Impact of Health on the Ability of Older Australians to Stay in the Workforce - with Possible Contributions to Economic Sustainability

Agnes Walker
Fax: (02) 6201 2751; email: Agnes.Walker@natsem.canberra.edu.au

Principal Research Fellow, National Centre for Social Economic Modelling (NATSEM), University of Canberra, and Visiting Fellow, National Centre for Epidemiology and Population Health (NCEPH), Australian National University.

Abstract

The ageing of the population, combined with increasing life expectancies, is raising concerns about the sustainability of current economic and social structures. This paper studies the likelihood and impact of more older Australians staying in the labour force - subject to individuals' own health, socioeconomic status (SES), sex, age and family characteristics.

A dynamic microsimulation model is used to estimate the probability that, in a changed employment environment, more Australians aged 65-70 would work more than 15 hours per week. Under that scenario, the findings are that around 500,000 additional persons aged 65-70 years would remain in the workforce - with the related earnings totalling up to $20 billion in 1998 ($35 billion in 2018). The estimated savings by government on the age pension would be around $2 billion ($4 billion in 2018).

1 Introduction

Ageing populations, combined with improved life expectancies, have led to 'longer working lives' becoming a much discussed topic throughout the developed world – Treasury (2002). As in other industrialised countries, the proportion of working age Australians is declining and that of the retired population increasing. In the next decade or so some 4 million 'baby boomers' are expected to join the 2 million Australians currently retired. Treasury (2002) and Treasurer (2004) note that a key issue is whether current policies – and the consequent government expenditures – are sustainable in the longer term.

Treasury (2002) saw fiscal sustainability as a major issue – the concern being that future generations may face unmanageable tax expenditures for the government services provided to the current generation. When developing its projections, Treasury (2002) took account of a wide-range of factors – such as likely changes in fertility, mortality and migration; and changing economic growth prospects due to productivity, employment, unemployment, wages and price changes.

Other studies focussed more specifically on possible changes to government policies and to older people's willingness to work and their access to jobs. One much discussed policy response is the raising of the state pension age. While some countries already have a qualifying age for the state pension that is above 65 years – eg 67 years in Norway (Frederiksen and Stolen, 2003) – several others, such as Germany and the UK, are considering proposals to increase the pension age to 67 or 70 years - O'Connell (2003). O'Connell also discussed older people's fear that, if the pension age was raised, inability to work due to unexpected ill-health may leave them with no income at all. Another issue discussed is the need to bring about a change in employer attitudes to improve older persons' access to jobs (Howard, 2003).

Earlier, the Australian government initiated several policies leading to the gradual alignment of the pension age for men and women to 65 years. More recently it asked older Australians to keep working longer (Howard, 2003) and started to introduce policies that are more in line with the work preferences of older persons, mainly 65-74 year olds (Treasury 2004). Examples are access to superannuation by those aged 65 or over who wish to remain in the labour force, but at reduced hours of work.

Apart from policy initiatives such as the lifting of the age pension age, the key changes considered in this study are more favourable and flexible labour market conditions and general improvements in health.

2 Objectives

The aims of this paper are to establish how important health is in Australians' decision to retire; what financial consequences longer working lives have for individuals and for government; and how the situation would change if health at the population level could be improved. Results will be presented for a historical year, 1998, and for a projection year, 2018.

The scope of the projections was limited to consideration of the impact of possible changes, in line with recently proposed or implemented policy initiatives in Australia and elsewhere (section 1). In relation to the many other factors that could impact on future economic and social trends, we adopted the traditional 'ceteris paribus' assumption (ie that, apart from the changes considered, 'all else will remain unchanged').

The focus of the study was the 65-70 age group. People in that group were considered employed if they worked more than 15 hours per week. While early retirement - that is people leaving the workforce before age 65 - is also an issue of considerable policy concern, it was not covered in the analyses.

To estimate the probability that Australians aged 65-70 would work more than 15 hours per week - had suitable changes in the policy and work environments occurred - a dynamic microsimulation model of the Australian population was used. The likelihood of more older Australians staying in the labour force was studied subject to individuals' own health, socioeconomic status (SES), sex, age and family characteristics.

The impacts of more older Australians working were simulated in a world in which current patterns of health by age, sex and SES remained unchanged over time (Base case); and a world in which the health of all Australians was lifted to that of the most advantaged 20% of the population (Improved Health Scenario).

3 The model used

The analytical tool used was the Australian dynamic microsimulation model developed at the National Centre for Social and Economic Modelling (University of Canberra). To it the author added health and socioeconomic modules as part of a PhD thesis at the National Centre for Epidemiology and Population Health (Australian National University).

The original dynamic microsimulation model

The original version of the model, DYNAMOD,[1] simulates future events occurring in the lives of individual Australians - such as couple formation, birth of a child, education, leaving home, migration, divorce, being employed, income from work and from government, wealth accumulation, becoming disabled, recovering from disability and death.

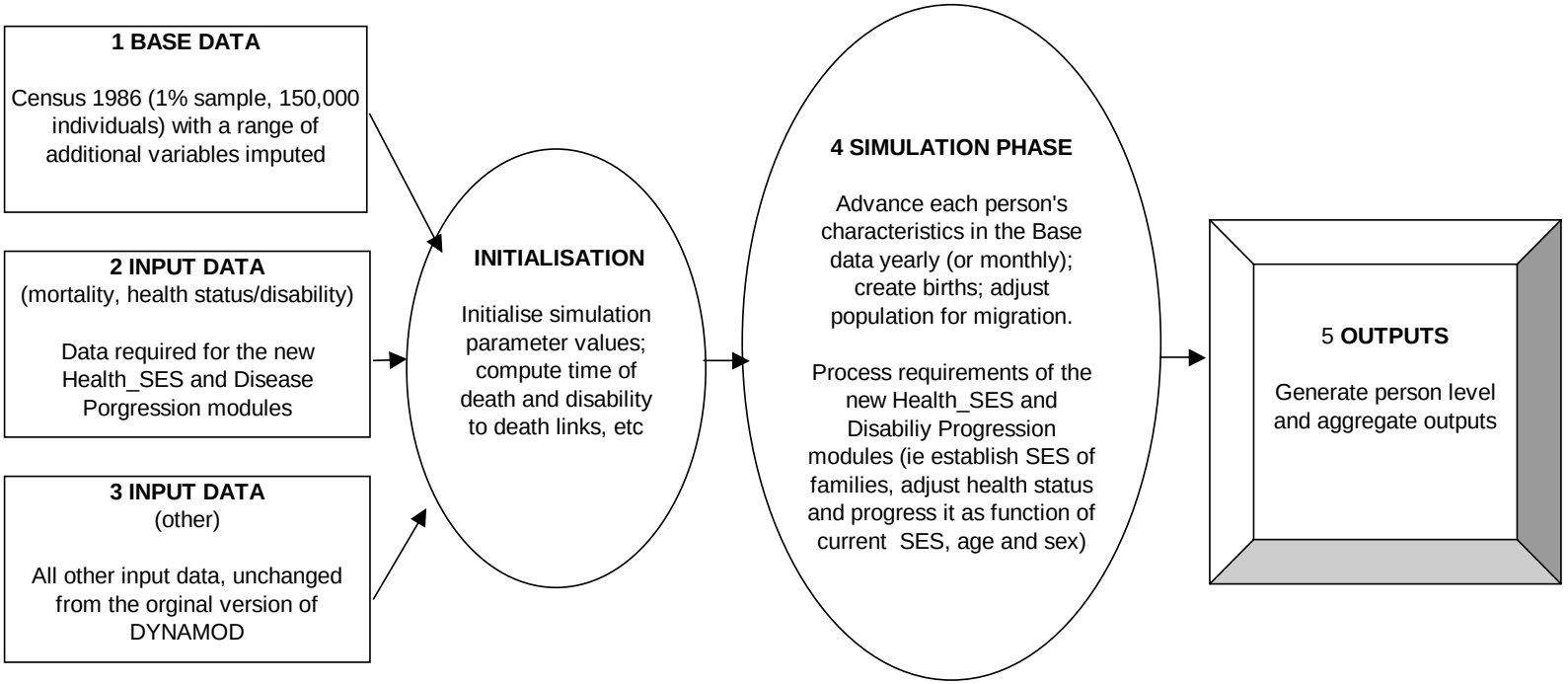
DYNAMOD is based on a 1 per cent representative sample of the population (around 150,000 individuals) extracted by the Australian Bureau of Statistics (ABS) from its 1986 Census. The model projects up to 30 years into the future.

The Health and SocioeconomicSstatus modules added

The new Health and Socioeconomic Status modules added to the original version of DYNAMOD are described in Walker and Becker (2004) and Walker (2004a,b,c and 2002).

Figure 1 summarises the processes that needed to be modelled when adding these two new modules: that is the imputation of the additional health and SES variables to the model's Base data – ie the 1% census sample; preparation of new input data on disability and its severity by SES; initialisation of these new variables; allowing for these new variables to be processed in the model's simulation phase – such as the progression of people's health state and SES as they age; and generation of the related person-level and aggregate outputs.

Figure 1**: Elements of the enhanced version of DYNAMOD**



In the new *Health module* disability[2] is used as the indicator of health status. It is linked it to mortality, so that in a healthier society people will live longer. The severity of disability is also accounted for since it affects an individual's functionality - in terms of people's ability to remain in the workforce or to live independently. When estimating health transition probabilities (Walker 2004c) from cross sectional survey data (ABS 1999a) four health states were considered: 'No illness or disability', 'Long term illness', 'Disabled_mild restriction' and 'Disabled_severe restriction'.

When building the new *SES module*, we used the following variables available in the original version of DYNAMOD: earned incomes of individuals, the cash benefits their families received from government; and their family's wealth as it accumulated over the life course. With these we computed three different SES indicators:

- *Income* = Family income (earned + government benefits);
- *Income_Wealth* = Family income (earned + government benefits) + annualised wealth;[3]
- *Equivalent Income_Wealth* = {family income (earned + government benefits) + annualised family wealth} / equivalence scale factor.[4]

We then ranked these indicators and divided the population into five equal parts - the 20% with the lowest SES making up the bottom (or least advantaged) quintile of socioeconomic status, and the 20% with the highest SES the top (or most advantaged) quintile. For the research reported in this paper we chose the Income_Wealth indicator.

All aspects of the model were aligned to aggregate published statistics, including the upward drift observed in disability prevalences across the ABS's last four Disability surveys. For this drift we calibrated the model so that its simulated future disability rates increased by 0.43% every 5 years. This is a considerably slower rate than what past trends indicate (that is a 1.28% upward drift every five years across the 1983 and 1998 ABS Disability surveys). Reasons why we adopted a slower rate include expectations, based on recent data, that a slowing of that upward drift may occur in future. Details are in Walker (2004c).

3 Modelling the employment status of 65-70 year olds

For the new Work_65-70 module we selected the 65-70 age group, because this group was most likely to be affected by proposed policy changes, such as the lifting of the pension age (section 1). The choice of 70 years as an upper limit was strengthened by the fact that beyond that age poorer health - and other effects of ageing - were expected to lead to a considerable reduction in the number of hours worked.

Data and methodology

To model the employment status of older Australians in a changed job and regulatory environment, we used the 1998 Disability survey unit record files (ABS 1999a). The advantages of that nationwide survey over other ABS surveys are that it is not restricted to households, has a better coverage of older age groups, and has information on ill health and its severity.

Two major tasks needed to be carried out to model the employment status of older Australians in different work and health environments. First, to estimate the likely work patterns of this

older age group under the changed environment we used logistic regression techniques. Second, to impute that work pattern onto each individual in DYNAMOD - so as to reflect that individual's personal and family characteristics – we used logistic regression and the Monte Carlo method.

Choice of variables explaining work patterns

For the 65-70 age group, we considered that people had extended their period of employment if they worked more than 15 hours per week. Thus, in what follows 'work' refers to working more than 15 hours per week.

Studies have shown that the major determinants of employment status are age - Cai and Kalb (2004); Green and Leeves (2003) - own health, others' health (such as spouse), sex (Walker 2004c) and SES (ABS 1999c). When estimating the probability that 65-70 year olds will continue to 'work', we considered these factors as explanatory variables, together with whether there was one or more dependent.

From amongst the SES indicators available in the 1998 Disability survey, we chose the geographic area-based SEIFA index of socioeconomic disadvantage. Because people with a job tend to have considerably higher incomes than the retired, we expected the SEIFA to be less highly correlated with employment than the income-based SES indicators. Also, we chose SES at age 55 – rather than current SES – because the SEIFA quintile of those retired is in general considerably lower than the SEIFA quintiles of people of the same age still working. Thus, SES at age 55 - indicated by the Income_Wealth measure in DYNAMOD - is a more appropriate indicator for the 'working' 65-70 group than their current SES.

One difficulty presented by the patterns observed in the Disability survey was that in 1998 only 10% of 65-69 year olds worked 15 hours or more per week. This 10% corresponded to a sample of 160 individuals, which proved to be too small to extract work patterns by health, SES, sex, spouse and dependent(s). As a result, to model the probability of 65-70 year olds working more than 15 hours per week, we searched for a younger age group – one that still had most of its members in the workforce. The Disability survey data showed that beyond age 54 most survey respondents - 59% of 55-64 year olds and 88% of 65-69 year olds - gave the 'retired' or 'too old' response as to why they were not looking for work, rather than reasons such as own or others' ill-health. Thus, the 1998 survey data for those aged 55+ could not be used to study what the work patterns of 65-70 year olds might be in future under different employment environments.

As a result, we had to go back as far as the 45-54 group to find data on what might occur amongst 65-70 year olds under a changed job and regulatory environment.[5] We then assumed that, within each 'health-SES-age-sex-spouse-dependent' cell, the work patterns of 65-70 year olds in DYNAMOD were those observed in 1998 for 45-54 year olds.

This assumption meant that, while the imputed work patterns did account for the 'worse health' and smaller 'family size' characteristics of 65-70 year olds relative to 45-54 year olds, behavioural differences – such as the desire to work or salary expectations - were not considered. However, as will be seen in sections 7 and 8, the reader can assess the implications of a number of possible behavioural differences from the results presented – such as working only part of the year.

Logistic regression for the probability of working

In this section we estimate an equation for the probability of working, for use in DYNAMOD when determining which 65-70 year old will have 'working' status in each year of the model's simulation phase.

Logistic regression was applied to the 1998 Disability survey data to assess the probability p_i that an individual of given characteristics x_i would work more than 15 hours per week:

$p_i = \text{prob}(\text{work}=1 \mid x_i) = e^{\eta}/(1+ e^{\eta})$ (Equation 1)

where

$$\eta = \mu + a*A + b_1*I_1 + b_2*I_2 + b_3*I_3 - (b_1+b_2+b_3)I_4 + c*sex + d*SP + e*Dep + f_1*SES_1 + f_2*SES_2 + f_3*SES3 + f_4*SES_4 - (f_1 + f_2 + f_3 + f_4)*SES_5$$

with A=1 for 45-49 year olds and A=0 for 50-54 year olds;

I_1 =1 for 'No illness'; I_2 =1 for 'Long term illness'; I_3 =1 for 'Disability_mild restriction'; I_4 =1 for 'Disability_severe restriction', with each being zero otherwise;

sex is 0 for males and 1 for females;

SP is 1 if there is a spouse and 0 otherwise; [6]

Dep is 1 if there is dependent(s) and 0 otherwise;

SES (=SEIFA_Q at age 55) is a 1 to 5 categorical variable. SES_1 = 1 for the most disadvantaged quintile, etc.

Using Disability survey data on 45-54 year olds, the parameter estimates produced by weighted[7] logistic regression using the SAS programming language were:

μ=0.7661; a=0.1211; b_1=1.0325; b_2=0.7476; b_3=-0.4987; c=-1.3484;
d=0.2335; e=-0.0199; f_1=-0.6597; f_2=-0.158; f_3=0.0413; f_4=0.2824.

The univariate results in Table 1 show that 'own health' and 'SEIFA quintile' had the greatest explanatory power (each being over 50% concordant, and 'own health' having by far the greatest Likelihood Ratio Chi-square). The '% concordant' statistic indicates the per cent of predicted probabilities that are concordant with the responses observed in the original survey.

Sex was the next most important (with 40% concordance, while 'age', 'spouse' and 'dependent' were about equally important (each with close to 30% concordance). While age would normally be expected to be more important, in these analyses we only considered 45-54 year olds (that is two categorical classes: 45-49 and 50-54 year olds) and within that range the effect of age was only moderate.

As expected, for a dataset of that size (5134 individuals), the results were statistically highly significant ($p<0.0001$). All variables considered contributed to goodness of fit. The multivariate results in Table 1 show that the three most important variables – own health, SES and sex – explained most of the variations observed, with the 'per cent concordant' statistic being 77.5 with these three variables, compared with 78.8 with all the variables.

Table 1: **Logistic regressions, 45-54 year olds, variables influencing whether 'working', 1998**

Independent variables	**Likelihood Ratio Chi-square (df)#**	**% concordant***
Univariate		
age - categorical	9728 (1)	28.8
sex	167751 (1)	40.0
SEIFA quintile	98078 (4)	52.3
own health	248468 (3)	52.9
spouse	24323 (1)	27.6
dependent(s)	12584 (1)	26.1
Multiple regressions *(adding variables in order of importance)*		
own health, SEIFA quintile	308528 (7)	68.8
own health, SEIFA quintile, sex	496915 (8)	77.5
own health, SEIFA quintile, sex, age	502640 (9)	78.2
own health, SEIFA quintile, sex, age, spouse	506614 (10)	78.5
own health, SEIFA quintile, sex, age, spouse, dependent(s)	506650 (11)	78.8

degree of freedom in brackets. * The per cent of predicted probabilities that were concordant with the responses observed in the survey.
Source: 1998 Disability Survey

Imputing 'work' status in the main model

To impute 'work' status to individuals in DYNAMOD, we first used Equation 1 to estimate the probability p_i that a 65-70 year old with particular 'age_sex_SES_health_family-type' characteristics would 'work'. Next we simulated the decision to work using a Monte Carlo approach, drawing a random number, *z*, from a uniform distribution over the interval [0, 1], and comparing it with the estimated probability *pi*.

In each simulation year, the person was then assigned a status of 'working' when z <= pi. Due to lack of longitudinal data from which transition probabilities could be estimated, we had to re-assign a 'work' status to 65-70 year olds year-by-year. While this method of assignment does not accurately depict what happens to individuals over the life course, the aggregate estimates – such as the proportion of 65-70 year olds 'working' – are a reasonable reflection given the large sample sizes embedded in DYNAMOD (8,396 persons aged 65-70 years in 1998 and 14,504 in 2018).

Validation

To validate the new Work_65-70 module, we carried out a random check on the probability of 'working' predicted by Equation 1. The aim was to assess whether it had been correctly applied to each 65-70 year old in DYNAMOD, when imputing their work status. Broad-based validation comparing 1998 aggregate patterns from DYNAMOD simulations with patterns in the 1998 Disability survey were also carried out.

4 Description of the Base case and Scenario simulations

Simulations were carried out under two alternatives regarding population health:

- **Base case:** whereby the work pattern changes occurred in an environment where health inequalities by socioeconomic status were those observed in 1998; and
- **Improved Health Scenario**: whereby the work pattern changes occurred in an environment where the health of all Australians – in terms of mortality and disability rates - was lifted to that of the most advantaged 20% of the population.[8]

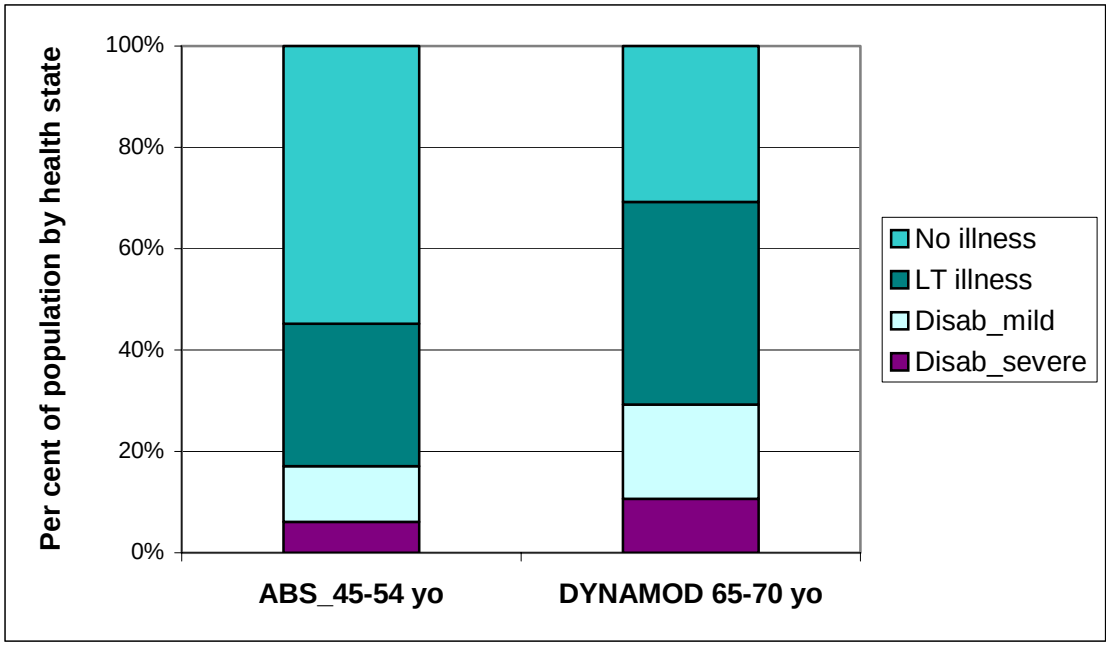
5 Results: health and employment of 45-54 year olds versus 65-70 year olds

To check that the model results were in line with expectations, the health and employment patterns in the 1998 Disability survey were compared with those in DYNAMOD under the Base case. Figure 2 shows the distribution by health state of the population aged 45-54 years in the survey and that of the 1998 DYNAMOD population aged 65-70 years. The Figure shows that, while over 80% of the 45-54 group in the survey population had no disabilities – and thus no related impact on their ability to 'work' - that proportion was considerably lesser for DYNAMOD's 65-70 group (around 70%). As a result, in 1998, the proportion working amongst the survey's 45-54 year olds was higher than that amongst DYNAMOD's 60-70 year olds (Figure 3).

Because we used Equation 1 with a single explanatory variable (ie health state) when constructing Figure 3, these findings can be interpreted as arising uniquely from the poorer health of 65-70 year olds than that of 45-54 year olds. A key finding from Figure 3 is that, due to poorer health in older ages, 7% less of the DYNAMOD 65-70 year olds were 'working' than of the survey's of 45-54 year olds.

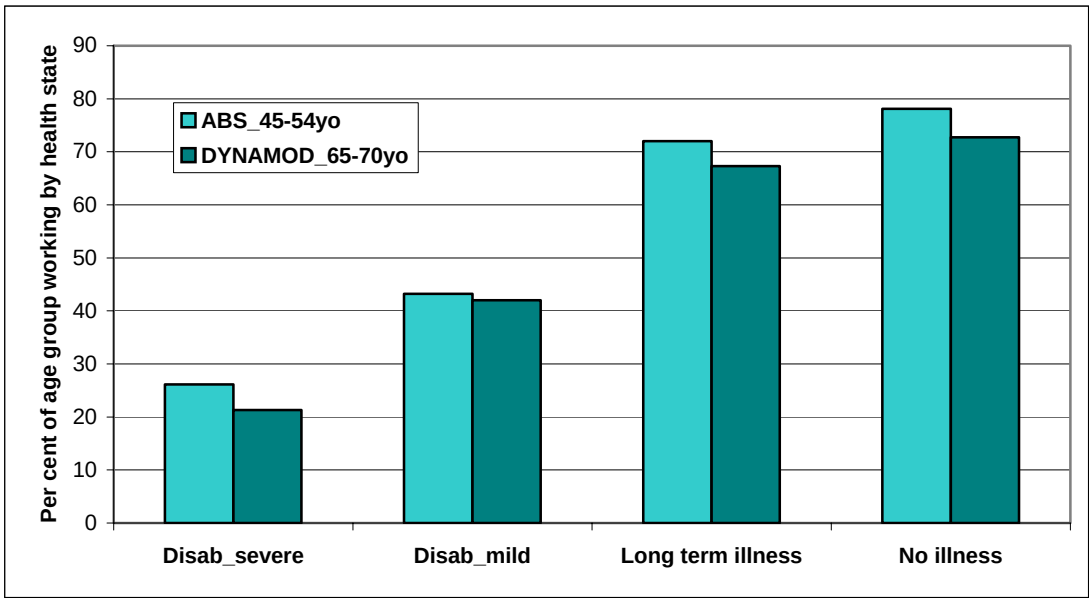
This finding has consequences for superannuation and age pension policies, in that account needs to be taken of the smaller and smaller proportion of the population healthy enough to be able to 'work' as people age. Another conclusion is that 'prevention' of the more severe stages of chronic illnesses has the potential to significantly increase the proportion 'working' in a given older age group – hence the consideration of the Improved Health Scenario.

Figure 2: **Distribution of the 45-54 and 65-70 populations by health state, ABS Survey and DYNAMOD, Base case, 1998**



Sources: ABS 1998 Disability Survey (1999a) and DYNAMOD simulations

Figure 3: **Per cent of 45-54 and 65-70 populations 'working' by health state,* ABS survey and DYNAMOD, Base case, 1998**



* Based on a logistic regression equation for 'work' by health state only.
Sources: ABS 1998 Disability Survey (1999a) and DYNAMOD simulations

6 RESULTS: predicted population of 65-70 year olds and the proportion working

Table 2 shows the estimated number of 65-70 year olds by health status under the Base case and the Improved Health Scenario in 1998 and 2018.

Table 2: **Persons* aged 65-70 years by health status, Base case and Scenario, 1998 and 2018**

	65-70 year olds		
	Base case	**Scenario**	**Difference**
	(a)	(b)	(b-a)/a
	'000	'000	%
1998			
Disabled	252.9	178.0	-29.6
severe restr'n	91.5	63.3	-30.7
mild restr'n	161.4	114.6	-29.0
Long term illness	345.7	373.9	8.2
No illness or disability	266.3	312.9	17.5
All health states	864.8	864.8	0.0
2018			
Disabled	419.5	350.0	-16.6
severe restr'n	145.5	95.1	-34.7
mild restr'n	274.0	254.9	-7.0
Long term illness	655.0	622.0	-5.0
No illness or disability	419.4	538.2	28.3
All health states	1493.9	1510.2	1.1

* NOTE: numbers in Table may not add up due to rounding. Also, the total number of persons under the Base case and the scenario are slightly different in 2018 due mainly to less people dying under the scenario.
Source: DYNAMOD simulations

Table 2 indicates that, for 1998, the model generated a total of 864,800 persons aged 65-70 years. The corresponding population published by the ABS is 817,000 persons – indicating a reasonable alignment between DYNAMOD and publicly available benchmark data.

Table 2 also shows that - as expected - the total number of 65-70 year olds were similar under the Base case and the Scenario.[9] The improvements in population health, however, manifest themselves by there being 30% less disabled in 1998 (and 17% in 2018) under the Scenario than under the Base case. The smaller difference in 2018 arises mainly from the upward drift built into the model in the proportion disabled (section 2).

Table 3 shows how many 65-70 year olds were predicted to 'work' under both the Base case and the Scenario. In 1998, 516,200 persons aged 65-70 years were estimated to work more than 15 hours per week under the Base case. This compares with 55,000 persons aged 65-69 years working the same hours per week in the 1998 Disability survey (ABS 1999a). After

subtracting these 55,000, the implementation of 'extending working lives' policies and related societal changes was estimated to result in 450,000 more 65-70 year olds remaining in the workforce in 1998 (around 800,000 in 2018) than in the absence of such changes. This 450,000 estimate represents an increase of just over 7% on the 6.2 million full time 15-64 year old workforce indicated by the 1998 Disability survey.

Table 3: **Number of 65-70 year olds working more than 15 hours per week, Base case and Scenario, 1998 and 2018**

	65-70 year olds		
	Base case	**Scenario**	**Difference**
	(a) '000	(b) '000	(b-a)/a %
1998			
Disabled	87.2	62.4	-28.5
severe restr'n	19.5	17.3	-11.1
mild restr'n	67.8	45.1	-33.4
Long term illness	234.6	259.7	10.7
No illness or disability	194.4	230.9	18.8
All health states	516.2	553.0	7.1
2018			
Disabled	155.2	130.5	-15.9
severe restr'n	37.0	26.5	-28.4
mild restr'n	118.2	104.0	-12.0
Long term illness	454.3	452.8	-0.3
No illness or disability	313.1	401.2	28.1
All health states	922.7	984.5	6.7

* NOTE: numbers in Table may not add up due to rounding.
Source: DYNAMOD simulations.

Table 3 also shows that there would be around 7% more 65-70 year olds 'working' under the scenario than under the Base case. This is mainly due to there being less disabled working under the scenario than under the Base case – 29% less in 1998 and 16% less in 2018. As before, the smaller 16% difference in 2018 arises mainly from the upward drift in the per cent disabled built into the model (section 2).

7 RESULTS: earnings of 65-70 Year Olds

The earnings of 65-70 year olds were based on what 45-54 year olds who worked more than 15 hours per week earned, and for whom wage or salary was the main source of income (ABS 1999a). We used the person level 'total weekly cash income' variable in the survey. Although the earnings of 60-64 year olds would have been more appropriate, there were too few

respondents in the survey in that age group who had wages or salaries as their main source of income. For most, their income came mainly from government (age pension).

Table 4 shows that in 1998 the mean weekly cash income of 45-54 year olds was $737 from wages or salaries. Assuming that this age group drew this salary 52 weeks in the year, then the corresponding income would have been $38,000 a year – an income well above the average earnings of all age groups working more than 15 hours per week ($32,500). This is as expected, because people's incomes tend to increase as their career progresses with age, and because those with skills/education who command higher salaries are more likely to have a job.

Table 4: **Mean weekly cash incomes of 45-54 year olds who worked more than 15 hours per week and whose main source of income was from wages and salaries, by health state** (1998 dollars)

	45-49	**50-54**	**45-54**
1998	$	$	$
Disabled, severe restr'n	640	603	625
Disabled, mild restr'n	659	664	662
Long term illness	742	746	744
No illness or disability	742	746	744
All health states	737	738	737

Source: 1998 Disability survey, unit record files – ABS (1999a).

Table 4 also shows that in both the 45-49 and 50-54 age groups the earned incomes of the disabled - while well above the age pension[10] - were significantly lower than the earned incomes of the non-disabled.

Using the DYNAMOD generated estimates of the numbers of 65-70 year olds who worked more than 15 hours per week (Table 3) and the mean earnings data in Table 4, the annual earnings of the working 65-70 year olds under the Base case and the scenario are presented in Table 5. Although these estimates were prepared assuming that the same weekly earnings were received 52 times in the year, it is easy for the reader to compute estimates for various alternative 'part-year employment' scenarios. Similarly, the reader could also estimate the impact of older people accepting salaries lower than those in Table 4.

Table 5 indicates that under the Base case the earnings of persons aged 65-70 years would have been $19.8 billion in 1998 ($35.4 billion in 2018) – in 1998 constant prices. Accounting for the 55,000 persons who would have worked without the Base case changes, the 1998 estimate becomes $17.7 billion. Under the Scenario, the earnings of 65-70 year olds would be around 7% higher than under the Base case ($1.4 billion higher in 1998 and $2.4 billion in 2018).

Table 5: **Annual earnings* of 65 to 70 year olds, Base case and Scenario, 1998 and 2018** (1998 dollars)

	65-70 year olds		
	Base case	**Scenario**	**% change**
	(a)	(b)	(b-a)/a
	$ million	$ million	%
1998			
Disabled			
severe restr'n	633	562	-11.1
mild restr'n	2333	1553	-33.4
Long term illness	9078	10046	10.7
No illness or disability	7519	8934	18.8
All health states	19784	21193	7.1
2018			
Disabled			
severe restr'n	1202	860	-28.4
mild restr'n	4070	3581	-12.0
Long term illness	17577	17517	-0.3
No illness or disability	12114	15521	28.1
All health states	35361	37729	6.7

* Assumes that the weekly earnings reported in the 1998 Disability survey (ABS 1999a) occurred 52 times in the year. ** Defined as whether working more than 15 hours per week.
Sources: DYNAMOD simulations for the numbers working more than 15 hours per week (Table 3); Table 4 for the person level estimates of earnings.

8 RESULTS: expenditures on the age pension for 65-70 year olds

We initially assumed that, for every person working under the Base case and the Scenario, the government would save on the age pension. This is because currently only a very small proportion of 65-70 year olds work more than 15 hours per week, and because their earnings are likely to be well above the age pension (section 7).

To be able to estimate the impact of longer working lives on government expenditures on the age pension, we first examined the related statistics published by the Department of Family and Community Services (1999, p.5). For 1999 these indicate that:

- out of the 1.7 million Australians aged 60 years or more who received the age pension, close to 0.5 million were aged 65-69 years (27.9%);
- the proportion of singles amongst all Australians receiving the age pension was 47.3% and of couples 52.7%; and
- 68.2% received the maximum pension rate and 31.8% a reduced rate.

The first point shows that people in the 65-70 group accounted in the late 1990s for close to a third of all age pensioners. Also, comparing the 1.7 million receiving the age pension with ABS population statistics, around 70% of Australians aged 60 years or more received the age pension in 1999.

The average full and part pension rates were obtained from Treasury (1999, Table 6). Based on the total age pension expenditure in 1997-98 ($13,141 million), we found that, on average, the part pension rate amounted to around half of the full pension rate.

In view of the above statistics, we made some assumptions when estimating the savings on the age pension under the Base case and the scenario (Table 6).

Table 6: **Assumptions made when estimating age pension expenditures on 65-70 year olds, Base case and Scenario, 1998 and 2018**

Proportion of the 65-70 year old population with the age pension	70.0%
Proportion of age pension customers - 'single' rate	47.3%
Proportion of age pension customers - 'couple' rate	52.7%
Proportion of age pension customers - full pension	68.2%
Proportion of age pension customers - part pension	31.8%
Ratio of part pension to full pension	0.5

Sources: Department of Family and Community Services (1999) and Treasury (1999)

We also assumed that the average earnings of 65-70 year olds who 'worked' under the Base case and the scenario were equal to those shown in Table 4 – and were thus not eligible for the age pension (section 7).

Based on these assumptions, Table 7 shows that the total saving on the age pension in 1998 was estimated at $2.6 billion under the Base case (4.6 billion in 2018) – in constant 1998 prices. When adjusted for the 55,000 persons[11] who would have 'worked' without any changes in the current situation, this $2.6 billion reduces to $2.2 billion - equivalent to 17% of the government's 1997-98 expenditure on the age pension.

Table 7: **Potential savings on the age pension of 65 to 70 year olds if their employment patterns* were similar to that of 45 to 54 year olds in 1998, 1998 and 2018** (1998 dollars)

	65-70 year olds		
	Base case	**Scenario**	**Difference**
	(a)	(b)	(b-a)/a
	$ million	$ million	%
1998			
Disabled	435	312	-28.5
severe restr'n	97	86	-11.1
mild restr'n	338	225	-33.4
Long term illness	1171	1296	10.7
No illness or disability	970	1153	18.8
All health states	2577	2760	7.1
2018			
Disabled	775	651	-15.9
severe restr'n	185	132	-28.4
mild restr'n	590	519	-12.0
Long term illness	2268	2260	-0.3
No illness or disability	1563	2002	28.1
All health states	4605	4914	6.7

* Defined as working more than 15 hours per week.

Sources: DYNAMOD simulations for the numbers working; Department of Family and Community Services (2004 and 1999) for age pension statistics.

Table 7 also shows that under the Improved Health Scenario, the government would save about $4.9 billion (1998 dollars) on the age pension in 2018 – an amount that is around 7% greater than under the Base case.

Although these estimates were prepared assuming that the same weekly earnings were received 52 times in the year, it is easy for the reader to compute estimates for various alternative 'part-year employment' and payment scenarios.

9 RESULTS: comparing the Base case and Scenario results

The financial implications under the Scenario were estimated to be around 7% greater than under the Base case. For example, the additional earnings of 65-70 year olds were around $19.8 billion in 1998 and $35.4 billion in 2018, compared with $21.2 and $37.7 billion under the scenario - Table 5. The related savings on the age pension under the Base case were $2.6 billion in 1998 ($4.6 billion in 2018), compared with $2.8 billion ($4.9 billion) under the scenario - Table 7.

This implies that considerably greater financial benefits would arise from effective government incentives for 65-70 year olds to remain in the workforce - combined with improved job availability for that age group – than from the improved population health scenario. However, improved population health across all age groups would have many benefits not accounted for in this paper, which only considers older Australians. Walker (2004b) found that full population benefits would include: one million fewer Australians being disabled, over 180,000 life years saved, $3 billion lower health care and A$1 billion savings to government on the disability support pension.

10 Discussion

The study method chosen for the paper allowed us to model the decision to retire as a function of each individual's own health, socioeconomic status, age, sex and family composition. An additional 450,000 persons aged 65-70 years were estimated to remain in the workforce - with the related earnings totalling up to $20 billion in 1998 ($35 billion in 2018) and savings by government on the age pension of around $2 billion ($4 billion in 2018).

The study method chosen also allowed the estimation of the combined impacts of the 'longer working lives' scenario and the 'narrower health inequalities scenario'.

The analyses presented demonstrate the importance of including health into discussions about the desirability of older Australians extending their working lives. We used a novel analytical method that allowed the *simultaneous* consideration of the many variables – such as health, life expectancy, earning capacity, SES and family composition - that impact on the decision to remain in the workforce after age 65. The study also provided estimates of the financial consequences of longer working lives for individuals and government.

However, our analyses have several limitations. Probably the most important ones are the lack of historical statistics on the employment patterns of 65-70 year olds - due to most Australians in this age group being at present retired; the lack of data on how older Australians are likely to respond to recent and likely future government initiatives which encourage the extension of working lives; and the uncertainly about job availability for those 65-70 year olds who are willing and able to continue working under the changed regulatory environment. A further limitation is that the increase in GDP resulting from 65-70 years working – which is expected to be small - was not taken into account.

Other limitations arise from the assumptions and exclusions that are inevitably made in studies of this kind. One such assumption is that in future the reluctance by Australian employers to retain or hire older workers[12] would disappear. While some improvements in the acceptance of older workers are already apparent, it is unlikely that such reluctance would disappear completely – suggesting that our findings could be an over-estimate.

Another assumption that may result in an over-estimate is that the 65-70 year olds working more than 15 hours per week would work at that intensity for 52 weeks in a year. In this respect our findings can easily be adjusted for people working only part of the year. For example, if 65-70 year olds were assumed to 'work' for only 26 weeks in a year, then the earnings and age pension cost estimates would need to be halved.

The tendency to over-estimation due to the above two assumptions is offset by the exclusion in our analyses of older Australians who worked less than 15 hours per week; of people retiring between ages 55 and 65;[13] and, for the 2018 results, the much slower upward drift modelled in disability rates than what past trends indicate.

Another exclusion is the non-consideration of unpaid carers – mainly family and friends – who in 2000-01 provided informal assistance to the disabled valued at A$29 billion (AIHW 2003). The more older people remain in the workforce, the more this informal assistance will diminish, putting greater pressure on governments to replace the informal unpaid care with formal paid services for the disabled and the frail old.

References

Abello, A., Kelly, S. and King, A. 2002, *Demographic Projections with DYNAMOD-2*, Technical Paper No. 21, National Centre for Social and Economic Modelling, University of Canberra.

Antcliff, S., Bracher, M., Gruskin, A., Hardin, A. and Kapuscinski, C, 1996, *Development of DYNAMOD: 1993 and 1994*, Technical Paper 1, National Centre for Social and Economic Modelling, University of Canberra.

ABS (Australian Bureau of Statistics) 1999a, Disability *Ageing and Carers, 1998*, Confidentialised Unit record Files.

—— 1999b, *Disability Ageing and Carers, 1998, User Guide*, Cat no. 4431.0, Canberra

—— 1999c, *Disability Ageing and Carers1998: Summary of Findings*, Cat no. 4430.0, Canberra

—— 2003, *Household Income and Income Distribution,* Cat No 6523.0, 2003, Canberra.

AIHW (Australian Institute of Health and Welfare), (2003), *Australia's Welfare 2003*, Canberra.

Bækgaard, H. 2002a, *Micro-Macro Linkage and the Alignment of Transition Processes*, Technical Paper No. 25, National Centre for Social and Economic Modelling, University of Canberra.

—— 2002b, *Modelling the Dynamics of the Distribution of Earned Income*, Technical Paper No. 24 National Centre for Social and Economic Modelling, University of Canberra.

Cai, L. and Kalb, G. 2004, *Health Status and Labour Force Participation: Evidence from the HILDA Data*, Working Paper No 04/2004, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Department of Family and Community Services 2004, *Rates of Pension*, accessed from www.facs.gov.au/guide/ssguide/52210.htm on 14 March 2004

—— 1999, *Income Support Customers: a Statistical Overview*, Canberra.

Frederiksen, D. and Stolen, M. 2003, 'Possible Ways to Moderate Future Pension Burden in Norway', *7th Nordic Conference on Microsimulation Models*, 12-13 June, Helsinki, Finland.

Green C. and Leeves, G. 2003, 'The Incidence and Consequence of Worker Displacement in Australia', *Australian Economic Papers*, Vol 42, Issue 3, p. 316, September.

Howard, J.,Prime Minister, 2003, *Address to Symposium on Mature Age Employment*, Sydney, 27 August.

Kelly, S. 2002, 'Simulating Future Trends in Wealth Inequality', Paper presented at the 2002 Australian Conference of Economists, 3 October, Adelaide, Australia.

Kelly, S., Farbotco, C. and Harding, A. 2004, Income, Superannuation and Debt Pre and Post Retirement, AMP-NATSEM Income and Wealth Report, March.

King, A., Walker, A. and Bækgaard, H. 2002, *Modelling Overseas Migration in DYNAMOD-2*, Technical Paper No. 22, National Centre for Social and Economic Modelling, University of Canberra.

King, A., Bækgaard, H., and Robinson, M. 1999a, *Dynamod-2: An Overview*, Technical Paper No. 19, National Centre for Social and Economic Modelling, University of Canberra.

—— 1999b, *The Base Data for Dynamod-2*, Technical Paper No. 20 National Centre for Social and Economic Modelling, University of Canberra.

Manton, K and XiLiang G, 2001, Changes in the prevalence of chronic disability in the United States black and nonblack population above age 65 from 1982 to 1999. *Proceedings of the National Academy of Sciences of the United States of America*, Vol 98, No11, pp6354-59.

Mejer, L and Siermann, C, 2000, "Income Poverty in the European Union: Children, Gender and Poverty Gaps", *Statistics in Focus*, Eurostat.

Robinson, M. and Bækgaard, H. 2002, *Modelling Students in DYNAMOD-2*, Technical Paper No. 23 National Centre for Social and Economic Modelling, University of Canberra.

Treasurer, 2004, *Australia's Demographic Challenges* (available from www.treasurer.gov.au)

Treasury, 2004, *A More Flexible And Adaptable Retirement Income System*, Canberra.

—— 2002, "*Intergenerational Report*", Budget Paper No 5, 2002-03 Budget (available from www.budget.gov.au).

—— 1999, *1998-99 Budget Paper No 4*, accessed on www.budget.gov.au on 15 March 2004, Canberra.

Walker, A. and Becker, N. 2004, 'Health Inequalities Across Socioeconomic Groups: Comparing Geographic-Area-Based and Individual-Based Indicators', *Public Health* (submitted May 2004).

Walker, A. 2004a, 'Narrower Health Inequalities in Australia: Impacts on Health Outcomes and Health Expenditures', *Journal of Applied Economics*, (submitted May 2004).

—— 2004b, 'Economic and Health Impacts of Narrower Health Inequalities, Australia', *Proceedings of International Conference on Health Economics Management and Policy*, Athens, 3-5 June.

—— 2004c, *Modelling the Links Between Socioeconomic Status and Health in Australia: a Dynamic Microsimulation Approach*, PhD dissertation, Australian National University (submitted August 2004).

—— 2002, 'Modeling Health Inequalities Using Dynamic Microsimulation: Statistical Issues and Future Scope' in Gulati, C., Lin Y., Mishra S. and Rayner, J. (eds), *Advances in Statistics, Combinatorics and Related Areas*, World Scientific, Singapore, pp 332-348.

Walker, A., Kelly, S., Harding, A and Abello, A. 2003, *Does Your Wealth Depend on Good Health?*, AMP-NATSEM Income and Wealth Report, National Centre for Social and Economic Modelling, University of Canberra, March.

Acknowledgements:

The author is grateful to Professor Niels Becker (NCEPH) for overall guidance of the project and statistical advice; to Professor Ann Harding (NATSEM) for making the dynamic microsimulation model available for this project; and to Dr Simon Kelly (NATSEM) for valuable help with the setting up and understanding of the original version of DYNAMOD.

Endnotes

[1] Stage 1 of the original model is documented in Antcliff et al (1996). King et al (1999a) provide an overview of stage 2 of DYNAMOD's development, with details and calibration in Abello et al (2002), Bækgaard (2002 a and b), King et al (2002), King et al (1999b) and Robinson et al (2002). Stage 3 is described in Kelly (2002).

[2] Disability, which mainly arises from chronic diseases, is defined as a limitation or impairment which has lasted, or is likely to last, for at least six months and restricts every day activities (ABS 1999b, pp.66-7). In every day life, even a mild disability will have a highly restricting effect on a person's functionality. Examples of mild disability are an inability to easily walk 200 metres, walk up and down stairs without a handrail, or use public transport.

[3] To convert wealth into an annuity we used a constant, 0.052 - the observed 5.2% rate of return on renting private dwellings. This reflects the fact that most of the wealth of Australians arises from home ownership (Kelly et al 2004).

[4] The 'equivalence scale' used was the modified OECD and equalled the sum of 1.0 for the first adult, 0.5 for the second adult and 0.3 for each dependent child (ie children under 16 and full-time students under 25) - Mejer and Siermann, 2000.

[5] The Disability survey (ABS 1999a) indicated that, in 1998, people started retiring from age 55 onwards – with 69% 'working' amongst 45-54 year olds, but only 49% amongst 55-59 year olds and 26% amongst 60-64 year olds.

[6] Although we constructed a spouse's health varaiable in the Disability survey, we were only able to consider whether the individual had a spouse or not - due to the small size of the 45-54 year old dataset (5134 records – 3902 'with spouse' and 1232 'without spouse').

[7] Regressions were carried out 'weighted' because DYNAMOD – into which results from the regression equation are to be imputed - is a full population model.

[8] For disability, this means that in the input data to DYNAMOD the 31.4% disabled in the most disadvantaged SEIFA quintile – and the 25.9%, 23.8%, 20.6% disabled in SEIFA quintiles 2, 3 and 4 respectively – will all be lowered to 17.8% (ie to match the proportion disabled in the most advantaged SEIFA quintile).

[9] The small difference between these estimates arises from the probabilistic nature of DYNAMOD and the number of deaths being lower under the Improved Health Scenario than under the Base case.

[10] As at September 1998, the single age pension was $178.65 per week. For couples it was $149.05 each per week – Department of Family and Community Services (2004).

[11] The number of 65-69 year olds in the Disability survey (ABS 1999a) who worked more than 15 hours per week in 1998 was around 55,000.

[12] ABS (2003, p.16) found that, amongst the unemployed, 30% of 45-54 year olds said that being 'considered too old by employers' was their main difficulty in finding work, with this proportion nearly doubling for the 55+ age group (59%).

[13] Treasurer (2002) contains a scenario with higher full time labour force participation of 45-64 year old men. "Overall, higher full-time labour force participation of older men, under this scenario, would reduce projected government spending by 0.25 per cent of GDP by 2041-42, principally by increasing GDP. This reduced spending is mainly in health and Age Pensions. However, this only captures first order effects, and does not capture any potential second order effects, such as changes in health or health service use of the additional older workers who remained in the workforce for longer." – p.63.