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Mandatory superannuation and self-sufficiency in retirement

AN APPLICATION OF THE APPSIM DYNAMIC MICROSIMULATION MODEL

Conference Paper

PREPARED BY

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ABOUT NATSEM

The National Centre for Social and Economic Modelling was established on 1 January 1993, and supports its activities through research grants, commissioned research and longer term contracts for model maintenance and development.

NATSEM aims to be a key contributor to social and economic policy debate and analysis by developing models of the highest quality, undertaking independent and impartial research, and supplying valued consultancy services.

Policy changes often have to be made without sufficient information about either the current environment or the consequences of change. NATSEM specialises in analysing data and producing models so that decision makers have the best possible quantitative information on which to base their decisions.

NATSEM has an international reputation as a centre of excellence for analysing microdata and constructing microsimulation models. Such data and models commence with the records of real (but unidentifiable) Australians. Analysis typically begins by looking at either the characteristics or the impact of a policy change on an individual household, building up to the bigger picture by looking at many individual cases through the use of large datasets.

It must be emphasised that NATSEM does not have views on policy. All opinions are the authors' own and are not necessarily shared by NATSEM.

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AUTHOR NOTE

Marcia Keegan is a PhD candidate at the National Centre for Social and Economic Modelling at the University of Canberra.

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GENERAL CAVEAT

SUMMARY

One of the most significant concerns about the ageing population in Australia is the impact on pension costs. In Australia, one is entitled to a modest, fixed pension from age 65 onwards, subject to assets and means tests, regardless of how much was earned during one's working life. Mandatory occupational superannuation was introduced in 1993 to reduce future pension costs: a person with moderate to high levels of superannuation can provide for themselves to some extent and thus has a reduced pension entitlement. When individuals who have spent their whole working lives contributing to mandatory superannuation reach retirement age, it is hoped that a substantial proportion will have no need for a pension or will only require a part pension, easing future budgetary pressures. The ability of mandatory superannuation to reduce future pension costs is best modelled by dynamic microsimulation, as this takes into account the effect of numerous factors such as disability, child-rearing, employment history and life expectancy on superannuation levels.

NATSEM has been developing APPSIM (Australian Population and Policy Simulation Model), a dynamic microsimulation model that projects a 1 percent sample of the Australian population out to 2050. This paper uses APPSIM to estimate what percentage of the population will be entitled to a) a full pension or b) a part pension under the following scenarios: higher labour force participation across the board; reduced disability among over-40s; higher labour force participation among primary carers of children and an increase in the mandatory superannuation contribution rate.

Key words
APPSIM, dynamic microsimulation, labour market, age pension

1 INTRODUCTION

Australia, like most developed nations in the world, is concerned with potential future budgetary impacts of the ageing population. Lower birthrates since the 1970s and increasing life expectancies over the last century have resulted in the average age of the population increasing. This has resulted in concerns about the sustainability of Australia's federal budget expenditures. In particular, Australia's provision of a universal, means-tested age pension may become financially unsustainable as a greater percentage of the population become old enough to receive it. Policies to improve labour force participation and increase retirement savings among workers can alleviate these future budgetary pressures.

The first section of this paper summarises Australia's retirement income system and the reasons why its sustainability is under pressure. The second section describes APPSIM, the Australian Population and Policy Simulation Model, a dynamic microsimulation model developed by NATSEM to assess policies that relate to population ageing concerns. The following sections describe how APPSIM is used to assess a series of policies designed to increase labour force participation and/or improve retirement savings, reducing the future pension burden on Australian budgets. Finally, it discusses the distributional impacts of these four policies.

APPSIM is still subject to further development and refinement so these results should be viewed as preliminary.

1.1 RETIREMENT PROVISION IN AUSTRALIA

The most noticeable difference between Australia's pension system and those common in the rest of the world is that we are one of only two nations in the OECD that do not have social security taxes. This is, quite simply, because Australia does not have social security as other nations know it.

In most other OECD nations, a certain amount or percentage per employee is paid into a social security fund, which is kept separate from general taxation revenue. When a person retires or reaches pension age, their entitlement to a payment and/or the size of their payment is dependent on how long they have worked for and/or how much they have contributed to social security. Sometimes a flat base rate will be payable to all persons, which may be increased if an individual has paid a certain amount into social security, or over a certain time period (Gruber and Wise 2002).

Australia's system is quite different. Mandatory social security does not exist. Retirees are provided for through a combination of basic payments, mandatory saving and voluntary saving. Australia's system is often described as a 'three pillar' system, a form that has been recommended by the World Bank (1994). The three pillars are:

1. The means-tested old-age pension;

2. Compulsory superannuation; and
3. Voluntary superannuation and other savings/investments.

1.1.1 The age pension

When a person turns 65 in Australia, they are entitled to an age pension. Women may currently claim the pension when they turn 63.5; in 1909, when pensions were reduced, the pension age for women was 60, and this is gradually being increased. This is a flat-rate, means-tested payment funded out of general taxation revenue. The number of years spent working in Australia and the amount earned has no impact on how much one is entitled to.

The maximum pension rate is currently $569.80 for singles and $475.90 each for couples. Under the income test a single person can earn up to $138 per fortnight (couples $240) and receive a full pension. Income over this amount reduces the pension by 40c for each dollar earned (20c each for couples). No pension is payable for singles earning more than $1558 per fortnight or couples earning more than $2602.

The assets test allows singles to claim the full pension if they have up to $171 750 in assets, and couples to claim if they have combined assets of $243 500 (for homeowners) or $296 250 for singles and $368 000 for couples who are not homeowners. The value of the home one lives in is excluded from the assets test. A part pension can be claimed for homeowning singles with assets less than $550 000, homeowning couples with less than $873 000 in assets, non-homeowning singles with $675 000 or non-homeowning couples with less than $998 000. The test that results in the lower rate of pension payable is applied (Centrelink 2009).

In the very recent Federal Budget delivered on 12 May 2009, the Federal Government has announced that the age pension age will be increased to 67 between 2017 and 2023. In addition the 40 cents in the dollar taper rate is being toughened to 50 cents in the dollar, although earnings (as opposed to investment income) are to be treated more liberally in a separate income test, in an attempt to encourage workforce participation (Treasury 2009). However, since this change is so recent and has not yet been approved by Parliament at the time of writing, this paper proceeds under the previous scenario, in which one receives the age pension at age 65.

1.1.2 Compulsory superannuation

The closest thing that Australia has to a contributions-based social security system is the superannuation system, 'super' for short. This was made mandatory for all employees earning over $450 a week in 1993. When introduced, three percent of an employee's salary was placed in a superannuation fund (at the time the employer chose the fund, now the employee can choose.) These superannuation funds are private commercial entities - in fact individuals can choose to set up their own fund to manage their own super. The mandatory contribution amount has since increased to nine percent. This money can be

accessed from age 55 with a tax penalty, and age 60 with no tax penalty (Nielson and Harris 2008). The aim of the superannuation system is to reduce dependence on the public, means-tested pension as the population ages, and to improve the welfare of retirees.

The superannuation system in Australia is quite distinct from public or private pension programs overseas. First, it is different from private or occupational pensions in other countries in that payments into a fund are mandatory for all employees who make more than minimal earnings. Secondly, all contributions an individual makes to a superannuation fund (minus management fees) are his own private property, kept in his own separate account. Although generally he cannot access these funds until he is 55, legislation permits early access to super in some circumstances (for example if the holder is terminally ill, or is unable to pay a mortgage and risks losing the family home without additional funding). Mandatory pension schemes from overseas do not pay all contributions into individual funds for withdrawal at retirement; rather the payments (or most of the payments) go to a common fund. Payments into the fund entitle one to an income stream when the individual meets certain circumstances.

1.1.3 Voluntary superannuation

Any individual with a superannuation account, whether working or not, has the option of placing money into his superannuation account over and above mandatory contributions. Voluntary contributions are promoted by the federal government through matching schemes and tax advantages. For example, low income earners receive an additional $1.50 for each $1 they place into their superannuation account. Moderate to high income earners benefit from reduced income tax on income that is placed directly into super[1]. These schemes are intended to promote saving sufficient amounts for retirement to reduce future pension burdens.

In addition to these three methods, individuals may save for their retirement through other means such as bank deposits, purchase of shares and equities, investment properties or developing a business to sell in retirement. These do not receive the same tax advantages of superannuation, but have the advantage that the returns can be accessed earlier in one's life.

1.2 GOVERNMENT BUDGETS, RETIREMENT PROVISION AND LABOUR FORCE PARTICIPATION

The last forty years of the 20th century were characterised by steadily declining birth rates, with the total fertility rate falling below the replacement rate in 1976. By 2000, birthrates were down to 1.75 babies per woman, although that has since increased to 1.9 (ABS 2007). In addition, life expectancies have increased from less than 60 years in 1910 to over 80 years

[1] These two schemes have been temporarily reduced in the recently announced 2009-10 Budget.

now (ABS 2004). With more older people and fewer younger people, the average age of Australia's population is increasing. The implication of this is that in the future, an increasing percentage of the population will be older than the retirement age of 65. The aged dependency ratio, which is the ratio of people aged 65 or older to people of working age, is expected to increase from 20 percent now to 42 percent in 2050 (Treasury 2007).

As a result of this, fewer taxpayers will be supporting more older people, who tend to use more government services such as pensions, health care and aged care. Governments the world over have been concerned about the implications of the ageing population for budgets, intergenerational equity, health and aged care systems.

To estimate the impact of the ageing population on Australia's national budget, several studies have been undertaken by government departments. The Treasury is required to issue Intergenerational Reports every five years. The first IGR was released in 2002, the second in 2007. The Productivity Commission released Economic Implications of an Ageing Australia in 2005, and moved beyond the exclusive focus on federal taxation and revenue to also consider the fiscal implications of population ageing for the states.

The findings of the reports were similar. They predicted higher healthcare costs, aged care costs and pension costs, and declining overall labour force participation as more people are aged over 65. They estimated the cost of fiscal gaps, the difference between projected expenditure and revenue. Economic Implications of an Ageing Australia predicted the fiscal gap to be 6.4 percent of GDP (Productivity Commission 2005). The first IGR estimated a fiscal gap of 5 percent, and IGR 2 revised this to 3.5 percent. This revision was due to the fact that the basis for the assumptions in IGR2 changed over the five years between 2005 and 2007 (for example net migration increased, the birthrate increased, the Future Fund was created, etc) (Treasury 2007).

The OECD's 2006 Economic Outlook for Australia contained a chapter on the importance of improving labour force participation to sustain economic growth in the face of population ageing, and identified three main groups that should be focused upon.

"The major challenge is to increase participation among women with families and lone parents, disability benefit recipients and older workers over 55. While participation decisions reflect personal choices, these are influenced by policy settings. Despite improvements in "inactivity traps", Australia ranks high internationally in terms of "low wage traps" for lone parents and one earner households. Tackling such "low wage traps" either by addressing allowance and parenting payment income tests or by reducing the lowest income tax rate or raising the threshold at which income tax is first paid, should be a priority." (OECD 2006)

These reports all recommended that increasing labour force participation will be important in mitigating future fiscal gaps. There are a number of reasons for this:

1. People who are employed pay taxes, which increases government revenue.
2. People who are employed receive less in government benefits, which reduces government expenditure.

3. People who are employed contribute to superannuation, which (hopefully) reduces their future public pension burden.

This paper focuses on the impact of labour force participation on superannuation balances, and thus the proportion of the population dependent on the age pension in part or in full.

2 APPSIM

The ageing of the population and the availability of detailed longitudinal data for Australians has prompted NATSEM to commence building a dynamic microsimulation model for Australia. Under an Australian Research Council Linkage Grant (LP0562493), NATSEM is collaborating with 12 government agencies in developing the Australian Population and Policy Simulation Model (APPSIM), a model of the Australian population until 2050, to be used in evaluating the impact of future social and fiscal policies. APPSIM is able to assess the detailed distributional impacts of policy changes, rather than just the impacts on the population as a whole or a limited number of population subgroups. The main development driver of the model is to provide a decision support tool for policy makers that allows them to develop policy that will minimise the costs and maximise the benefits of the ageing population, spreading both burdens and benefits fairly both between and within generations. APPSIM must be tailored to represent the particular concerns that arise from the ageing population.

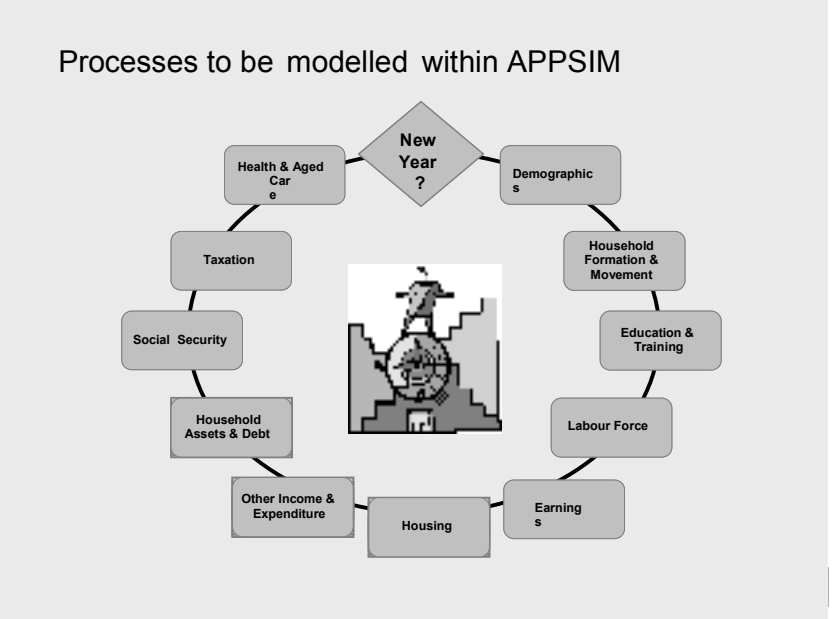
The starting point for APPSIM is the one percent sample of the 2001 Census. Onto these 188 000 records, extra characteristics are added and some more detailed information is imputed to form the initial APPSIM population – the *base data*. NATSEM modellers are using the Household, Income and Labour Dynamics in Australia[2] (HILDA) and other datasets to generate transition probabilities for events within the model; that is, the likelihood a person will move from one state (eg full-time employment, married, good health) to another (eg unemployed, separated, disabled). The modelling also includes the probabilities of childbirth, overseas migration and death, allowing the simulated population to change over time. The transition probabilities are applied to every person in the initial APPSIM population to update the population's characteristics for each year in the model. For example, one transition probability might give a 32 year old married woman with certain characteristics a 5 percent chance of having a baby in the following year. APPSIM will then apply this transition probability to all such women in its dataset. When APPSIM's 'clock' ticks over to the next year, around one-twentieth of these women will have had a baby.

APPSIM is a modular DMSM; that is, its primary functions are broken down into groupings or modules. Figure 1 shows the flow of modules in APPSIM. The demographic

[2] HILDA is maintained by the Melbourne Institute of Applied Economic and Social Research and is funded by the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA).

module simulates births, deaths and migration. The household formation and movement module simulates couple formation and separation and children leaving home. These modules create a dataset of people and their relationships to each other, upon which estimation of education, labour force participation and the other modules can be based (Kelly 2007).

Figure 1 Processes within APPSIM



2.1 OPERATION OF THE LABOUR FORCE MODULE

The labour force participation module is based on a series of transition probabilities based on six years of data from HILDA. Persons aged 15-74 are deemed eligible to participate in the labour force in APPSIM. (Although some people do engage in paid work outside of this age group, the participation of people younger than 15 tends to involve minor jobs for a few hours a week outside of school-time that has little impact on their lifetime earnings and data on such work is rarely collected. At the other end of the age spectrum, so few people aged over 74 participate in the labour force that it is too difficult to gather sufficient data to build a reasonable model of participation.)

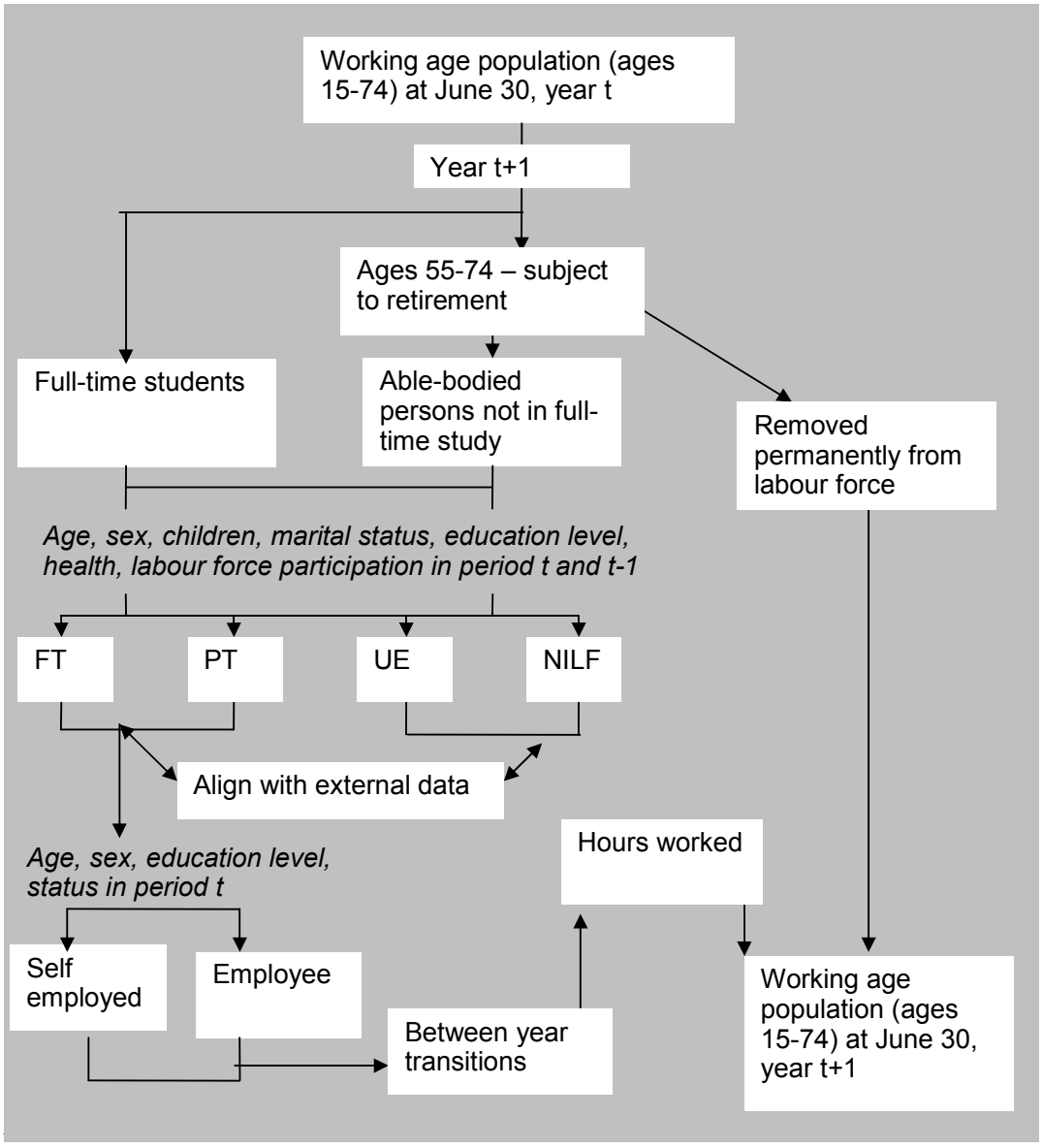
Figure 2 shows how the labour force is modelled in APPSIM. At the beginning of the year, all persons aged 15-74 are considered for labour force participation.

The retirement function operates next. It is a binominal logit model that generates the probability that a person will retire that year. The equations' coefficients are presented in Table A1 of the Appendix. Once a person is retired, they do not re-enter the labour force. The explanatory variables included in the retirement function are previous year's labour force status, two dummy variables for whether one is older than the minium age for tax-free access to superannuation and older than the eligibility age for the pension, self

employment, highest level of education, partnership status and previous year's health status. All persons aged 55-74 face a risk of retirement.

Those that survive the retirement process are then subject to a series of multinomial logit equations that determine the probability that they will be full-time employed (35 hours or more per week), part-time employed (34 or less hours per week), unemployed (not working but looking for work and able to start work within four weeks) or not in the labour force (the remainder). Separate equations are used for full-time students and part-time or non-students.

Figure 2 The operation of the labour force module in APPSIM



Non-students are separated into six groups by sex and age (15-24, 25-54 and 55-74). Explanatory variables are labour force participation in the previous two years, highest level

of education achieved (bachelor degree or higher, certificate/diploma, Year 12 only or less than Year 12), marital status (partnered or unpartnered), age of youngest child (for those aged 15-54) and previous year's health status (a score of 0 to 10, where 0 is perfect health and 10 is worst health). Coefficients for these equations can be found in Table A2 of the Appendix.

In APPSIM, only persons aged 49 or less can be full-time students, thus the labour force participation equation for full-time students is only for people aged 15-49. Once again, binomial logit equations are used to determine the probability that the student will be employed full-time, part-time, unemployed or not in the labour force. Separate equations are used for each sex. Explanatory variables are age, previous two years' labour force status, whether the student has a child aged under six, and if they live with their parents as a dependent student (see Table A3 for coefficients).

As outputs from dynamic microsimulation models that use the Monte Carlo method can be subject to random differences in aggregate numbers from different simulations, and because bias and other problems in the underlying panel data used to predict the transitions can exist, these simulation outcomes are aligned with official or user-defined benchmarks. For example, the unemployment level can be set by the user to a certain fixed percentage rate; for most APPSIM simulations, the unemployment rate defaults to around six percent.

Once labour force states have been allocated, self employment/employee status is determined. Two binomial logit equations (one for each sex) determine the probability a person will be self employed in that year, as opposed to an employee. Explanatory variables are self-employment in the previous two years, whether one is working part-time or full-time, marital status, age of youngest child (up to age six) and age (see Table A4 for coefficients).

The next step is to calculate quarterly transitions between labour force states. The probability that a person will be in each of the four labour force states for each quarter in the year between, say, July 2010 and June 2011, is based on their labour force states in July 2010 and June 2011.

Hours worked per week is calculated by a fairly complicated method, because the only variable that has any power in predicting hours worked is hours worked in the previous year(s). Those who were not in the labour force the previous year simply have their hours allocated from a sex-specific probability distribution. Those who were in the labour force the previous year face a binomial logit equation which determines whether their hours will change or stay the same as the previous year. Those whose hours are determined to change are allocated a random number of hours, with a mean of 0 and a standard deviation of 6, which is added to the previous year's hours to determine their new hours worked.

3 ESTIMATING FUTURE PENSION BURDENS

Higher superannuation savings in Australia are likely to reduce future pension burdens, as wealth in super and earnings from super will increase the number of people who do not meet the income and assets tests to receive the full or part public age pension. This is where dynamic microsimulation proves its worth. It is insufficient to estimate the overall or average increase in superannuation savings. This does not tell us who is accumulating the superannuation – what percentage of the population is benefiting from the increase and how much they had to start with. For example, a policy that results in a large increase in total super wealth is unlikely to reduce future pension burdens if all of the increase is experienced by those who would have had sufficient super to be independent of the pension anyway. A policy that results in greater super wealth that is evenly distributed, or is targeted to those who are unlikely to have much super, is likely to have a greater impact.

This paper seeks to estimate the rate at which certain policy or labour force changes would impact future pension burdens. The 'pension burden' measured here is the percentage of the pension-age population who are entitled to a full pension or a part pension, based on their income and assets. APPSIM uses STINMOD, a static model of Australia's tax and transfer system, to estimate the number of people who will be entitled to a full or part pension under a number of scenarios.

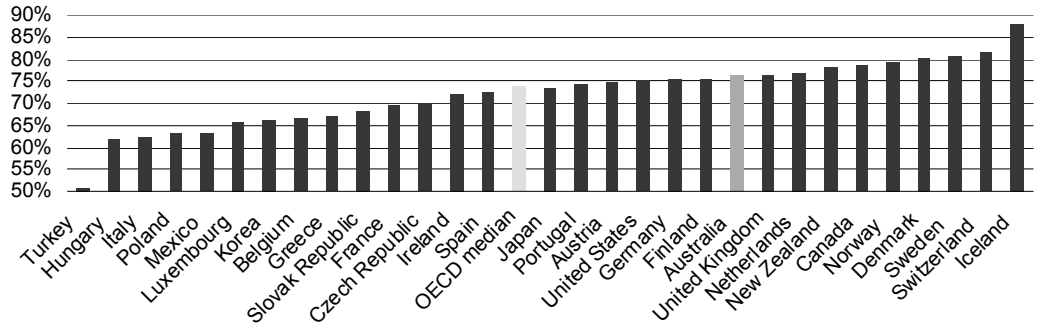
This paper is based on simulations out to the year 2043. Although APPSIM can project further out than this, 2043 was chosen as it marks 50 years since the introduction of compulsory superannuation. This means that people who turned 15 in 1993, when compulsory super was introduced, will be 65 in 2043, and the impact of a full working life contributing to superannuation will be captured.

Four scenarios are considered: first, increasing participation rates among all age groups, reduced levels of disability in the 45-64 age group, increasing participation amongst parents of young children and increasing the minimum superannuation contribution rate.

4 INCREASING OVERALL LABOUR FORCE PARTICIPATION

Australia's overall labour force participation is higher than the OECD average: 76 percent of 15-64 year old Australians participate in the labour force, compared to an average of 71 percent in other OECD nations, or a median participation rate of 74 percent. However, there is scope to increase this participation rate further. Fourteen OECD nations have participation rates of 75 percent or greater, and five have participation rates of greater than 80 percent, as can be seen in Figure 3.

Figure 3 Labour force participation rates across the OECD, 2007



Source: (OECD 2009)

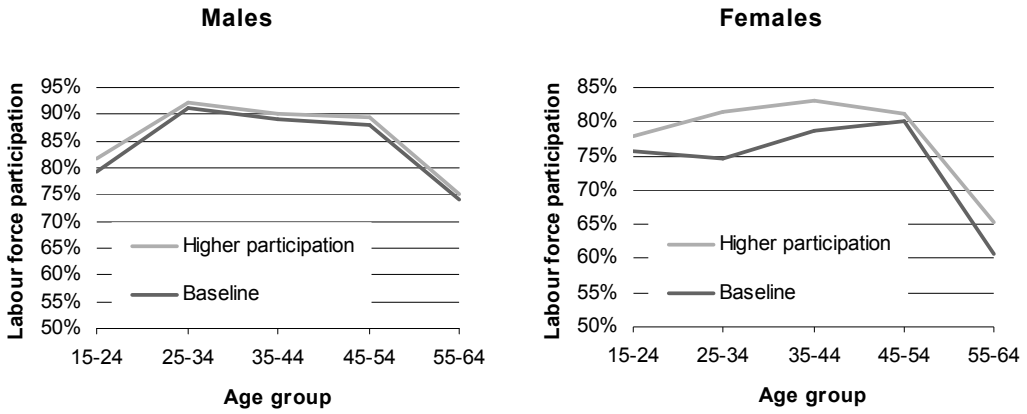
The second IGR projected that Australia's participation rate would rise to 78 percent for people aged 15-64, from its 2006 rate of 76 percent. This was based on the projection that labour force participation among over-55s would continue to increase, as it had done in the early 2000s.

What this section models is the effect of increasing participation rates among 15-64 year olds by five percent from 2012, and letting that participation rate remain static from then on. This is a more optimistic projection than that made in IGR2, but it is not necessarily unreasonable. The restructuring of working-age welfare payments to encourage people to seek employment may contribute to a further increase in participation rates (Australian Workplace 2009). The damage to superannuation savings caused by the global financial crisis is likely to mean that many older workers cannot afford to retire as early as they had hoped, further boosting participation beyond that anticipated by Treasury in IGR2. As each generation of young people is more educated than the previous one, participation rates are likely to increase as higher education levels are associated with, and to a lesser degree cause, higher labour force participation: see Gruen and Garbutt (2003); Lattimore (2007); Jaumotte (2003); and Keegan (2008).

Performing this simulation in APPSIM is relatively simple. This involves 'forcing' total outputs of a certain kind to reach a particular number - in this case, alignment is used to 'force' total labour force participation to five percent more than baseline participation. If the baseline simulation shows a labour force participation rate at a certain level, then the individuals who are not in the labour force but who have a relatively high probability of entering the labour force are 'forced' to enter it, until the target of 5 percent participation above the baseline is reached.

Compared with a baseline scenario, where labour force participation among 15-64 year olds approximates 78 percent in 2043, a higher participation scenario increases participation among certain groups more than others. Figure 4 shows that the increase in participation is more significant among men in the youngest age bracket (15-24) and among women, particularly those of childbearing age, where there is greater scope to increase participation.

Figure 4 Higher labour force participation, 2043



Source: APPSIM simulations

Although the alignment specifically targeted the participation of 15-64 year olds, the lagged labour force participation variables also resulted in an increase in participation among the 65-74 year old age group. Participation increased from 17 to 19 percent for women and from 19 to 20 percent for men.

The result of this increase in labour force participation throughout the population is an increase in superannuation savings. Table 1 shows the estimated mean and median superannuation savings for three older age groups. Median superannuation is around $7000 higher in the 45-54 age group and $19000 higher in the 55-64 and 65-74 age groups.

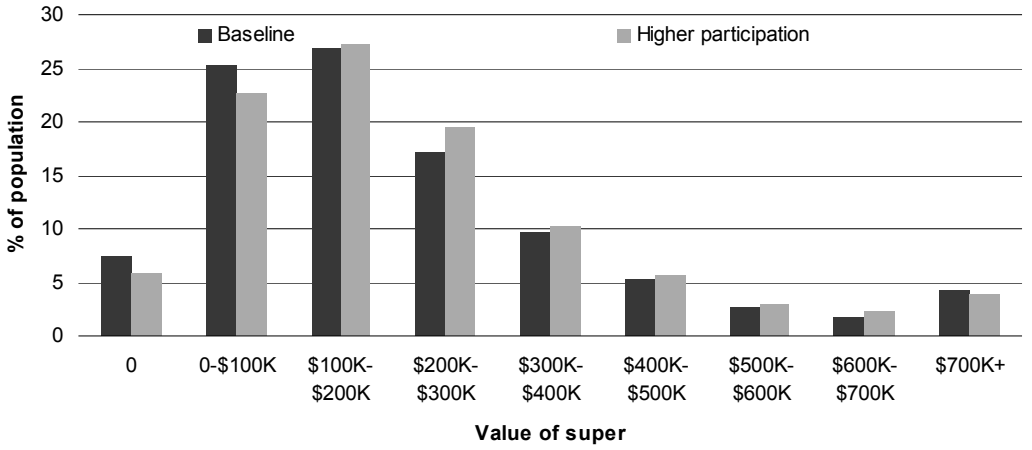
Table 1 Effect of higher overall participation on mean and median superannuation, 2043

	Higher participation		Baseline	
	Mean	Median	Mean	Median
	$ 000	$ 000	$ 000	$ 000
45-54	190	126	183	119
55-64	273	179	260	160
65-74	221	85	184	66

Note: All values are in 2006 dollars.
Source: APPSIM simulations

Figure 5 shows the distribution of superannuation among the 55-64 age group – the age group close to the end of their working lives whose super balances are peaking.

Figure 5 Distribution of superannuation accumulation in 55-64 age group, 2043



Note: All values are in 2006 dollars.

Source: APPSIM simulations

Under a higher participation scenario, the percentage of the population with $100 000 or less in superannuation declines from 33 percent to 28 percent. The percentage of the population with more than half a million dollars in superannuation increases from 8.5 percent to 9.2 percent.

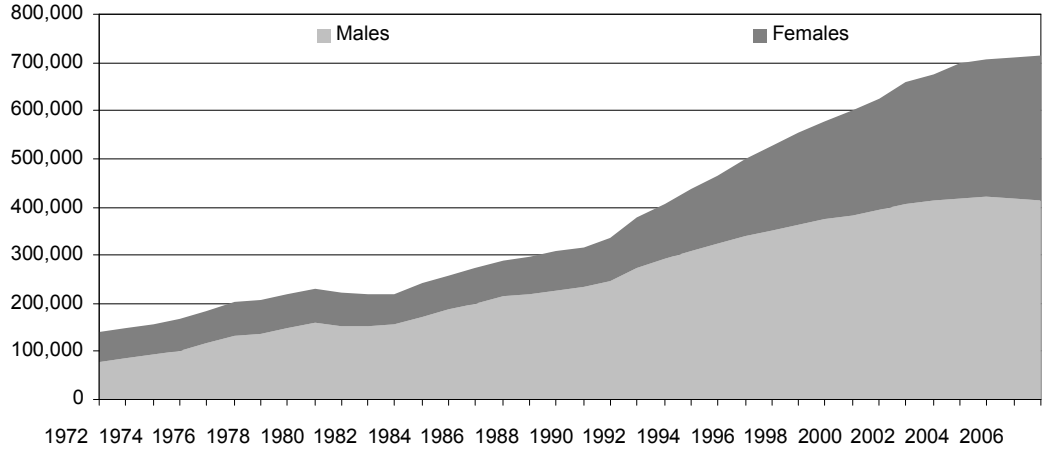
The reduction in the percentage of people with very little superannuation (less than $100 000) at age 55-64 is particularly noticeable among women. In the baseline scenario, 43 percent of women have superannuation balances of less than $100 000; under the higher participation scenario, this declines to 35 percent.

Increasing labour force participation overall resulted in a reduction in the percentage of the population aged 65-74 who could claim the age pension. Twenty-nine percent received no pension and seven percent received part-pensions, compared with 28 percent and 7 percent respectively under the baseline scenario.

5 REDUCED DISABILITY AMONG OVER-45S

The number of people of working age who claim a Disability Support Pension (DSP), a payment made to people aged 15-64 who have a disability that prevents them from working, has increased at a faster rate than population growth. Figure 6 shows the increase in the number of DSP recipients from 1972 to 2007.

Figure 6 Disability support pension recipients by sex, 1972-2007



Source: (FaHCSIA 2007)

Two-thirds of DSP recipients are aged 45-64: as people get older, they are more likely to develop disabilities or health problems that affect their ability to work. However, with advances in medical treatments, improvements in preventative health knowledge and better occupational health and safety practices, this is likely to reduce in the future.

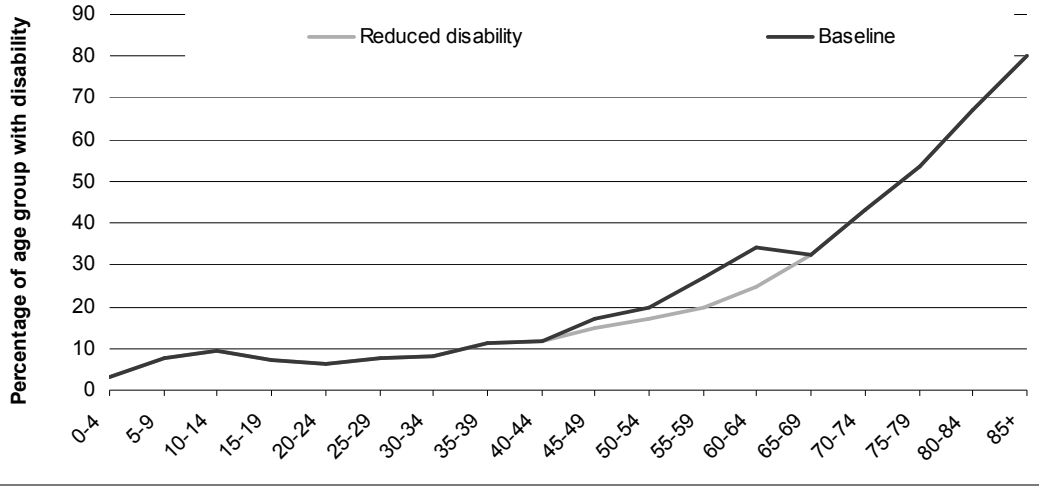
There has been some discussion that the increase in the number of DSP recipients may be due to their difficulties finding work rather than inability to physically work. Saunders (2004) points out that, until 2001, case assessors were permitted to consider the employment prospects available in a person's geographic region when determining whether a person should receive DSP or not; and Argyrous and Neale explain the relationship between high unemployment and high rates of disability (2003). In short, it is likely that many people classified as disabled and in receipt of the DSP are suffering from long-term unemployment rather than a significant disability, and could re-enter the workforce with support, retraining and possible relocation. The fact that the percentage of the population who are classified as disabled *declines* in the 65-69 age group (when age pension eligibility is achieved) adds weight to this suggestion.

Recent Welfare to Work reforms introduced in 2006 are likely to reduce the number of people who are classified as too disabled to work. First, disabled people who are capable of working 15 or more hours per week will be required to seek work (previously the cut-off was 30 hours per week.) Secondly, assistance with retraining will be provided for people with disabilities to allow them to find employment they are capable of performing (Australian Workplace 2009). For example, a bricklayer whose disability prevents him from performing his job may be retrained to work in an office job.

Thus it is expected that the number of people who do not work because they are in receipt of DSP will decline in the future for two reasons – first, the tightening of eligibility requirements for DSP and second, improved workplace health and safety and health care reducing disability among working age people.

To simulate the scenario of lower disability in APPSIM, we simply reduced the percentage of people aged 45-64 who suffer from a mild or moderate disability. Figure 7 shows the baseline scenario, in which the percentage of disabled people in the population climbs up until 60-64 and then declines at pension age, with a lower-disability scenario, in which the increase in disability is slower between the years of 45-64.

Figure 7 Baseline and reduced-disability scenarios in APPSIM



Source: NATSEM simulations

Under a reduced disability scenario, 81 percent of people aged 45-64 were free of disability in 2043. Three percent had a mild disability and a further five percent had a moderate disability. Under the baseline scenario, 76 percent of people in the same age group were free of disability, three percent had a mild disability and eight percent had a moderate disability. This results in an increase in labour force participation, particularly full-time participation, as shown in Table 2.

Table 2 Labour force participation under baseline and low-disability scenarios, 2043

	Lower disability	Baseline
Age 45-54		
Full-time	60	59
Part-time	22	20
Unemployed	4	5
Not in the labour force	14	16
Age 55-64		
Full-time	44	41
Part-time	23	24
Unemployed	3	3
Not in the labour force	30	32

Source: APPSIM simulations

The difference between the percentage of people not in the labour force in each scenario was two percent among both age groups 45-54 and 55-64. There was no significant difference in early retirement rates between the low-disability and baseline scenarios. However, retirement tended to be slightly later under the low-disability scenario, with 32 percent of 65-69 year olds remaining in the labour force under a low disability scenario compared with 33 percent under the baseline scenario.

The lower disability rates had a small effect on median superannuation balances, as seen in Table 3.

Table 3 Effect of lower disability on mean and median superannuation, 2043 (2006 dollars)

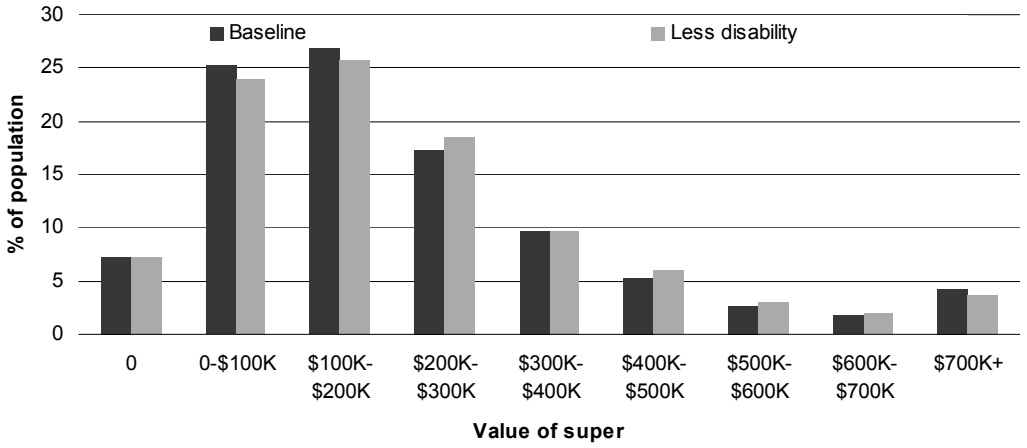
	Lower disability		Baseline	
	Mean	Median	Mean	Median
	$ 000	$ 000	$ 000	$ 000
45-54	190	119	183	119
55-64	254	167	260	160
65-74	199	66	184	66

Note: All values are in 2006 dollars.
Source: APPSIM simulations

Little difference can be seen in the mean and median superannuation in the 45-54 age group, as the lower disability rates have had little opportunity to affect super balances. The impact is more noticeable in the 55-64 age group, in which the median super balance is around seven thousand dollars higher under a low-disability scenario. In the 65-74 age group, median superannuation is similar under the two scenarios, as retirees have drawn down and spent some or all of their super.

Figure 8 shows the distribution of superannuation among the 55-64 age group in 2043. The increase in superannuation balances is fairly well distributed. Under the low disability scenario, 57 percent of the 55-64 age group had less than $200 000 in superannuation; under the baseline scenario this figure is 59 percent.

Figure 8 Distribution of superannuation in 55-64 age group, 2043



Note: All values are in 2006 dollars.
Source: APPSIM simulations

Reducing disability has the impact of reducing the percentage of the population who have very little superannuation. As a result, the percentage of people aged 65-74 who do not receive the age pension is 1 percent less under a low disability scenario (29 percent compared to 28 percent), plus more people are only eligible for a part pension under the low disability scenario (8 percent) compared to the baseline (7 percent).

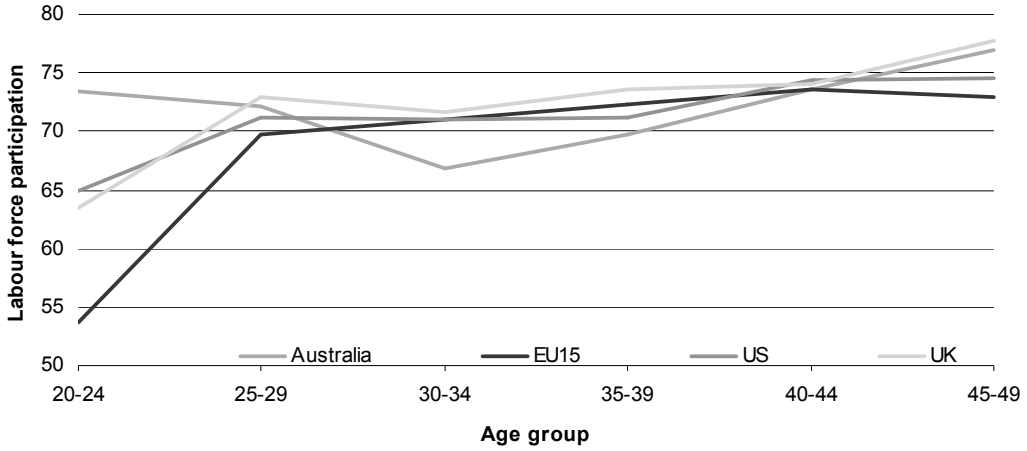
6 IMPROVING LABOUR FORCE PARTICIPATION OF PRIMARY CARERS OF CHILDREN

Primary carers of children, usually women, tend to have lower labour force participation rates as they are more likely to focus their energies on caring duties instead of paid employment, particularly when their children are young.

When looking at women's labour force participation by age group, childrearing responsibilities produce a 'nappy valley', or a dip in employment rates in the late 20s to late 30s – the most common age groups for women to have children and take time out from paid employment to raise them.

Figure 9 shows the employment rates by five-year age bracket of women in the EU15, Australia, the US and the UK. Australia has easily the most pronounced 'nappy valley' of these four groups of countries. Part of this may be because Australia does not yet have universal paid maternity leave (persons on paid leave are classified as being employed, those on unpaid leave are classified as out of the labour force); however the US also has no universal paid maternity leave and its nappy valley is far less significant than Australia's.

Figure 9 Female labour force participation by age group, 2007



Source: (OECD 2009)

A great deal has been written about the reasons for low employment rates among single and second earner parents. Much of the research centres on Australia's generous system of family payments, which are progressively withdrawn as the family's income increases, which can result in high effective marginal tax rates: see Harding, et al. (2006); Kalb (2007), and difficulties in finding childcare and childcare costs that negated most of the benefits from working; see Payne et al. (2007). These disincentives to work are greatest for those with children under six who have not yet started primary school, as parents must pay for childcare if they wish to work. The younger the child, the higher the cost, as child care centres charge higher rates for younger children.

These high costs and high effective marginal tax rates affect not only a mother's income while she has children, but also her income in retirement. A woman who has two children, two years apart and does not return to work until the youngest enters school, loses eight years of working life and eight years of superannuation accumulation. This loss occurs in the early to the middle part of her working career, so she misses out on a great deal of capital growth on her lost super. If anything, women's greater life expectancy means they require more superannuation than men. Career breaks to rear children is one of the major reasons why women tend to have less superannuation than men. If the duration of these career breaks can be reduced, this will increase the amount of super women have in retirement. This could be accomplished by the recently announced introduction of paid maternity leave in Australia (Swan and Oakes 2009), improving labour force flexibility, improving access to childcare, and taking steps to reduce effective marginal tax rates.

APPSIM was used to simulate the effect of women becoming more likely to work when they had a young child. As described in an earlier section, the equations for labour force participation have three dummy variables to simulate the effect of childrearing on labour force participation – one dummy variable if the youngest child aged 0, a second if the youngest child is aged 1 or 2, and a third if the youngest child is aged 3 to 6. To increase the probability that women would return to the labour force following childbirth, the

coefficient for having a child aged 3-6 was set to zero, and halved if the youngest child was aged one or two. This means that under this simulated scenario, labour force participation of women with babies will be unchanged, increased slightly for women with toddlers and increased more for women with preschool aged children.

Under this scenario, labour force participation for women with children aged six or less increased to 69 percent from 59 percent. Two-thirds of this represented an increase in part-time employment and one-third was from an increase in full-time employment (with unemployment remaining unchanged.)

Table 4 Effect of higher maternal participation on mean and median superannuation, 2043

	Higher participation		Baseline	
	Mean	Median	Mean	Median
	$ 000	$ 000	$ 000	$ 000
45-54	186	119	183	119
55-64	267	167	260	160
65-74	179	62	184	66

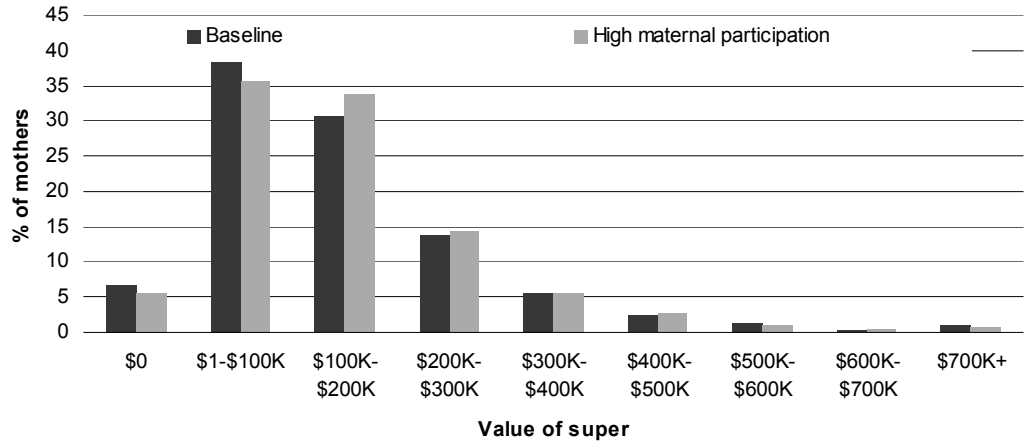
Note: All values are in 2006 dollars.

Source: APPSIM simulations

No consistent pattern of higher superannuation wealth is noticeable from Table 3. As women who have had children represent less than half the population with superannuation (and generally are poorer) an increase in superannuation in this group is unlikely to be very noticeable among total superannuation accumulations. However, when we focus specifically on women who have had children, the picture becomes more promising.

Women who had at least one child in their lifetimes had mean and median super balances of $182 000and $123 000 by age 55-64 in the higher maternal participation scenario, compared with $167 000 and $114 under the baseline scenario. Generally, the more children a woman has, the lower her superannuation balance. Under the high maternal participation scenario, each additional child born resulted in an average of $3753 less super for its mother when she was 55-64; under the baseline scenario, each additional child 'cost' $5921 in superannuation.

Figure 10 Superannuation wealth of mothers aged 55-64, 2043



Note: All values are in 2006 dollars.
Source: APPSIM simulations

Under the high maternal participation scenario, the percentage of women who had less than one hundred thousand dollars in superannuation at age 55-64 was 41 percent, compared to 45 percent in the baseline scenario.

Because women tend to have less superannuation than men, there was no impact on the number of people who were ineligible for the age pension at all. However, the number of people who only received a part pension increased from 7 percent to 8 percent.

7 INCREASING THE SUPERANNUATION CONTRIBUTION RATE TO 12%

When the Superannuation Guarantee was introduced in 1993, the minimum superannuation contribution was 3 percent of earnings. It has since gradually increased, reaching nine percent in 2002. However, the original architect of compulsory superannuation in Australia, Paul Keating, wanted mandatory superannuation contributions to increase to 12 percent and later, 15 percent. This additional six percent was to come from government contributions (3 percent) and employee contributions (3 percent). Successive governments, both Liberal and Labor, have decided not to implement this increase and leave superannuation contributions at nine percent; however additional measures have been implemented to promote voluntary contributions to superannuation.

Keating stated in 2006 that if the superannuation contribution rate had been increased, as he had intended, average workers who work from age 20 to age 60 would be able to retire on 45 percent of the average wage (ABC 2006), compared to the age pension, which is 25 percent of the average wage. Increasing the rate at which every working Australian saves over their lifetime has the potential to increase the number of people who will be fully or partially self-sufficient in retirement.

One could potentially increase the mandatory superannuation contribution to 10 percent, 15 percent or even higher, but for this simulation we have chosen the figure of 12 percent. This scenario assumes that the superannuation guarantee is lifted to 12 percent from 9 percent in 2010. It is implicitly assumed that the increase in super contributions comes from either government or employers, as no reduction in earnings was simulated.

Table 4 shows the impact of increasing the superannuation guarantee to 12 percent. As one would expect, mean and median super balances are greater across all age groups, even at age 65-74 when most people have started to draw down their super.

Table 5 Effect of 12% super contributions on mean and median superannuation, 2043

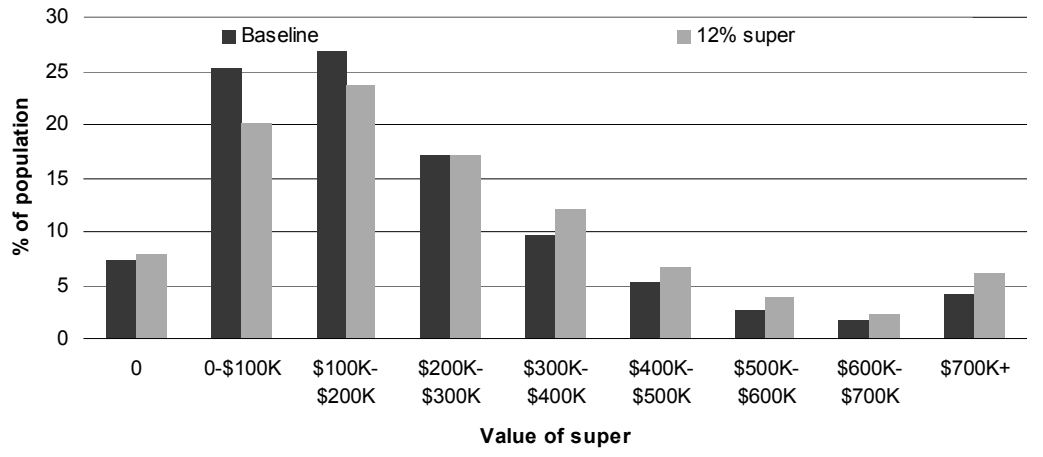
	12% super contributions		Baseline	
	Mean	Median	Mean	Median
	$ 000	$ 000	$ 000	$ 000
45-54	224	146	183	119
55-64	316	193	260	160
65-74	210	80	184	66

Note: All values are in 2006 dollars.

Source: APPSIM simulations

Figure 11 shows the distribution of superannuation balances of persons aged 55-64 in 2043. The percentage of this age group with less than $200 000 in superannuation is 52 percent with the higher superannuation guarantee compared to 59 percent under the baseline scenario. It is clear from this chart that this policy causes increased superannuation wealth among all groups, including both the relatively poor and the relatively wealthy.

Figure 11 Percentiles of superannuation accumulation among 55-64 year olds in 2043



Note: All values are in 2006 dollars.

Source: APPSIM simulations

As a result of this increase in super balances, 30 percent of the population aged 65-74 who will not be entitled to an age pension, compared to 28 percent under the baseline scenario. Seven percent are only eligible for a part pension, the same as the baseline scenario.

8 CONCLUSIONS

This paper has considered four policies targeted to increase superannuation accumulation and reduce the future pension burden. APPSIM modelling of all these scenarios shows that although mean superannuation balances do not increase greatly – and in the case of lower disability, decrease, the super wealth of the 25th percentile and median is greater under the four alternative scenarios. This means that each of these policy initiatives is able to improve superannuation savings among poorer groups as well as wealthier ones.

Reducing disability levels and increasing participation among mothers only had the least impact on overall balances, because these policy measures only target specific population groups. Also, the targeted population groups – the middle-aged disabled and women with children - tend to have very low super balances so significant increases in their super may not have much overall effect.

Increasing the superannuation guarantee to 12 percent and increasing overall participation levels by five percent both had a greater impact, but the latter policy has more of an effect in the lower superannuation groups, while the former affects those with higher super wealth as well as lower super wealth.

Table 6 Super balances at 55-64 under five scenarios, 2043

	Mean	25th percentile	Median	75th percentile
	$ 000	$ 000	$ 000	$ 000
Baseline	260	72	160	287
Increased overall participation	273	88	179	300
Lower disability	254	76	167	294
Higher participation for mothers	267	73	167	294
Super Guarantee 12%	316	86	193	344

Note: All values are in 2006 dollars.
Source: APPSIM simulations

As a result, all of these scenarios resulted in fewer recipients in receipt of the full age pension, as can be seen in Table 7. Since the lower disability and higher maternal participation scenarios targeted people who, in most circumstances, would not have had a great deal of superannuation anyway, these policies resulted in more people on the part pension instead of the full pension. Increasing the superannuation guarantee to 12 percent results in fewer people on both the full and age pension, as it increases savings among all income groups.

Table 7 Recipients of age pension aged 65-74 under five scenarios, 2043

	No age pension	Part pension	Full age pension
	%	%	%
Baseline	28	7	65
Increased overall participation	29	7	64
Lower disability	29	8	63
Higher participation for mothers	28	8	64
Super Guarantee 12%	30	7	63

Source: APPSIM simulations

This analysis indicates that while broad-brush approaches to reducing the pension burden, such as increasing the superannuation guarantee, have the greatest impact on the greatest number of people; smaller, more targeted policies such as reducing disability and increasing the participation of mothers should also be considered as their impact disproportionately affects those who would otherwise be fully dependent on the age pension.

One must also consider the practicalities and short-term effects of these policies. Implementing an increase in the super guarantee is relatively easy to undertake, requiring only a legislation change, while programs to reduce disability or increase participation may require a combination of changes to tax and welfare payments, provision of additional services and so forth.

However, increasing overall participation, reducing disability and increasing the participation of mothers increases total economic production in the short term, as well as increasing superannuation savings. On the other hand, increasing the superannuation guarantee by three percent to a total of 12 percent requires resources to be immediately diverted to long term savings, either from company profits, employee wages or government revenue. Precise calculations of the short-term impacts of these policies are outside the scope of this paper.

Although these findings are preliminary results and APPSIM is still subject to further development and refinement, they illustrate the usefulness of a dynamic microsimulation approach in assessing the distributional impact of a range of policies.

A APPENDIX

Table A1 Logit coefficients for APPSIM retirement equations

	Males	Females
Lfprev=PT	0.648	0.930
Lfprev=UE	1.441	1.377
Lfprev=NILF	0.941	1.607
Age 60 or over	0.755	0.680
Over pension age	0.709	0.177
Self-employed in previous period	-0.149	0.128
Education= trade/diploma	0.463	0.228
Education= Year 12	0.413	0.268
Education= <Yr12	0.467	0.418
Partner	0.052	0.075
Health (0=fully ablebodied; 10= severely disabled)	0.161	0.059
Constant	-4.077	-3.833

Table A2 Multinomial logit coefficients for labour force participation equations for non-students in APPSIM

	Coefficients 15-24		Coefficients 25-54		Coefficients 55-74	
	Males	Females	Males	Females	Males	Females
Part-time						
Part time last year	2.772	2.500	3.001	2.763	2.862	3.106
Unemployed last year	2.351	2.403	2.301	1.675	1.962	2.718
NILF last year	2.080	2.192	2.208	2.513	2.445	2.681
Part time year before last			1.491	1.450	1.824	1.499
UE year before last			1.095	1.104	1.260	1.303
NILF year before last			1.130	1.445	1.475	1.201
Education= trade/diploma	-0.131	0.461	-0.211	0.103	-0.648	-0.034
Education= Year 12	0.200	0.478	0.252	0.139	-0.343	0.152
Education= <Yr12	-0.096	0.776	0.037	0.380	-0.447	0.189
Partner	-0.481	-0.275	-0.207	0.271	0.050	0.540
Youngest child aged 0		1.978	0.268	2.212		
Youngest child aged 1-2		1.092		0.571		
Youngest child aged 3-6		0.851		0.365		
Tax-free super					0.543	0.338
Age pension					0.301	0.383
Health	0.089	0.037	0.155	0.050	0.066	0.033
Constant	-2.814	-2.471	-3.576	-2.853	-2.506	-2.792
Unemployed						
Part time last year	1.067	1.463	1.527	1.471	1.133	0.820
Unemployed last year	2.610	3.327	3.084	3.347	4.291	4.042
NILF last year	2.533	2.713	2.790	3.327	3.490	2.832
Part time year before last			1.367	0.952	1.362	1.962
UE year before last			2.196	2.213	2.377	2.874
NILF year before last			1.470	1.867	1.679	1.804
Education= trade/diploma	1.119	0.478	0.170	0.383	-0.218	-0.975
Education= Year 12	1.458	0.859	0.103	0.629	0.004	-0.323
Education= <Yr12	1.973	1.645	0.496	0.652	-0.352	-0.528

	Coefficients 15-24		Coefficients 25-54		Coefficients 55-74	
	Males	Females	Males	Females	Males	Females
Partner	-0.860	-0.341	-0.681	-0.524	-0.397	0.195
Youngest child aged 0		2.169	0.164	2.313		
Youngest child aged 1-2		1.063		-0.332		
Youngest child aged 3-6		1.180		0.338		
Tax-free super					-0.060	0.427
Age pension					-36.389	-1.308
Health	0.144	0.181	0.114	0.102	-0.039	0.151
Constant	-4.537	-4.179	-4.550	-4.894	-3.967	-4.829
Not in the labour force						
Part time last year	2.249	1.955	1.820	1.879	2.175	2.188
Unemployed last year	2.348	2.545	2.362	2.346	2.834	3.539
NILF last year	3.478	3.532	4.013	4.307	3.785	4.654
Part time year before last			0.676	1.188	1.024	1.016
UE year before last			1.705	1.597	2.147	1.521
NILF year before last			2.227	2.623	2.505	2.537
Education= trade/diploma	-0.863	0.247	0.286	0.347	-0.331	0.087
Education= Year 12	0.085	0.466	0.630	0.596	-0.288	0.482
Education= <Yr12	0.301	1.685	0.748	1.009	-0.204	0.643
Partner	-0.708	-0.194	-0.305	0.204	-0.340	0.600
Youngest child aged 0		4.763	0.425	3.950		
Youngest child aged 1-2[a]		2.736		0.572		
Youngest child aged 3-6[a]		1.922		0.316		
Tax-free super					0.665	0.219
Age pension					-0.049	0.510
Health	0.370	0.208	0.251	0.198	0.151	0.053
Constant	-4.129	-4.376	-4.740	-4.658	-3.564	-4.147

a For the scenario involving higher maternal participation, the coefficients for 'youngest child aged 1-2' were halved, and the coefficients for 'youngest child aged 3-6' were set to zero.

Table A3 Multinomial logit coefficients for labour force participation equations for full-time students in APPSIM

	Males	Females
Full time employed		
Part time last year	-1.015	-1.307
Unemployed last year	-1.120	-3.842
NILF last year	-2.542	-2.570
Part time year before last	-0.497	-0.481
UE year before last	-0.668	-0.203
NILF year before last	-1.092	-1.074
Age	-0.282	-0.034
Dependent student	-37.509	-36.195
Has child under 6	0.946	-0.973
Constant	8.153	2.744
Part time employed		
Part time last year	1.171	0.042
Unemployed last year	-0.229	-1.329
NILF last year	-0.899	-2.363
Part time year before last	-0.159	-0.251
UE year before last	-0.602	-0.164
NILF year before last	-0.867	-0.610
Age	0.009	-0.008
Dependent student	0.607	0.443
Has child under 6	-0.920	-1.523
Constant	0.274	2.153
Unemployed		
Part time last year	0.411	-0.640
Unemployed last year	1.166	0.542
NILF last year	-0.092	-0.966
Part time year before last	1.791	-1.076
UE year before last	2.144	-0.613
NILF year before last	1.744	-0.854
Age	0.004	-0.099
Dependent student	-0.117	-0.423
Has child under 6	-0.437	-1.212
Constant	-3.218	2.129

Table A4 Logit coefficients for whether a person will be self employed (as opposed to an employee)

	Males	Females
Own business in t-1	3.759	3.327
Own business in t-2	2.239	2.256
Age	0.018	0.027
Part-time worker	0.825	0.243
Partner	0.249	0.486
Youngest child aged 0	0.379	0.875
Youngest child aged 1-2	0.315	0.705
Youngest child aged 3-6	0.255	0.331
Constant	-4.386	-5.008

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