Final Report

Dynamics of Mature Age Workforce Participation: Policy Effects and Continuing Trends

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EXECUTIVE SUMMARY

This report assesses the effects on mature age workforce participation of three types of changes. These are, first, *policy changes already implemented in 2005-07*, notably complex changes to superannuation eligibility and the taxation of mature age people which took effect in July 2005 and July 2007. Secondly, we project the likely future effects of several *policy changes still in the pipeline*, notably the gradual increase in the pension eligibility age for women to 65 by 2013, and then to 67 for both men and women by 2023. *Human capital trends* are a third type of change affecting workforce participation, particularly continuing improvements in the health and educational levels of mature age people.

The public policy concern which motivates this report is the ageing of the Australian population and the effect this may have on economic growth, living standards and the sustainability of government finances. Analyses undertaken by the Australian Government and the Productivity Commission have projected that substantial reductions in the rate of economic growth are likely, unless countervailing measures are taken (Intergenerational Reports (IGR), 2002, 2007, 2010; Productivity Commission, 2005). The Third Intergenerational Report, issued in 2010, noted that if the workforce participation rate of 55-64 year olds could be increased from its current level of about 60% to 67% by 2049-50, then GDP would be 2.4% higher by that date (Intergenerational Report 3, 2010).

The main data source is the Household, Income and Labour Dynamics in Australia Survey (HILDA). The advantage of HILDA for present purposes is that it is the first Australian dataset in which it is possible to follow a large representative sample through various employment

transitions to retirement. It is feasible to compare the characteristics and intentions of those mature age people who retire or exit the labour force at relatively young ages with those who continue working and retire late or never. HILDA began in 2001 with a sample of 13,969 individuals in 7,682 households. Everyone aged 15 and over in sample households is interviewed every year. The main way of maintaining sample representativeness is to follow 'split offs'; that is, original household members are reinterviewed even if they leave ('split off') from their original household and set up a new household. In 2008, the latest year for which data are available, the sample size was 12,785.

Section 1 of the Report outlines conceptual and estimation approaches used for assessing the effects of policy and human capital changes on mature age labour supply. We have mainly used a utility maximisation framework in which mature age workforce participation is viewed as a consequence of variables relating to labour demand and to individual preferences and budgets. Specifically for the purpose of analysing the incentive and disincentive effects of particular policy changes, we have also made use of a framework for analysing retirement decisions developed by Gruber and Wise (2004).

Sections 2, 3 and 4 give our main empirical results and projections. A key preliminary point is that, since the mid-1980s, both male and female mature age participation rates have been increasing quite rapidly, mainly due to a historically high rate of economic growth and associated demand for workers. In Section 2 we estimate that policy changes affecting access to superannuation and the taxation of mature age people – changes which came into effect in July 2005 and July 2007 - did not have statistically significant effects on either male or female workforce participation rates.

These rates continued to rise in 2001-08, but not due to the specific policy interventions assessed here.

Section 3 is about the projected future effects on mature age participation of increases in the Age Pension eligibility age, the superannuation preservation age and the Superannuation Guarantee. By 2023 the pension eligibility age for both men and women will be 67, and by 2025 the superannuation preservation age (the age at which superannuation is accessible without paying heavy taxes) will be 60. In the 2010 Budget it was announced that the Superannuation Guarantee is to increase from 9% to 12% by 2020. It is estimated that the net combined effect of these changes will be to increase the participation rates of 55-64 year old men by about 1% and women by about half a per cent. Increases in the participation rates of 65 and 66 year olds are also projected.

In Section 4 estimates are given of the projected effects of continuing health and human capital trends. Improvements in the health of mature age men and women are projected to increase participation rates by 2.0-2.5% by 2048. Improvements in formal education levels are projected to increase mature age men's participation rate by about 2%, and the women's rate by about 3%.

The concluding section of the report starts with recent evidence from the HILDA Survey about the retirement intentions and retirement income plans of people aged 45 and over. An important question is whether mature age people want to continue working later in life. The evidence is mixed, but it is clear that many people would be content to make a gradual transition to retirement. With this and the other findings of the

report in mind, the final section discusses policy implications and options which may be worth consideration.

Overall, it seems almost certain that the twenty-five year trend towards increased workforce participation by mature age Australians will continue, and is likely to exceed 67% by 2049-50. There are also likely to be gains in workforce participation among 65 and 66 year olds.

In short, the evidence leads us to believe that, for Australia, increased mature age workforce participation seems likely to go a long way towards preventing declines in economic growth previously projected by the Australian Government and the Productivity Commission.

The main point emphasised in the concluding section is that three lines of policy development have been effective or 'successful' in promoting mature age participation, and one type of development has been ineffective. Improvements in health and human capital have already had some impact and appear likely to matter most in future decades. The Australian Government has continuously promoted these trends, and COAG presses their importance in its agenda for a 'third wave' of economic reform (COAG, 2006). Also effective in increasing mature age participation are increases in the Age Pension eligibility age. These have had some positive effect in increasing female participation in recent years and are expected to have larger effects as the pension age for both men and women is increased to 67 by 2023. Indexing the pension eligibility age to rising levels of life expectancy is a step that could be considered for the future. A final effective type of policy – namely promotion of a high rate of economic growth – is of course not mainly directed at

increasing mature age workforce participation, but does so by increasing employer demand for older workers.

Less effective have been policy changes intended to increase mature age participation by means of increasing the after-tax incomes and superannuation savings of seniors. In particular, Budget changes implemented in July 2005 and July 2007 appear not to have made a statistically significant difference to mature age labour supply (although they presumably increased the living standards of seniors). Further changes on these lines are still being canvassed, but should be viewed with caution. The evidence to date is that direct attempts to provide incentives to seniors to undertake more paid work have countervailing substitution and income effects. Some do respond to the possibility of increasing their incomes and savings by increased work, but others take the opportunity to retire with what they regard as an adequate level of superannuation and savings. In aggregate, the substitution and income effects appear to cancel each other out.

SECTION 1

ISSUES, FRAMEWORKS FOR ANALYSIS, DATA SOURCES

1.1 THE PURPOSE OF THE REPORT: *Policy changes and human capital changes 2005-50: their effects on mature age workforce participation*

The policy changes and human capital trends whose effects on mature age workforce participation are to be assessed can be grouped under three headings: policy changes already enacted, policy changes still in the pipeline, and human capital trends which are underway and projected to continue in future years. The timeline is 2005-50.

(i) Policy changes already enacted

(a) *The 2004 Budget* made it possible for individuals aged 55+ to collect their superannuation as an income stream and then continue to do paid work with reduced hours if they wished ('transition to retirement pension'). Previously a person normally had to leave work in order to access super. The changes came into effect in July 2005.

(b) *The 2006 Budget* allowed individuals age 60 and over to collect all of their superannuation tax-free as a lump sum if they wished. The withdrawal tax was abolished, as was tax on earnings from superannuation accounts in pension phase.[1] The concept of reasonable benefit limits was ended, so that individuals in future could hold much higher levels of assets in superannuation accounts in pension phase, free of taxes on earnings (including capital gains). Also, individuals who were receiving superannuation income (i.e. their accounts were in 'pension phase' rather than 'accumulation phase') could in future remain in or return to paid work and have their labour income taxed from a zero base. Previously labour income was added to super income and taxed at the appropriate marginal rate. Further, in the 2006 Budget, the amount of income which could be deposited in superannuation accounts on favourable tax terms as 'undeducted contributions'

[1] Prior to the change, once a person started drawing a pension from his/her superannuation account ('pension phase' as distinct from 'accumulation phase'), tax was only due on earnings on savings which exceeded so-called 'reasonable benefit limits'. The large majority of superannuants did not exceed these limits.

was increased substantially (varying by age group). The Government also introduced a matching contribution scheme for low income Australians, whereby their contributions were matched by Government contributions up to a $1000 limit. These changes took effect on July 1 2007.

(ii) Policy changes in the pipeline

(a) The aged pension eligibility age for women is gradually being increased from 60 to 65. Since 1 July 1995, women's pension eligibility age has increased by six months every 2 years, so that it will be 65 by 1 July 2013.

(b) The pension eligibility age for both men and women is to be gradually raised to 67. Starting on 1 July 2017, age pension eligibility age will increase by six months every two years, reaching 67 years in 2023.

(c) The superannuation preservation age, that is, the age at which superannuation can first be accessed without being heavily taxed, will be gradually increased from 55 to 60 by 2025. Individuals born before 1 July 1960 will continue to have a preservation age of 55, but for those born after that date, the preservation age will be increased by one year for those born between 1 July 1960 and 30 June 1961, by two years for those born between 1 July 1961 and 30 June 1962, and so on, so that for individuals born after 30 June 1964, the superannuation preservation age will be 60.

(d) The 2009 Budget aimed to make continued work for seniors more attractive by replacing the Deferred Pension Bonus Plan with a Work Bonus Scheme. While the Deferred Pension Bonus Plan offered a once only, tax free lump sum bonus to those who continued working beyond Age Pension eligibility age and delayed claiming an Age Pension or service pension, the Work Bonus Scheme operates under the Age Pension Income Test by halving the rate at which the pension is withdrawn for the first $500 of fortnightly income.

(e) The 2010 Budget stipulated that the current 9% compulsory employer superannuation contributions will rise to 12%. The increase in compulsory superannuation contributions will be phased in starting on 1 July 2013, with increments of 0.25

percentage points in the first two years and 0.5 percentage points after that, until 12% is reached in 2019.

(iii) Continuing human capital trends which will affect mature age participation

(a) Older people are gradually getting healthier. It is already well known that better health is associated with increased labour force participation in the 55-64 age group (Woodland 1987; Headey et al 2004). Each successive cohort in 2010-50 is likely to be healthier than the previous one. The Council of Australian Governments (COAG) has adopted a reform agenda which includes the goal of further compressing morbidity into the final stages of life (COAG, 2006).

(b) Similarly, each successive cohort is certain to have higher levels of formal educational attainment than the previous one, and this too is associated with increased participation (Woodland 1987; Headey et al, 2006)

(c) The occupational profile of the workforce is increasingly tilted towards white collar and analytic jobs and away from manual and repetitive jobs. It is hypothesised that this ongoing change may also increase mature age participation.

(e) On a closely related issue, the capacity of manual workers to cope with an extended working life, which is what is envisaged by increasing the 'official' retirement age to 67 by 2023, might affect potential participation.

1.2 PUBLIC POLICY BACKGROUND

A central policy concern is the economic cost of population ageing. The Australian Government and the Productivity Commission have issued a series of reports – the latest being the Third Intergenerational Report (IGR3, 2010) – estimating declines in the GDP growth rate which are likely to occur unless countervailing policy measures are taken. The source of the problem is often expressed in dependency ratios. In 1970

Australia had 7.5 employed people for every economically dependent person; dependents being mainly senior citizens and children. Now in 2010 the dependency ratio is 5:1. By 2050 it will be 2.7:1 (IGR3, 2010). The number of people aged 65-84 will double by 2050 and the numbers of 'very old' (85+) will quadruple. At present the large majority of people retire from paid work before age 65. On average, men who retire in their early 60s then live until their mid-80s and women live until their late 80s. So late life economic 'dependency' typically lasts for over twenty years and is set to rise further as life expectancy continues to increase.

Based on these trends, the Australian Government estimates that, *with unchanged policies*, growth in GDP per capita is set to decline from an average of 1.9% p.a. in the last forty years to 1.5% in the next forty. It is worth mentioning that this projection is less pessimistic than earlier projections made by both the Australian Government and the Productivity Commission, which had the growth rate halving by mid-century (IGR 2002, 2007; Productivity Commission, 2005). Increased immigration and modestly increased fertility largely account for the revisions.

It is also worth mentioning that Australia's potential economic problems due to population ageing are minor compared with some other developed countries. Many countries now publish reports similar to Australia's IGRs. The highlights (or lowlights) of these reports make grim reading. Given unchanged policies, Japan looks set to record a population decline of 20% in the next forty years. About a third of Germany's and Italy's populations are expected to be over 65 in 2050 and Italy's population is also projected to decline. Several countries are projecting either zero or little growth in GDP and also huge increases in public expenditure due to increased health, aged care and pension costs.

Many Western countries have national public pension schemes funded on a pay-as-you-go basis. It appears that declining numbers of working people will be unable to fund pensions at previously expected rates for increasing numbers of retirees, unless major changes occur in Government budgets or public debt. In Australia health and aged care costs are set to increase substantially but this country has a pre-paid direct contribution (DC) pension scheme (the Superannuation Guarantee) rather than a pay-as-you-go direct benefit (DB) scheme. The Superannuation Guarantee will provide an increasing share of future retirement incomes, with the means tested Age Pension contributing a diminishing but still substantial share.

The Australian Government has a clearly articulated policy framework for addressing the economic costs of population ageing. The "3Ps Framework" encompasses productivity, participation and population. Our brief in this report relates to the second 'P' – workforce participation, and more specifically, the participation rate of the mature age population. A key objective of Government policy, at least since the first Intergenerational Report in 2002, has been to reverse the previous trend towards early retirement and to induce more mature age individuals to keep working, either full-time or at least part-time. The mature aged are often defined as those aged 45+, but in line with the approach taken by the Australian Government and the Productivity Commission, our main focus will initially be on those aged 55 to 64, who in the 1970s and 1980s were retiring at younger and younger ages but who are now being encouraged to work longer. The current Australian participation rate for 55-64 year olds is about 60% (men 70%, women 50%), which is a little

above the OECD average, but lower than the rate for the Canada, New Zealand, the UK and the US (IGR3, p.29).

Chart 1.1
Australian and International Participation Rates 2008: Men Aged 55-64

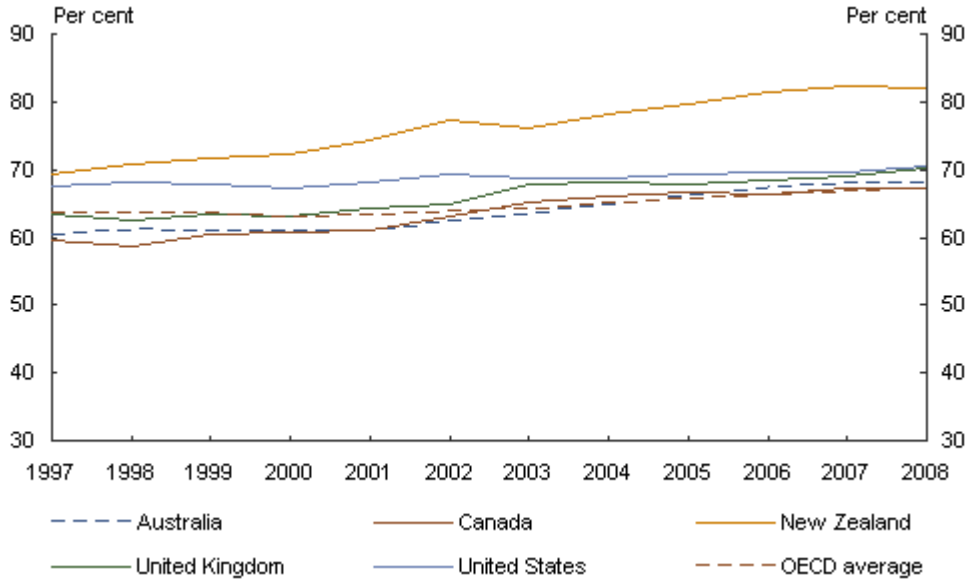
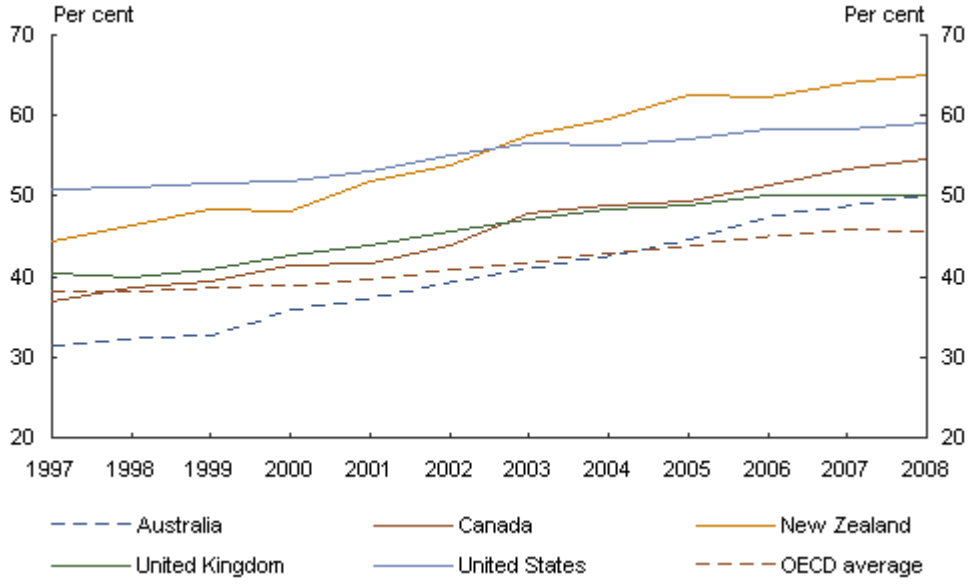


Chart 1.2
Australian & International Participation Rates 2008: Women Aged 55-64



Source: OECD and IGR3 (2010) p. 29

An increase in this participation rate to 67% by 2049-50 would improve GDP per capita by 2.4% compared with unchanged policies (IGR3, p30).[2] Obviously, making estimates and projections as far forward as 2050 is hazardous, but it has become standard for Australian Government reports and academic research to do so, because 2045-50 is when the economic problems caused by population ageing will peak (IGR1, 2002; IGR2, 2007; IGR3, 2010; Productivity Commission, 2005, 2006, 2008).

Many factors, both on the demand and the supply side, affect mature age workforce participation. Most previous research, including our own previous report to DEEWR in 2006, has emphasised *supply side* factors. These include the preferences of mature age people; their desire to work on into their senior years, either full-time or part-time, rather than retire. These preferences are regularly measured by the Australian Bureau of Statistics (ABS) in its retirement intentions surveys. HILDA too has asked in detail about retirement intentions – special modules were added to the Survey in 2003 and 2007 – and has included questions about target levels of savings and income for retirement. Other important supply side variables include the health of mature age people, their levels of education and the extent to which they have retained or gained appropriate skills, their wealth including retirement savings, their earning capacity, and incentives and disincentives due to taxes and transfers. In this report, we shall place somewhat more emphasis on *demand side* factors, especially aggregate demand, indicated by annual economic growth. The effects of more specific demand side factors, like employer attitudes to older workers, will be reviewed, although we have no new empirical evidence to offer in this report.

[2] With unchanged policies the expected participation rate in 2049-50 would be 62%.

A final point relating to ‘policy background’: much of this report is written as if the sole policy objective is for older people to work more . Plainly, this is not so. As in other policy areas, public policy affecting mature age workforce participation involves balancing several competing and potentially conflicting policy objectives. In practice, in this particular area of policy, the Government also needs to be concerned with objectives relating to self-funding in retirement, with the effects of an ageing population on its own tax base and budget, with tax equity and with the strong preference of many seniors for leisure rather than work. We will revisit issues caused by competing objectives in the concluding section of this report on ‘policy implications and options’.

1.3 UTILITY MAXIMISATION FRAMEWORK FOR ANALYSING THE LABOUR FORCE PARTICIPATION EFFECTS OF POLICY CHANGES AND HUMAN CAPITAL TRENDS

The purpose of this section is to lay out an economic model of mature age workforce participation which will provide the framework for estimating the effects of policy interventions and human capital trends.

An initial conceptual issue is whether our analysis should deal with mature age labour force participation, or more narrowly with mature age employment. The official definition of labour force participation includes not only those who are employed, but also those who are unemployed but actively seeking work. From a conceptual standpoint, a participation approach appears desirable, because the aim of current public policy is to keep mature age people active in the labour market, even if sometimes some of them are out of work. Empirically, however, there is a potential problem in treating participation as the dependent/outcome variable of interest in a project about mature age people. It is generally accepted that

non-trivial numbers of mature age individuals who are receiving unemployment benefits have in reality dropped out of the labour force (Freebairn, Porter and Walsh, 1989; Atkinson and Creedy, 1996).[3]

In practice, it transpired that all our main empirical results about current and future trends, and about factors affecting mature age workforce behaviour, were very similar whether we used participation or employment as the outcome of interest. Of course, actual or projected participation rates are always a few percentage points higher than the employment rate, but that is purely a matter of definition. So, in presenting results, we will initially provide estimates relating to both outcomes, but then subsequently concentrate just on participation.

In most analyses the dependent variable is dichotomous – it is labelled "Participation" in tables and it is scored 1=participating and 0=not participating. It may be noted that the Australian Government and the Productivity Commission, in their reports, nearly always use a dichotomous dependent variable in assessing current and future participation and employment rates. However, from the point of view of future economic growth, it can reasonably be argued that what also matters is how many hours mature age people actually work. With this in mind, we will also attempt to assess the effects of major recent policy changes on hours of work, as well as on participation and employment.[4]

[3] The same point applies to some mature age people who are receiving disability benefits, single parent benefits or widow benefits.

[4] It was not considered practical to estimate changes in hours worked which might result from future policy changes or human capital trends. This is not attempted in Treasury or Productivity Commission reports.

A standard economic approach is to view the labour supply decisions of mature age people in an inter-temporal or lifetime context. Individuals are viewed as seeking to maximise utility (satisfaction) over their entire lifetimes.[5] They gain utility from both consumption and leisure, and consumption requires paid work. It should be recognised that the utility maximisation model, while useful as a basis for empirical analysis, is highly stylised. Formally, it takes no account of the utility/satisfaction which people derive from work itself; the model treats work as a necessary evil to fund consumption. It is clear that, in practice, many people enjoy their work, and that some, particularly the self-employed, continue working into old age, partly for the interest and stimulation gained (Diener et al, 1999). Also, the stylised model takes no account of social norms. For example, it might be suggested that a social norm accepted by some Australians is that they have an entitlement to an Age Pension and a pension card. In some cases, they may seek to receive these benefits even if doing so does not maximise consumption or the consumption-leisure trade-off. Nevertheless, despite some inevitable 'distortions', the model provides a sensible framework for analysing work versus retirement decisions; decisions which, perhaps more than almost any other decisions in life, are essentially work versus leisure decisions.

[5] This account draws extensively on Disney (1986).

Equation 1.1 provides a formal framework. U is the utility function which individuals (or households) are trying to maximise. C stands for total lifetime consumption, L for lifetime leisure, H for total hours of work, W for a person's expected hourly wage rate, and T for total time available. Additionally, individuals are assumed to inherit assets A and to want to leave a bequest B.

$$\text{Max } U = U(C,L) \text{ subject to } C = HW + A - B = (T-L)W + A - B \qquad (1.1)$$

It has been pointed out that this equation contains no rationale for retirement (Disney, 1986). If an individual's hourly wage rate and preference for leisure were both assumed to be constant, he/she would have no reason to divide up life between a period of (say) full-time work and a later period of (say) full retirement. In order to account for retirement, it makes sense to add both an employer's perspective and to make some assumptions about changing employee preferences for leisure.

Evidence on the employment and unemployment rates of mature age Australians has been interpreted as indicating that employers generally perceive older people as worth retaining in their current jobs, but not as worth hiring as new employees (Borland, 2004). This inference can also be drawn from survey results showing that older people generally believe that, if they lost their current job, they would have a poor chance of finding one of equal standard (Borland, 2004; Headey et al, 2006). Studies of the attitudes of employers to older workers suggest that they suffer some discrimination in hiring, due to perceptions that their skills may be out of date and they are less adaptable than younger people (Encel and Studencki, 1996; Pickersgill et al, 1996; Encel, 1998;

Bennington and Tharenou, 1999; House of Representatives, 2000; Bittman et al, 2001; and see Borland, 2004). On the other hand, they are perceived positively by employers for their loyalty, experience and work ethic.

More concretely, it is presumably the case that at some age the productivity of (most) employees and hence their hourly wage rate declines. It is also probably the case, and it is conventionally assumed, that the marginal value of leisure (in most people's eyes) tends to increase with age. Plainly, this is another stylised assumption. It may be noted that some older people strongly prefer to work and that individual differences in the preference for leisure probably depend heavily on the number of hours one is working at present and the type of job one has. Some retirees find themselves with too much leisure and may welcome an opportunity to undertake some paid work, if the incentives are right.

Figure 1 illustrates the framework. The marginal product of labour (MVP) and the marginal utility of leisure (MUL) are graphed against age.[6] MVP is shown as an inverted u-shape, reflecting standard assumptions, and MUL is assumed to rise at a constant rate with age.

[6] The scale on the vertical axis is completely arbitrary, representing both values of leisure and labour product.

Figure 1: Model of the retirement decision

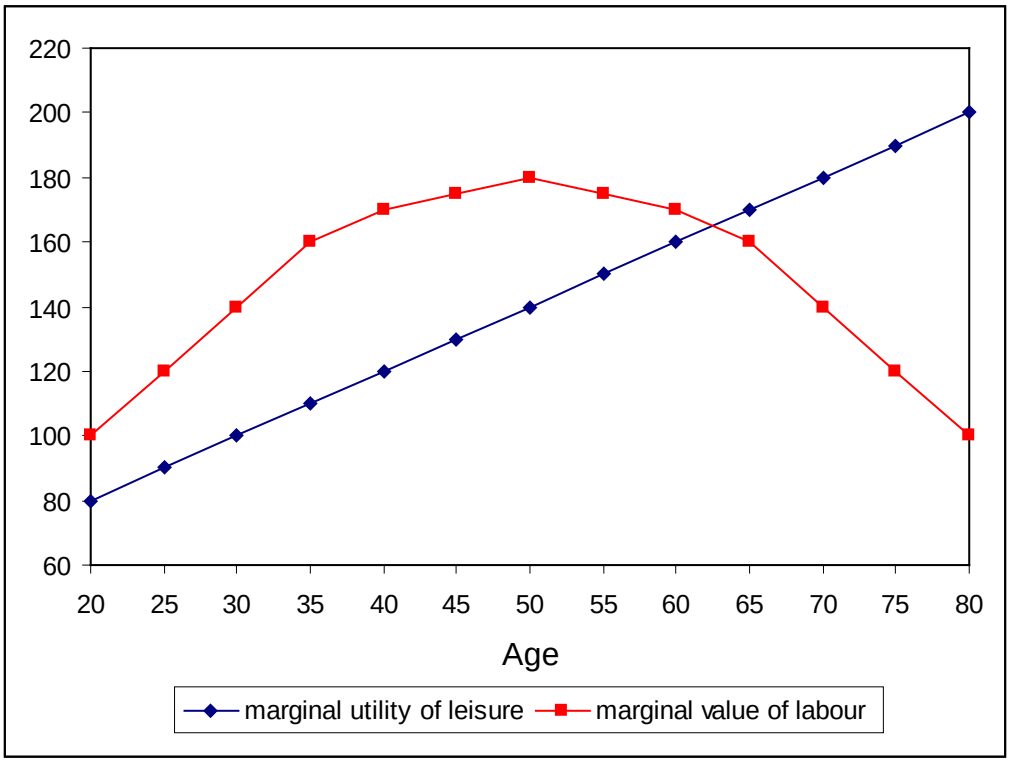


Figure 1 now gives a coherent account of work versus retirement decisions. Individuals are shown as working until their MVP falls below their MUL, at which point they exit the labour force ('retire'). It may be noted that a possible policy implication is that increased incentives for either employees or employers to extend working lifetimes could be counter-productive from a national economic growth perspective. This would be the case *if* individuals were induced (e.g. by tax concessions) to work on past their years of high productivity, possibly substituting for more productive younger workers.

Figure 1 offers an explanation for mature age exit from the labour force, but not for a national unemployment rate. Unemployment can be due to labour costs (wages plus on-costs) exceeding marginal productivity, or to labour market friction (not having the right people with the right skills in

the right place), or to a fall in aggregate demand as, for example, during the recent global economic crisis. A fall in demand creates a gap between the number of people who want to work and those employed at a wage rate mutually acceptable to them and employers. This gap increases in periods of low aggregate demand.

It seems a plausible hypothesis that changes in aggregate demand may affect mature age employees more strongly than others (Gruen, Robinson and Stone, 2005). To some extent they are 'marginal' to the labour force; that is, they may tend to remain in (or perhaps re-enter) the labour force in boom times, and then exit in large numbers when the economy is flat. These considerations suggest that our model should include a measure of the demand for mature age workers.[7] The obvious measure is the mature age unemployment rate, but unfortunately, as noted earlier, estimation of such a model would be undermined by practical problems of determining who is 'unemployed and actively seeking work'. In practice, for our empirical work, we have attempted to take account of aggregate demand by including annual GDP growth rates, lagged by one year, as explanatory variables on the right hand side of equations.[8] Also, when it was found that mature age participation increased steadily throughout the 2001-08 period (see Figures 2 and 3 on page 48) a variable labelled 'Year' coded 1-8 (for 2001-08) was added to the model to pick up this linear trend.

[7] In principle, it would be desirable to have a separate demand equation. However, this would present substantial estimation difficulties. In practice, demand equations are rarely included in papers on labour supply.

[8] Lagged annual GDP growth rates were just moderately related to annual rates of labour force participation (r=0.13). In this period the correlation between contemporaneous GDP growth and the participation rate was actually negative (r=-0.14).

Decisions relating to labour force participation also depend on a range of *preferences and constraints*, and also *budget variables* of a kind that are routinely included in labour supply equations.

Preferences and constraints

Preferences and constraints are not directly measured. Instead variables which proxy for them are taken to be:

- *Age* – older people are hypothesised to have a stronger preference for leisure.
- *Partner's age* – it is expected that married/partnered women in particular will be more likely to be out of the labour force, the older their partner.
- *Gender* – women are hypothesised, on average, to be less likely to want paid work, and to prefer fewer hours than men, partly because of caring responsibilities (see below).
- *Partnered* It is expected that partnered men will be more likely to participate than non-partnered men, but that partnered women will be less likely to do so than unpartnered women.
- *Carer responsibilities* – looking after elderly or sick relatives is likely to reduce workforce participation.
- *Health*: it is well established that ill-health is a key determinant of exit from the labour force (Woodland, 1987; Headey et al, 2006).
- *Partner's health* – it is hypothesised that partnered women will be less likely to seek work if their partner's health is poor.
- *Education* – it is hypothesised that better educated people will be more likely to participate than less well educated people, partly because they can earn more and partly because they are likely to be employed in less physically demanding jobs.

- *History of paid work*: individuals who have long work experience are likely to continue in work, whilst those not in work are likely to remain not working.
- *English competence:* people who speak, read and write English well are more likely to find and keep work.
- *Spouse works*: it is hypothesised that each partner is more likely to work if his/her spouse works – a great deal of evidence suggests joint decision-making of this kind (Jefferson, 2005; Breunig, 2008).

The *budget variables* included in our model include measures of both income and wealth.[9] HILDA has collected detailed information about household wealth (assets, debts) in 2002 and 2006.

- *Hourly rate of pay* All else equal, individuals are more likely to participate in the labour market, the higher their rate of pay after tax. However, rates of pay are partly determined by decisions about labour supply and so may be viewed as endogenous, and hence likely to lead to biased estimates, if inserted directly into reduced form equations (Killingsworth, 1983; Cai, 2010). One common approach to get round this problem is to use estimated rates of pay (or potential pay), both for those who actually work and those who do not. The estimates are based on human capital characteristics and pay in a previous job, if not working now. In practice, when we constructed such estimates, they showed symptoms of endogeneity in our labour supply equations. So we fell back on including a sociological measure of occupational status (the ANU

[9] Time budget (as distinct from financial) variables are only included in the model on the left hand side – hours worked per week. It would, in principle, also be desirable to consider other activities or time allocations.

occupational status scale, AUSEI06).[10] This was positively correlated with employment and appeared to serve as a satisfactory 'instrument' in equations, obviating the endogeneity issue.

- *Partner's hourly rate* It is expected that individuals will be less likely to work themselves, the higher their partner's rate of pay after tax. The expected hourly rate of partners who do not currently work is estimated from their previous earnings and human capital characteristics. It may be noted that the 'partner's hourly rate' is usually regarded as exogenous.
- *Home owned outright* It is hypothesised that people who own their homes outright – that is, the mortgage is paid off – are less likely to work than those who are still paying.
- *Wealth (net worth)* Similarly, it is expected that higher levels of household net worth (assets minus debts) will be associated with a lower probability of working. In this context economists speak of wealth 'substituting' for income in the household budget.

1.4 ESTIMATION ISSUES: PROBIT AND TOBIT ANALYSIS OF MATURE AGE LABOUR SUPPLY DECISIONS

Pulling this together, we have a model in which mature age workforce participation is viewed as depending on aggregate demand, individual preferences and budget variables.

Given a dichotomous dependent variable for mature age participation (1=participating 0=not participating) and the availability of the HILDA panel data, an appropriate statistical technique for is probit analysis. To

[10] Occupational status scales take account of earnings, educational attainment and the social status of occupations. For a detailed description of the ANU scale, see McMillan, J., Beavis, A. and Jones, F.L. (2009) 'The AUSEI06: A new socioeconomic index for Australia', *Journal of Sociology*, 45, 123-49.

be exact, most of the results in this report are based on *longitudinal random effects probit analyses*. A limitation of random effects model estimation, which it has in common with ordinary least squares estimation, is that it has to be assumed that explanatory variables included on the right hand side of equations are uncorrelated with omitted (unobserved) variables. In practice, this assumption is rarely fully met with the consequence that estimated coefficients may be biased. If one finds evidence of bias in estimates where the dependent variable is continuous (rather than dichotomous), the usual remedy is to run a fixed effects (or 'within person') analysis. In this latter type of analysis, the effects of all omitted variables which are constant over time are netted out, giving unbiased estimates. Unfortunately, fixed effects estimation is infeasible for non-linear models, including probit models. An alternative approach is to modify the random effects assumption by using a Mundlak correction (Mundlak, 1978). This involves including within-person over-time averages (means) of explanatory variables on the right hand side of equations alongside the variables themselves. For example, as well as just having the variable 'net worth in year t' on the right hand of the equation, one can also includes the mean of each person's net worth over the total time period. The idea behind the Mundlak correction is that unobserved fixed effects which happen to be correlated with included explanatory variables are more likely to be correlated with the mean variables than with the variables measured in year t, so that any bias affecting the coefficients for the latter variables may be more or less removed. Clearly, the Mundlak correction is only an approximate remedy and it can lead to computational difficulties, including problems of multicollinearity (Wooldridge, 2002). In practice, when Mundlak corrections were added to analyses presented in this report, the substantive policy results of main interest were not significantly affected.

Consequently we have not provided these corrections in the main body of the report and have instead just provided an example in Appendix 2.

Estimating working hours

As noted above, in assessing some recent policy changes, we attempted to account for their effects on weekly hours worked, as well as the decision to participate in the labour force or not. 'Weekly hours' is a continuous variable so it might appear that ordinary least squares estimation (or its longitudinal equivalent) would be appropriate. In fact, this is not the case for reasons pointed out by two Nobel Laureates, James Tobin and James J. Heckman (Tobin, 1958; Heckman and Willis, 1977; Heckman, 1979).

Tobin and Heckman showed that an ordinary least squares approach to modeling the variables affecting working hours leads to biased estimates because of the large number of people who work zero hours. In fact, estimates are potentially biased whether one excludes these individuals on the grounds that they do not work at all, or includes them on the grounds that they could be considered as supplying zero hours. Heckman strikingly demonstrated the practical importance of these insights in research on women's wages (Heckman, 1979, 1980). If women who did not work at all (many of whom had self-selected into home duties) were excluded from the wages equations, estimates of women's wages were biased upwards. If they were included with a wage of zero, estimates were biased downwards.

Heckman dealt with the problem by proposing a two-decision and hence two-stage approach to modelling wages. In this approach, the determinants of the decision to work or not are viewed as distinct from the determinants of the decision on wages (or hourly rates). In this report

we are not concerned with wages, but only with labour force participation and, to a limited extent, with working hours, so we can follow the somewhat simpler solution – Tobit regression analysis - proposed earlier by James Tobin (1958). In practice, it has become more or less standard in economics to use the Heckman approach for modelling wages and the Tobin approach for modelling working hours.

Tobit regressions can be used in a wide variety of situations when one is dealing with *censored* data. Here we are dealing with data which can be treated as *left censored* in the sense that, although we know that some individuals do not work, their score of zero for 'work hours' does not tell us about their propensity to work. Some people who do not actually work right now may have a fairly strong propensity to do so. The Tobit regression estimator is based on the assumption that the dependent variable is normally distributed, although left censored. Using the Tobit approach, the coefficients estimated for explanatory variables are unbiased, provided that other necessary conditions and assumptions are met. However, the approach does not work well when a very large proportion of observations are censored. In these circumstances the assumption of a continuous dependent variable is implausible (Killingsworth and Heckman, 1986; for an Australian application, see Cai, 2010).

Variables and measures: men, women and couples

Table 1 lists the HILDA Survey (2001-08) variables and measures in our labour supply (participation, employment and working hours) equations.

Table 1
List of variables and measures in labour supply equations

Variables	*Measures*
Participation	1=in paid work; 0=not working
Hours	Hours usually worked per week in all jobs combined
GDP growth rate lagged by one year	Annual real GDP growth rate measured from end-Sept. to end-Sept.[a]
Year: linear upward trend in workforce participation 2001-08	Years included in the analysis (coded 1-8)
Age	Age in years (55-64)
Age squared	Age squared/10
Partnered	1=married or de facto; 0=not partnered
Partner's age	Partner's age in years
Carer	Primary carer of a relative with a long term health problem (1-0)
General health: SF-36	Self-assessed health measure, scored 0-100 [b]
Long term health problem	A health problem which has lasted or is likely to last for 6 months or more (1-0)
Years of education	Years of completed full-time equivalent education
Work experience	% of years worked since completing f/t education
Partner works	1= partner works; 0=partner not working
Owns home outright	1=home fully paid off; 0=not paid off
Hourly wage rate (imputed)	Hourly wage rate imputed – see Appendix 1
Partner's hourly rate	Partner's actual hourly rate
Net property equity	Property ($): assets minus debts
Superannuation	Superannuation holdings ($)
Net other equity	Other equity ($): assets minus debts[c]
Eligible for Age Pension	1= women age 62-64; 0=all other 55-64 year old respondents

[a] The September quarter figures are used because most HILDA interviews are held in September-October. [b] Ware, Snow, Kosinski and Gandek (2000) [c] Other than property and superannuation

Empirical results for men's and women's labour supply decisions will be given separately. It is well known that mature age women are less likely to undertake paid work than men, and also on average work fewer hours.

The factors affecting their work and retirement decisions also differ to some extent. Partnered women often exit the labour force at the same time as their older partners (Borland, 2004; Warren, 2006; Jefferson, 2005; Headey et al, 2006).

Ideally, the labour supply decisions of married couples/partners should be modelled as 'joint decisions' (Breunig, 2008). However, this imposes substantial econometric difficulties, so the usual approach which is followed here, is to model the decisions of individuals but recognise that partner and household characteristics affect decisions by including these characteristics on the right hand side of equations. So in this report, when modelling the decisions of individual men and women, we included measures of their partner's age and health, as well as partner's work status and hourly rate of pay. Variables measuring household wealth – as distinct from individual wealth (net worth) – are also in our equations.

1.5 FRAMEWORK FOR ANALYSING THE INCENTIVE EFFECTS OF POLICY CHANGES: STYLISED CASES

The probit and Tobit models introduced in the previous section are primarily intended for assessing the effects on mature age participation of policy changes which have already been implemented. In this section we describe a framework which can be used for assessing the likely impact of future policy changes – changes which are still in the pipeline - as well as those already enacted. The aim is to analyse the incentives and disincentives for continued participation (versus retirement) which policy changes present to mature age individuals.

This type of analysis was pioneered by the OECD Economics Department and by the American economists Jonathan Gruber and David A. Wise (Blondal and Scarpetta, 1998; OECD, 2002; Duval, 2004; Gruber and Wise, 1999, 2004). The key outcome they focus on – the outcome which incentives and disincentives most importantly affect – is a person's predicted material standard of living in retirement. This can be measured as a stock or a flow. As a stock, it is one's retirement savings (or "nest egg"), including one's own home. As a flow it is the future retirement income derived from savings.

The OECD Economics Department has primarily focused on the issue of why so many men retire before the statutory pension age (Blondal and Scarpetta, 1998; OECD, 2002; Duval, 2004). Partly due to this work, OECD now issues an annual volume, *Pensions At A Glance*, which provides detailed international statistics on public and private pensions, the adequacy of pensions, the income replacement rates they provide and so forth. It may be noted that Australia has comparatively low income replacement rates…but that partly explains why Australian pension arrangements are under less budgetary pressure than those in other countries.

The OECD reports on mature age participation rest on an underlying utility maximisation framework, as described in the previous section. However, the detailed explanations offered by OECD economists for the fall in participation relate to the specific disincentives imposed by *high implicit tax rates* which employees face if they choose to continue work rather than taking an occupational pension (typically available at 55) or a state pension (typically available for men at 65). OECD publications have been based on calculating differences (expressed in terms of discounted

present values) between the increase in your accrued pension wealth if you continue working versus two cost factors (1) the foregone pension you would have collected if you had retired and (2) continued pension contributions (which are made by employers in Australia, but which, from an economic standpoint, should just be seen as part of the employee's remuneration package).

The statistical models estimated by OECD, and by academic economists, have been designed to account for the differing ages at which people in Western countries retire. Approaches have varied slightly but an underlying common feature, broadly supported by model results, has been that individuals will choose their retirement date in order to maximise their retirement savings. The following quotation precisely states the assumption underlying models aimed at accounting for differences in individual retirement ages:

> *People generally retire when they have the incentives to do so; i.e. when retirement income is high enough and when the financial incentive to continue working is matched by the disutility of continued working (OECD, 2002).*

Astonishing as it may seem, the OECD finds that in most countries, and at all ages from 55 upwards, employees who are eligible to collect a pension face reductions in the annualised discounted value of their pension wealth if they choose to continue to work. In other words, Governments all over the Western world are concerned about the ageing population and early retirement and have a stated policy aim of increasing workforce participation among mature age people. However, the actual incentive structures built into tax and retirement systems in many countries run counter to this policy aim.

Australia has been included in some OECD studies and Australian economists have previously undertaken analyses of detailed incentives faced by employees as they decide whether to continue working or retire (Woodland, 1987; Freebairn, Porter and Walsh, 1989; Atkinson, Creedy and Knox, 1995; Atkinson, Creedy and Knox, 1996; Atkinson and Creedy, 1996; Atkinson and Creedy, 1997; Bacon, 1999). It should be mentioned that, at least prior to recent policy changes (analysed below), Australia appears to have been close to the OECD average in terms of the implicit taxes on the incomes and savings of mature age people (Duval, 2004).

The international comparative literature clearly shows that the higher a country's implicit taxes on continued work, the lower its actual average age of retirement (Duval, 2004; Gruber and Wise, 1999, 2004). This literature focuses on supply side factors. However, in a recent paper O'Brien (2010) also includes measures of demand for labour, including the mature age unemployment rate, and shows that differences in demand also make a substantial contribution to accounting for international difference in mature age employment.

In the last decade the OECD/Gruber and Wise line of research has been extended to include policy simulations in which the incentive effects of *possible future policy changes* (e.g. increasing the statutory retirement age to 67) are estimated (Gruber and Wise, 2004). In our previous report for DEEWR we used Gruber and Wise's approach to analyse the incentives facing mature age Australians who may have been considering exit from the labour force in 2001-04 (Headey et al, 2006).

Adapting the Gruber and Wise model for Australian conditions

Adapting the OECD/Gruber and Wise approach to fit Australian conditions is not straightforward. In most Western countries there is a direct and obvious link between undertaking extra years of paid work and one's later retirement income. The link is spelled out in the rules of defined benefit (DB) social security schemes, which directly state that extra years of earnings will be related in a fixed way to extra retirement income. So the issue for individual decision becomes, 'Will the additional retirement income which I will finally receive if I continue in work be enough to compensate me for the year(s) of retirement income I am choosing to forego, plus the cost of the pension/superannuation fund contributions which I will have to keep on making?'

In Australia the 'system' is quite different. Most retirees still rely on the Age Pension as their main source of income, and most employees are in the Australian Government's Superannuation Guarantee defined contribution (DC) scheme. In DC schemes there is no simple direct relationship between years of earnings and retirement income. Retirement income from these funds depends on how they are invested and what rate of return they achieve.

The data requirements for Australian modelling, compared with European or North American models, are markedly different. However, they are in fact substantially met by the HILDA Survey. For Australian research we need to know about people's superannuation and total wealth portfolios (both the types of assets they hold and their value) because these are what determine private retirement income, pension eligibility and the returns

from continuing in paid employment. The 2002 and 2006 HILDA Surveys collected superannuation and wealth data. In Europe and North America, by contrast, the data requirements for models include individual lifetime earnings profiles, since these are what determine final retirement income.[11] In Australia such earnings profiles are not needed, except for individuals in defined benefit schemes, and even for them the HILDA data about superannuation and wealth holdings give us enough information to make reasonable estimates of future retirement income under different scenarios of continued work versus labour force exit.

In Australia the 'work or exit' choice became much more complicated for some mature age people in 2005, and then more complicated again in 2007. In 2005, for the first time, individuals aged 55+ could get access to their superannuation as an income stream and still continue in work ('transition to retirement pension'). From July 2007 people aged 60+ could get full access to their superannuation – as a lump sum if they wished – and continue in paid work. We shall need to take account of these more complex situations in our simulations, but first let's simplify.

Conceptual and measurement issues

In Gruber and Wise's framework, mature age people facing work versus exit decisions are assumed to be concerned about their 'social security wealth', or rather the future flow of income from that wealth. The concept of social security wealth is not quite appropriate for Australia. In the Australian context, it makes more sense to use the term 'expected lifetime retirement income', which we will abbreviate to LRI. This is *not* just

[11] Note that the models for most overseas countries lack wealth data, which is quite a serious defect, given the importance of property and share holdings to many people's total income in retirement.

income from 'social security'. In Australia it can be a combination of income from the Age Pension, and/or from superannuation, and/or from other private savings.[12]

For a worker who is S years old and plans to retire at age R, LRI is defined as:

$$LRI_s(R) = \sum_{t=R}^{\infty} YRET_t . a_t . \delta^{t-S} \qquad (1.2)$$

Where S = age now

R = retirement age

$YRET_t$ = net retirement income at age t (from all sources), in constant 2008 dollars

a_t = probability of surviving until at least age t, given survival until age S[13]

δ = discount rate[14]

Annual retirement income (*YRET*) includes means tested government payments (Age Pension if the eligibility age has been reached, or Newstart, or Disability Support Pension otherwise), as well as income from superannuation and other assets excluding the family home.[15] It is assumed that the return on superannuation and other savings is 6% per year, less income tax. One's annual LRI in retirement of course depends on life expectancy. So for calculating LRI we need to assume that mature

[12] Only liquid savings and properties other than the family home are included. This implies that people generally prefer to leave the family home as a bequest.

[13] The conditional probabilities that are required for these calculations were derived from gender specific Australian Life Tables (ABS Catalogue 3302.0).

[14] A standard discount rate of 3% is used.

[15] For individuals who have not yet reached Age Pension eligibility age, pension income is calculated according to the means tests for Newstart and the Disability Support Pension and multiplied by the probability of a person of their age and gender receiving that type of income support.

age people will die at the average (mean) age of death for their gender and current age. Also, the calculations are based on an assumption that all savings except the family home are exhausted at death. All estimates of LRI are in net present values discounted back to 2008 (for further details see Headey et al, 2006 and Appendix 1).

Alternative measures of financial incentives affecting the retire versus work decision

Gruber and Wise (2004) propose several alternative measures of the financial incentives affecting the decision to continue in work or retire. However, they all stem from the definition of LRI given above. We now describe the measures used in this report, namely one year accrual in LRI, the accrual rate, the implicit tax rate on continued work, the LRI peak value and the option value.

LRI: One-Year Accrual and Accrual Rate

One-year accrual in LRI is simply the dollar gain or loss in annual prospective LRI due to exiting the workforce ('retiring') in one year's time versus exiting now. So the accrual rate is then the proportional change in LRI due to retiring in a year rather than now.

$$\text{Accrual Rate} = \frac{LRI_t - LRI_{t-1}}{LRI_{t-1}} \qquad (1.3)$$

In order for accrual measures to be positive the increase in the future benefits due to postponement of retirement would need to offset the fact that the individual will receive the benefit for one less year. If the accrual rate is positive, there is a financial incentive to continue working.

However, if LRI in one year's time is lower than LRI if the person retires now (i.e. a negative accrual), there is a disincentive to remain in the labour force – the person gives up an extra year of leisure and their total expected LRI is less than if they had retired one year earlier.

As Gruber and Wise (2004) noted, it is natural to think of the accrual rate as positive, or at least not negative. That is, if a person works for another year and thus foregoes one year of retirement income, it might be expected that the flow of retirement income which began one year later would be large enough to offset the fact that receipt was postponed for a year. However, as already mentioned, in most countries the accrual rate is *significantly negative* (Gruber and Wise, 2004).

Implicit tax rate on continued work

In OECD publications, to make a policy point, the accrual rate has been expressed as a percentage rather than a proportion and viewed as a tax on continued work. The implicit tax rate is the difference in potential annual retirement income from working one extra year (dollar accrual) as a percentage of after-tax wage, multiplied by –1.

$$\text{Implicit tax rate} = -\frac{\text{LRI accrual}}{\text{after tax wage}} \qquad (1.4)$$

If the implicit tax rate is positive, it can be thought of as a tax on work. If it is negative, it can be considered an incentive to work rather than retire.

LRI Peak Value

The LRI accrual and implicit tax rates are really too simple as measures, because they only take account of the immediate benefit of working one extra year versus retiring immediately. In practice we would expect mature age people to have longer time horizons. Gruber and Wise's two remaining measures – LRI peak value and option value – are based on alternative ways of determining the optimum age of retirement. Peak value optimises lifetime retirement income and option value optimises lifetime utility

The peak value is the difference between the maximum possible value of expected LRI and expected LRI if the person retires now.[16] The peak value is defined by the following equation:

$$Peak = \max(LRI_R) - LRI_t, R > t \qquad (1.5)$$

Investigating all possible future retirement ages allows us to identify non-linearities in the accrual profile, which would not be apparent when only one extra year of work is considered. For example, a small negative accrual in year *t* may be followed by a small positive accrual in year *t+1*, and an even larger positive accrual in year *t+5*.

[16] It should also be noted that if LRI for an individual is maximum at time *t*, then the peak of the LRI process will be attained with immediate retirement, and the peak value will be exactly the same as the dollar accrual value. Also, beyond the optimal retirement age (after LRI has peaked) the peak value calculation also collapses to the one-year accrual measure.

LRI Option Value

The final measure, option value, is our (or, really, Gruber and Wise's) preferred measure, It rests on the idea that decisions about when to retire are likely to be based on a desire to maximise utility, and not just income, during one's remaining lifetime. In taking these decisions individuals may be thought of as balancing the utility gained from leisure in retirement, coupled with a certain retirement income, against the disutility of working coupled with a certain labour income. So the option value measure is preferred because (a) it considers utility and not just income, and (b) unlike the previous measures, it takes account of labour income from continued work (if the individual in question chooses that option).

Following Gruber and Wise (2004), we first give an equation which expresses the utility gained from work or, as a proxy, the utility assumed to be derived from labour income:

$$U_w(LABY_s) = LABY_s^{\gamma}$$

where $LABY_s$ = net labour income at age S, and

γ = degree of risk aversion (explained below)

Next is an equation to express the utility of retirement, including leisure in one's retirement years. The proxy here is the disutility of labour; individuals are assumed to weight (prefer) retirement income more than labour income. Hence, the indirect utility of retirement income is:

$$U_R(RETY_s) = (\kappa RETY_s)^{\gamma}, \text{ where } \kappa > 1.$$

where $RETY_s$ = retirement income at age S

γ = degree of risk aversion, and

κ = a measure of the disutility of labour

The parameter γ represents an individual's degree of risk aversion; his/her fear that retirement income is in the future and may or may not be collected.[17] For example $\gamma = 0$ implies a logarithmic utility function with an underlying assumption of high risk aversion (i.e. a strong fear that retirement income may not eventuate). On the other hand $\gamma = 1$ yields a linear utility function and assumes that retirement income is no more at risk than labour income.[18] Stock & Wise (1990) statistically reject the logarithmic utility function for their model using U.S data. We follow their lead in assuming a linear function.

Overall, the option value is the expected gain in utility from postponing retirement to the optimal retirement age, or, in other words, the option value is the maximum utility difference between retiring at any future age and retiring now. Option value can be expressed as:

$$OV_a = \max_h (V_h - V_a), \quad h = a + 1, ..., R \qquad (1.6)$$

In this equation V_a is the total expected utility of retiring at age *a*, and V_h is the total utility of retiring at age *h* ($h > a$).

The total expected utility of retiring at age *a* is defined as:

[17] The two main risks are death and a fall in returns on savings.

[18] For example an individual is indifferent between receiving $5000 with certainty and receiving $10000 with a 50% chance.

$$V_a = \sum_{t=a+1}^{T} \alpha_t \, \delta^{t-a} [\kappa RETY_t]^{\gamma}$$

and the utility drawn from retiring at a later age, *h*, is defined as:

$$V_h = \sum_{t=a+1}^{h} \alpha_t \delta^{t-a} LABY_t^{\gamma} + \sum_{t=h+1}^{T} \alpha_t \, \delta^{t-a} [\kappa RETY_t]^{\gamma}$$

where $RETY_t$ = Expected annual retirement income at age *t*

$LABY_t^{\gamma}$ = expected after-tax wage at age *t*

α_t = probability of surviving until age *t* given survival until age *t-1*

δ = discount rate =1/(1+r) , r = 0.03

T = age of certain death (here assumed to be 102)

k = parameter to account for the disutility of labour, and

γ = degree of risk aversion

Following Boldrin et al (2004) we set *k* = 1.25 and $\gamma = 1.$[19] Under these assumptions, V_a = 1.25(LRI_a) and $V_h = \sum_{t=a+1}^{h} \alpha_t \delta^{t-a} W_t^{\gamma}$ + 1.25(LRI_h), and the option value equation becomes:

$$OV_a = \max_h \left(\sum_{t=a+1}^{h} \alpha_t \delta^{t-a} W_t^{\gamma} + 1.25(LRI_h - LRI_a) \right) \qquad (1.7)$$

A final point: it should be understood that the higher a person's option value, the greater is his/her incentive to postpone retirement.

Stylised case studies

All LRI calculations in this report are for *stylised cases.*.. a diverse range of mature age men, women and couples who are assumed to be facing

[19] Evidence in the literature (Boldrin et al, 2004) shows that the results are not sensitive to sensible variations in these parameters.

decisions to continue in paid work or exit the labour force. The calculations will show whether the persons in question appear to face an increased net incentive to remain in work, or an increased net incentive to retire as a result of recent policy changes, or (later in the Report) changes which are still in the policy pipeline. Calculations on these or similar lines are the best that can be done in estimating the potential effects of future or proposed policy changes. It should be recognised, however, that individuals may or may not respond in the predicted direction to revised incentives. In our previous report to DEEWR we found that the work versus exit decisions of mature age men in 2001-04 did appear to be significantly affected by differences in their LRIs. However, women appeared not to be affected by these incentives and, instead, were more likely to respond to non-financial preferences and constraints, including whether their partner continued in work and carer responsibilities (Headey et al 2006; see also Woodland, 1987; Jefferson, 2005; Warren, 2006).

1.6 MAIN DATA SOURCE: THE HILDA PANEL SURVEY

The main data source for this report is the HILDA (Household, Income and Labour Dynamics Australia) Survey for 2001-08. This panel survey, which is sponsored by the Department of Family, Housing, Community Services and Indigenous Affairs and managed by Melbourne Institute at Melbourne University, provides the first available Australian dataset in which it is possible to follow a large representative sample through various employment transitions through to retirement. It is feasible to compare the characteristics and intentions of those mature age people who retire or exit the labour force at relatively young ages with those who retire late or never. In this report we use the HILDA data to estimate the

effects of policy changes already enacted in 2005-08 on mature age workforce participation. The data are also used to estimate the likely effects of policy changes still in the pipeline and the future effects of continuing human capital changes on workforce participation in 2010-45.

The HILDA Survey began in 2001 with a sample of 13,969 individuals in 7,682 households. The initial response rate, calculated on a household basis, was 66%.[20] Everyone aged 15 and over in sample households is interviewed every year. The main way of maintaining sample representativeness is to follow 'split offs'; that is, original household members are traced and reinterviewed even if they leave ('split off') from their original household and set up a new household. In fact, the entire new household becomes part of the sample. Of course, some sample members drop out due (mainly) to interview refusal or death. But in the last few years the sample size has actually increased. This is because the numbers entering the panel, mainly via split-off households, has exceeded the number of drop-outs. A second factor that boosts sample size is that children in sample households turn 15 and so become eligible for interview for the first time. In 2008, the latest year for which data are available, the interviewed sample size was 12,785.

The sample sizes available for this research on mature age workforce participation are, of course, considerably smaller than this, but are quite adequate. Over 2000 respondents were in the 55-69 age group in 2001-08. When we break results down by gender, the sample size is always over 1000. When we sub-divided by gender and age (e.g. age 55-59), the sample size is still over 500. At first sight these numbers might seem on the low side for some of the statistical analyses undertaken in the report.

[20] That is, one or more respondents were interviewed in 66% of sampled households.

However, it should be pointed out in all analyses the 'cases' are *person * year (person times year).* So, if a person was interviewed eight times in HILDA in 2001-08, he/she counts as eight cases. In practice, the typical HILDA respondent in the 55-69 has to date been interviewed about four times. So our typical sample size, reported for the tables in this report, is around 4000 (i.e. person* year cases).[21]

HILDA's interviews mainly take place mainly in September-October each year, which is convenient timing for projects, like this one, which include evaluations of policy changes. Most policy changes, certainly tax and transfer changes, are implemented on July 1, so the HILDA data are neatly timed for making before-and-after (or time trend) assessments of policy effects.

Most of the questions in the annual survey relate to employment, incomes and family issues. However, modules are included on special topics on a rotating basis. In 2003 and 2007 there have been modules on retirement intentions and financial goals for retirement. These modules are particularly valuable for the current project.

The HILDA project team regularly issues technical reports which assess data quality and, inter alia, benchmark the data by comparing with ABS and other official sources (Watson and Wooden, 2004ab). It is clear that the HILDA employment data, used in this project, mirror accurately the evidence in ABS labour force surveys.

[21] When person*cases are used in regression analyses, rather than just persons, estimated standard errors tend to be too low, because of 'clustering' by person. The usual remedy are to use robust standard errors or standard errors based on clustering. Robust standard errors have been used in this report where possible. However, it should be noted that robust standard errors (and errors based on clustering) cannot be calculated for some estimation techniques, including probit estimation, used in this report.

SECTION 2

EMPIRICAL RESULTS: ASSESSING THE EFFECTS ON MATURE AGE WORKFORCE PARTICIPATION OF POLICY CHANGES ENACTED IN 2005-07

2.1 KEY TRENDS IN MATURE AGE PARTICIPATION

Assessments of the effects of particular policy changes can only be well understood against the background of what was happening to the whole economy, to employment and unemployment, and particularly to mature age labour supply. In the 1970s and early 1980s, in Australia as in most other Western countries, male early retirement – retiring before the pension eligibility age – became increasingly common. So the participation rates of mature age men, particularly 55-64 year olds, steadily declined. At the same time, in Australia and elsewhere, women's employment rates steadily rose.

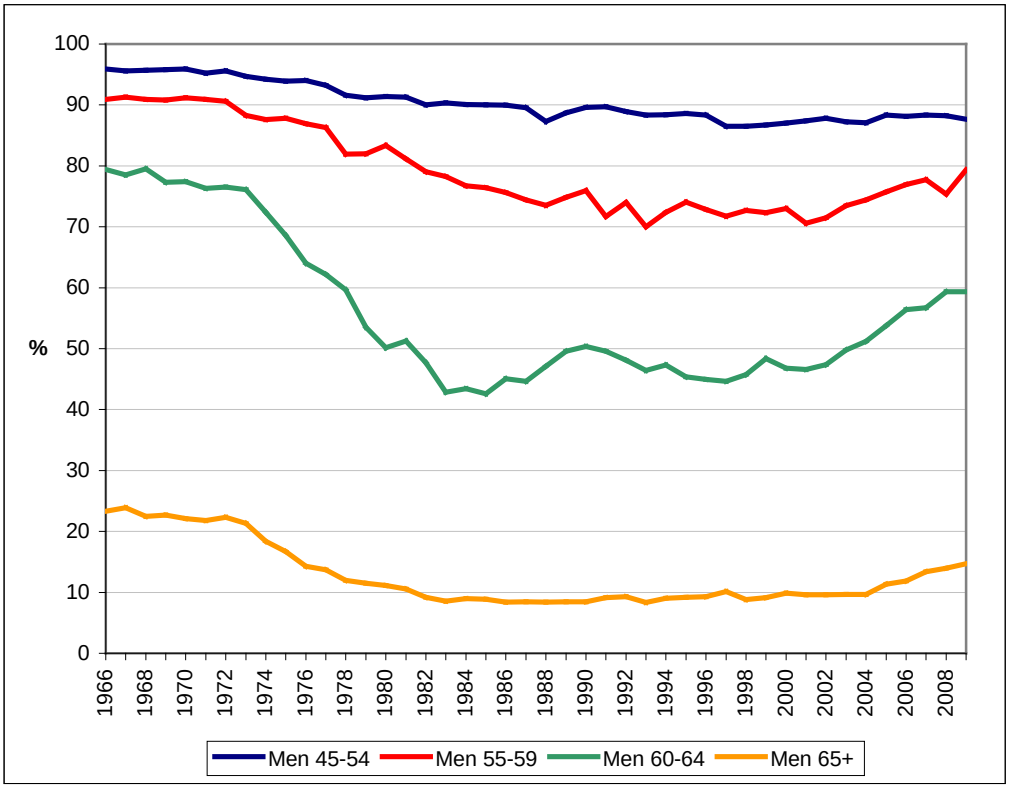
Although the 1970s and early 1980s trend in Australia for more men to retire early mirrored what was happening in other Western countries, there were several factors specific to this country which increased the trend. During the 1970s increasing numbers of war veterans turned sixty and became eligible for a Service Pension. Merrilees (1982) calculated that this factor accounted for 15 of the 26 percentage point decline in 60-64 year old male participation in 1973-80. He further attributes almost all of the decline in the participation of 55-59 year old men to increased access to the Disability Support Pension.

The significance of these special factors, operating in earlier decades, is perhaps emphasised by what has happened since. Since the early nineties the economy has grown strongly and unemployment has fallen. These facts are well known. What is less well known, but crucial, is that the male trend towards early retirement has been sharply reversed; mature age male participation rates have gone up and up, although they are still not back to where they were in the 1960s and 1970s. At the same time

women have continued steadily to increase their labour supply. The graphs below tell the story.[22]

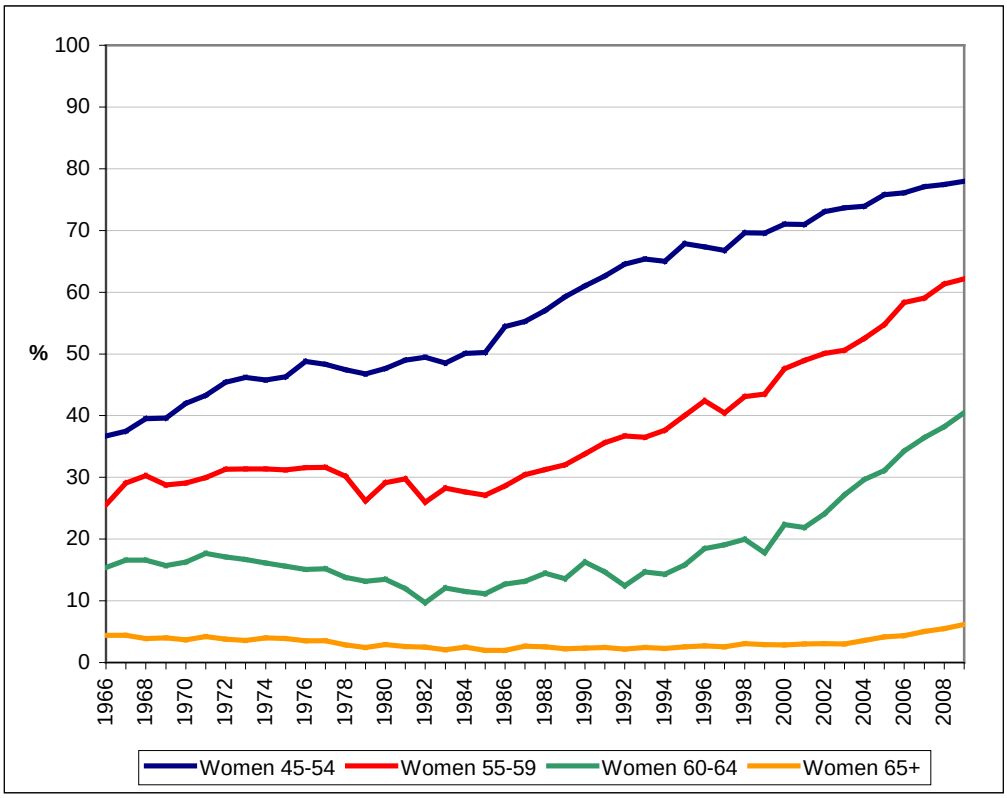
[22] The graphs are only given for 1966 onwards, because before that data the ABS did not routinely supply labour supply figures broken down by age.

Figure 2: Participation Rates Of Mature Age Men 1966-2009



Source: Australian Bureau of Statistics (ABS) 2010, 6291.0.55.001 Labour Force, Australia, Detailed. Australian Bureau of Statistics (ABS) 2009, 6204.0.55.001 - Labour Force Historical Timeseries, Australia, 1966 to 2009.

Figure 3: Participation Rates of Mature Age Women 1978-2009



Source: Australian Bureau of Statistics (ABS) 2010, 6291.0.55.001 Labour Force, Australia, Detailed. Australian Bureau of Statistics (ABS) 2009, 6204.0.55.001 - Labour Force Historical Timeseries, Australia, 1966 to 2009.

These data show, since the mid-1980s, the *aim* of increasing mature age participation has been achieved. The participation rates of mature age men aged 55-59 and 60-64, and of women aged 45-54, 55-59 and 60-64 rose rapidly. Only men aged 45-54 were not part of the steady upward trend. However, these figures cannot be conclusive on whether policies specifically aimed at increasing mature age participation were successful; that is a question addressed in the rest of this report. But they do suggest that a high (and, in general, accelerating) rate of economic growth increased aggregate demand for labour and pulled (or retained) many mature age people into the labour force. People over 55 are often regarded as somewhat 'marginal' to the labour market. They tend to have an increasing preference for leisure, and employers for their part may have mixed feelings about hiring them. But in these years of economic boom, they were drawn into the labour market. O'Brien (2010) has observed the same trends at an international level. That is, in countries which have had comparatively high economic growth rates mature age people have remained in or re-entered the labour market.

When we get into the details of assessing particular policy initiatives, the picture will become less not more clear. We shall find that specific policy packages, introduced at a particular date, offered some positive incentives for increased mature age labour supply, but also some disincentives. Or, to put it another way, policies 'incentivised' and 'disincentivised' different groups of people in different ways. So their net effects on labour supply were often small and (statistically) insignificant. But the background information in the above graphs needs to be in the forefront of the reader's mind. All specific policy packages, introduced in this period, had the effect of perturbing (or not perturbing) a continuing upward trend in participation. The main trend was upwards, driven by

aggregate demand, whether policy x or policy y had a positive, negative or nil effect.

2.2 ASSESSING THE EFFECTS OF THE JULY 1 2007 POLICY CHANGES

Rather than assessing policy changes in the chronological order in which they were introduced, it seems preferable to begin with a fairly detailed analysis of what appear to be the most far-reaching set of reforms to the superannuation and retirement system in 2005-10, namely the reforms announced in the 2006 Budget, which actually took effect on July 1 2007. We will then cover the policy changes of 2005 in less detail, recognizing that they were more or less superceded by the July 2007 package, and then move on to the changes in the 2008 and 2010 Budgets.

The policy changes to superannuation and to taxation of mature aged people's incomes, which were announced in the 2006 Budget and took effect on July 1 2007, were probably the most substantial reforms in this field since the introduction of the Superannuation Guarantee in 1992. They appeared to offer both incentives and disincentives for increased mature age workforce participation. The media headline-catching reform was that individuals age 60 and over would in future be able to collect all of their superannuation tax-free as a lump sum without paying any withdrawal tax. Viewed in isolation this change appeared to make it more likely that individuals with substantial amounts (or potential amounts) of superannuation might well choose not to retire before age 60, but might be more likely to do so immediately on turning 60, especially if their lump sum seemed likely to yield an adequate LRI.

A second major change also offered both work incentive and disincentive effects. The concept of a 'reasonable benefit limit' to superannuation was abolished, which meant that in future individuals could hold very high levels of assets in superannuation in pension phase and pay no tax on earnings or capital gains. This gave people an incentive to transfer assets into superannuation and an incentive to continue in work if they were motivated to build a high level of almost tax free wealth.[23] On the other hand, the changes made it easier for a person with a strong preference for leisure to reach his/her goals. Such a person might aim to reach a certain target level of savings and LRI and then immediately retire.

New rules increasing the allowable amounts which could be taken from pre-tax labour income and put into superannuation as 'concessional contributions' also seemed likely to have different effects on different people. They allowed someone who wanted to maximise remaining lifetime income (or make a large bequest) to make considerable gains. But, again, they also made it easier and quicker for someone with a target level of retirement savings and a preference for leisure to meet his/her goals. Translating into the terminology of economics, it can be said that these changes set up conflicting substitution and income effects. Earlier retirement became more expensive because the net returns from work and investing in superannuation increased. At the same time, extra after-tax income offered incentives for more leisure (full or partial retirement) and less work.

A further aspect of the reforms, of great potential future importance, was that in future individuals would be able to both *retire and work*, and do so

[23] A 15% tax remained on income earned from superannuation holdings in 'accumulation phase'. Capital gains tax on realised gains was 10%.

on very favourable tax terms. Previous policies had encouraged both superannuants and age pensioners to do some paid work, but the 2006/07 reforms went the whole way in allowing superannuants to receive all their super and also work full time, if they wished. Not only would capital gains and earnings from superannuation be untaxed, but labour income would be taxed from a zero base, instead of being added to superannuation earnings and taxed at the appropriate marginal rate. Again, there are substitution and income effects influencing work versus retirement decisions in opposite directions.

Two other changes came into force at the same time as these major reforms. Most marginal and all average rates of income tax were reduced and the pension assets test was made less stringent. The effects of these changes cannot in practice be separated from the effects of the more major reforms in analysis of changes in labour supply due to the July 2007 'policy package'.

A reasonable way to summarise the whole 'policy package' might be to say that it offered both strong incentives to lifetime *income maximisers* who would be to carry on working into old age *and* strong incentives to *income satisficers* who preferred leisure and wanted to fully retire, provided they had an adequate LRI.

It seems fair to say that when the July 2007 changes were announced, the Government view was that they would 'incentivise' many seniors to remain in work longer. It was also probably thought particularly likely that high skill, high wage, high super individuals would be strongly 'incentivised'. If their future contribution to the economy could be increased, then the decline in economic growth due to population ageing

would be mitigated. By implication, in making its decisions, the Government placed more weight on the substitution effects of higher after-tax returns from further work and delayed retirement and downplayed net income and utility gains from purchasing more leisure.

Our assessment of the July 2007 package begins with an analysis of incentive effects, using our modified Gruber and Wise (2004) approach. As we shall see, the new incentive structure was very complex and it is by no means clear that most high skill individuals had increased incentives to remain in paid work. After reviewing incentives, we then use probit and Tobit regressions to analyse the net effects of the July 2007 package on mature age participation.

The incentive effects of the 2007 policy changes: stylised case studies

The case studies have been selected to provide a 'sample' with adequate diversity rather than being 'typical' of the whole community. We have included men and women, all around the age of 60, with a wide diversity of incomes, superannuation holdings and other assets (net worth). Some are partnered, some are not, some are homeowners, some rent. All of them are now working and face a decision to continue in paid work, or to exit the labour force. As we shall see, in most cases the incentives they face are complex and not easy for them, their financial adviser (if any), or us to sort out (for more detail about assumptions relating to the calculations below, see Appendix 1).

We begin with a very straightforward case: a single man of 56, who is not a homeowner, has a low wage and low assets (net worth), and is clearly headed towards reliance on the pension when he retires. For this case, as

for all others, we first calculate the LRI he would receive if he retired now versus the LRI he would get if he retired in one year's time. Results are given on the basis of both pre-July 2007 policy settings and post-July 2007. Then we calculate the pre- and post-July 2007 incentives expressed as a one-year accrual, a one-year accrual rate, an implicit tax rate on continued work (positive or negative), a peak value and an option value. All calculations are in constant 2008 dollars.

Case 1 - Single Man, age 56, non-homeowner,
Current annual wage (before tax) = $40000,
Current superannuation balance = $50000,
Other Assets = $5000

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*
If he retires now		
Annual income from super	4722	4722
Annual income from other assets	472	472
Annual pension income	12631	12631
Total annual retirement income, after tax	17825	17825
If he retires in 1 year		
Annual income from super	5251	5251
Annual income from other assets	495	495
Annual pension income	12507	12507
Total annual retirement income, after tax	18253	18253

For this man, there is no change in prospective LRI after the 2007 policy changes. He will be eligible for a full age pension once he reaches pension eligibility age. His superannuation holding was too low to pay withdrawal tax before July 2007 changes, so the abolition of the tax makes no difference to him. Of course, he is yet to reach age pension age

so any transfer income he did receive if he retired 'early' would have to be in the form of some other type of income support such as DSP.[24]

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	306820	307225	405	0.13	-1.11	13943	130643
After	306820	307225	405	0.13	-1.07	13943	129144

Because he would have been eligible for a full age pension once he reached age 65 and also would have paid no withdrawal tax on super, the only effects of the 2007 changes are a very small change in his implicit tax rate on continued work and a small decrease in his LRI option value. These are due to a small increase in after-tax wages resulting from the 2007 changes in marginal rates of income tax.

Case 2 - Single Woman, age 63, homeowner
Current annual wage (before tax) = $80000
Current superannuation balance = $200000
Other Assets = $100000

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*
If she retires now		
Annual income from super	18400	19732
Annual income from other assets	9866	9866
Annual pension income	0	9221
Total annual retirement income, after tax	28266	38819
If she retires in 1 year		
Annual income from super	19737	21305
Annual income from other assets	10383	10383
Annual pension income	0	8573
Total annual retirement income, after tax	30120	40261

[24] It is widely believed that, in practice, some seniors who exit the labour force before pension eligibility age receive DSP or unemployment benefits, and are in effect able to use these benefits as a substitute for and precursor to the Age Pension.

After the 2007 changes, this woman is now eligible for some age pension because the assets test has been made less stringent. Her superannuation income is higher because her lump sum withdrawal is no longer taxed. Income from other assets has not changed because, due to the SATO, it was too low to be taxed even before the changes in marginal tax rates.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	547094	547094	5558	1.03	-8.40	19391	92739
After	734070	734070	-10317	-1.39	14.09	-10317	13490

Before the 2007 changes, accrual and peak value were both positive, indicating that she would have been better off, in terms of total retirement income, to continue working. However after the changes, she has more superannuation income as well as some age pension. Consequently her LRI increases substantially and accrual and peak value become negative and equal (at -$10,317), suggesting that she is now better off to retire immediately.

Case 3 - Partnered woman, age 57, homeowner
Current annual wage (before tax) = $50000
Current superannuation balance = $60000
Other household assets = $15000
Husband not working

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*
If she retires now		
Annual income from super	5394	5394
Annual income from other assets[25]	674	674
Annual pension income	10568	10568
Total annual retirement income, after tax	16636	16636
If she retires in 1 year		
Annual income from super	5991	5991
Annual income from other assets	704	704
Annual pension income	10567	10567
Total annual retirement income, after tax	17262	17262

This woman would have paid no withdrawal tax on her superannuation even before the 2007 changes, because her holdings were under the low rate threshold. If she wanted to retire early she would have to obtain some form of income support such as unemployment benefit or DSP.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	377602	383651	6049	1.6	-13.03	24214	175250
After	377602	383651	6049	1.6	-13.45	24214	178405

In her case the only effect of the 2007 changes on the financial incentive measures is a small decrease in the implicit tax rate on continued work and an increase in her option value.[26] These are due to the changes in marginal tax rates made in 2007. Accrual and peak value are positive,

[25] In the case of couples, it is assumed that they divide the income from other assets equally.

[26] Recall that a negative implicit tax means that there is an incentive to continue in paid work.

suggesting that she would be better off in terms of total retirement income if she continued working.

Case 4 - Partnered man, age 62, homeowner
Current annual wage (before tax) = $120000
Current superannuation balance = $400000
Other household assets = $500000
Wife earns $60000 p.a.

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*	*After2007 policy changes, with 80% of other assets moved to super*
If he retires now			
Annual income from super	37521	42227	63341
Annual income from other assets	22826	23515	5278
Annual pension income	0	0	0
Total annual retirement income, after tax	60347	65742	68619
If he retires in 1 year			
Annual income from super	40283	45477	67638
Annual income from other assets	23908	24829	5588
Annual pension income	0	0	0
Total annual retirement income, after tax	64191	70306	73226

This man was not eligible for the age pension before or after the 2007 asset test change because his assets remained too high. However, his income from superannuation and other assets has increased due to the removal of tax on superannuation withdrawal for those aged 60 and over. He also gains in terms of income from other assets as a result of the 2007 changes to marginal tax rates. Finally, if he and his wife moved most of their other assets ($200,000 each) into superannuation to eventually take advantage of the removal of the withdrawal tax on superannuation,[27] his

[27] That is, tax on income from super accounts which exceeded the pre-2007 RBL limits.

potential retirement income would increase by approximately $3000 per year.[28]

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	978967	977723	-1244	-0.13	1.36	-1244	75705
After	1066448	1070812	4364	0.41	-4.28	7388	88118
After, with assets moved to super	1113096	1115252	2155	0.19	-2.11	2404	63272

Before the 2007 policy changes, accrual and peak value were negative and equal, which suggest that he would have been better off in terms of potential lifetime retirement income if he retired immediately. After the policy changes his LRI increased, his accrual rate became positive and his peak value became higher than the one-year accrual. That is, total lifetime retirement income would now be maximized if he continued working.

Under a revised scenario, assume that this man moved most of his other assets into superannuation. If he did so, his LRI would increase again, but his accrual rate, implicit tax rate, peak value and option value would all fall. This suggests that there is still a financial incentive to continue in paid work, but it is not as strong as under the previous scenario.

[28] Presumably most other assets are in the form of property, shares, managed funds etc and there would be costs such as stamp duty and capital gains tax involved in liquidizing these assets in order to move them into superannuation. These costs have not been included in the calculations.

Case 5 - Single woman, age 59, homeowner
Current annual wage (before tax) = $80000
Current superannuation balance = $260000
Other assets = $130000

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*	*After2007 policy changes, with 80% of other assets moved to super*
If she retires now			
Annual income from super	22050	24026	33766
Annual income from other assets	11197	11293	2184
Annual pension income	0	1208	936
Total annual retirement income, after tax	33247	36527	36886
If she retires in 1 year			
Annual income from super	27279	25603	35764
Annual income from other assets	11663	11771	2949
Annual pension income	0	802	965
Total annual retirement income, after tax	38942	38176	39678

In this woman's case, the 2007 changes to marginal income tax rates and tax on superannuation generated a small increase in income from superannuation and also from other assets. As her superannuation balance and other assets generated a relatively small income and hence were subject to little tax, there was very little benefit from moving other assets into superannuation.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	758043	764190	6147	0.81	-9.29	23465	150023
After	911453	903578	-7875	-0.86	10.76	-7875	110912
After, with assets moved to super	916441	910524	-5917	-0.65	8.08	-5917	131966

The effect of the 2007 changes for this woman were to increase LRI derived from superannuation and other assets. However, her accrual and

peak values changed from positive to negative and her option value became lower, suggesting that before the 2007 changes she would have been better off to continue working, but that afterwards she would be better off retiring immediately.

Case 6 - Partnered man, age 62, homeowner
Current annual wage (before tax) = $150000
Current superannuation balance = $1800000
Other household assets = $600000
Wife not in paid work

Changes in potential retirement income:

	Before 2007 policy changes	*After 2007 policy changes*	*After2007 policy changes, with 80% of other assets moved to super*
If he retires now			
Annual income from super	140014	186001	211834
Annual income from other assets	26052	27432	5167
Annual pension income	0	0	0
Total annual retirement income, after tax	166066	213433	217001
If he retires in 1 year			
Annual income from super	146376	196262	223324
Annual income from other assets	27279	28922	5459
Annual pension income	0	0	0
Total annual retirement income, after tax	173655	225184	228783

Because this man had a superannuation balance that was higher than the reasonable benefit limit in place before the 2007 changes, the reforms produced a substantial increase in his potential retirement income. Furthermore, moving most of his other assets into superannuation would increase retirement income by approximately $4000 per year.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before	2834641	2792000	-42640	-1.50	38.50	-42640	44764
After	3642927	3620232	-22694	-0.62	18.35	-22694	37332
After, with assets moved to super	3703815	3678085	-25730	-0.69	20.8	-25730	31744

However, due to the changes, his one year accrual rate became lower, but was still negative and equal to peak value. This indicates that he would still be better off in terms of LRI to retire immediately. After the 2007 changes, his option value also became lower, and was reduced further when assets were moved into superannuation. This all suggests that the 2007 changes, particularly the removal of tax on superannuation withdrawal, increased his incentive to retire.

Transitions to retirement – superannuation and work

We now analyse two particularly interesting cases of individuals who are 60 or over and seek to take advantage of the 2007 changes. They decide to (1) collect their superannuation as a lump sum and convert it to pension phase (2) move most of their assets into superannuation *and* (3) continue in work, either full-time or part-time for another three years.

Case 7 - Single woman, age 60, homeowner
Current annual wage (before tax) = $80000
Current superannuation balance = $260000
Other assets = $130000

This woman combines superannuation receipt with continued paid work. She receives some income from super and also her labour income, both on favourable tax terms. She is age 60, so she decides to collect her

superannuation as a lump sum and move it into pension phase, which means that it is no longer subject to the 15% tax which was due during accumulation phase. In her case it is assumed she continues in work for three years and then fully retires. It is further assumed that she plans to have a net income during her three more years of work equal to her net wage when she was working full-time.

Changes in pre-retirement and potential retirement income:

	Before 2007 policy changes	*Reducing work hours by 20% and taking $8000 of superannuation per year*	*Reducing work hours by 40% and taking $19000 of superannuation per year*	*Take $20000 super and salary sacrifice $30000 wage (no reduction in work hours)*
Before retirement				
After tax wage	55020	47200	36000	37400
+ superannuation taken	0	8000	19000	30000
Total wage and superannuation income	55020	55200	55000	67400
If she retires at age 63				
Annual income from super	22294	37575	32764	42329
Annual income from other assets	10754	3254	3254	3254
Annual pension income	0	3371	3553	3189
Total annual retirement income, after tax	33048	44200	39571	48772

In our first scenario she reduces working hours by 20%, which reduces her after tax wage to $47200. To retain her previous standard of living she tops this up with about $8000 a year from her super account. Because the assets test for the age pension was made less stringent in 2007, she will now become eligible for a part pension when she retires in three years time.

If, on a second scenario, she reduces her working hours by 40% and takes $19000 per year from her superannuation in order to have a constant real income, total income from wages and superannuation will be $55000. But her annual superannuation income when she completely retires will drop to $32764. Her age pension income increases slightly, but not enough to make up for the drop in superannuation income.

In a third scenario she continues to work full-time, but salary sacrifices $30000 into super and replaces the salary sacrificed amount by withdrawing enough from super not to have to reduce her consumption. This gives her $48772 in annual LRI compared to only $33048 in the pre-2007 scenario; a very substantial increase. The increase is a result of a combination of policy changes—changes to the assets test for the age pension, changes to withdrawal tax on super and changes to marginal income tax rates.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before 2007	737083	742527	5444	.74	-8.23	18548	132944
Reducing hours by 20%	895086	876362	-18724	-2.09	33.0	-18724	100716
Reducing hours by 40%	872581	830961	-41620	-4.77	96.17	-41620	52470
No reduction in hours: salary sacrifice	922705	925355	2649	0.29	-3.62	245449	201543

Turning to financial incentives: before the 2007 changes her accrual and peak value were positive, indicating that there was a financial incentive to continue working. After the 2007 changes, in scenarios 1 and 2, she decided to reduce working hours and supplement her income from

superannuation. In these two scenarios, accrual and peak value are negative and equal, suggesting that this woman would be better off in terms of LRI to retire immediately.

On the other hand, in the third scenario where income from wages is salary sacrificed into superannuation and replaced by withdrawing some superannuation, the resulting increase in superannuation income creates positive accrual and peak values, which suggests that this person is now better off in terms of LRI to continue in paid work rather than retire.

Case 8 - Partnered man, age 62, homeowner
Current annual wage (before tax) = $120000
Current superannuation balance = $400000
Other household assets = $500000
Wife earns $60000 per year

Columns 2 and 3 in the table below are alternative scenarios for a man of 62 who chooses both to collect his super as a lump sum, while continuing paid work, but part-time instead of full-time. Column 4 is a scenario in which he continues in full-time work. In all scenarios he takes enough superannuation income to maintain his current standard of living, which in the third scenario requires replacing salary sacrificed amounts. The advantage of salary sacrificing is that taxable income is reduced and the sacrificed amount is only taxed at 15% (contributions tax). Again, it is assumed that the transition to full retirement takes three years.

Changes in pre-retirement and potential retirement income:

	Before 2007	*Reducing work hours by 20% and taking $6000 of superannuation*	*Reducing work hours by 40% and taking $24000 of superannuation*	*Take $60000 super and salary sacrifice $80000 wage into super*
Before retirement				
After tax wage	76220	70500	52800	30400
+ superannuation taken	0	6000	24000	60000
Total wage and superannuation income	76220	76500	76800	90400
If he retires (completely) at age 65				
Annual income from super	38787	75966	66869	81214
Annual income from other assets	21997	6312	6312	6312
Annual pension income	0	0	0	0
Total annual retirement income, after tax	60784	82778	73181	87526

In the first scenario, reducing working hours by 20% would reduce after-tax wage to $70,500 and, with the extra superannuation taken, this man would have a total income of $76500. If he reduces his working hours by 40% and takes $24000 out of his superannuation, his total income from wages and superannuation would be maintained, but his annual superannuation income when he completely retires would be approximately $9000 lower than if he had reduced his working hours by only 20%.

Continuing to work full-time (scenario 3), but salary sacrificing $80000 into super and replacing the salary sacrificed income by withdrawing $60000 annually from super increases his annual superannuation income when he eventually retires to $87526.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
Before 2007	978967	977723	-1244	-0.13	1.36	-1244	75705
Reducing hours by 20%	1102826	1100562	-2264	-0.21	2.67	-2264	63587
Reducing hours by 40%	1072013	1037527	-34487	-3.22	54.33	-34487	19562
No reduction in hours: salary sacrifice	1126791	1141588	14797	1.31	-14.5	495399	174467

The final table of financial incentives shows that, prior to the 2007 changes, his accrual and peak value were negative and equal, which suggests that in terms of LRI he would be better off to retire immediately. After the 2007 changes, in scenarios 1 and 2 in which he reduces working hours, his accrual and peak value remain negative and equal but are larger than before. This suggests that, for this man, the financial incentive to retire is stronger than before.

In the third scenario in which income from wages is salary sacrificed into superannuation and replaced by withdrawing some superannuation, the resulting increase in superannuation income increases LRI substantially. Accrual and peak value become positive, and his option value is much higher than before, which suggests that he is now better off in terms of LRI to continue working rather than retire.

Net effects of the 2007 policy changes on mature age participation: probit analyses

The stylised case studies analysed in the previous section indicate that some mature age people faced positive incentives for continued work as a

result of the July 2007 changes, while others faced negative incentives, and still others were in an unchanged situation. But what were the net effects on the labour supply of the entire cohort of men and women aged 55-64 in 2001-08?

In interpreting the results in the following tables, it is crucial to remember that mature age workforce participation was steadily and substantially increasing in 2001-08. So the question becomes 'Did the policy changes tilt the upward trend line further upwards, tilt it downwards, or leave it on course?"

Men age 55-69

Using HILDA data for 2001-08, we now provide probit model estimates of the effect of the July 2007 policy changes on the workforce participation of men aged 55-69, netting out the effects of the demand side, preference and budget variables which simultaneously also affected participation. Deciding on the exact sample of men in this age group to include in the analysis turned out to be a matter of some importance. When all 55-69 year olds were included, our empirical results proved to be quite unstable, quite sensitive to what appeared to be minor changes in model specification. This was puzzling until it was realised that the analysis included a lot of men who had been out of the labour force for several years before the July 2007 reforms came into effect. Technically, this meant that the analysis included too many 'censored observations'; a problem which is known to lead to unstable estimates (Blundell and Dias, 2008). When we excluded men who had not worked for three or more years before 2007 results stabilised. It was also decided to exclude men who were not in the HILDA sample in 2006 and 2007 on the grounds that

they were 'missing' in the specific transition years when maximum policy effects were likely to be seen.

Table 2
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Men's Workforce Participation: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**-0.098 (0.132)**
July 2007 (1-0)	**Marginal effect -0.010 (0.014)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.028 (0.041)
Year (time trend)	-0.008 (0.027)
Preferences & constraints	
Age	-0.131*** (0.016)
Partner's age	0.007 (0.011)
Partnered (1-0)	-0.696 (0.62)
Carer (1-0)	-0.274 (0.247)
Long term health problem (1-0)	-0.811*** (0.097)
Partner: long term health problem (1-0)	-0.009 (0.1)
Education: years	0.093** (0.034)
Work experience	0.049*** (0.007)
English competence (1-0)	-0.879 (0.765)
Partner works (1-0)	1.579*** (0.179)
Budget variables	
Owns home outright (1-0)	-0.631*** (0.107)
Net property equity ($)	-0.031* (0.016)
Superannuation ($)	-0.009 (0.011)
Other net equity ($)	0.001 (0.008)
Occupational status	-0.002 (0.003)
Partner: net hourly pay	-0.161** (0.057)
Constant	5.346*** (1.397)
Log likelihood	-1494.066
Wald Chi-sq	341.36***
Sample size	4402

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The main finding here is that the policy changes introduced in July 2007 appear to have had little or no effect on workforce participation of mature age men. Net of other variables affecting labour supply, the effect of the July 2007 changes is estimated to have reduced the participation rate of these men by 1.0% (the marginal effect), but this result is not statistically significant from zero even at the 10% level.

The other main variables affecting the participation of mature age men appear to be their health – those with an adverse health condition were much less likely to participate – the length of their previous work experience, and whether their partner worked (men whose partner works continue in work themselves). Owning a home outright made it much more likely that a man would choose to retire rather than continue to work or seek work, and having a partner who was relatively highly paid (high hourly rate) also predisposed men to retire.

Parallel results are now given for a model in which the outcome variable is whether mature age men are employed or not. The aim is solely to illustrate the point that results here are very similar to the results already reported for men's workforce participation. So in practical terms in this time period it makes no difference to the analysis which dependent variable is used.[29]

[29] It should not be assumed that this non-difference would hold during a recession. The participation rate = the employment rate + the unemployment rate. In a recession, especially a prolonged recession, the employment rate goes down, but the unemployment rate tends not to go up correspondingly due to the 'discouraged worker effect'. In other words, some non-employed people, who in a boom period actively seek work (and hence are classified as unemployed), tend to become 'discouraged' during a recession… they stop seeking work and so no longer count as 'participating'.

Table 3
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Men's Employment: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	EMPLOYED (1-0)
After policy change	**-0.098 (0.125)**
July 2007 (1-0)	**Marginal effect -0.013 (0.018)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.017 (0.04)
Year	0.002 (0.025)
Preferences & constraints	
Age	-0.111*** (0.015)
Partner's age	0.008 (0.01)
Partnered (1-0)	-0.817 (0.578)
Carer (1-0)	-0.082 (0.238)
Long term health problem (1-0)	-0.793*** (0.092)
Partner: long term health problem (1-0)	-0.088 (0.094)
Education: years	0.085** (0.032)
Work experience	0.052*** (0.007)
English competence (1-0)	-0.543 (0.6)
Partner works (1-0)	1.584*** (0.169)
Budget variables	
Owns home outright (1-0)	-0.632 (0.1)
Net property equity ($)	-0.023 (0.014)
Superannuation ($)	-0.005 (0.01)
Other net equity ($)	0.003 (0.008)
Occupational status	-0.001 (0.002)
Partner: net hourly pay	-0.178*** (0.053)
Constant	3.344** (1.25)
Log likelihood	-1587.6455
Wald Chi-sq	354.52***
Sample size	4402

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The impact of the July 2007 policy changes on mature age men's labour supply is again estimated to be slight; a 1.3% estimated reduction in employment which is also not significantly different from zero at the 10% level. In the remainder of the report we will focus only on mature age participation, knowing that results would be much the same for employment.

An initial finding that the policy changes appear not to have much affected the participation rate of men aged 55-69 of course does not rule out the possibility that certain sub-groups may have been substantially affected. One reasonable hypothesis was that men aged 55-59 might have increased their participation rate because, on the face of it (although not really according to our simulations), they had additional incentives to increase their superannuation and other savings before (perhaps) taking an available lump sum and retiring at 60. In the event, there was no supporting evidence for this hypothesis. The participation of men aged 55-59 is estimated to have declined by about half of one percent after the July 2007 changes took effect; a result which is not even statistically significant at the 10% level. By contrast, men aged 60-64 reported a decline in participation which was just significant at the 5% level.

A perhaps more promising hypothesis is that men with higher levels of superannuation, or alternatively higher wages (hourly rates), may have been differentially 'incentivised' by the July 2007 changes. The Australian Government did not expressly announce that it was seeking to incentivise higher super and/or high earning individuals, but it might be inferred from the contents of the policy package that it was directed specifically at better off people and not so clearly at the less well off.

An appropriate policy evaluation method for assessing whether a particular set of changes 'incentivised' one group more than another is 'difference-in-difference' analysis (Blundell and Dias, 2008). We first focus on individuals with above average amounts of superannuation and compare their behaviour (i.e. participation in the workforce) before-and-after the policy change with the behaviour of those with below average amounts of superannuation. (The mean amount of super held by men in

the 55-69 age group in 2001-08 was $201,000). The coefficient of main interest in Table 4 relates to 'difference post-policy' – that is, the difference in participation rates after the policy was introduced between the high super group and the low super group. (Technically, 'difference post-policy' is an interaction term between the variable 'after July 2007' and a variable splitting the sample into those with above-the-mean and below-the-mean levels of superannuation).

Table 4
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Men's Labour Force Participation: Difference-in-Difference Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**-0.100 (0.147)**
July 2007 (1-0)	**Marginal effect -0.011 (0.016)**
High Super	-0.265* (0.119)
Difference Post Policy	**-0.051 (0.16)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.023 (0.041)
Year	-0.002 (0.027)
Preferences & constraints	
Age	-0.131*** (0.016)
Partner's age	0.007 (0.01)
Partnered (1-0)	-0.705 (0.615)
Carer (1-0)	-0.287 (0.247)
Long term health problem (1-0)	-0.822*** (0.097)
Partner: long term health problem (1-0)	-0.013 (0.1)
Education: years	0.1** (0.034)
Work experience	0.049*** (0.007)
English competence (1-0)	-0.882 (0.763)
Partner works (1-0)	1.556*** (0.178)
Budget variables	
Owns home outright (1-0)	-0.613*** (0.106)
Net property equity ($)	-0.029 (0.016)
Other net equity ($)	0.003 (0.008)
Occupational status	-0.001 (0.003)
Partner: net hourly pay	-0.157** (0.057)
Constant	5.151*** (1.386)
Log likelihood	-1587.6455
Wald Chi-sq	354.52***
Sample size	4402

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The evidence in Table 4 makes it clear that there was no differential response to the policy package as between men with high and lower super holdings. The coefficient of -0.051 is not even significant at the 0.10 level and, since it is negative, certainly does not indicate that high super men were more likely to participate after July 2007.[30]

Many more difference-in-difference analyses were conducted…all with statistically non-significant results. There appeared to be no differential policy response on the part of men with high levels of earnings (high hourly rates) as compared with low earning men. Similarly, there were no significant differences post-policy in the participation of highly educated versus less educated men, or men with high rather than low occupational status.[31] Not did it make any difference when these various groupings were split by age into those aged 55-59, 60-64 and 64-69.[32]

As noted earlier, we also undertook a few analyses to assess whether, regardless of the participation rate, the July 2007 package led to a change in *hours worked*. Table 5 reports results of a Tobit regression in which the dependent variable is hours of work per week.

[30] Results remained statistically insignificant when an interaction term with a continuous (log dollars) measure of superannuation was used, rather than a variable split at the mean.

[31] The Australian National University measure of status AUSEI06 was used. See footnote 10.

[32] In practice, separate analyses on the group aged 65-69 were not feasible because the sample of those who had worked in recent years, and so might have been 'incentivised' by the policy changes was too small.

Table 5
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Men's Working Hours: Longitudinal Tobit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	HOURS WORKED (1-0)
After policy change July 2007 (1-0)	**0.977 (1.006)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.53 (0.319)
Year	-0.637** (0.224)
Preferences & constraints	
Age	-1.798*** (0.161)
Partner's age	-0.001 (0.11)
Partnered (1-0)	-1.221 (6.301)
Carer (1-0)	-2.98 (2.532)
Long term health problem (1-0)	-7.978*** (0.929)
Partner: long term health problem (1-0)	-2.117* (0.848)
Education: years	0.602 (0.358)
Work experience	1.028*** (0.086)
English competence (1-0)	-13.22* (6.404)
Partner works (1-0)	15.495*** (1.216)
Budget variables	
Owns home outright (1-0)	-6.436*** (0.82)
Net property equity ($)	-0.381** (0.14)
Superannuation ($)	0.062 (0.113)
Other net equity ($)	0.069 (0.068)
Occupational status	0.002 (0.023)
Partner: net hourly pay	-1.508*** (0.369)
Constant	51.34*** (14.9)
Log likelihood	15743.456
Wald Chi-sq	1276.54***
Sample size	4244

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

Plainly, the policy changes had no significant effect on working hours. The coefficient of 0.977 for the policy variable is not even close to significance at the 10% level.

Finally, it should be reported that the results just given were not sensitive to a range of small changes in model specification. It made no significant difference to the policy coefficients of main interest whether the demand side variables, lagged economic growth and 'Year' (linear trend variable),

were omitted or included. Nor were results substantively affected when Mundlak corrections for the budget variables were added to the model (see Appendix 2).

Women age 55-69

Table 6 reports estimates of the effect of the July 2007 policy package on the workforce participation of women aged 55-69.

Table 6
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Women's Workforce Participation: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**0.084 (0.136)**
July 2007 (1-0)	**Marginal effect 0.018 (0.028)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.05 (0.043)
Year	-0.025 (0.029)
Preferences & constraints	
Age	-0.109*** (0.017)
Partner's age	0.01 (0.013)
Partnered (1-0)	-1.88* (0.843)
Carer (1-0)	-0.042 (0.182)
Long term health problem (1-0)	-0.593*** (0.103)
Partner: long term health problem (1-0)	0.188 (0.11)
Education: years	0.041 (0.034)
Work experience	0.015*** (0.003)
English competence (1-0)	1.202 (0.671)
Partner works (1-0)	1.739*** (0.157)
Budget variables	
Owns home outright (1-0)	-0.525*** (0.11)
Net property equity ($)	0.03* (0.015)
Superannuation ($)	0.064*** (0.011)
Other net equity ($)	-0.015 (0.009)
Occupational status	0.003 (0.003)
Partner: net hourly pay	-0.199*** (0.042)
Constant	4.731*** (1.258)
Log likelihood	-1445.8107
Wald Chi-sq	293.08
Sample size	3562

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

It is clear that the policy changes had no substantial effect on the labour supply of this age group. The policy coefficient and the marginal effect of 1.8% are not statistically significant even at the 10% level. As was true of the men, other variables in the model did have a significant effect on labour supply. Women with lots of previous work experience were more likely than other women to remain in work in their late 50s and 60s, and women whose partners were still working were more likely to continue themselves. Women with comparatively high levels of superannuation were also more likely to work. On the other hand, partnered women were less likely to remain in work than single women, especially if their partner earned a high income. Women with an adverse health condition had mostly stopped work. Those who owned their home outright were much less likely to remain in work than those still paying off a mortgage.

The purpose of Table 7 is simply to show that for women, as was the case for men, results are much the same if the outcome variable in question is employment rather than labour force participation.

Table 7
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Women's Employment: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	EMPLOYED (1-0)
After policy change	**0.034 (0.131)**
July 2007 (1-0)	**Marginal effect 0.008 (0.031)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.038 (0.041)
Year	-0.014 (0.027)
Preferences & constraints	
Age	-0.098*** (0.016)
Partner's age	0.013 (0.012)
Partnered (1-0)	-2.057** (0.794)
Carer (1-0)	0.013 (0.177)
Long term health problem (1-0)	-0.621*** (0.099)
Partner: long term health problem (1-0)	0.166 (0.106)
Education: years	0.03 (0.032)
Work experience	0.015*** (0.002)
English competence (1-0)	1.085 (0.639)
Partner works (1-0)	1.656*** (0.148)
Budget variables	
Owns home outright (1-0)	-0.478*** (0.104)
Net property equity ($)	0.031* (0.014)
Superannuation ($)	0.063*** (0.01)
Other net equity ($)	-0.01 (0.009)
Occupational status	0.003 (0.002)
Partner: net hourly pay	-0.185*** (0.04)
Constant	4.155*** (1.184)
Log likelihood	-1503.3441
Wald Chi-sq	310.19
Sample size	3562

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

Plainly, the July 2007 package has no substantial effect on the employment of mature age women.

More detailed analyses indicated that the package had no effects on the labour supply of sub-sets of women in the 55-59, 60-64 or 65-69 age groups. In view of the fact that, in this period, women with comparatively high levels of superannuation showed a greater propensity to work than other women, it seemed possible that the July 2007 might have had an

incentivising effect specifically on them. However, a difference-in-difference analysis (Table 8) showed that this was not the case.

Table 8
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Women's Labour Force Participation: Difference-in-Difference Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**0.104 (0.151)**
July 2007 (1-0)	**Marginal effect 0.021 (0.030)**
High Super	-0.290* (0.132)
Difference Post Policy	-0.240 (0.178)
Aggregate demand	
GDP growth rate (1 year lag)	-0.041 (0.043)
Year	0.001 (0.029)
Preferences & constraints	
Age	-0.142*** (0.018)
Partner's age	0.012 (0.014)
Partnered (1-0)	-2.019* (0.894)
Carer (1-0)	-0.152 (0.188)
Long term health problem (1-0)	-0.644*** (0.106)
Partner: long term health problem (1-0)	0.136 (0.114)
Education: years	0.069 (0.037)
Work experience	0.020*** (0.003)
English competence (1-0)	1.548* (0.712)
Partner works (1-0)	1.801*** (0.162)
Budget variables	
Owns home outright (1-0)	-0.486*** (0.113)
Net property equity ($)	0.044** (0.016)
Other net equity ($)	-0.012 (0.009)
Occupational status	0.006* (0.003)
Partner: net hourly pay	-0.214*** (0.043)
Constant	5.839*** (1.328)
Log likelihood	-1456.7238
Wald Chi-sq	273.08***
Sample size	3562

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The evidence here again indicates that the policy changes had no significant effect on labour supply. The sign of the policy coefficient is actually negative (-0.243) but it is not significant even at the 10% level.

As was the case for men, a Tobit regression analysis indicated that the July 2007 policy changes did not lead to any significant change in hours worked.

Table 9
Effects Of July 1 2007 Policy Package On Mature Age (55-69) Women's Working Hours: Longitudinal Tobit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	HOURS WORKED (1-0)
After policy change July 2007 (1-0)	**0.028 (0.022)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.011(0.007)
Year	-0.005(0.005)
Preferences & constraints	
Age	-0.180***(0.003)
Partner's age	0.001(0.002)
Partnered (1-0)	-0.309*(0.140)
Carer (1-0)	0.005(0.031)
Long term health problem (1-0)	-0.100***(0.018)
Partner: long term health problem (1-0)	0.034(0.018)
Education: years	0.008(0.006)
Work experience	0.003***(0.000)
English competence (1-0)	0.131(0.086)
Partner works (1-0)	0.343***(0.024)
Budget variables	
Owns home outright (1-0)	-0.076***(0.017)
Net property equity ($)	0.004(0.002)
Superannuation ($)	0.014***(0.002)
Other net equity ($)	-0.002(0.001)
Occupational status	0.000(0.000)
Partner: net hourly pay	-0.033***(0.007)
Constant	1.354***(0.191)
Log likelihood	-1393.377
Wald Chi-sq	747.74***
Sample size	3652

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

Once again, the policy coefficient of 0.028 is not even significant at the 10% level.

2.3 EFFECTS OF THE JULY 2005 CHANGES ON MATURE AGE WORKFORCE PARTICIPATION

Using the same methodology, we now assess the effects of changes announced in the 2004 Budget, which took effect in July 2005. These made it possible for individuals aged 55 and over to collect their superannuation as an income stream and then continue to do paid work with reduced hours if they wished ('transition to retirement pension'). Previously a person normally had to leave work in order to access super. The changes were, on the face of it, less far-reaching than the 2007 changes and were more or less superseded by them.

The analysis in Table 10, relating to mature age men (55-69), uses HILDA data for 2001-06; that is, the years before and after the July 2005 changes, but excluding the years in which the July 2007 changes had taken effect. The explanatory variable of main interest is "After July 2005", which is constructed on the same lines as the dummy variable "After July 2007" used in previous analyses; that is, it is coded 1 for the years after the policy change 2005-06) and zero for the years before the change (2001-04). Again, the sample is restricted to men who had undertaken some paid work within the three years prior to the change.

Table 10
Effects Of July 1 2005 Policy Package On Mature Age (55-69) Men's Workforce Participation: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**-0.052 (0.137)**
July 2005 (1-0)	**Marginal effect -0.006 (0.015)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.117 (0.067)
Year	-0.007 (0.041)
Preferences & constraints	
Age	-0.104*** (0.017)
Partner's age	-0.001 (0.01)
Partnered (1-0)	-0.319 (0.616)
Carer (1-0)	-0.124 (0.278)
Long term health problem (1-0)	-0.957*** (0.105)
Partner: long term health problem (1-0)	0.013 (0.111)
Education: years	0.046 (0.035)
Work experience	0.035*** (0.007)
English competence (1-0)	-0.085 (0.541)
Partner works (1-0)	1.578*** (0.192)
Budget variables	
Owns home outright (1-0)	-0.698*** (0.12)
Net property equity ($)	-0.009 (0.016)
Superannuation ($)	0.015 (0.011)
Other net equity ($)	0.009 (0.009)
Occupational status	-0.002 (0.003)
Partner: net hourly pay	-0.136* (0.061)
Constant	4.72*** (1.316)
Log likelihood	-1248.7484
Wald Chi-sq	268.17***
Sample size	3594

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The evidence in Table 10 indicates that the July 2005 reforms had no significant effect on the workforce participation of mature age men. The coefficient of 0.133 is not significant even at the 10% level. Further analysis confirmed that results were similar for sub-sets of men aged 55-59, 60-64 and 65-69, and also for men with relatively high and low levels of superannuation and earnings.

Table 11 gives parallel results for mature age women.

Table 11
Effects Of July 1 2005 Policy Package On Mature Age (55-69) Women's Workforce Participation: Longitudinal Probit Analysis
Metric coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**0.132 (0.147)**
July 2005 (1-0)	**Marginal effect 0.028 (0.031)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.022 (0.072)
Year	-0.068 (0.046)
Preferences & constraints	
Age	-0.085*** (0.019)
Partner's age	0.015 (0.015)
Partnered (1-0)	-2.209* (0.943)
Carer (1-0)	0.086 (0.209)
Long term health problem (1-0)	-0.774*** (0.123)
Partner: long term health problem (1-0)	0.17 (0.127)
Education: years	0.059 (0.039)
Work experience	0.014*** (0.003)
English competence (1-0)	1.018 (0.762)
Partner works (1-0)	1.849*** (0.181)
Budget variables	
Owns home outright (1-0)	-0.589*** (0.128)
Net property equity ($)	0.009 (0.018)
Superannuation ($)	0.073*** (0.012)
Other net equity ($)	-0.025* (0.011)
Occupational status	0.003 (0.003)
Partner: net hourly pay	-0.195*** (0.048)
Constant	3.712* (1.433)
Log likelihood	-1141.8771
Wald Chi-sq	232.05***
Sample size	2797

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

For women too the evidence is that the July 2005 changes had no significant effect on labour supply. The policy coefficient of 0.132 is not significant even at the 10% level.

SECTION 3

THE PROJECTED EFFECTS OF FORTHCOMING POLICY CHANGES – CHANGES ALREADY IN THE PIPELINE

3.1 THE PROJECTED EFFECTS OF FORTHCOMING POLICY CHANGES – CHANGES ALREADY IN THE PIPELINE[33]

This section of the Report deals with policy changes that have already been announced but not yet enacted – they are still in the policy pipeline. Following the same approach as in the previous section, we begin with a detailed analysis of the policy change likely to have the greatest effect on mature age workforce participation, namely increasing the pension eligibility age to 67 by 2023. Then, following the same modelling approach, we assess the effects of several other changes still in the policy pipeline.

Our initial assessment of the effects of increasing the pension eligibility age to 67 ignores two other gradual changes due to occur during these years, namely the increase in women's pension eligibility age to 65 by 2014 and the increase in the superannuation preservation age to 60, which won't actually be complete until 2025. Basically, we shall find that the main reform is likely to have a substantial effect on mature age workforce participation, while the latter two changes have modest additional effects.

[33] It should be noted that the RIMGROUP, working in the Treasury, has reportedly developed a cohort model to assess labour supply issues around the retirement transition (IGR3, 2010, Appendix C). A cohort model with adequate simulated 'sample' size, and the rules of the tax-transfer system built in, is likely to yield superior and more detailed projections than those provided here on the basis of the HILDA sample for 2001-08.

3.2 INCREASING THE AGE PENSION ELIGIBILITY AGE TO 67 – CHANGE TO BE COMPLETED BY 2023

Men

Our first cut at modelling this change focuses on men who were aged 55-68 in 2001-08.[34] We use the HILDA panel data to model their actual decisions to continue working or quit during this period. So we restrict the sample for each year just to men who were in employment the previous year. This enables us to calculate a hazard rate for quitting work at each age (a) before the change of policy and (b) after the change. The dependent variable is again 'participation' (1=Yes, 0=No).

The explanatory (or predictor) variables in the model are much the same as in the probit and Tobit equations reported above. However, there are two important changes. One is that age is represented by a set of dummy variables (age 55, age 56….), rather than by a linear term. The dummies for age 65 and age 67 are of particular interest because they are the pension eligibility ages before and after the policy change. The second change to the model arises from the fact that we need to build a measure of financial incentives to participate or quit the labour market into our equation. Clearly, as explained earlier, financial incentives are almost bound to have a significant effect on participate or quit decisions. The incentive measure included here is Gruber and Wise's option value of LRI, which is their preferred measure because it takes account of the incentives people face for their remaining lifetimes (rather than just for the next year), and also includes leisure preferences within a utility

[34] The age 68 cut-off is used because the large majority are retired by this age. The HILDA sample of men who are still working becomes very small beyond this point.

maximisation framework (rather than assuming that people just seek to maximise income).[35]

The main hypothesis underlying Table 12 – it is really a near-certainty – is that the currently 'normal' decline in the participation rate for men aged 65 (relative to 64) will be at least partly displaced to 67 (relative to 66) after the policy change. Of course both the new and the old policies would never have affected *all* mature aged men. Men who at the present time are well enough off to be ineligible even for a part-pension have no special incentive to quit at 65. After the policy change they will have no special incentive to quit at 67. It is also probably the case that some individuals are currently gaming the system by retiring 'early' and then reducing their assets so that they become eligible for a full pension at 65 (Freebairn, Porter and Walsh, 1989; Atkinson and Creedy, 1996, 1997; Atkinson, Creedy and Knox, 1996). They may or may not choose to adopt the same strategy at a somewhat later age after 2023.

[35] In practice, however, Gruber and Wise's evidence for all the countries whose retirement systems they investigated, strongly suggested that results derived from very simple measures, like the one-year accrual rate, gave substantively much the same results as were found using more complex measures like option value (Gruber and Wise, 1999, 2004).

Table 12

Estimating The Effects of Increasing The Age Pension Eligibility Age To 67: Preliminary Model for Men Aged 55-68 in 2001-08 - Probit Analysis

Explanatory variables	PARTICIPATION (1-0)
Aggregate demand	
GDP growth rate (1 year lag)	-0.1# (0.055)
Year	-0.176** (0.058)
Preferences & constraints	
Age 55 [a]	0.856* (0.415)
Age 56	0.983** (0.383)
Age 57	0.946** (0.362)
Age 58	1.104** (0.363)
Age 59	1.114** (0.368)
Age 60	0.578 (0.296)
Age 61	0.443 (0.275)
Age 62	0.487# (0.272)
Age 63	0.298 (0.256)
Pension eligibility age = 65	**-0.426(0.271)**
Marginal effect	**-0.020(0.021)**
Age 66	-0.319 (0.324)
Age 67	-0.133 (0.361)
Age 68	-0.375 (0.376)
Partner's age	0.027# (0.014)
Partnered (1-0)	-1.809* (0.85)
Carer (1-0)	-0.224 (0.456)
Long term health problem (1-0)	-0.76*** (0.149)
Partner: long term health problem (1-0)	-0.009 (0.144)
Education: years	0.08 (0.049)
Work experience	0.072** (0.024)
English competence (1-0)	0.311 (0.948)
Partner works (1-0)	1.079*** (0.245)
Budget variables	
OPTION VALUE	**0.005* (0.002)**
Owns home outright (1-0)	-0.685*** (0.205)
Net property equity ($)	-0.035 (0.026)
Superannuation ($)	-0.003 (0.024)
Other net equity ($)	0.002 (0.019)
Occupational status	-0.002 (0.004)
Partner: net hourly pay	-0.01 (0.066)
Constant	-5.116* (2.354*)
Wald chi-squared	47.10
Log likelihood	-681.95449
Sample size	2917

Source: HILDA 2001-08.

a. The reference group is men aged 64.

*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

The key results in this table relate to the retirement (exit) rates of men of different ages. The reference group is men of 64. Compared to this group, men of 65 have a 2.0% higher probability (the marginal effect) of being out of the workforce. This effect appears to be not statistically significant, but that is solely because turning age 65 is associated with a big increase in the option value of LRI for many individuals, precisely because they become eligible for the pension. Note that the coefficient for option value is positive and statistically significant ($b=0.005$, $p<0.05$). Furthermore, if the model is re-run with option value omitted, the dummy variable for age 65 becomes highly significant ($b=-0.358$, marginal effect=-0.102 , $p<0.001$).

The jump in retirement at age 65 can be viewed, not just as a response to the 'incentive' of becoming eligible to receive a pension, but also as a response to a social norm; a norm which says that it is socially acceptable to retire and take the pension at this 'normal' age.

The next steps are computationally straightforward but require making a set of somewhat debateable assumptions. We add two years to the pension eligibility age, making it 67 instead of 65, and then use the coefficients in Table 12 to project revised rates of how many mature age men (out of those working the year before) would be likely to continue to participate in the labour force once the new policy was in place. It should also be noted that all option values have been recalculated to take account of the revised set of financial incentives likely to be in place after 2023.[36] The table below shows percentages of men at different ages (again out of

[36] The main changes derive from the fact that increasing the pension eligibility age has the effect of reducing LRI for all those eligible for a full or part pension.

those working in year t-1) estimated to continue participating in the labour market after the policy change.

Table 13
Estimates of Participation Rates Before and After Increasing the Pension Eligibility Age to 67: Men Who Were 'Participating' In Year t-1

Age	Before policy change: eligible at age 65	After policy change: eligible at age 67
55	0.976	0.976
56	0.981	0.976
57	0.979	0.975
58	0.981	0.976
59	0.978	0.971
60	0.936	0.972
61	0.916	0.969
62	0.910	0.920
63	0.886	0.904
64	0.805	0.888
65	**0.703**	**0.881**
66	**0.737**	**0.837**
67	0.774	0.701
68	0.669	0.685

The upshot is that the percentage choosing to participate at age 65 (if they were participating at 64) is projected to rise from 70.3% to 88.1% and the percentage doing so at 66 (if they were participating at 65) rises from 73.7% to 83.7%. There are smaller changes at all other ages.

Finally, we need to translate these results into projections of the likely actual participation rates of mature age men before and after the policy change. Recall that the results in Tables 12 and 13 only relate to men participating in the labour market in year t-1. But in reality many men in this age bracket had already quit the workforce before age 55. Others quit during the period in question (2001-08) and are not included in our equations for some later years (e.g. 2007, 2008). In fact, in this period the number of men aged 65 who were still participating averaged 29.46%,

and the number of 66 year olds averaged 24.95% (Source: HILDA 2001-08). So our estimate of the percentage who would actually remain in work at age 65 after the policy change is 29.46*88.1/70.3=36.92%. Our projection for 66 year olds remaining in the workforce after the change is 24.95*83.7/73.7 = 28.34%.

Clearly, these are fairly substantial gains in the mature age participation rate. It may be noted that they are broadly in line with similar projections made by Gruber and Wise (2004) for other OECD countries.

We now assess the *additional effects* on mature age male participation of two other policy changes taking place in roughly the same period: the raising of the superannuation preservation age from 55 to 60, due for completion in 2025, and the raising of the Superannuation Guarantee from 9% to 12% by 2020.[37] The effect of both reforms will be to change the expected value (and hence option value) of LRI. The raising of the superannuation preservation age will reduce LRI for people who retire before 60, inducing more of them to participate in the labour force than was the case before the change. The likely impact of a 12% Superannuation Guarantee cannot be predicted in a straightforward way; the changed incentive structure will almost certainly have differing incentive effects for different sub-groups (compare the results given on pages 54-70 of this report). Increased superannuation contributions will increase LRI, possibly inducing some people to retire sooner than they would otherwise have done (a negative income effect). On the other hand, the opportunity to save more will also increase the gain from postponing

[37] In other words, we take the effects of the raised pension eligibility age as given, then work out the net additional effects of, first, the change in the super preservation. Then we calculate the further incremental effect of increasing the Superannuation Guarantee.

retirement (or the opportunity cost of retiring) and so may induce others to delay retirement (a positive substitution effect).

Table 14
The Additional Effects On Mature Age Male Participation Rates Of Projected Changes To The Superannuation Preservation Age And The Superannuation Guarantee: Men Who Were 'Participating' In Year t-1

Age	Pension age = 67	Pension age = 67 + Preservation age = 60	Pension age = 67 + Preservation age = 60 + Super Guarantee = 12%
55	**0.976**	**0.982**	0.977
56	**0.976**	**0.982**	0.978
57	**0.975**	**0.980**	0.977
58	**0.976**	**0.979**	0.978
59	**0.971**	**0.973**	0.972
60	0.972	0.972	0.974
61	0.969	0.969	0.971
62	0.920	0.920	0.922
63	0.904	0.904	0.906
64	0.888	0.888	0.891
65	0.881	0.881	0.883
66	0.837	0.837	0.839
67	0.701	0.701	0.704
68	0.685	0.685	0.688

As a reference point, the first column of Table 14 simply repeats the projections in the previous table. The second column shows that, as expected, the effect of raising the superannuation preservation age will probably be to increase the participation rates of men aged 55-59. The increases are, however, projected to be quite modest. The increase in the Superannuation Guarantee is projected to have mixed effects. It is calculated to slightly reduce the participation rates of men aged 55-59, suggesting that negative income effects slightly outweigh positive substitution effects for this group. On the other hand, participation is projected to increase by small margins in the 60-68 age range, suggesting that here substitution effects weigh more heavily.

We are now in a position to assess the combined impact of all main changes to retirement financial arrangements in this period. This can again be calculated using baseline participation rates for 2001-08.

Table 15
Projected Participation Rate After All Three Policy Changes Are Complete: Mature Age Men 55-68

Age	Actual rate before all 3 policy changes	After all 3 policy changes
55	0.801	0.802
56	0.781	0.778
57	0.744	0.742
58	0.724	0.721
59	0.675	0.671
60	0.601	0.625
61	0.566	0.599
62	0.493	0.499
63	0.459	0.470
64	0.387	0.428
65	0.295	0.371
66	0.249	0.284
67	0.222	0.202
68	0.192	0.197

To recapitulate: the forthcoming increase in the pension eligibility age is projected to lead to a substantial increase in the participation rates of men in the 64-66 age bracket; the impact of the other two changes is likely to be modest.

The net impact of these changes on achieving a 55-64 year old participation rate of 67% by 2049-50 also needs to be considered (IGR3, 2010). Based on the figures in Table 15, the rate for men in this age group is projected to rise by 0.9%. It should be noted that this figure ignores substantial projected increases among 65 and 66 year olds.

Women

The array of policy changes still in the pipeline which are due to affect mature age women is even more formidable than for men. The pension eligibility age for women used to be 60 and is now gradually rising to 65, with the change due to be complete by 2014. Then the pension age will rise again to 67 by 2023 (same as men's). Women too will be affected by the change in the superannuation preservation age and the increase in the Superannuation Guarantee.

We again begin with a baseline model which uses HILDA data for 2001-08 to assess factors influencing retirement for mature age women who were working in year t-1. However, for women we include a linear term for age instead of a set of dummy variables. Initial inspection of the data indicated the absence of sharp jumps in retirement at particular ages, and this made sense in view of the fact that, since women's pension eligibility age kept changing during this period, there was no reason to expect that any social norm (or norms) would develop about the acceptability or 'normality' of retiring at particular ages.[38]

[38] Also, in contrast to the results for men, dummy variables for specific ages (e.g. age 63 when the pension eligibility age was 63, which it was for much of this period) were not even statistically significant when LRI option value was omitted.

Table 16
Estimating The Effects of Increasing The Age Pension Eligibility Age To 65: Preliminary Model for Women Aged 55-68 in 2001-08 - Probit Analysis

Explanatory variables	PARTICIPATION (1-0)
Aggregate demand	
GDP growth rate (1 year lag)	-0.029 (0.053)
Year	-0.067 (0.041)
Preferences & constraints	
AGE	-0.025 (0.034)
Partner's age	0.009 (0.017)
Partnered (1-0)	-1.364 (1.111)
Carer (1-0)	-0.064 (0.233)
Long term health problem (1-0)	-0.253* (0.122)
Partner: long term health problem (1-0)	0.334* (0.146)
Education: years	-0.019 (0.035)
Work experience	0.005 (0.003)
Partner works (1-0)	0.607** (0.195)
Budget variables	
OPTION VALUE	**0.005** (0.002)**
Owns home outright (1-0)	-0.483** (0.183)
Net property equity ($)	0.023 (0.019)
Superannuation ($)	0.029 (0.019)
Other net equity ($)	-0.019 (0.02)
Occupational status	0.006 (0.003)
Partner: net hourly pay	0.053 (0.054)
Constant	2.75 (2.334)
Wald chi-squared	34.16*
Log likelihood	-600.882
Sample size	2241

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

As was true for men, the option value of LRI is positive and statistically significant (at the 0.01 level), indicating that for women too financial incentives influence retirement behaviour. The linear age variable is negative, as expected, but, as was true for men, it is not statistically significant because it is highly correlated with option value. (If the model is re-run without option value, the marginal effect of age is -0.108, or -10.8%, which is statistically significant at the 0.001 level).

Using the same assumptions as before, we now project the effects on the female participation rate of increasing the pension age to 65. Also shown, as a sequence of further increments or decrements to participation rates, are the effects of increasing the pension age to 67, then raising the superannuation preservation age, then increasing the Superannuation Guarantee.

Table 17
Estimates of Participation Rates Before and After Policy Changes: Women Who Were 'Participating' In Year t-1

Age	Before all changes: pension at 63	Pension age: increase to 65	+ Pension age: increase to 67	+ Super preservation age increase to 60	+ Superannuation Guarantee increase to 12%
55	0.969	0.968	**0.968**	**0.973**	0.970
56	0.965	0.965	**0.965**	**0.969**	0.967
57	0.950	0.950	**0.949**	**0.954**	0.952
58	0.942	0.942	**0.941**	**0.945**	0.944
59	0.926	0.925	**0.924**	**0.927**	0.927
60	0.918	0.917	0.916	0.916	0.920
61	0.909	0.908	0.907	0.907	0.910
62	0.861	0.899	0.898	0.898	0.901
63	**0.844**	**0.890**	0.889	0.889	0.891
64	**0.845**	**0.896**	0.894	0.894	0.896
65	0.808	**0.808**	**0.869**	0.869	0.871
66	0.801	**0.801**	**0.858**	0.858	0.861
67	0.786	0.786	0.786	0.786	0.788
68	0.779	0.779	0.779	0.779	0.780

The effects of increasing the retirement age for women to 65 and then to 67 are estimated to have quite large effects on the female participation rate (again, key changes are shown in bold type). However, the effects of changes to the superannuation preservation age and the Superannuation Guarantee appear relatively minor. Again, however, it should be pointed out that relative size of effects is partly a consequence of the sequence in which these reforms are assumed to have their impact. Treating the increase in the pension age to 65 as the first effect makes sense because it definitely will be the first reform out of the pipeline. But the gradual

increases in the superannuation preservation age and Superannuation Guarantee will occur more or less simultaneously, so the relative size of their estimated effects is somewhat arbitrary.

Again, the main purpose is to assess the combined effect of all the reforms on the participation rate. This is again calculated by multiplying the 2001-08 baseline rates of participation for the whole mature age female population by the change in participation estimated as likely to occur within the economically active group.

Table 18
Projected Participation Rate After All Policy Changes Are Complete: Mature Age Women 55-68

Age	Actual rate before all 3 policy changes	After all 3 policy changes
55	0.628	0.629
56	0.623	0.624
57	0.598	0.599
58	0.533	0.534
59	0.486	0.487
60	0.422	0.423
61	0.373	0.373
62	0.312	0.327
63	0.259	0.274
64	0.202	0.214
65	0.169	0.182
66	0.134	0.144
67	0.129	0.129
68	0.109	0.109

In summary, the two forthcoming increases in the pension eligibility age for women are projected to lead to substantial increases in their labour force participation rate; the impact of the other two changes is likely to be fairly minor.

In concluding we again consider the combined effect of these changes on increasing the 55-64 year old participation rate. Based on the figures in Table 16, the participation rate of women in this age range is projected to rise by 0.4%. Small increases are also expected for 65 and 66 year olds.

3.2 PROJECTED EFFECTS OF REPLACING THE PENSION BONUS SCHEME WITH THE WORK BONUS SCHEME

Since the late 1990's a number of bonus plans and tax offsets have been established with the aim of creating financial incentives for mature age workers to delay retirement. In July 1998, the Deferred Pension Bonus Scheme was introduced. This scheme offered a once only, tax free lump sum bonus to people who continued working beyond Age Pension eligibility age, rather than claiming an Age Pension or service pension. The amount received was dependent on the amount of basic Age Pension the individual was entitled to when they left the workforce, the length of time they had been a member of the Deferred Pension Bonus Scheme, and whether they were single or partnered during the time they had deferred the Age Pension.[39]

It appears that the Pension Bonus scheme had very little effect on mature age labour force participation rates. Take-up of the scheme was quite low, with less than 10% of those who were eligible participating in 2004 (Dunsford and Rice, 2004). The main reasons for the low levels of take-up appeared to be relatively little publicity for the scheme, the modest

[39] The minimum bonus payable (accumulated over one year) was 9.4 per cent of the basic pension entitlement, and the maximum bonus payable (accumulated over five years) was 235% of the basic pension entitlement (FaCSIA, 2006) The entitlement was calculated by taking 9.4% of the person's annual basic pension entitlement for each year, and multiplying this figure by the number of qualifying years squared. As of 1 July 2008, the maximum amount of pension bonus payable to a single person who would have been entitled to a full pension but deferred retirement for one year was $1336.40 ($1116.40 each for couples). For those who would have been eligible for a full Age Pension but deferred their retirement by five years, the deferred pension bonus increased to $33,409.50 for singles and $27,910.50 each for couples.

level of benefits and the complexity of registering and proving eligibility for the period of entitlement.[40] The Harmer Pension Review found that direct incentives for paid work would be better targeted to pensioners with limited resources, and more effective than the Pension Bonus Scheme. Subsequently the Pension Bonus Scheme was closed to new entrants and replaced with the Work Bonus Scheme. This Scheme operates under the Age Pension income test, halving the rate at which the pension is withdrawn for the first $500 of fortnightly income. Compared to the Deferred Pension Bonus Scheme, the new scheme is much less complex, and is expected to be more effective in encouraging labour force participation among those eligible to receive an age pension.

It is not possible to estimate the overall effects of the new scheme on mature age participation, or on the incomes of all potentially eligible individuals. Here, using the same approach as in Section 2 of this report, we provide a stylised case study comparing the incentive effects of the old and new schemes for an individual whose circumstances would have allowed him to benefit from either. He is age 65 and eligible for a full pension, so he could have gained maximum benefit from the Pension Bonus Scheme if he had chosen to continue in work. He can also benefit from the new Work Bonus Scheme, if he chooses to collect his pension (and his superannuation) while still undertaking part-time work.

[40] Using the Australian Survey of Retirement Attitudes and Motivations (ASRAM), a nationally representative survey of Australian workers aged 40 to 59 in 2006, Walter, Jackson and Felmingham (2008) found that only one quarter of respondents were aware of the Deferred Pension Bonus Scheme, and among those who were aware of the scheme, only 40% indicated the scheme was likely to persuade them to remain in the workforce past the age of 65.

Single Man, age 65, homeowner,
Current annual wage (before tax) = $40000,
Current superannuation balance = $90000,
Other Assets = $60000

Changes in potential retirement income:

	With Pension Bonus	*With Work Bonus*	*With Pension Bonus – Reduced working hours*	*With Work Bonus – Reduced working hours*
If he retires now				
Annual income from super	10198	10198	10198	10198
Annual income from other assets	6799	6799	6799	6799
Annual pension income	12741	12741	10664	12664
Wage Income	0	0	8000	8000
Total annual retirement income, after tax	29738	29738	35661	37661
If he retires in 1 year				
Annual income from super	11309	11309	10018	10018
Annual income from other assets	7245	7245	7245	7245
Annual pension income	12665*	12665	10582	12595
Wage Income	0	0	8000	8000
Total annual retirement income, after tax	31219	31219	35845	37858

* Plus once off Pension Bonus Payment of $880

Under the Pension Bonus Scheme, if he had chosen to delay retirement and age pension receipt until age 70, he would have received a one-off payment of $19852. This sounds substantial, but viewed in terms of its effects on LRI, the payment would not have been enough to offset the age pension foregone by delaying retirement for five years.

The Work Bonus Scheme only applies to those who receive a full or part pension and also do some paid work. So the effects of the scheme can best be seen in a scenario (Columns 3 and 4 in the above table) in which this man more than half retires. He moves his modest superannuation balance from accumulation phase to pension phase, receives the age pension to which he is entitled, but still works one day per week. The

effect of the Work Bonus is to increase the age pension he is entitled to by approximately $2000 per year.

The table below completes the scenario by comparing the overall incentive effects of the old and new schemes in terms of LRI.

Measures of financial incentives:

	LRI_0 ($)	LRI_1 ($)	1 year accrual ($)	1 year accrual rate (%)	Implicit tax rate (%)	Peak value ($)	Option value ($)
With Pension Bonus	294634	287052	-7582	-2.57	19.95	-7582	10644
With Work Bonus (pension Bonus Removed)	294634	285994	-8641	-2.93	22.73	-8641	-2308

Judged by differences in LRI, this person would really be better off to retire completely under either the Pension Bonus or the Work Bonus Scheme. The removal of the Pension Bonus has actually created a stronger incentive to retire, since accrual and peak value have become larger and option value has changed from positive to negative.

SECTION 4

THE EFFECTS OF CONTINUING TRENDS IN HUMAN CAPITAL AND HEALTH ON MATURE AGE PARTICIPATION

THE EFFECTS OF CONTINUING TRENDS IN HUMAN CAPITAL AND HEALTH ON MATURE AGE PARTICIPATION

Economists sometimes define human capital more broadly than the textbook standard of 'years of education' and 'work experience'. COAG, for example, quite explicitly includes health reforms in its third wave human capital reform agenda for Australia; an agenda that was adopted in 2006 (COAG, 2006). In this section we estimate the likely effects of improved health and increased life expectancy on mature age participation through to 2048. Again, in presenting results, we are beginning with a relatively detailed assessment of the change projected to have the greatest future effects on mature age participation. Then we will provide evidence about changes which will have smaller effects, namely improved levels of education attainment in the mature age population and related change towards an occupational structure in which white collar 'analytic' jobs increasingly replace blue collar manual jobs.

4.1 PROJECTED EFFECTS OF HEALTH IMPROVEMENTS ON MATURE AGE PARTICIPATION RATES

The Australian Bureau of Statistics (ABS) regularly issues estimates of future life expectancy. Its latest release in 2008 provides estimates decade by decade forward to 2048 (see Table 19).

Table 19
Projected Life Expectancy Increases 2008-48*

	2008	2018	2028	2038	2048
Life expectancy – men	79.2	82.2	85.2	88.2	91.2
% increase		3.79	7.58	11.36	15.15
Life expectancy - women	83.7	86.2	88.7	91.2	93.7
% increase		2.99	5.97	8.96	11.95

*Based on life expectancy at birth and the assumption that life expectancy will increase by 0.3 years per year for men and 0.25 years per year for women until 2056, so that at that date life expectancy will be 93.9 for men and 96.1 for women (ABS 3222.0, 2008).

ABS projects that the life expectancy of men may increase by 0.30 years per year from 2008 to 2048, and that women's life expectancy may increase by 0.25 years per year. These projections assume that life expectancy continues to increase at about the same rate in future as in recent decades.[41] In order to next make health projections we need to make two further assumptions. The first is that general health will improve at the same rate as life expectancy. This may sound like an over-optimistic assumption, but it is one routinely made by health researchers. It may also be mentioned that the COAG reform agenda aims to achieve a *better outcome* than we are projecting; it aims to compress morbidity more tightly into the last phase of life (COAG, 2006).

A second assumption made here is that future improvements in health will be proportionately reflected in increased scores on the SF-36 General Health Scale. The SF-36 is the main health measure in the HILDA Survey. Scores on the SF-36 are calibrated (by the scale designers) to run from 0-100, so can be treated as quasi-percentiles.

Tables 20 and 21 give results of probit regressions, using HILDA data for 2001-08, in which the workforce participation of mature age men and women is regressed on much the same set of explanatory variables used in previous analyses in this report, but with the SF-36 also included. Table 20 relates to mature age men and Table 21 to mature age women.

[41] ABS also provides an alternative set of assumptions, not used here, in which health improvements continue until 2011 and then gradually slow down.

Table 20
Effect of General Health, Net of Other Explanatory Variables, on Workforce Participation of Men Aged 55-69 in 2001-08: Probit Regression

Explanatory variables	PARTICIPATION (1-0)
SF-36 Health	**0.024*** (0.002)**
	Marginal Effect: 0.006* (0.001)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.026 (0.039)
Year	0.083*** (0.021)
Preferences & constraints	
Age	-0.256*** (0.022)
Partner's age	0.016 (0.013)
Partnered (1-0)	-1.341 (0.708)
Carer (1-0)	-0.100 (0.272)
Partner: long term health problem (1-0)	0.049 (0.110)
Education: years	0.061*** (0.037)
Work experience	0.119*** (0.008)
English competence (1-0)	-0.851 (0.444)
Partner works (1-0)	1.389*** (0.120)
Constant	2.007 (1.511)
Wald chi-squared	576.73
Log likelihood	-1740.3505
Sample size	5597

Source: HILDA 2001-08. *** significant at 0.001 **significant at 0.01 *significant at 0.05

Table 21
Effect of General Health, Net of Other Explanatory Variables, on Workforce Participation of Women Aged 55-64 in 2001-08: Probit Regression

Explanatory variables	PARTICIPATION (1-0)
SF-36 Health	**0.023*** (0.003)**
	Marginal Effect: 0.008* (0.001)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.013 (0.037)
Year	0.104*** (0.023)
Preferences & constraints	
Age	-0.276*** (0.025)
Partner's age	-0.006 (0.017)
Partnered (1-0)	-0.952 (1.099)
Carer (1-0)	-0.444* (0.187)
Partner: long term health problem (1-0)	0.186 (0.117)
Education: years	0.139** (0.044)
Work experience	0.057*** (0.004)
English competence (1-0)	2.422** (0.782)
Partner works (1-0)	1.859*** (0.141)
Constant	7.066*** (1.683)
Wald chi-squared	575.12
Log likelihood	-1909.0612
Sample size	5882

Source: HILDA 2001-08. *** significant at 0.001 **significant at 0.01 *significant at 0.05

These tables confirm that health is one of the major determinants of continued workforce participation for both mature age women and men. In fact, only age, previous work experience and partners employment status are as strong or stronger predictors of continuing to participate in the labour market in later life.

How can we use this information to project future increases in employment due to improved health? Our approach assumes that all other relationships shown in Tables 20 and 21 will remain unchanged through to 2048 and that health will improve by the amounts estimated by ABS. We then evaluate the men's and women's equations for each individual and calculate the probability of being employed at each age, given

expected improvements in health. Results are given in Tables 22 and 23 below.

Table 22
Projected Future Participation Rates For Men Aged 55-64 Based On Improved Health*

Age	2008	2018	2028	2038	2048
55	0.883	0.885	0.887	0.890	0.891
56	0.859	0.861	0.863	0.867	0.868
57	0.836	0.842	0.845	0.850	0.851
58	0.794	0.799	0.803	0.809	0.811
59	0.750	0.758	0.763	0.770	0.772
60	0.709	0.711	0.717	0.727	0.730
61	0.643	0.658	0.665	0.677	0.679
62	0.557	0.559	0.569	0.582	0.585
63	0.474	0.489	0.499	0.514	0.518
64	0.370	0.392	0.403	0.418	0.422

*Projections based on ABS estimates of future life expectancy, plus unchanged relationships between employment and other variables.

Table 23
Projected Future Participation Rates For Women Aged 55-64 Based On Improved Health*

Age	2008	2018	2028	2038	2048
55	0.744	0.749	0.754	0.758	0.762
56	0.687	0.686	0.691	0.696	0.700
57	0.625	0.627	0.632	0.637	0.642
58	0.553	0.555	0.561	0.566	0.571
59	0.478	0.486	0.492	0.498	0.503
60	0.421	0.431	0.437	0.443	0.449
61	0.337	0.353	0.359	0.365	0.371
62	0.251	0.268	0.274	0.279	0.284
63	0.188	0.196	0.202	0.207	0.212
64	0.121	0.134	0.138	0.143	0.147

*Projections based on ABS estimates of future life expectancy, plus unchanged relationships between employment and other variables.

The estimates in Tables 22 and 23 indicate that improvements in health, provided they transpire, are likely to make a substantial difference to mature age participation rates during the next forty years. The participation rate of men aged 55 is projected to go up from 88.3% in

2008 to 89.1% in 2048, while the rate for men aged 64 may rise from 37.0% to 42.2%. The projected increase for the whole age range is 2.4%.

Projected increases for women are similar. It is estimated that by 2048 the participation rate for women aged 55 may have increased from 74.4% to 76.2%. The projected increase for 64 year old women is from 12.1% to 14.7%. Over the entire age range, the projected increase is 2.2%.

It should be emphasised again that these projections are made on the basis that nothing else changes. In practice, some foreseeable developments which are also considered in this report, including improved educational attainment and increases in the Age Pension eligibility age, are likely to increase participation rates further. Health, however, is clearly an important factor and, with that in mind, determined implementation of the health aspects of COAG's (2006) human capital reform agenda would be valuable. This issue is revisited in the concluding section of the report ('Policy Implications and Options').

4.2 PROJECTED EFFECTS OF INCREASED EDUCATION ON MATURE AGE PARTICIPATION RATES

A second human capital trend which is likely to increase mature age workforce participation in coming decades is an increased level of formal education. It is well known, and the results below confirm, that better educated people tend to remain in the workforce to a later age than people with less formal education. Furthermore, in recent times in Australia, as in all other developed countries, each successive cohort has a higher level of formal education than the previous one.

Let us first assess the link between formal education and the participation rate of 55-64 years olds in 2001-08. For this purpose we use the same labour supply equation as for health, but with 'years of education' being the key explanatory variable rather than the SF-36 health rating. Years of education are calculated using a standard international coding scheme which rates the number of full-time equivalent years required to obtain various educational qualifications. Tables 24 and 25 give separate results for men and women.

Table 24
Effect of Education, Net of Other Explanatory Variables, on Workforce Participation of Men Aged 55-64 in 2001-08: Probit Regression

Explanatory variables	PARTICIPATION (1-0)
Years of Education	**0.177*** (0.036)**
Marginal Effect	**0.045*** (0.010)**
Aggregate demand	
GDP growth rate (1 year lag)	-0.024 (0.037)
Year	0.089*** (0.021)
Preferences & constraints	
Age	-0.250*** (0.022)
Partner's age	0.009 (0.012)
Partnered (1-0)	-1.037 (0.655)
Carer (1-0)	-0.321 (0.260)
Long term health problem (1-0)	-0.841*** (0.091)
Partner: long term health problem (1-0)	0.081 (0.108)
Work experience	0.122*** (0.008)
English competence (1-0)	-0.176 (0.358)
Partner works (1-0)	1.387*** (0.116)
Constant	2.377 (1.451)
Wald Chi-squared	628.61***
Log likelihood	-1863.3575
Sample size	6064

Source: HILDA 2001-08. *** significant at 0.001 **significant at 0.01 *significant at 0.05

It can be seen that, for 55-64 year old men in 2001-08, every extra year of formal education increased the probability of participating in the labour force by 4.5% (the marginal effect).

Table 25
Effect of Education, Net of Other Explanatory Variables, on Workforce Participation of Women Aged 55-64 in 2001-08: Probit Regression

Explanatory variables	PARTICIPATION (1-0)
Years of Education	**0.150*** (0.044)**
Marginal Effect	**0.051*** (0.015)**
Aggregate demand	
GDP growth rate (1 year lag)	0.002 (0.036)
Year	0.120*** (0.023)
Preferences & constraints	
Age	-0.286*** (0.025)
Partner's age	-0.007 (0.017)
Partnered (1-0)	-0.738 (1.072)
Carer (1-0)	-0.460* (0.184)
Long term health problem (1-0)	-0.549*** (0.093)
Partner: long term health problem (1-0)	0.194 (0.115)
Work experience	0.060*** (0.004)
English competence (1-0)	1.987*** (0.541)
Partner works (1-0)	1.889*** (0.137)
Constant	8.524*** (1.550)
Wald chi-squared	620.31
Log likelihood	-2018.0424
Sample size	6347

Source: HILDA 2001-08. *** significant at 0.001 **significant at 0.01 *significant at 0.05

For women the effect of every additional year of education was to increase labour force participation by 5.1%.

We next need to estimate probable increases in formal educational levels for successive future cohorts of 55-64 year olds. This can be done for the next three cohorts by noting their current levels of formal education and assuming that they undertake little or no formal education in future years. Table 26 gives the latest available (2004) OECD figures for 'years of education' for Australians in the current 55-64 cohort, and also for upcoming cohorts who are now aged 25-34, 35-44 and 45-54. The table also reports an estimated *percentage increase* in years of education for each future cohort, using the current cohort as a baseline.

Table 26
Average years of schooling weighted by proportion of the population participating in different levels of education, Australia, 2004

	Average years of education in 2004				Increase in average number of years of schooling for those in the 55-64 age group		
Age	25-34	35-44	45-54	55-64	by 2014	by 2024	by 2034
Men	13.2	12.8	12.7	12.2	4.10%	4.92%	8.20%
Women	13.3	12.4	12.3	11.7	5.13%	5.98%	13.68%

Source: OECD Education database Table C09.1: Educational attainment expressed as average number of years of successfully completed formal education (2004)
http://www.oecd.org/dataoecd/56/9/37863998.pdf

In 2004 55-64 years old men averaged 12.2 years of formal education and women averaged 11.7 years. In thirty years time in 2034 these averages will have gone up to 13.2 for men and 13.3 for women; increases of 8.2% and 13.7% respectively.

Finally, we need to estimate the effect of increases in education on future labour supply. The left hand columns of Table 27 (men) and Table 28 (women) show rates of mature age labour force participation in 2004, estimated directly from the equations underlying Table 24 (men) and Table 25 (women).[42] The second, third and fourth columns then provide estimated rates of participation by 55-64 year olds in 2014, 2024 and 2034. These rates are obtained by substituting estimated future years of education into our underlying labour force equations. (The values of all other variables in these equations are left unchanged).

[42] N.B. these are rates estimated from labour supply equations, rather than actual observed rates in the HILDA Survey.

Table 27
Projected Future Participation Rates For Men Aged 55-64 Based On Improved Education*

Age	2004	2014	2024	2034
55	0.879	0.884	0.885	0.888
56	0.860	0.865	0.866	0.870
57	0.837	0.843	0.845	0.849
58	0.794	0.802	0.804	0.810
59	0.746	0.757	0.759	0.767
60	0.687	0.700	0.703	0.713
61	0.633	0.647	0.650	0.661
62	0.538	0.553	0.557	0.569
63	0.459	0.475	0.479	0.492
64	0.357	0.373	0.377	0.390

* Compared to 2004 levels of Education

The rate of participation for men aged 55 is projected to rise from 87.9% in 2004 to 88.4% in 2014, then to 88.8% in 2034. The rate of increase for 64 year olds is somewhat higher; from 35.7% in 2004 to 39.0% in 2034. For the entire age group, the effect of improved education is projected to increase participation by 2.0%.

Similar projections for future cohorts of mature age women are given in Table 28.

Table 28
Projected Future Participation Rates For Women Aged 55-64 Based On Improved Education*

Age	2004	2014	2024	2034
55	0.746	0.756	0.757	0.771
56	0.683	0.695	0.697	0.713
57	0.616	0.629	0.631	0.649
58	0.544	0.558	0.560	0.580
59	0.473	0.487	0.490	0.511
60	0.416	0.430	0.433	0.455
61	0.338	0.353	0.355	0.377
62	0.251	0.264	0.266	0.285
63	0.183	0.194	0.196	0.213
64	0.120	0.130	0.131	0.146

* Compared to 2004 levels of Education

Women's future participation rates are likely to rise even more than men's, precisely because their education levels will rise more. By 2034 it is estimated that the participation rate of 55 year old women will have risen from 74.6% in 2004 to 77.1% in 2034, and the rate for 64 year olds will be up from 12.0% to 14.6% in 2034. The projected increase for the whole age group is very substantial at 3.2%.

We have not attempted to make projections beyond 2034, because to do so would require assumptions about future educational policies and trends which are essentially unknowable. Clearly, however, increases in both male and female mature age participation rates, projected to occur between now and 2034 as a result of increased formal education, are far from trivial.

4.3 PROJECTED EFFECTS OF THE INCREASING PROPORTION OF ANALYTIC WHITE COLLAR JOBS ON MATURE AGE WORKFORCE PARTICIPATION

A third trend which may increase mature age workforce participation is the increasing proportion of analytic white collar jobs in the overall occupational structure. This trend has been underway for many years and is likely to continue. It is a plausible conjecture that, since white collar analytic jobs are relatively pleasant to do, and certainly do not involve hard physical labour, some individuals may be willing to continue in them further into their senior years. Conversely, it is reasonable to hypothesise that those who perform hard physical jobs may be likely to retire early because they find it difficult to continue.

Men

The occupational structure was divided into four categories along conventional lines, using the International Standard Classification of Occupations (ISCO): upper white collar professional and managerial jobs, middle level white collar jobs (associate professionals), lower white collar clerical and sales jobs, and manual jobs[43]. HILDA respondents age 55-64 were assigned to these categories on the basis of their current job if they were still working, and on the basis of their last previous job if they were not working. Table 29 shows the participation rates in 2001-08 of men aged 55-64 in each category. It should be noted that the rates shown are higher than actual participation rates because individuals who did not nominate a current or previous occupation (perhaps because they had not worked for a long time) are omitted.

Table 29
Participation Rates of Men Aged 55-64 In 2001-08 By Occupational Category[a]

Occupational category	*%*
Professional & managerial	93.1
Middle level white collar: associate professionals	94.3
Lower white collar: clerical & sales	90.1
Manual work	90.1
Total	91.7

Source: HILDA 2001-08.
a. Excluding respondents who did not nominate a current or last previous occupation.

It might appear that men holding upper and middle level white collar jobs were somewhat more willing and able to continue in work in these years than men in the middle three occupational categories, and that manual workers were most likely to be retired. However the differences are not large, so it makes sense to see if they remain statistically significant when included in our standard labour supply equation, including 'controls' for demand side and preference/constraint variables

[43] The ISCO classification makes it difficult to differentiate within the manual category between those in skilled or semi-skilled jobs and those in unskilled jobs.

(Table 30).[44] The reference group is men working in lower white collar clerical and sales jobs.

Table 30
Differences In Labour Force Participation By Occupational Category In 2001-08: Men Age 55-64

Occupational category[a]	PARTICIPATION (1-0)
Professional & managerial	-1.372#(0.732)
Middle level white collar: associate professionals	-1.390(0.914)
Manual work	0.258(0.668)
Aggregate demand	
GDP growth rate (1 year lag)	4.629***(0.556)
Year	2.392***(0.177)
Preferences & constraints	
Age	-0.585***(0.088)
Partner's age	-0.009(0.047)
Partnered (1-0)	-1.190(1.368)
Carer (1-0)	-0.974(1.283)
Long term health problem (1-0)	-5.654***(0.510)
Partner: long term health problem (1-0)	0.547(0.552)
Education: years	0.595***(0.165)
Partner works (1-0)	4.907***(0.635)
Constant	14.203**(5.513)
Log likelihood	-499.591
Wald Chi-square	240.28***
Sample size	4057

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 *significant at 0.05 #significant at 0.10.
a. Reference group is employees in the clerical and sales occupational category.

It can be seen that, once the effects of demand side and preference variables are netted out, there are no predictable and statistically significant differences between the workforce participation rates of mature age men in these four main occupational categories[45]. On this basis we infer that changes in the future occupational structure which may take place in 2010-50 are not likely to affect mature age men's labour supply. Nor, on this limited basis, is there reason to believe that future increases in the pension eligibility age will impose excessive

[44] Budget variables and the work experience variable were omitted because they are endogenous; ie. they are likely to be consequences of the occupational category in which people are employed.

burdens on manual workers. At present these workers do not, on average, retire at a younger age than other men.

These issues need further research. The conclusions drawn here are subject to the caveat that the occupational categories we have used are necessarily broad (otherwise sub-sample sizes would be too small) and that it is possible that, if a finer-grained analysis were undertaken, some significant differences in current and projected future participation rates would emerge.

Women

Table 31 reports participation rates for women age 55-64 by occupational category. It should be recalled that only individuals who nominated a current or previous occupation are included in Table 31; over 40% of women in this age group did not do so.

Table 31
Participation Rates of Women Aged 55-64 In 2001-08 By Occupational Category[a]

Occupational category	*%*
Professional & managerial	89.8
Middle level white collar: associate professionals	90.5
Lower white collar: clerical & sales	84.0
Manual work	75.5
Total	85.3

Source: HILDA 2001-08.
a. Excluding respondents who did not nominate a current or last previous occupation.

[45] One result is statistically significant just at the 10% level. It appears that, contrary to hypothesis, those in professional and managerial positions may have been less not more likely to continue in work. This is probably not a result in which any confidence can be placed.

The evidence suggests that, among women in this age group unlike men, participation rates are higher in the higher status occupations. The probit results in Table 32 confirm the point for middle level associate professionals, but not for higher level professional and managerial employees.

Table 32
Differences In Labour Force Participation By Occupational Category In 2001-08: Women Age 55-64

Occupational category[a]	PARTICIPATION (1-0)
Professional & managerial	0.489(0.510)
Middle level white collar: associate professionals	1.166*(0.539)
Manual work	-0.266(0.438)
Aggregate demand	
GDP growth rate (1 year lag)	3.017***(0.403)
Year	2.109***(0.203)
Preferences & constraints	
Age	-0.636***(0.082)
Partner's age	0.016(0.051)
Partnered (1-0)	-2.205(3.222)
Carer (1-0)	-1.056(0.741)
Long term health problem (1-0)	-3.342***(0.453)
Partner: long term health problem (1-0)	0.373(0.456)
Education: years	0.267*(0.125)
Partner works (1-0)	4.508***(0.549)
Constant	23.563***(4.803)
Log likelihood	-486.440
Wald Chi-square	153.76***
Sample size	3335

Source: HILDA 2001-08.
*** significant at 0.001 **significant at 0.01 *significant at 0.05 # significant at 0.10
a. Reference group is employees in the clerical and sales occupational category.

The only statistically significant difference here is that mature age women in middle level white collar occupations have a significantly higher participation rate than the reference group of women in clerical and sales jobs ($b=1.166$ $p<0.05$). Based on this, it seems possible that a continuing shift in the occupational structure away from manual jobs might have just a small positive effect in coming decades on mature age women's participation rates. However, it is not really possible to estimate the size

of this future effect because, except in the broadest terms, Australia's future occupational structure is unknowable. It is likely that, in three or four decades time, all kinds of occupations will have emerged which are unheard of now.

SECTION 5

POLICY IMPLICATIONS AND OPTIONS

POLICY IMPLICATIONS AND OPTIONS

5.1 DO PEOPLE WANT WHAT THE GOVERNMENT WANTS?

This concluding section is mainly about policy options for increasing mature age workforce participation. However, before considering various options, it is useful to review evidence in recent *retirement intentions surveys* and ask whether individual retirement intentions and public policy goals are consistent with each other. This is quite a crucial question. If Australians are starting to expect and want to work longer into their mature years and old age, then it will be less difficult to achieve current policy objectives. If, on the other hand, most people continue to expect to retire in their late fifties or early sixties, the aim of bringing about change will be harder to achieve.

The latest retirement intentions survey module in HILDA was in the field in September-October 2007. This was fortunate timing, given that a major set of reforms intended to increase mature age participation had just taken effect in July of that year. Questions about retirement were put to all respondents in the survey who were aged 45 and over. We shall focus on two groups: the current group of 55-64 year olds and, secondly, the group who are now in the 45-54 age range and whose future participation rate as seniors is of key interest.

According to the HILDA Survey, the overall participation rate for 55-64 year olds in 2007 was 59.4% (men 67.3%, women 52.2%). Table 33

gives more detail, showing how many people were still participating at ages 55, 60 and 64.

Table 33
Workforce Participation At Age 55, 60 and 64: Individuals Currently Aged 55-64 In 2007

Age	All %	Men %	Women %
55	76.1	86.4	67.7
60	53.6	67.4	42.7
64	32.0	41.9	22.2

*Source: HILDA 2007 data.

The results of most interest, perhaps, relate to 64 year olds: 32.0% of the population were still participating in the labour force at this age, 41.9% of men and 22.2% of women.

We now compare the results in Table 33 with evidence about the expectations and preferences of people who were aged 45-54 in 2007. These respondents were asked both at what age they *expected* to retire completely from the workforce, and the age at which they would *choose* to retire. By subtracting from 100 the percentages who say they expect or would choose to retire by a certain age, we obtain the following estimates of future participation rates for this cohort (Table 34).

Table 34
Estimated Future Participation Rates For People Aged 45-54 In 2007

Age	All: Expect %	All: Choose %	Men: Expect %	Men: Choose %	Women: Expect %	Women: Choose %
55	87.7	48.0	92.3	47.3	92.1	65.7
60	51.4	21.4	60.9	23.5	64.1	37.8
64	15.9	10.6	19.6	11.2	24.9	19.8

*Source: HILDA 2007 data.

Clearly, many people expect to carry on working until a later age than they would ideally choose to, with the difference presumably being due to financial pressures. The evidence in Table 34 underlines the perhaps obvious point that, if people could retire when they wanted, future mature age participation rates would go down not up. But even if we focus on expectations rather than choices/preferences, there is little in Table 34 to suggest that the next cohort will continue participating in the workforce to a later age than the current cohort of 55-64 year olds. For 60 and 64 year olds expected participation rates are lower in the next cohort than the current cohort's actual rates. However, the overall projected decline is entirely due to men; women's projected rates are higher in the next cohort than the current one.

Comparing age groups, it appears that only the projected participation rates for 55 year olds are higher in the upcoming cohort than the current cohort. However, this may well be a misleading estimate, because it is probably the case that many people who retire in their fifties do so for health reasons; their own or their partner's ill health (Woodland, 1987; Headey et al., 2006). Ill-health is presumably *un*expected.

Although on balance the evidence looks unpromising, there are a few pointers in the direction of increased participation. It has already been mentioned that women's participation rates are projected to rise. It is also the case that there are more people in the upcoming cohort who expect to still be working at age 65 and over (15.9%) than are actually active in the labour market in the current cohort (9.5%). Again, though, it should be pointed out that ill-health and death could falsify these expectations.

One potentially important way in which there may be prospects of encouraging increased participation by seniors is via gradual transition to retirement. Historically, most Australians have stopped working suddenly; working full-time before retirement, then ceasing work completely. As previously discussed, the Australian Government in 2004-05 sought to modify this pattern by introducing 'transition to retirement' pensions, and then in 2007 the Government further sought to make part-time work attractive to seniors by reducing applicable marginal tax rates.

Evidence in the HILDA retirement module indicates that many people would like to make a gradual transition. Among those aged 45 and over, 12.3% (men: 13.1% women: 11.6%) claim that they are 'partly retired' and hence presumably already in transition. Even more promising, among those not yet retired, a large majority (63.5%) claim that they would rather retire gradually than retire all at once. The individuals who said they would prefer gradual retirement were then asked whether they saw any specific obstacles preventing them from doing so. About a quarter (24.3% of the 63.5% who preferred a gradual transition) saw one or more obstacles. The main one was money; about half (47.9%) of those who mentioned obstacles listed not being able to make enough money in a transition job. 14.2% mentioned their own or their partner's ill-health, while 15.1% said their superannuation entitlements would be affected.[46]

It appears, then, that prospects of increasing mature age labour supply by further encouraging gradual transitions to retirement are promising, and some policy options are discussed below. A note of caution is in order,

[46] In most cases this latter perception would have been incorrect, since from July 2007 onwards superannuation payments in pension phase have been untaxed.

however. Claims by 13.1% of men aged 55-64, and 11.6% of women, that they are already in transition may be based on rather subjective judgments. The main evidence one would expect to see if people were making gradual transitions would be movement from full-time work to part-time work and then to zero work.[47] Current Australian evidence indicates that only a few percent of current retirees have clearly made this type of transition (Borland and Warren, 2005). Similar evidence has emerged in the U.S. (Rust, 1990; Blau, 1994). It seems that many people, when they report a gradual transition, may just mean that they feel that they are winding down towards retirement.

Whether or not people can retire, either fully or partly, when they expect to or choose to depends heavily on questions of affordability and financial planning. HILDA respondents were asked about their financial plans and, in particular, whether they had thought about how much after-tax income they needed to retire. Among 45-54 year olds a small majority said they had not thought about it much. Among those age 55 and over, and hence closer to retirement, about 60% claimed to have given the matter "a lot" or "a reasonable amount" of thought. These respondents were further asked what level of income they were aiming for in retirement and what level of savings (excluding the family home) they would need to achieve their target income. The median after-tax income nominated was $50,000 and the median level of savings deemed necessary to achieve this was $600,000.

[47] Some people, however, move from their main career job to a full-time job which is less demanding. Others still move into self-employment. It is open question as to how many of these moves are entirely voluntary, rather than reflecting constraints on choice of job and hours.

By way of comment, it may be suggested that achieving an income of $50,000 from savings of $600,000 appears not unrealistic. It implies an after-tax return on investment of 8.25%, or considerably less if it is assumed that savings are run to down to zero by death. However, analysis of the levels of savings (including superannuation) which HILDA respondents (and older Australians more generally) are actually achieving suggests that many will fall well short of their targets (Wilkins, Warren, Hahn and Houg, 2010). In particular, while over three-quarters of non-retired HILDA respondents aged over 45 expect that superannuation and other savings will be their main source of income in retirement, the evidence suggests that many, perhaps most, will be mainly reliant on the Age Pension (Wilkins, Warren, Hahn and Houg, 2010; see also IGR3, 2010).

It may well be then that financial pressures and the desire for an adequate perceived standard of living in their senior years will induce many people to postpone retirement and participate in the labour market for longer than they now expect or would choose. One further pointer in this direction is that an ABS retirement intentions survey, conducted during the Global Financial Crisis in 2008-09, found that the percentage of people expecting to work until 65 or later, and the percentage who expected to never retire (or did not know when they would retire) had shot up well above the percentages recorded in previous ABS surveys (The Age, December 18-19, 2009, p3; ABS, 2009).

5.2 POLICY OPTIONS

A central conclusion of this Report is that the Australian Government's policy objective of achieving a substantial increase in the mature age

participation rate from its current level of about 60% is virtually certain to be achieved. As the graphs in Section 2 showed, the participation rate of 55-64 year old men has increased by over 10% in the last 25 years, and the participation rate of women in this age group has increased by over 15%. If these rates of increase could be maintained over the next 40 years, the mature age participation rate would be comfortably over 70% by 2049-50.

Increased mature age workforce participation seems likely to go a long way towards mitigating the long-term decline in economic growth previously projected. Our conclusions are more optimistic than those reached by the Australian Government (IGR 2002; 2007, 2010), the Productivity Commission (2005) and a previous Melbourne Institute Report to DEEWR (Headey et al, 2006).[48]

The reasons behind the strong growth in participation are not exactly known, but almost certainly include factors examined in this Report, notably improvements in the health and education of mature age people, and, for women, a raised pension eligibility age. Another likely explanation is increased demand by employers for older workers, especially high skill workers, given that the supply of prime age employees is diminishing (at least as a share of the total population) due to population ageing. It seems clear that all these trends will continue: health and education will continue to improve, further increases to the pension eligibility age are in the pipeline, and, unless the rate of economic growth seriously declines, employer demand for skilled older workers is bound to increase.

[48] The previous MI report basically accepted the analyses of the Treasury and the Productivity Commission and focussed on policy options to increase mature age participation.

A further positive point is that the labour supply of people just above the 55-64 age bracket has also been increasing rapidly and is projected to rise further as a result of the increase in the pension age to 67; a change which will be completed in 2023. On the negative side of the ledger, it should be noted that projected future changes in the participation rate are *not* likely to be fully reflected in hours worked…and it is hours worked (rather than the employment rate or participation rate) that matter most for economic growth. Mature age employees, especially males, work fewer hours on average than prime age employees, and as more and more older people are drawn into the labour market, it is likely that the average weekly hours worked by the entire labour force will decline. There may or may not still be an increase in *total hours worked*. Estimating probable trends in total hours for future decades (say 2010-50) would be a difficult task and was beyond the scope of this report. It is worth further inquiry.

Increasing mature age participation: successful policy developments

From a public policy standpoint, it is important to clarify which policy developments have been contributing to the successful drive to increase mature age participation, and which have been less successful. The evidence in this report – evidence about the recent past (2001-08) and projections forward to 2049-50 - points to three sets of successful policy developments, and one unsuccessful set. The successful sets are (1) improvements in education and health; human capital gains which the Australian Government has actively promoted (2) increases in the Age Pension eligibility age and (3) sustained economic growth. A fourth set of policy initiatives have the general property of incentivising increased savings for retirement by increasing after-tax returns both to

superannuation and to any paid work undertaken during retirement. These initiatives have gone some way towards meeting other current policy objectives - including self-funding in retirement and increased living standards in retirement - but the specific changes assessed in Section 2 of this report appear not to have increased mature age workforce participation (further discussion below).

The evidence is Section 4 confirmed that health and education are both significant determinants of mature age workforce participation. With increased levels in younger cohorts, these human capital variables are projected to make a large contribution towards significantly increasing future participation levels by 2049-50. Education yields higher workplace productivity and wages, and is associated with more interesting and less physically demanding jobs. Well educated people have higher desired incomes and expenditures in retirement. Good health for an individual, and also for his/her partner, is associated with higher workforce participation via higher productivity. It leads to longer lives which require more savings and more income spread over a longer period.

The Council of Australian Governments (COAG) endorsed a human capital reform agenda in 2006, labelling it the 'third wave' of economic reform in this country (COAG, 2006). The main aims set out in this agenda are to increase labour supply and productivity by increasing the educational standards of younger people, by reducing the incidence of so-called 'lifestyle diseases', such as obesity and Type 2 diabetes, and by compressing ill-health even more into the last few years of life. The evidence in this report indicates that effective implementation of COAG's agenda would have the side-benefit of bringing about substantial increases in mature age workforce participation.

In Section 3 of the Report, it was estimated that past and future increases in the Age Pension eligibility age have had and will have a positive effect on the workforce participation decisions of the mature aged. It is likely that these changes in the 'official' retirement age will gradually change social norms – norms held by employees and employers – about when it is appropriate to retire. Presumably, with further increases in life expectancy, there will be opportunities in future to raise the pension eligibility age even further. One politically difficult but logically sound option would be to index the eligibility age to increases in life expectancy.

Finally, even though this report is primarily about labour supply, it is essential to recognise the importance of sustained economic growth and hence high labour demand as explanations for recent strong increases in mature age participation. In this regard, macroeconomic monetary and fiscal policies, and microeconomic policies to sustain productivity growth and the restructuring of the economy to adapt to changing circumstances, are key policy levers which, of course, promote other objectives besides increasing mature age participation.

Policy developments which did not increase mature age participation

In contrast to the effects of the policy developments just reviewed, our estimates in Section 2 of the Report indicated that both the July 2005 and July 2007 changes in policy towards superannuation and mature age employment did not have statistically significant effects on labour supply. Both sets of policy changes, and particularly those of 2007, effectively increased the after-tax return from earned income invested into

superannuation. A number of reasons are suggested for the non-significant effects. For many people the changes were irrelevant because, among other factors, their superannuation balances were below the effective tax thresholds. Others may either have been unaware of the changes and their financial implications, or may perhaps have viewed these specific changes as just another in a long series of changes to superannuation in almost every budget. For those taking a homo-economics decision strategy, the income effects of higher after-tax superannuation returns and more leisure (as a normal good) may have approximated the substitution effects of a higher return to extended work, and more market goods and services, relative to leisure and home production in retirement. Certainly, there is much anecdotal evidence of the importance of wealth targets, mainly income effects at the expense of substitution effects, on the timing of retirement decisions.

Our projections for policy changes affecting retirement income, which are still in the pipeline, indicate that they also may not have positive effects on mature age participation. The projected increase in the Superannuation Guarantee from 9 to 12 per cent of wages and salaries announced in May 2010, as was the case with the initial increases in the Superannuation Guarantee to 9 per cent (Connolly, 2007-08), is likely to have different effects at different income levels. For the better off, the main effect may be a substitution in the mix of superannuation and other private saving. For those on low incomes, the forced life cycle redistribution of income, including more income in retirement, may be more likely to bring forward rather than increase the age of retirement.[49]

[49] Over the longer run, and with labour demand more elastic than labour supply, most of the increase in the Superannuation Guarantee will be borne by employees as lower take home pay during employment, and a larger superannuation payment than otherwise, with labour costs to employers little changed.

The Henry Review of Australia's Future Taxation System (2010) and the Cooper Review (2010) of the superannuation system both recommended changes which would have the effect of further reducing the tax burden on superannuation. It is outside the scope of this report to estimate what the likely effects of these changes would be, if adopted. However, they would presumably involve a complex mixture of income and substitution effects in an uncertain world of constrained choice decision making, as did the previous changes analysed in detail in Section 2 of the report. A lesson which may be drawn from previous experience is that apparent incentives for increased mature age labour supply may often not work out in practice.

Further, it should be acknowledged that policies which affect superannuation and after-tax income have multiple objectives; they are not just directed at changing labour supply. One stated objective is to reduce reliance on the Age Pension by increasing full or partial self-funding in retirement. Another is to raise the living standards of Australian retirees above the comparatively low level (by international standards) at which they are almost bound to be if most people rely on a pension financed from general revenue (OECD, 2009). These objectives unavoidably compete and sometimes conflict with labour supply objectives, and are one reason why labour supply objectives may not be met. It bears repeating that any time there is an increase in after-tax returns to current or future retirement savings, mature age individuals and households with a strong preference for tolerably well financed leisure have an added incentive to exit the labour force.

There are several other policy options of a kind not considered in this report, which could have a positive effect on mature age participation. It

is widely believed that, at present, substantial numbers of people exit the labour force sooner rather than later in order to 'game' the system by taking advantage of 'anomalies' caused by the non-alignment of the pension eligibility age (65 for men, rising to 65 for women), the superannuation preservation age (55 rising to 60), and the age at which superannuation can be taken tax free (60). In particular, people with moderate amounts of superannuation may retire a few years before they reach the pension age with the intention of living off their savings and reducing them to the maximum level (for example, $258,000 for a homeowning couple) at which they are still just entitled to a full pension when they eventually reach the 'official' retirement age. The apparently 'obvious' but politically difficult solution is to align the ages at which the Age Pension and superannuation become available. Of course, exceptions would need to be made for early access to superannuation for people with poor health or with carer responsibilities.

A final set of policy options to increase mature age workforce participation involves changes in attitudes and social mores about retirement. The Australian Government has been trying to change the attitudes of both employers and employees to work in later life. Rather than retiring completely, the aim is to get many older people – perhaps particularly those with high skills – to make gradual transitions to retirement, or even to convert their superannuation into pension phase and still work full-time. The evidence to date (reviewed at the beginning of this section) suggests that, while many individuals are in principle in favour of a gradual transition, not many are actually making one. An important reason may be that few yet realise the very substantial financial incentives (and perhaps utility gains?) available to older people who continue to do at least some paid work. Perhaps Government agencies

could work more effectively with financial planners, tax accountants, and others who give financial advice to seniors, with the aim of better informing these intermediaries on the potential financial benefits to their clients of continued paid work. On the employer side, the Government has launched small scale programs providing incentives to businesses which may wish to retain the skills of older people, and perhaps use them as mentors in the workplace. For example, the 'golden gurus' program offers grants up to $10,000 to train older employees to share life skills and work skill (www.deewr.gov.au/goldengurus). Federal, State and Local Governments around Australia could also themselves take the lead in designing transition-to-retirement programs suited to the needs of their own employees.

Summary and suggestions for further research

The main empirical finding in this report, and its main conclusion, is that the aim of substantially increasing the mature age workforce participation rate by 2049-50 is almost certain to be achieved. This should contribute substantially to preventing a decline in the rate of economic growth projected as otherwise likely to occur due to population ageing. The only serious doubt about this scenario is that the supply of total work hours by older people may be inadequate, since even if they continue doing some paid work, many will prefer much reduced hours. It is recommended that further research be undertaken on this issue. It would also be worthwhile to make projections of the likely productivity of increasing numbers of older employees, both in order to estimate their future contribution to economic growth and to assess the extent to which further incentives for seniors to continue in paid work may be worthwhile.

APPENDIX 1

Calculation of Lifetime Retirement Income (LRI)

Calculations of expected LRI

For each individual, expected lifetime annual retirement income (LRI) is calculated for each remaining year of life. Gender specific Australian Life Tables (ABS Catalogue 3302.0) are used to predict survival rates and age of death. Expected LRI is defined as the sum of pension income, income from superannuation and income from other assets, adjusted for the probability of survival from the previous year. All incomes are discounted back to present values (2008 prices), using a standard discount rate of 3%.

It is assumed that before retirement, superannuation and other assets (excluding the family home) are invested at a rate of 6% (real), and that other assets are not run down until the individual retires. It is also assumed that when an individual eventually retires, assets are invested at the same rate as before retirement (6% real), and that these assets are drawn down in equal amounts each year for the rest of the person's life (i.e. financial assets are exactly exhausted at death, if the person lives to exactly his/her predicted age).[50] Use of an alternative rate of return of 4% did not substantially change interpretation of the key results relating to financial incentives.

For couples, income from assets is calculated separately for both partners, using the individual's superannuation balance and half of the couple's

[50] People are assumed to live until the average life expectancy, as determined in ABS Life Tables. If the individual lives longer than average life expectancy, they are assumed to rely solely on the Age Pension for those additional years.

other assets. It is assumed that there is no tax payable on superannuation earnings and capital gains.[51] Income from other assets is assumed to be taxed at 32% (taken to be the marginal rate of tax for middle range incomes).

Pension income

Potential Age Pension income is calculated based on current payment rates. Pension eligibility was checked against both the income test and the assets test, and the amount of Age Pension then allocated according to whichever test gave the lower amount of pension. For most people this was the income test.

For people under Age Pension eligibility age, it is assumed that, if they were not working, they would be eligible for another type of government income support (e.g. Newstart payments, mature age allowance, or disability support pension) subject to appropriate means tests, until they reached Age Pension eligibility age. Potential income support from each of the three sources mentioned above is calculated in 2008 values, using the income and assets tests appropriate for that year and then allocated to the individual by multiplying by the probability of receiving that type of income support for a person of that age and gender. The amount of income support that would be received is then allocated, subject to means tests based on individual circumstances.[52]

[51] As most superannuation balances were below the Reasonable Benefit Limit for tax on Superannuation withdrawal before the removal of this tax in 2007, it is assumed that there is no tax payable on superannuation withdrawal in all years.

[52] Probabilities by age and gender were calculated using HILDA income support data.

For disability support pension, the payment rates and means tests are the same as for the Age Pension. However, the payment rates for Newstart allowance and mature age allowance are slightly lower, and, while the assets test is the same for all pensions, the income tests for Newstart and mature age allowance are stricter than for Age Pension and DSP. As a result, our calculations of expected pension incomes for people under Age Pension age usually result in lower values than expected pension income once Age Pension age is reached.

Tables A.1 and A.2 summarise the values of the financial incentive variables for men and women respectively. For men, the median level of LRI is generally higher for those who have not yet reached age pension eligibility age than for those aged 65 and older. Median LRI accrual decreases with age and becomes negative at age 63, indicating that, in terms of LRI, many men would be better off retiring at this age rather than continuing in employment. The mean values of peak value and option value generally decrease with age, and the implicit tax rate increases with age. From the age of 64 onward, peak value is negative and equal to accrual, indicating that at least 50 per cent of men at these ages would maximize their LRI by retiring immediately. While the median levels of option value remain positive until age 70, there is a substantial decrease between the ages of 64 and 65, indicating that once age pension eligibility age has been reached, the expected gain in utility from postponing retirement is considerably lower. For women, median levels of LRI are lower than for men. This is a result of the fact that women generally have lower superannuation balances than men. As was the case for men, median accrual becomes negative once Age Pension eligibility age has been reached, and peak value is equal to accrual for women aged 63 and older. Median levels of option value were also lower

for women than for men, but showed the same general pattern of decreasing with age.

Table A.1 Measures of Financial Incentives, Median Values By Age: Men 55-70

	LRI	Accrual	Peak Value	Implicit Tax Rate	Option Value
55	276691.1	4866.625	27050.16	-0.12569	140603
56	271706.7	4088.467	23451.5	-0.11016	128960
57	251885.2	5458.656	16910.81	-0.13864	109078.7
58	267753.2	4241.938	13392.34	-0.12187	102755.8
59	257213.4	3193.369	8468.531	-0.08803	93216.23
60	257661.9	791.7578	3235.93	-0.02178	90718.09
61	234442.2	1764.18	2885.188	-0.0559	87681.42
62	217153.4	588.625	713.0625	-0.01694	83781.79
63	213789.6	-458.555	976.75	-0.01329	79791.2
64	208671.9	-1127.92	-1127.92	0.037334	76929.26
65	188666.2	-5395.16	-5395.16	0.207001	1869.054
66	194167.8	-5437.41	-5437.41	0.123388	2791.173
67	176570.4	-6321.34	-6321.34	0.187597	516.2754
68	139697.2	-6680	-6680	0.22283	347.4817
69	126086.6	-6064.6	-6064.6	0.206201	202.168
70	127247.3	-6327.38	-6327.38	0.27222	-603.066

Table A.2 Measures of Financial Incentives, Median Values By Age: Women 55-70

	LRI	Accrual	Peak Value	Implicit Tax Rate	Option Value
55	229098.3	4777.762	30743.58	-0.18672	101959.7
56	229294.2	6110.156	27761.23	-0.19585	91085.67
57	240495.4	2842.398	17283.8	-0.11336	81848.8
58	234965.1	2662.266	14543.94	-0.1079	77891.19
59	238226.5	1579.511	9169.156	-0.06162	66265.52
60	243546.1	2288.404	6176.375	-0.10906	58531.17
61	239268.4	962.5	3239.438	-0.04481	55623.78
62	240402.8	1354.75	2060.469	-0.06332	47961.38
63	237280.8	-5906.47	-5906.47	0.202031	45966
64	221739	-5964.89	-5964.89	0.198594	4145.73
65	197927.2	-7234.59	-7234.59	0.284625	817.376
66	190213.6	-7220.16	-7220.16	0.301087	-0.08832
67	168711.3	-8703.06	-8703.06	0.370442	-782.469
68	171127.1	-9155.03	-9155.03	0.413944	-1346.56
69	124865.6	-8655.33	-8655.33	0.43869	-939.883
70	98238.86	-5735.69	-5735.69	0.277626	-727.579

APPENDIX 2

Supplementary Result Relating To The Impact Of The July 2007 Policy Changes On Male Workforce Participation

Most of the results in this report are based on longitudinal probit analyses. A limitation of this model is that any bias in coefficients which may be present due to individual fixed effects, which may covary with explanatory variables, cannot be netted out. A suggested remedy for this problem is the Mundlak correction (Mundlak, 1978). This involves adding individual-level over-time means of explanatory variables to the right hand side of equations. The researcher's expectation is then that omitted fixed individual effects will covary with these means, and not with the explanatory variables of main interest. The coefficients for these latter variables should then be unbiased.

In practice, adding Mundlak corrections to the probit equations in this paper made no substantive difference to the policy results of main interest. As an example, Table A2 gives results including Mundlak corrections (means of selected explanatory variables) for the effect of the July 2007 policy changes on the labour supply of men age 54-69. The explanatory variables for which it made sense to add over-time individual means were: property equity, superannuation, net other equity and partner's hourly wage rate.

Table A2

Effects Of July 1 2007 Policy Package On Mature Age (55-69) Men's Workforce Participation. Longitudinal Probit Analysis With Mundlak Correction: Metric Coefficients (standard errors in parentheses)

Explanatory variables	PARTICIPATION (1-0)
After policy change	**-0.105(0.132)**
July 2007 (1-0)	**-0.011(0.015)**
Aggregate demand	
GDP growth rate (1 year lag)	0.027(0.041)
Year	0.002(0.028)
Preferences & constraints	
Age	-0.130***(0.016)
Partner's age	0.007(0.010)
Partnered (1-0)	-0.707(0.624)
Carer (1-0)	-0.272(0.246)
Long term health problem (1-0)	-0.797***(0.097)
Partner: long term health problem (1-0)	0.008(0.101)
Education: years	0.089**(0.034)
Work experience	0.049***(0.007)
English competence (1-0)	-0.812(0.756)
Partner works (1-0)	1.583***(0.179)
Budget variables	
Owns home outright (1-0)	-0.652***(0.108)
Net property equity ($)	-0.073**(0.027)
Mean: net property equity	0.056#(0.031)
Superannuation ($)	-0.134(0.013)
Mean: superannuation	0.007(0.021)
Other net equity ($)	0.001(0.009)
Mean: other net equity	-0.004(0.021)
Occupational status	-0.002(0.003)
Partner: net hourly pay	-0.147*(0.061)
Mean: partner's net hourly pay	-0.035(0.068)
Constant	5.224***(1.387)
Log likelihood	-1482.9042
Wald Chi-sq	345.77***
Sample size	4376

Source: HILDA 2001-08.

*** significant at 0.001 **significant at 0.01 * significant at 0.05 #significant at 0.1

Comparing results here with results for the same equation without Mundlak corrections (Table 2 in the main report), it can be seen that very little has changed. In particular, the policy coefficient of main interest is still negative and still not significant even at the 10% level. The coefficients for the variables which have received a Mundlak correction

have the same sign as before, but are smaller and in some cases no longer statistically significant. It appears that variance accounted for by these variables has been partitioned between the initial variables and the Mundlak mean variables.

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