQ 3	0.43	0.31	3.61	6.14	7.82
Single male – WQ 4	0.16	0.46	1.07	1.51	0.80
Single female – WQ 1	1.81	1.95	5.74	10.57	15.75
Single female – WQ 2	0.19	1.40	0.77	3.78	5.23
Single female – WQ 3	0.40	0.29	3.39	5.75	7.33
Single female – WQ 4	0.17	0.48	1.12	1.58	0.84
Couple – WQ 1	1.27	1.36	4.01	7.38	11.00
Couple – WQ 2	0.29	2.10	1.15	5.69	7.86
Couple – WQ 3	0.40	0.29	3.38	5.74	7.32
Couple – WQ 4	0.19	0.52	1.23	1.74	0.92

a Wealth quartile 1 (WQ 1) is the lowest wealth quartile and wealth quartile 4 (WQ 4) is the highest wealth quartile. **b** Age refers to the age of the respondent at the time of the survey and is restricted to individuals who reported that they retired in the past four years. It was not possible to restrict the sample to those who retired in the previous 12 months due to the limited number of observations, hence the four-yearly data have been annualised.

Source: Commission estimates based on HILDA (2013, release 13, wave 11).

References

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