7 Literature review of other models

Before making a decision to develop its own model of retirement behaviour, the Commission reviewed the literature detailing other modelling approaches that have been adopted, particularly in relation to assessing the impact of a change in the preservation age. In general, empirical research into the impacts of changing the preservation age is limited. Published studies in the area include those undertaken by:

- Kudrna and Woodland (2010)
- the National Centre for Social and Economic Modelling (Harding et al. 2009)
- the Melbourne Institute (Headey, Freebairn and Warren 2010; Headey et al. 2007; Warren and Oguzoglu 2010).

The Retirement and Income Modelling Unit within the Department of Treasury also developed a model — called RIMHYPO-B — which has the capacity to examine changes in retirement behaviour (Oliver and Dixon 2010).

The existing models or modelling approaches have their advantages. However, the Commission considers that developing its own retirement modelling capability is preferable, and that a behavioural microsimulation model such as the Productivity Commission Retirement Model (PCRM) is well-suited to analysing the impact of changes to the preservation age (and other policy parameters) on retirement behaviour. In developing the PCRM however, the Commission has drawn extensively on the experience and methodology of others working in this field.

The different approaches and underlying assumptions adopted means that the various modelling results are not directly comparable.

Kudrna and Woodland

Kudrna and Woodland (2010) construct and use a dynamic general equilibrium (GE) model with overlapping generations in order to assess a range of policy proposals, including one that looks at gradually increasing the preservation age to 67 years to match that of the Age Pension age. The paper, which was commissioned by the Department of Treasury, was undertaken by George Kudrna and Alan Woodland at the University of New South Wales, and comprised part of the research that fed into the Henry Tax Review.

The GE model estimates the behaviour of representative households, which are characterised by different ages (21 to 90) and different levels of income (high, medium and low). Households are assumed to maximise their utility by choosing consumption, savings and the hours they work for each year, and are paid their marginal product of labour, which increases and then declines with age. Individuals within each household are uncertain as to when they will die, with a deterministic probability applied at each age. The model assumes that the share of each age cohort as a proportion of the population is constant through time.

The assets of households whose members die before 90 are redistributed equally to households in the cohorts aged between 45 and 65 as a proxy for bequests. The model also includes a means-tested Age Pension, and a superannuation system that pays out all benefits in the form of a lump sum at the age of 60. The model includes standard GE assumptions around the production, government and foreign sectors.

The paper compares a range of policy proposals against a steady-state baseline case, including increasing the Age Pension eligibility age from 65 to 67. By using a steady state, the model assumes that the superannuation system starts at a point of 'maturity'. The model is calibrated using a range of data, including information from the national accounts, ABS life tables and Commonwealth Budgets.

The most relevant policy examined in the paper is one where the preservation age is raised from 60 by one year every two years until it matches the Age Pension eligibility age of 67. The main result is that households accumulate far less private savings over their lifespan to offset the increase in superannuation savings (and so smooth consumption). In the long run, aggregate labour supply increases by 0.44 per cent, and government expenditure on the Age Pension declines by 1.6 per cent. There are different welfare effects depending on whether the households are low, medium or high income. For example, middle income households have lower lifetime welfare (on average) because the benefits from higher consumption in retirement due to accumulating more superannuation savings do not outweigh the welfare losses associated with having to retire later.

NATSEM

The National Centre for Social and Economic Modelling (NATSEM) have developed a dynamic microsimulation model to evaluate and test the longer-term revenue and distributional impacts of possible policy reforms to pensions, taxation and other programs. Their model, the Australian Population and Policy Simulation Model (APPSIM) has been used to explore the impact of three possible policy changes — namely, increasing government pension age from 65 to 67 years, increasing the superannuation guarantee rate from 9 to 15 per cent, and increasing the preservation age from 55 to 60 years.

APPSIM is based on data from the ABS Census of Population and Housing, with probabilities of events for microsimulation based on equations from sources such as the Household, Income and Labour Dynamics in Australia (HILDA) Survey.

The model operates as follows: each individual in the base data is subject to transition equations in sequential modules — demographics, household movement and formation, education and training, labour force, earnings, housing, other income and expenditure, household assets and debt, social security, taxation, health and aged care. After every individual in the base data has been subject to change by all of these modules, each individual's new characteristics are recorded, representing their new state at the end of the first year of the simulation. Then the simulation occurs again, simulating the changes that occur in another year. This can happen up to 50 times, simulating a population changing over a 50 year period.

Unlike the Kudrna and Woodland approach (and the PCRM approach), the APPSIM model does not optimise the retirement decision, but instead uses the parameters from a series of regression equations to estimate the probability of retirement (for each individual) at a given age. Simulating the impact of an increase in the preservation age is done by reducing the probability of retirement at all ages between the old preservation age and the new preservation age.

In 2009, APPSIM was used to simulate a policy shock where the preservation age was immediately increased from 55 to 60 years of age. As a result of this policy change, it was estimated that future government Age Pension outlays in 2049 would fall from 2.5 times to 2.23 times that of 2009 outlays. In relation to Generation X (who will be the first cohort to be directly affected), the model projects that private (retirement) incomes would increase from $657 per week to $850 per week, and thus reduce Government funded Age Pension outlays for this cohort by around 25 per cent (Harding et al. 2009).

Melbourne Institute of Applied Economic and Social Research

The Melbourne Institute have produced a number of research reports (Headey, Freebairn and Warren 2010; Headey et al. 2007; Warren and Oguzoglu 2010) that primarily look at the effects of retirement income policies on mature age workforce participation. These papers use a utility maximization framework (based on the work of Gruber and Wise (2004)) to analyse the effects of changes to retirement income policy on labour force participation.

The Melbourne Institute reports use panel data from the HILDA survey to undertake longitudinal random effects probit analyses of the retirement decisions of mature age workers. The analyses incorporate a range of explanatory variables for retirement decisions, including characteristics of each individual and (where relevant) their spouse, such as age, education, health and work experience, household incomes, assets and debts, superannuation balances, home ownership status and Age Pension eligibility. The models also include an 'option value' for lifetime retirement income as an explanatory variable. The option value represents the expected utility gain from postponing retirement to a later age — it captures both the additional utility of labour income and the utility of retirement (alternately, the disutility of labour). A higher option value denotes a greater incentive to postpone retirement.

Changes to retirement income policy settings, such as a change in the preservation age, will affect the option value at each age for an individual. For example, Headey, Freebairn and Warren (2010) estimate the effect of raising the preservation age from 55 to 60. While this change would be expected to reduce retirement income for those who retire before 60, inducing more participation, they found that the predicted increases in mature age participation were quite modest. For example, the probability of a male aged 55 participating in the labour force as a result of raising the preservation age from 55 to 60 was estimated to increase by 0.6 per cent.

The Melbourne Institute papers generate estimates of the average change in labour force participation by age and gender under alternative policy scenarios but do not generate estimates of the aggregate or economywide effects of policy changes, such as changes in government expenditure, or changes in aggregate employment or activity.

Retirement Income Modelling Unit

The Retirement and Income Modelling Unit (RIM) — previously known as the Retirement Income Modelling Taskforce — within the Department of Treasury undertakes a wide range of costing and modelling work for personal income and tax related issues. The Unit has also played a key role in generating projections for the current and previous editions of the Intergenerational Report.[1]

The modelling unit use the RIMGROUP model for much of this work. RIMGROUP is a comprehensive cohort projection model of the Australian population, which starts with population and labour force models, tracks the accumulation of superannuation in a specified set of account types, estimates non-superannuation savings, and calculates tax liabilities, social security payments including pensions and the generation of other retirement incomes (see Rothman (1997, 2011, 2012)).

RIMGROUP is not an individually based microsimulation model however, and hence does not endogenously determine the retirement age for each individual or cohort. Rather, retirement ages are fixed or assumed.

Another RIM model, RIMHYPO-B, does have characteristics that would allow it to be used to assess the effects of policy changes — such as an increase in the preservation age — on the timing of retirement decisions. RIMHYPO-B is a household-level behavioural model that calculates optimal retirement outcomes based on lifetime utility measured in terms of consumption, leisure, preferences, discount rates and conditional survival probabilities (Oliver and Dixon 2010). Moreover, a large number of simulations can be run for different household types to provide a more representative population cohort, and

1 For more information about the RIM see: http://rim.treasury.gov.au/content/default.asp.

therefore a more realistic distribution of retirement outcomes. While the model generates results for different population cohorts, it does not generate aggregate results for the population or economy as a whole.

The Parliamentary Budget Office has also developed a model to examine changes to retirement behaviour and fiscal costs associated with policy and demographic changes. The model draws on the previous modelling work undertaken within the Australian Treasury.

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