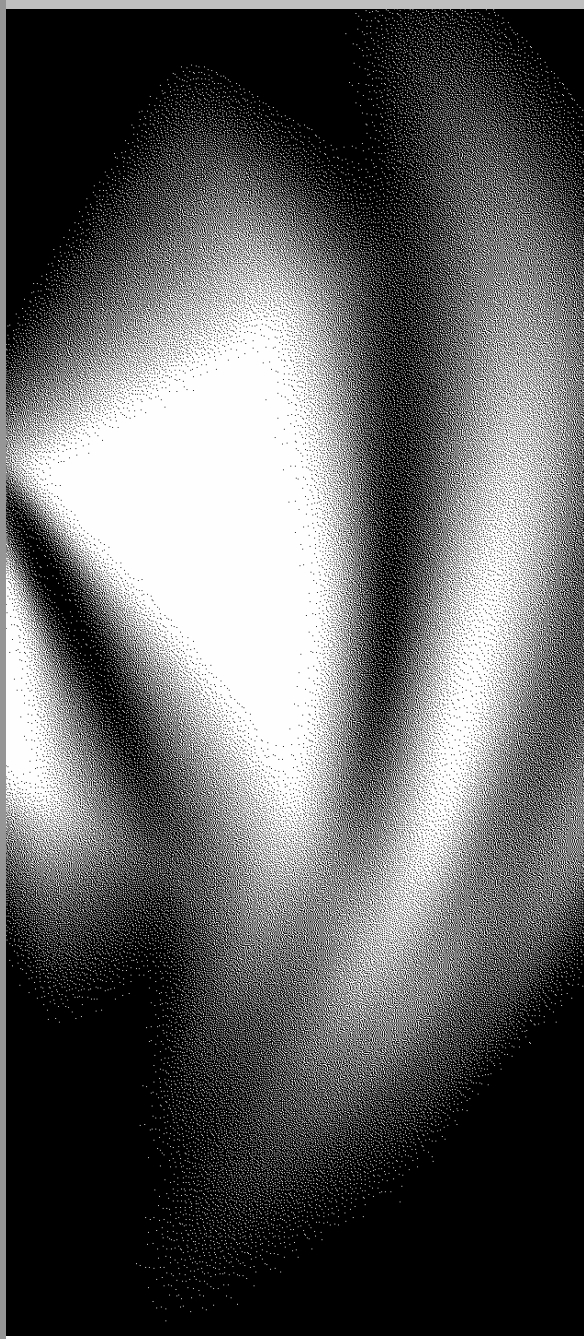
Australian Government
Productivity Commission

Economic Implications of an Ageing Australia

Productivity Commission Research Report

24 March 2005



© Commonwealth of Australia 2005

ISBN 1 74037 173 9

This work is subject to copyright. Apart from any use as permitted under the *Copyright Act 1968*, the work may be reproduced in whole or in part for study or training purposes, subject to the inclusion of an acknowledgment of the source. Reproduction for commercial use or sale requires prior written permission from the Attorney-General's Department. Requests and inquiries concerning reproduction and rights should be addressed to the Commonwealth Copyright Administration, Attorney-General's Department, Robert Garran Offices, National Circuit, Canberra ACT 2600.

This publication is available in hard copy or PDF format from the Productivity Commission website at www.pc.gov.au. If you require part or all of this publication in a different format, please contact Media and Publications (see below).

Publications Inquiries:
Media and Publications
Productivity Commission
Locked Bag 2 Collins Street East
Melbourne VIC 8003

Tel: (03) 9653 2244
Fax: (03) 9653 2303
Email: maps@pc.gov.au

General Inquiries:
Tel: (03) 9653 2100 or (02) 6240 3200

An appropriate citation for this paper is:

Productivity Commission 2005, *Economic Implications of an Ageing Australia*, Research Report, Canberra.

The Productivity Commission

The Productivity Commission, an independent agency, is the Australian Government's principal review and advisory body on microeconomic policy and regulation. It conducts public inquiries and research into a broad range of economic and social issues affecting the welfare of Australians.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Information on the Productivity Commission, its publications and its current work program can be found on the World Wide Web at www.pc.gov.au or by contacting Media and Publications on (03) 9653 2244.

Foreword

Australia, like most developed countries, has an ageing population. The proportion of people aged 65 and over is expected to more than double over the next few decades, raising questions about how this will affect Australia's long term economic prospects.

The 2002 *Intergenerational Report* examined the fiscal effects of an ageing population from an Australian Government perspective. Following a request from the Council of Australian Governments, the Government asked the Productivity Commission to undertake a research study examining the productivity, labour supply and fiscal implications of likely demographic trends over the next 40 years for all levels of government.

In preparing this report, the Commission has drawn on information from submissions, consultations with all governments, other relevant organisations and research groups, as well as a wide array of studies of the impacts of ageing. The Commission wishes to thank the many people who contributed for their co-operation in providing information and analytical input, including in response to a draft report.

The study was conducted by a research team from the Commission's Canberra office headed by Ralph Lattimore. In overseeing the project, I was assisted in the initial stages by Commissioner Mike Woods and then by Helen Owens.

Gary Banks
Chairman
March 2005

Terms of reference

IMPLICATIONS OF THE FUTURE AGEING OF AUSTRALIA'S POPULATION

PRODUCTIVITY COMMISSION ACT 1998

The Productivity Commission is requested to undertake a research study examining the productivity, labour supply and fiscal implications of likely demographic trends over the next 40 years, to further improve understanding of the challenges and opportunities resulting from an ageing Australia.

The context for this research study is the projected ageing of the Australian population, the associated impacts on growth in the labour force, overall economic growth and the fiscal positions of all levels of government.

In undertaking the study, the Commission is to consult broadly with governments and other key interested groups; and take into consideration any recent work relevant to the study.

The Commission is to report on the following:

1. The likely impact of an ageing population on Australia's overall productivity and economic growth.
2. The potential economic implications of future demographic trends for labour supply and retirement age, and the implications for unpaid work such as caring and volunteering.
3. The potential fiscal impact of the above factors on Commonwealth, State and Territory and, to the extent practicable, local governments.

The Commission is required to provide a report within 9 months of receipt of this reference. The report will be provided to the Council of Australian Governments.

It is anticipated that the analysis and projections in the report would provide useful background information for future planning and policy development by Australian governments.

PETER COSTELLO
Received: 24 June 2004

Contents

Foreword **III**

Terms of reference **IV**

Abbreviations and explanations **IX**

Overview **XIII**

1 Introduction **1**

1.1 Scope of the study 1

1.2 Participation in the study 3

1.3 Structure of the report 4

2 Ageing of the Australian population **5**

2.1 Introduction 6

2.2 The extent of the demographic transition 6

2.3 Mortality rates have been falling 18

2.4 Fertility has been falling 24

2.5 The role of migration in population ageing 32

2.6 Putting the jigsaw of effects together 43

3 Ageing and labour markets **47**

3.1 Why does ageing matter for the labour market? 48

3.2 The determinants of economic growth 50

3.3 Labour supply trends: the view backwards 53

3.4 Projections of Australia's labour supply 68

3.5 Volunteering 91

4 Productivity and ageing **95**

4.1 Introduction 96

4.2 Labour productivity assumptions used in previous studies 97

4.3 Past and future productivity growth 100

4.4 Relative productivity of current workers 104

4.5 Capital deepening, technical progress and ageing 115
4.6 Convergence or divergence in State productivity growth? 121

5 Economic growth implications 125
5.1 Economic growth over the next forty years 126
5.2 The role of ageing 127
5.3 Exploring other scenarios for Australia's economic future 131
5.4 Placing these projections in context 141

6 Health expenditure 143
6.1 Government expenditure on health 144
6.2 Influences on health care expenditure: what role for ageing? 145
6.3 Projecting government health expenditure 164

7 Aged care expenditure and carer payments 175
7.1 Expenditure on aged care 175
7.2 Payments to carers 186

8 Personal benefit payments 191
8.1 Nature and magnitude of payments 192
8.2 Benefits are strongly age-related 194
8.3 Method for projections 197
8.4 The projected growth in payments 202

9 Education expenditure and ageing 205
9.1 Structure of education and funding 206
9.2 Method for projecting government expenditure 207
9.3 Projected education expenditures 219

10 Other expenditure 223
10.1 Housing assistance trends 224
10.2 Spending on transport services 231
10.3 Law and Order 241
10.4 State and Territory government concessions 248
10.5 Superannuation expenditure 251

11 Revenue 257
11.1 Relevant features of the tax system 258

11.2 Whither Australian Government taxes? 260
11.3 What about State taxation revenues? 261
11.4 Summing up 276

12 Local government and regional impacts 277
12.1 Demographic change at the regional level 277
12.2 Economic implications of ageing for local government 290
12.3 Other regional impacts 300

13 Implications of population ageing 303
13.1 Introduction 304
13.2 Ageing and fiscal pressures 304
13.3 Uncertainties surrounding the projections 315
13.4 The ageing 'problem' in perspective 321
13.5 Implications of financing the fiscal gap 323
13.6 Addressing the fiscal drivers 327
13.7 Summing up 339

A Submissions and consultations 343
A.1 Submissions received 343
A.2 Consultations 344

B Education and labour force participation 347

C Health expenditure projection methods and sensitivity analysis 355
C.1 Method 355
C.2 Alternative projection methods 360

D Non-demographic growth in health expenditure 365

E Voluntary work 377
E.1 Volunteers 377
E.2 Volunteering in an ageing population 380

F Fiscal risks for governments 385
F.1 The vertical fiscal imbalance and fiscal pressure 385
F.2 What payments are at risk? 386
F.3 Fiscal pressures for the 'Combined States' compared with the Australian Government 388

F.4 Relative fiscal risks for individual States compared with each other 400

References **403**

Abbreviations and explanations **IX**

Included with this report is a CD-ROM containing 11 technical papers, the demographic model and various data. The technical papers are:

T1 Demographic projections

T2 Growth curves

T3 Cohort analysis

T4 Total health expenditure

T5 Aggregate studies of age and health expenditures

T6 Health cost decompositions

T7 The prevalence of disability

T8 Non-demographic expenditure pressure

T9 Conveyancing revenue

T10 Gambling revenue

T11 Goods and Services Tax

Abbreviations and explanations

Abbreviations

ABS	Australian Bureau of Statistics
ADR	Aged dependency rate
AIHW	Australian Institute of Health and Welfare
ALGA	Australian Local Government Association
AWE	Average weekly earnings
CACP	Community Aged Care Package
CBD	Central business district
CFR	Completed fertility rate
CPI	Consumer Price Index
CRA	Commonwealth Rent Assistance
CSHA	Commonwealth State Housing Agreement
DEST	Department of Education, Science and Training
DEWR	Department of Employment and Workplace Relations
DoFA	Department of Finance and Administration
DoHA	Department of Health and Ageing
DSP	Disability Support Pension
FaCS	Department of Family and Community Services
FAG	Financial Assistance Grant
FTE	Full-time equivalent
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GSP	Gross State Product
GST	Goods and Services Tax

HACC	Home and Community Care
HECS	Higher Education Contribution Scheme
HFE	Horizontal fiscal equilisation
PBS	Pharmaceutical Benefits Scheme
PC	Productivity Commission
SDR	Standardised death rate
SLA	Statistical Local Area
SPP	Special Purpose Payment
TFR	Total fertility rate
VET	Vocational education and training

Explanations

Billion	The convention used for a billion is a thousand million (10^9).
Logistic	An S shaped curve described in technical paper 2.
PC-M	The standard PC population projection series for Australia and the States described in chapter 2.
PC-NTALT	A specific set of population projections for the Northern Territory that takes account of its Indigenous and non-Indigenous populations.
States	Refers to the States of Australia, the Australian Capital Territory and the Northern Territory.

OVERVIEW

Key points

- Australia faces a pronounced ageing of its population over the next forty years. One-quarter of Australians will be aged 65 years or more by 2044-45, roughly double the present proportion. The proportion of the 'oldest old' will increase even more.
  - In itself, population ageing should not be seen as a problem, but it will give rise to economic and fiscal impacts that pose significant policy challenges.
- People aged over 55 years have significantly lower labour force participation rates than younger people. As more people move into older age groups, overall participation rates are projected to drop from around 63.5 per cent in 2003-04 to 56.3 per cent by 2044-45.
  - Hours worked per capita will be about 10 per cent lower than without ageing.
- Assuming the average labour productivity performance of the past 30 years, per capita GDP growth will slump to 1.25 per cent per year by the mid 2020s, half its rate in 2003-04.
- While taxation revenue will largely track GDP growth, government expenditure is likely to rise more rapidly, placing budgets under considerable pressure.
  - Although education and some welfare payments are projected to increase more slowly than GDP, government spending on health, aged care and pensions will grow at a faster rate.
  - The major source of budgetary pressure is health care costs, which are projected to rise by about 4.5 percentage points of GDP by 2044-45, with ageing accounting for nearly one-half of this.
- In the absence of policy responses, the aggregate fiscal gap will be around 6.4 percentage points of GDP by 2044-45, with an accumulated value over the forty years of around $2200 billion in 2002-03 prices.
  - On past trends, much of this could be expected to be borne by the Australian Government, but there are significant potential burdens faced by State and Territory Governments.
- A range of policy measures will be needed to reduce the fiscal pressure from ageing and/or to finance the fiscal gap.
  - Plausible increases in fertility and net migration would have little impact on ageing trends.
  - Measures to raise productivity and participation would enhance income growth and the capacity to 'pay' for the costs of ageing, including through taxation. However their ability to alleviate fiscal pressure directly depends on the extent to which service demands and costs continue to rise with growth.
  - More cost-effective service provision, especially in health care, would alleviate a major source of fiscal pressure at its source.
- Timely action would avoid a need for costly or inequitable 'big bang' interventions later. Population ageing can only be conceived as a crisis if we let it become one.

Overview

Population ageing has been called the quiet transformation, because it is gradual, but also unremitting and ultimately pervasive. Population ageing will accelerate over the next few decades in Australia, with far-reaching economic implications. It will slow Australia's workforce and economic growth, at the very time that burgeoning demands are placed on Australia's health and aged care systems. Unless offsetting action is taken, a gap will open between Government revenue and spending that will need to be closed. Every jurisdiction in Australia is affected in different ways, depending on their specific responsibilities and capacity for raising revenue. Population ageing will require new policy approaches at all levels of government.

This study has been requested by the Australian Treasurer on behalf of the Council of Australian Governments. The terms of reference essentially require the Commission to assess the implications of Australia's ageing population for productivity, labour force and fiscal outcomes across the three tiers of government. The study is complementary to, but updates and builds on, the Australian Treasury's *Intergenerational Report* (2002). A key distinguishing feature is that it includes detailed projections for the States and Territories. It has benefited from submissions and other input from all governments and a range of interested parties.

The Commission's assessment of the impacts of ageing are based on projections, not forecasts. The projections are intended to be a guide to what would happen under existing Government policies and if people's behaviour continues in much the same way as it has recently. But they are not forecasts in the sense that they are expected to occur. Indeed, the projections would be right only if governments chose to do nothing.

Australia's demographic transition

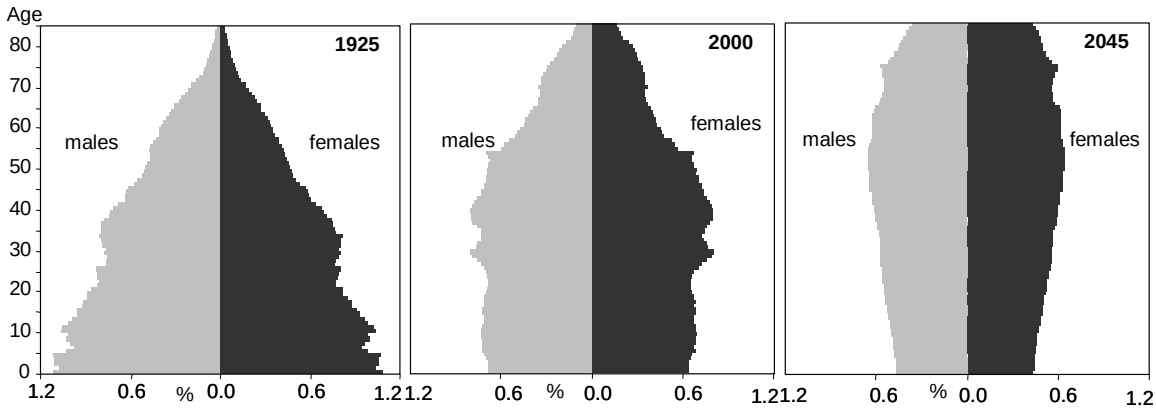
The ageing of our population has been occurring ever since people started to acquire influence over fertility and mortality. As the incidence of deaths in all age groups has declined and the average number of births per women has fallen, the age structure has shifted profoundly. At Federation, the old were scarce. Less than one in 25 of the population were aged 65 years or more. Now, they comprise one in

every eight Australians. By 2044-45, almost one in four will be aged 65 years and over. They will comprise around 7 million Australians.

The age distribution is being squeezed into a different shape by these demographic pressures. It has already shifted from a pyramid to its present beehive shape. Given current trends, the population age structure will continue its inversion and begin to resemble a coffin (figure 1).

Figure 1 **From pyramid to coffin**

Changing age structure of the Australian population, 1925-2045



Ageing is occurring across Australia, with no jurisdiction escaping a significant shift in its age structure (figure 2). South Australia and Tasmania stand out as having the greatest concentrations of the old by 2044-45. This reflects their present above-average representation of the old and the tendency for migration patterns to disproportionately remove the young. The Northern Territory remains, by contrast, a relatively 'young' jurisdiction, as a consequence of its large Indigenous population and the fact that older Territorians often retire to other States.

While population ageing is not a new phenomenon, it will begin to gather pace over the next two decades (figure 3). In every year between 2012 and 2028, the aged share of the Australian population is projected to increase by more than 0.35 percentage points — an increase around 4 times the long-term average.

The generation that will turn 65 years old between 2011 and 2031 is called the 'baby boomers' — born in an era of heightened fertility after World War II. The demographic transition faced by Australia is sometimes seen as a baby boomer 'problem'. However, it is a mistake to see population ageing as just about the number of old people. It is really about the age structure of the population — the ratio of the old to other ages. Any given number of old people's needs can be met as long as there are sufficient numbers of younger people to drive the economy and provide the needed services. Much of the projected change in the age structure

reflects slow growth in the population of younger ages in the coming decades. This is not a symptom of the baby boom, but its opposite, the long-run decline of fertility in Australia since the 1960s.

Figure 2 **Ageing affects all Australian States and Territories**
Change from 2002-03 to 2044-45

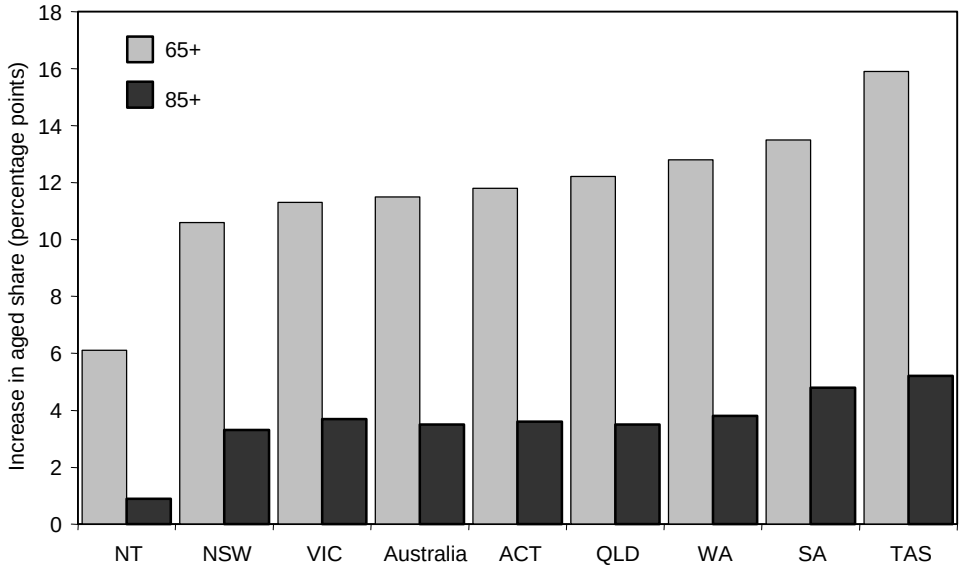
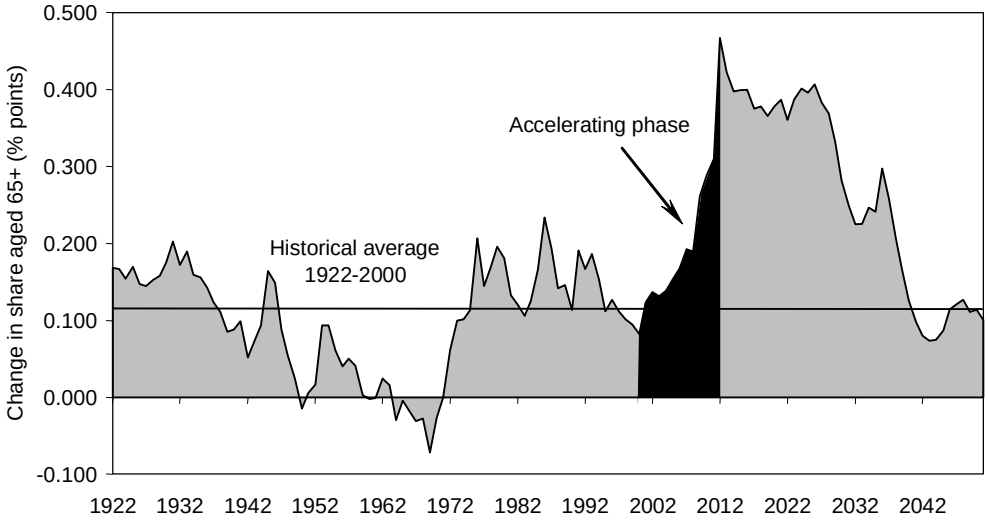


Figure 3 **Ageing is set to accelerate**
Annual change in the share of people aged 65+ in the population: 1922-2051



The Commission examined the contribution of the baby boomers to ageing trends by simulating what would have happened had there been no baby boom. Assuming a slow continuous decline in fertility rates since the Second World War, population ageing would have been brought forward in time and would have generated a

greater age dependency rate than with the baby boom until the mid 2030s (and little difference over the period to 2051). Thus, the main effects of the baby boom have been to *defer* population ageing in Australia and then to make its onset more pronounced. The real drivers of population ageing are the long-term declines in fertility and, more importantly, increased longevity.

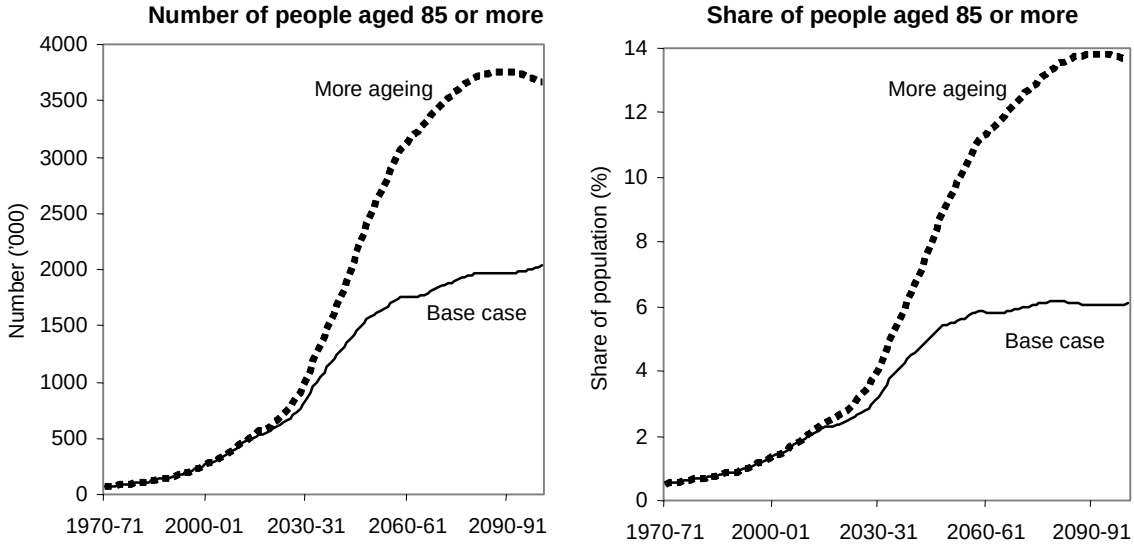
Projections and assumptions

Perspectives on the future age structure involve assumptions about future fertility, mortality and net migration patterns. These contain many uncertainties. In consultation with an expert group, comprising the ABS and some of Australia's leading demographers, the Commission developed population projections. These take into account the most recent information about fertility, mortality and migration trends, which is why they have been used in place of the official Australian Bureau of Statistics population projections produced in 2003. The new projections assume a slight increase in Australia's fertility rate from 1.75 to 1.8 babies per fertile woman (which is the major difference from the official series), yearly net migration into Australia averaging 115 000 people and continued improvements in longevity.

Under any realistic set of assumptions, population ageing is an inevitability. Even if there were no further improvement in life expectancy (a very pessimistic outlook) and fertility rates and migration were constant, population ageing would continue. The aged dependency ratio — the ratio of those aged 65 years and above to those aged 15-64 years — would still rise by nearly 16 percentage points from 2003-04 to 2044-45. This compares with the 22 percentage points rise in the aged dependency ratio under the base case projections used throughout this study.

In fact, there are credible arguments that population ageing may turn out to be more profound than the base case. The population share of the oldest old (people aged 85 years or more) — the group for whom health and aged care costs are the highest — is particularly sensitive to demographic assumptions. For example, under quite feasible alternative assumptions about future fertility and longevity, the share of the oldest old increases from 1.4 per cent of the population in 2001-02 to 8 per cent by 2044-45 and nearly 14 per cent by 2100-01. In raw numbers, this would be an increase in the number of the oldest old from 277 000 to 2.1 million and 3.7 million by 2044-45 and 2100-01 respectively — considerably more than under the Commission's base case (figure 4).

Figure 4 **The 'oldest old' could be more numerous than projected**
1970-71 to 2100-01



Increased migration cannot do much to avoid population ageing

In the absence of *any* net migration, Australia's population would age more rapidly (and, indeed, begin to decline after 2035). Our intake of migrants therefore does act as a brake on population ageing. However, the relevant policy question is whether increases in migration above *present* levels would have significant effects on population ageing. The numbers reveal that feasible increases have only modest and relatively short-lived impacts.

- For example, were migration to remain at 140 000 for the next forty years (25 000 a year more than in the base case projections), then the share of people aged 65 years or more would be 23.8 per cent rather than the projected 24.5 per cent.

Of course, larger intakes can start to make appreciable differences to ageing, but only at the cost of unsustainably large population growth. To take an extreme example:

- to delay *any* increase in the aged dependency ratio by 40 years would require a net migrant inflow to population ratio of 3.1 per cent — more than five times the present ratio. This would result in an Australian population of around 85 million by 2044-45 (compared to the base case projection of 28.3 million).

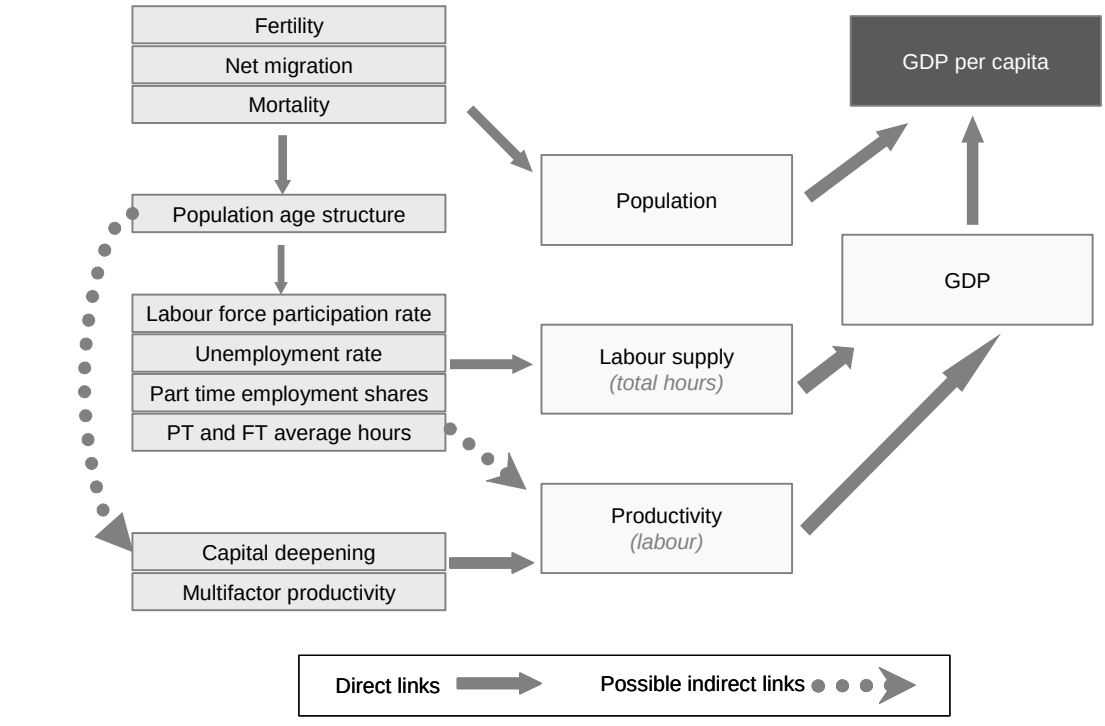
Changes in net overseas migration cannot realistically be engineered to avoid or even substantially to moderate Australia's demographic transition to an older population. Nevertheless, as discussed below, migration policy — especially

relating to skilled migrants — could usefully contribute as part of a package of measures aimed at reducing the fiscal impacts of ageing.

Impacts on labour supply and economic growth

Population ageing will reduce labour supply growth — diminishing Australia's future (per capita) growth prospects (figure 5). There are several factors at work here, but the most important is the impact of ageing on the labour force participation rate. This is the share of the population who are in the labour force (either in a job or actively looking for one).

Figure 5 **The '3 Ps' of economic growth**
Population, participation and productivity



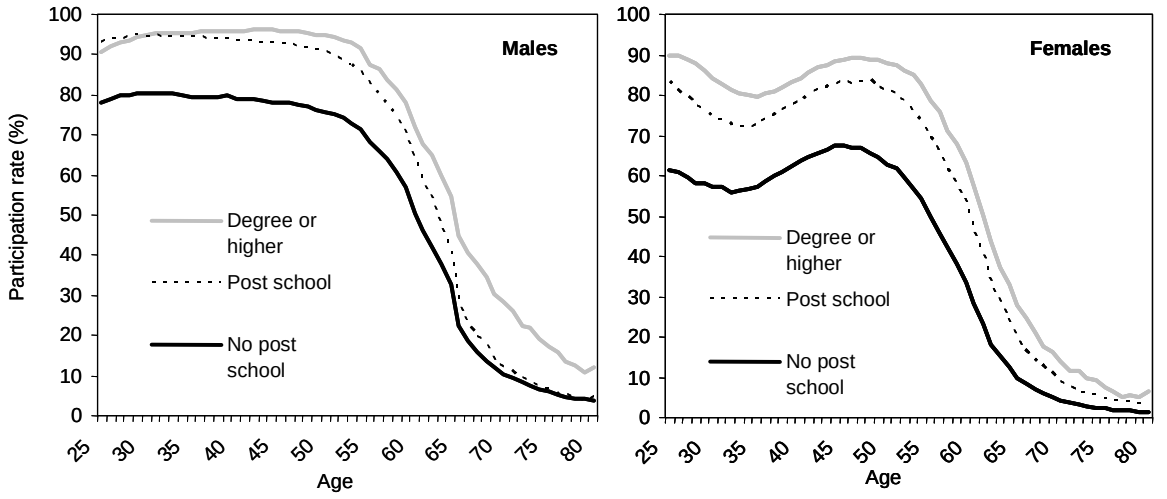
Labour participation currently falls significantly for those over 55 years and is negligible after the age of 70 years. As more people move into these older groups, outflows from the labour force are likely to quicken and the overall labour participation rate to fall. This ageing effect is only partly offset by new young workers, since lower past fertility rates have reduced their numbers. It is also partly offset by a continuing trend for higher female participation at most ages — but this trend must abate at some point.

To develop an overall picture of these counteracting flows, the Commission estimated age-specific participation rates and combined these with projections of

the changing age shares of the workforce. Rather than just look at age-specific participation rates and how they might evolve, the Commission modelled the labour participation rates of *cohorts* of people — groups of people born in distinct periods. It is important to do this because the labour market behaviour of different cohorts can be quite different, reflecting varying social attitudes, access to education and other influences.

It is clear, for example, that currently younger people are on average much better educated than older ones, and that better educated people generally have higher participation rates (figure 6). It is projected that education levels will continue to rise. This will stimulate labour participation rates. However, the benefits of education for labour participation are likely to fall with its extension to a greater share of any generation, so that the effect is unlikely to be as strong as figure 6 would imply.

Figure 6 **Labour force participation differs by age and highest educational attainment, 2001**

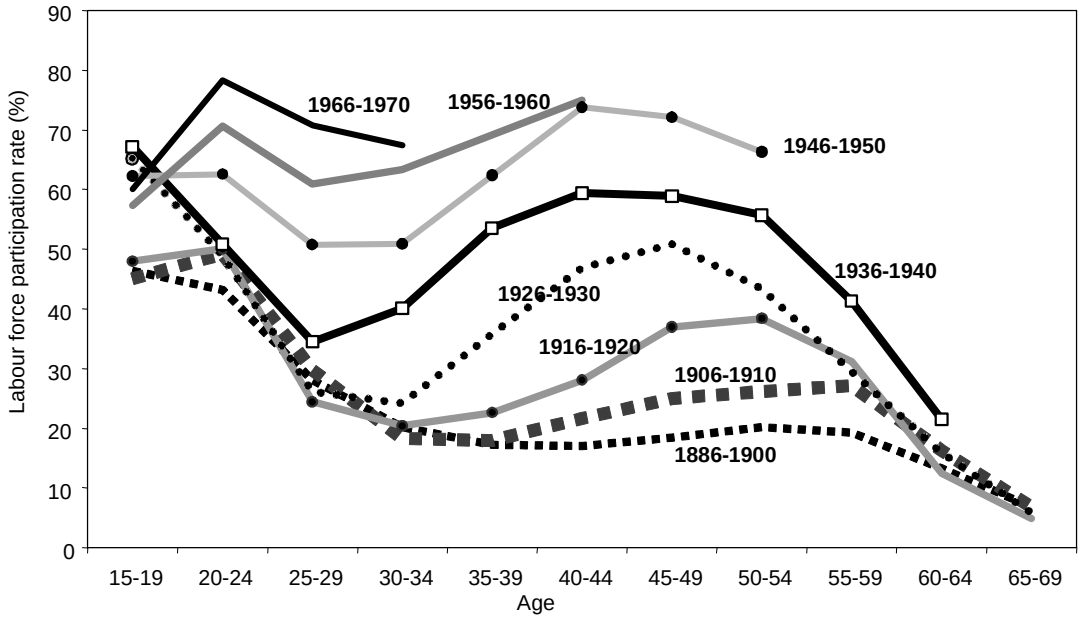


Cohort effects on participation rates are especially strong for women (figure 7). Lifetime female participation in the labour force has increased dramatically and its time profile has also altered.

- A woman born around Federation typically participated in the formal labour market while very young (aged 15 to 19 years), and withdrew with marriage and child bearing. After having (several) children, she generally never returned to a paid job.
- A woman born just before the Second World War also had her peak participation rate when young, but her withdrawal from the labour market with the advent of childbearing was temporary.

- Later female cohorts have significantly lower participation rates when young than pre-1920 females, reflecting greater involvement in senior secondary schooling and tertiary education. But against this, the dip in participation associated with childbearing is smaller and less protracted. Women have become better educated, and have fewer children and greater access to part-time jobs and childcare. The peak involvement of women in the labour force is now around 40-44 years — in stark contrast to their great-grandmothers.

Figure 7 **Recent female cohorts participate much more[a]**



a The years shown are the birth years of the various cohorts.

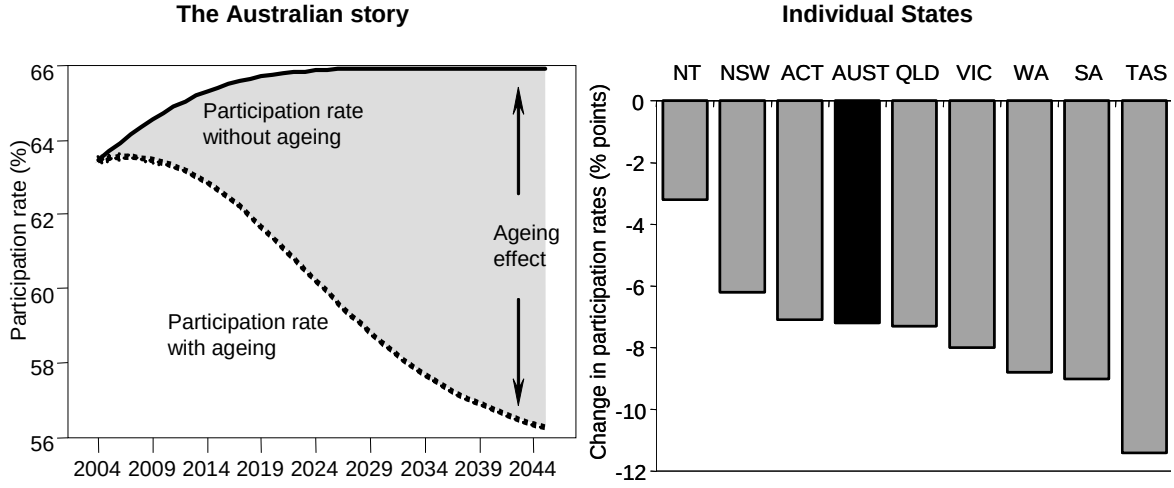
Cohort effects are much less pronounced for males than females, and their long-run impact has been to *reduce* rather than increase labour force participation. A significant factor in this has been an increasing incidence of disability pension uptake among older males in unskilled occupations.

Taking account of these changing cohort patterns, the Commission has projected future participation rates for different age groups by gender. The projections show a continuing tendency for greater female participation for all ages over 25 years and a (slowly abating) trend for lower participation rates for males aged from 25 to 54 years. Ultimately, female and male participation rates are expected to converge for most age groups.

The aggregate participation rate will fall with ageing

Applying these age-specific trends to Australia's ageing population, aggregate labour force participation rates are projected to fall by around 7 percentage points: from their current level of 63.5 per cent to 56.3 per cent by 2044-45 (figure 8). Had there been no change in the age structure of the population, participation rates would have *risen* by around 2.5 percentage points, reflecting the continued importance of increasing female participation. Accordingly, by 2044-45, the difference in participation rates attributable to ageing amounts to nearly 10 percentage points — a margin that would have large effects on Australia's growth prospects.

Figure 8 **Aggregate participation rates fall with ageing**
2003-04 to 2044-45



The most important determinant of this overall reduction in the labour force participation rate is the shift in the age structure of the population towards older, less participating groups. Plausible increases or decreases in age-specific participation rates do not greatly alter the picture that emerges.

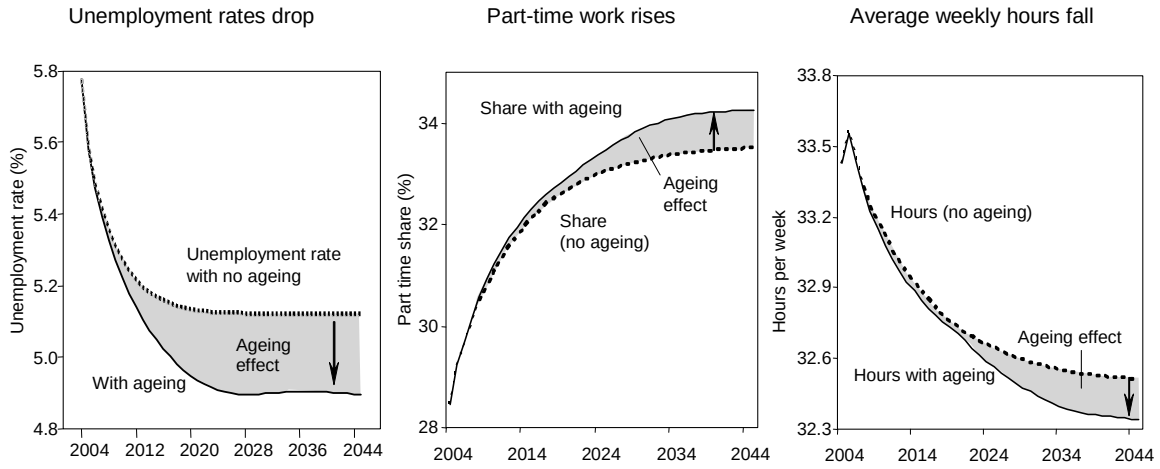
Most States are similar to the national pattern, but two exhibit more extreme results (figure 8). There are large projected declines in participation rates in the most 'greying' jurisdiction — Tasmania. In contrast, participation rates fall by a much smaller amount in the Northern Territory, a reflection of its unique demography.

Unemployment will fall, but so will hours worked

Participation is only part of the labour supply story. The other two important elements are unemployment and hours worked.

Ageing is likely to have a positive twist for *unemployment*. This is because the highest unemployment rates are experienced by young people, who are in transition from education to work, and the lowest by older people, who have the alternative of retirement (or, in many cases, a disability pension). Consequently, the shift in the age structure of the workforce is likely to reduce measured unemployment rates, although the effect is quite small. This effect is reinforced by a generally falling trend in unemployment rates and implies that, for a *given* participation rate, the *effective* labour supply will be higher than otherwise (figure 9).

Figure 9 **Effects of ageing on unemployment, part-time employment rates and average hours worked**
2003-04 to 2044-45



The story for average hours worked is different again. Average hours worked are generally projected to increase modestly for part-time workers of most ages, while being stable for full-time workers generally. However, the *incidence* of part-time work will continue to rise for Australians of most ages (particularly for males). That, and the fact that older workers have a greater tendency to work part-time, mean that average weekly hours per employee are projected to fall.

So ageing has a doubly depressive effect on labour supply — reducing participation rates and cutting average hours worked. These elements greatly outweigh the positive influences of lower unemployment.

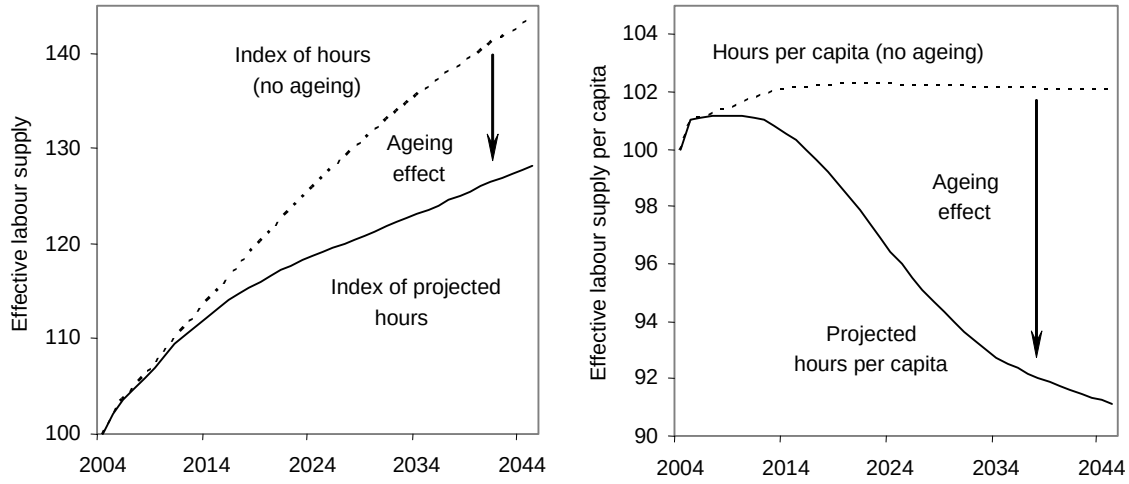
Labour supply growth slows

These components of labour supply — participation, part-time and full-time work, average hours and unemployment — can be brought together to provide two perspectives on labour supply:

- the number of people in employment; and
- the total number of hours actually worked per year (the 'effective' labour supply).

Both are projected to grow sluggishly as a result of ageing (figure 10). For example, the number of workers is projected to grow by over one million in the seven years from 2003-04 to 2010-11. This is about the same growth in the labour supply that is projected to occur over the entire 21 years from 2023-24 to 2044-45. Indeed, in the next forty years, the pace of effective labour supply growth is expected to be slower than population growth (unlike in the past). From a peak in 2011-12, the number of hours worked per capita is projected to decline by around 10 per cent.

Figure 10 **Ageing and effective labour supply**
Australia 2003-04 to 2044-45

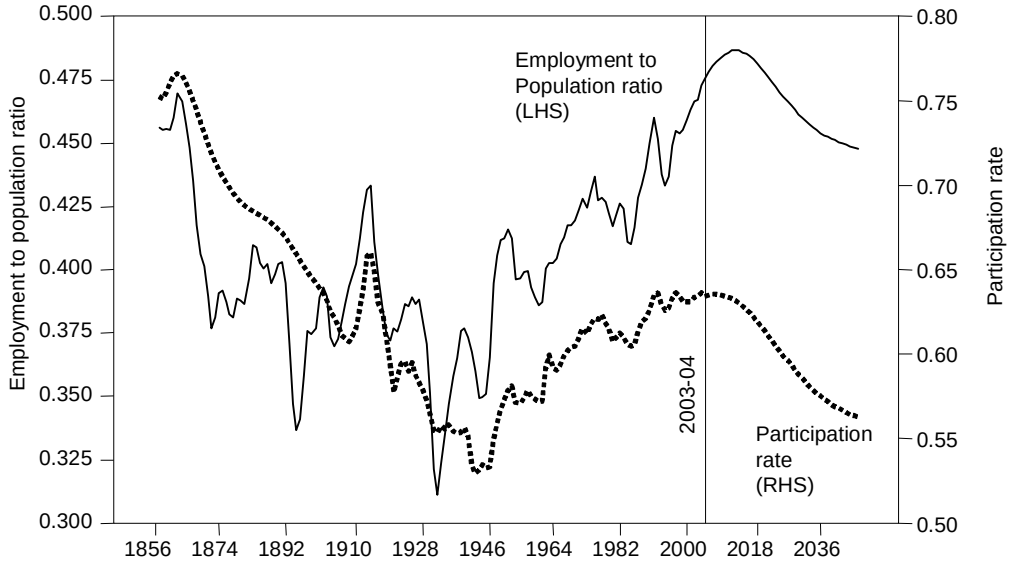


It is sometimes argued that future sluggish labour supply will be partly self-correcting, as the unemployed and those currently out of the labour force acquire jobs in response to labour shortages. However, such an automatic correction is unlikely. Unemployed people and people outside the labour force are generally different from the employed in skill, motivation and aptitude. They cannot simply occupy vacant jobs without triggering wage and cost pressures that invite macroeconomic responses that restore 'equilibrium' unemployment rates (a situation analogous to an overheating economy). This is why government policies to improve the employability of people currently without jobs, or to increase intakes of skilled migrants, would be important for raising future labour supply.

The labour supply 'problem' in historical perspective

Adopting an historical perspective reveals a more positive story than told by the projected outcomes for the next forty years alone (figure 11). The employment to population ratio over the next forty years is not historically low. Even with the projected decline in participation, the ratio of employees to population will still be higher in 2050 than at almost any time in the last century. (This reflects the importance of the reduced young population in the denominator of this ratio.)

Figure 11 **Taking a long view: 200 years of Australian labour supply**



This historical perspective shows why it would be misplaced to *blame* ageing for any economic pains, since the flip side of ageing has been an earlier era of economic gains.

- A significant source of ageing (and the accompanying projected decline in the employment to population ratio over the next 40 years) was the general decline in fertility after the baby boom.
- But the presence of the baby boomers and the relative absence of their progeny was a major factor behind the *rise* in employment to population ratios after the Second World War and its current apex. The baby boomer phenomenon produced a big economic growth bulge, which will inevitably subside as the boomers age.

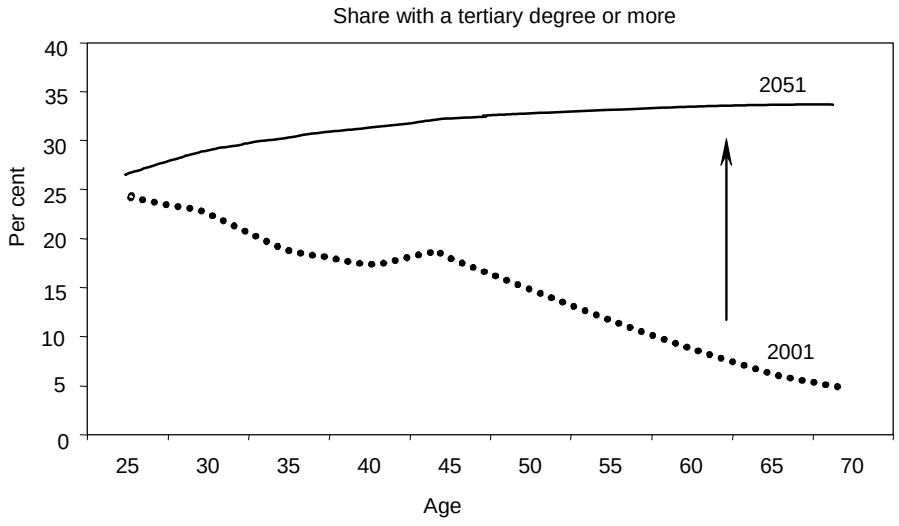
What effect on labour productivity?

The effects of ageing on labour productivity are less clear-cut than its impacts on labour supply. This is because there is a variety of, sometimes offsetting, ways in which ageing could affect productivity.

Information on wage rates and empirical estimates of productivity by age groups suggest that, on average, a person's productivity levels initially increase with age before declining after middle age — with productivity following an inverted u-shape.

However, the old of tomorrow will be different from those of today. Very few older Australians currently have post-secondary educational qualifications. That is set to change as today's more highly educated younger cohorts get older (figure 12). Together with the potential for a healthier older workforce (as new health technologies are developed and employment moves away from more hazardous occupations), this suggests that the productivity disparity between middle-aged and older workers will diminish somewhat over time.

Figure 12 **The old of the future will be more highly educated than younger cohorts**



Overall, the impact on productivity of the gradual shift to an older workforce depends on two things:

- the shape of the productivity profile across different ages (and how this changes over time); and
- the relative shares of the workforce in a given age range.

The net effect on productivity depends on whether the gains from a reduced share of inexperienced (and less productive) younger workers are outweighed by the falls in productivity associated with a growing share of the oldest workers. Overall, the Commission estimates that the net effect is negative, but negligible.

Productivity has an international dimension too. Population ageing is a global phenomenon, which may affect international capital markets as hundreds of millions of old people deplete their retirement assets and as demands for new investment change with slowing labour supply growth in developed economies. These global forces are important because they may affect capital to labour ratios in Australia — historically, an important determinant of labour productivity growth. However, this is a complex area with competing views from different models about likely outcomes. Moreover, growth in capital deepening in Australia has been remarkably stable over the last 40 years, against a backdrop of significantly changing global investment and demographic conditions.

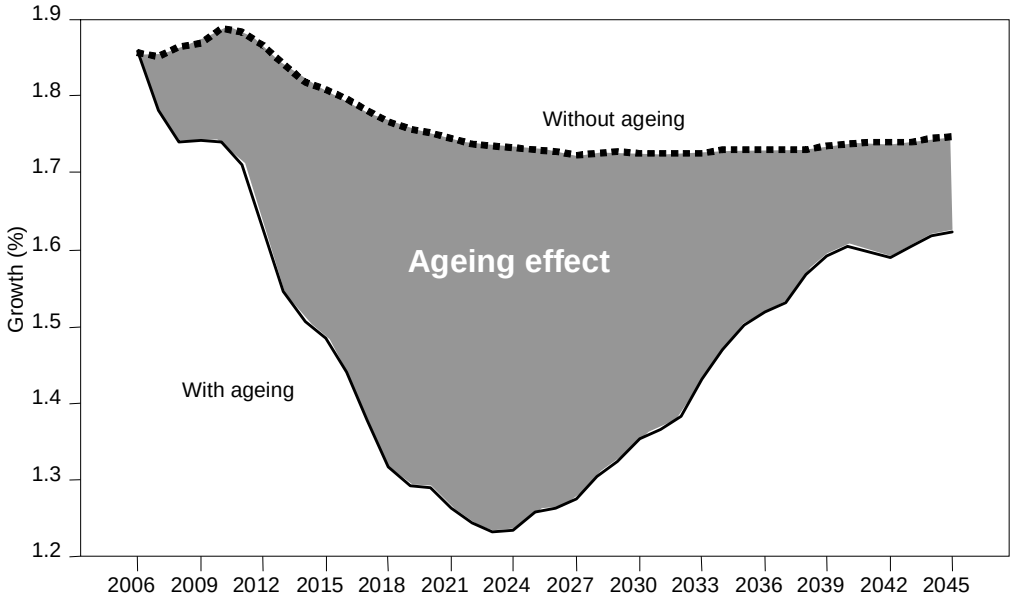
There are also complex links between demographic change and innovation, entrepreneurship and incentives for technical progress. But there is little persuasive evidence that these will undermine labour productivity growth.

Overall, there is insufficient evidence to suggest that ageing per se will either enhance or erode Australia's labour productivity prospects.

Future economic growth — an age of diminished expectations?

For a given labour productivity growth rate, the effect of population ageing on labour supply is to slow Australia's economic growth over the coming decades. GDP per capita growth rates are projected to fall steadily over the period to around 2025, with a partial recovery thereafter (figure 13). The dip mainly reflects the ageing and withdrawal of the baby boomers from the labour force. GDP per capita growth is projected to slump to around 1.25 per cent a year by the mid 2020s — roughly half its rate in 2003-04 and one-third lower than without ageing. The longer run prognosis for economic growth per capita of 1.75 per cent a year reflects the fact that labour supply growth per capita in a stable population will be close to zero, so that growth only depends on the underlying rate of labour productivity growth.

Figure 13 **Economic growth in Australia — a 40 year projection**
Per capita GDP, 2005-06 to 2044-45



However, these impacts need to be placed in perspective. Real per capita incomes will still be much higher than today — indeed by 2044-45 they are projected to be nearly double those of 2003-04. In addition, the measures of output used in the above analysis tend, if anything, to understate the true increase in living standards. This is because — following standard National Accounts conventions — the calculations pre-suppose zero productivity gains in sectors such as education where output is hard to measure.

Moreover, in the modelling behind the above results, nothing adverse is happening to the incomes of individuals from a lifecycle perspective (in fact, every new generation has substantially growing lifetime earnings). The slowdown in *aggregate* growth merely reflects the fact that there are more people in retirement or the part-time working years of their lives. It should also be recalled that people value the leisure received in retirement and often choose to retire voluntarily.

The results also reveal that, in the likely absence of any major resurgence in the workforce, Australia's future economic growth will overwhelmingly depend on productivity growth. To illustrate its significance, suppose that Australia was able to sustain the so-called 'miracle' productivity performance of the 1990s. With an annual productivity growth rate of 2.05 per cent instead of the assumed base case of 1.75 per cent, Australians would be better off in cumulative GDP terms by around $4 200 *billion* over the projection period to 2044-45. (The picture looks correspondingly worse, of course, if productivity rates fall.)

What happens to spending?

Many aspects of an ageing Australia will be accommodated automatically by markets. Private consumption and production patterns will shift over time towards goods and services that best meet the preferences and needs of an ageing population.

But some critical age-related goods and services are funded and regulated by governments, reflecting problems in their market provision — such as access and equity concerns. The demographic transition may place pressure on government finances because GDP — the pie from which services are ultimately funded — is projected to grow more slowly than spending demands.

Of course, not all areas of government spending will be increased by ageing:

- education costs will fall as a share of GDP, as younger cohorts diminish in relative importance;
- a range of social welfare payments — particularly family assistance, parenting payments and unemployment benefits — will also decline in importance;
- other expenditure areas, such as transport, housing, and law and order — while all having an ageing dimension — are not likely to be much affected by ageing; and
- many government expenditure functions — such as defence — are not obviously linked to demography at all.

In one area where ageing *is* likely to increase government costs relative to GDP — age pensions — Australia is relatively well placed compared to most developed countries. This reflects past reforms to superannuation and retirement saving policy.

The most important sources of potential stress on Government spending are health and aged care.

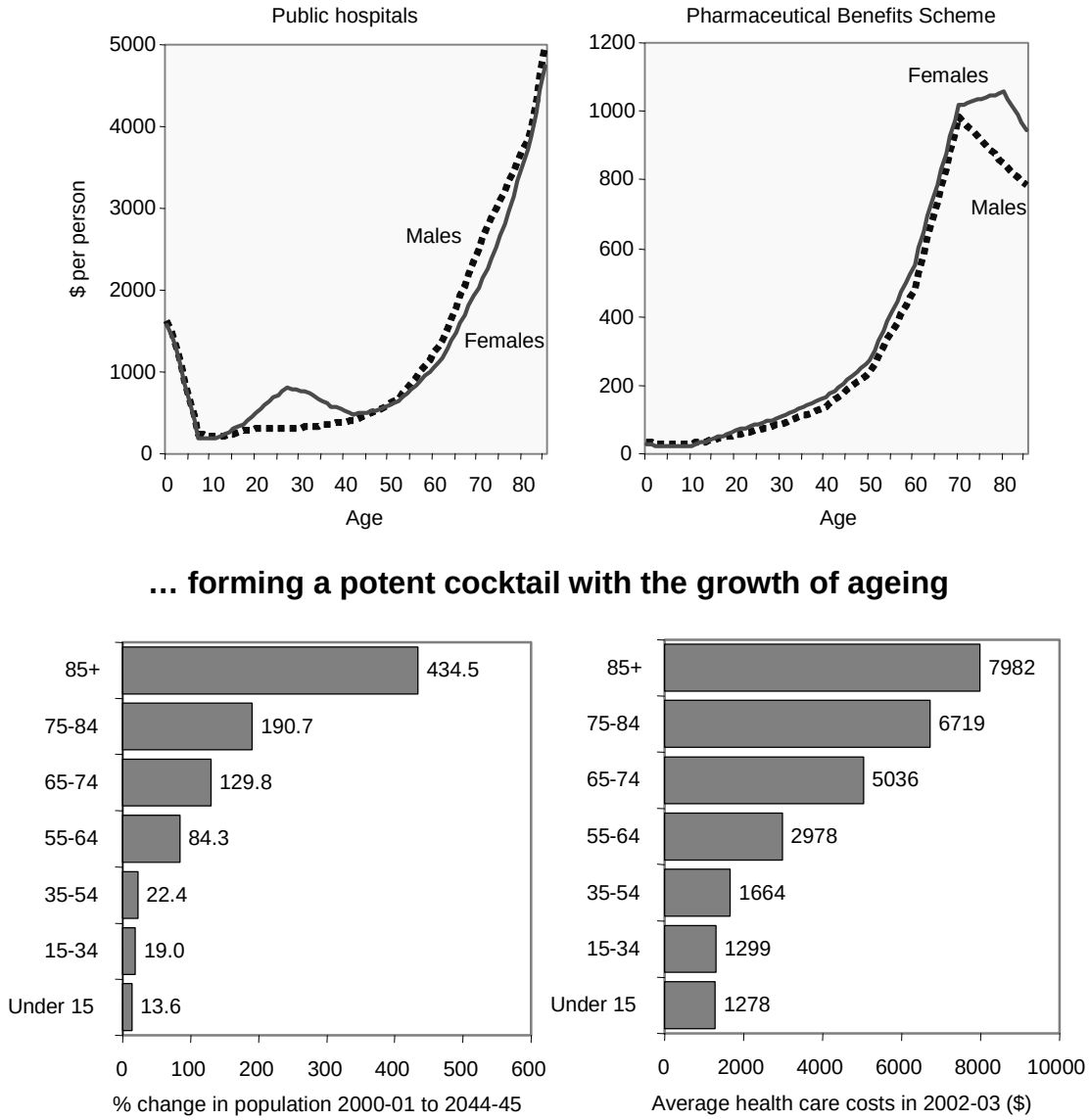
Health care expenditure will escalate

The incidence of sickness and disability rises with age. Accordingly, on average, older people use significantly more health services per person than other Australians. For example:

- Costs per person in the Pharmaceutical Benefits Scheme are strongly age-related — average costs for a male aged 65-74 are more than 18 times those for a male aged 15-24 (figure 14).

- Hospital costs follow a similarly steep age-profile, while Medicare costs also rise with age, though less steeply.

Figure 14 **Costs of hospitals and drugs rise with age**



Across health services as a whole, expenditure on the over 65s amounts to around 4 times more per person than that on those under 65, and rises to between 6 to 9 times more for the oldest groups. Similarly pronounced age-based relationships are observable across time and in all developed countries. With rapidly increasing numbers of the old, the upward-sloping age profile of health expenditure suggests that ageing will increase health spending significantly.

The importance of demand and technology

In itself, ageing has been historically a relatively minor driver of rising health costs. Non–demographic factors, particularly increasing utilisation of services at any given age and the use of new (and expensive) technologies, have been the main source of rising health expenditure over the last 20 years. Real per capita spending has been increasing for all major components of government health expenditure. Real average annual growth rates range from a high 7.5 per cent for pharmaceuticals to a more modest 2.3 per cent for hospital expenditure.

These trends arise because rising incomes simultaneously provide the capacity for increased government funding of health care, create expectations of better and more extensive treatments and prompt investments in new health technologies. While some of these technologies lower the unit cost of care (for example, cataract operations), overall the expansion of treatment is generally considered to have outweighed any unit cost reductions. This may be a negative in expenditure terms, but to a large extent it reflects the success of modern medicine in improving and prolonging peoples' lives. For example, one study found that over 70 per cent of the reduction in mortality for coronary heart disease between 1980 and 1990 has been traced to improvements in medical technology (and the rest to prevention strategies).

These demand and technology developments are sometimes seen as being 'ageing-neutral', because rising trends in expenditure per person occur for all ages. However, this ignores the fact that older people use more health services, so that the aggregate expenditure impact of any given increase in costs arising from technology is amplified the greater the aged share of the population.

A critical question for the future is whether demand and technological factors will serve to steepen or flatten the age-cost profiles of health care (such as those in figure 14). Were health costs to rise more slowly for the aged than for the young, then the fiscal consequences of ageing would be much reduced. However, across all government-funded health expenditure areas in Australia, historical evidence suggests that demand and technology are acting to maintain (and even slightly increase) the age profile of expenditure across different components of health care.

It is sometimes claimed that governments will automatically constrain future rises in health costs relative to GDP arising from ageing by slowing the acquisition of technologies below historical rates. While this could be a way of offsetting the impacts of ageing, it would transmute the cost of ageing from a fiscal to a technology deficit. This may or may not be a useful policy response to ageing, but the Commission's projections are intended to highlight what would happen if the

basic policy stances of governments are preserved, rather than implicitly (or explicitly) making judgments about particular policy responses.

But aren't the old getting healthier?

It has been suggested that ageing will not have as large an impact on health costs as projected because older people will be significantly healthier in the future. An apparent decline in age-specific disability rates is adduced as evidence for this.

The story is complex and, as yet, not fully resolved, but the weight of evidence does not support the view that better health in the elderly will reduce health expenditure.

- For one thing, the findings on disability rate trends remain controversial, and depend on the definitions and contexts in which judgements are made.
- There is evidence of a rise in chronic conditions among the old, even in those populations recording lower disability rates. The connection may be that medical interventions have lowered disability or trauma associated with morbidity, but the condition remains present.
- Even where populations have higher health status, this may reflect the use of effective (but costly) treatments. That is, the causality may well run from additional treatment to better health, rather than from better health to lower treatment costs. For example, hip replacements can provide greater mobility and relief of pain, but are relatively expensive operations.

The risks are more likely to go the other way

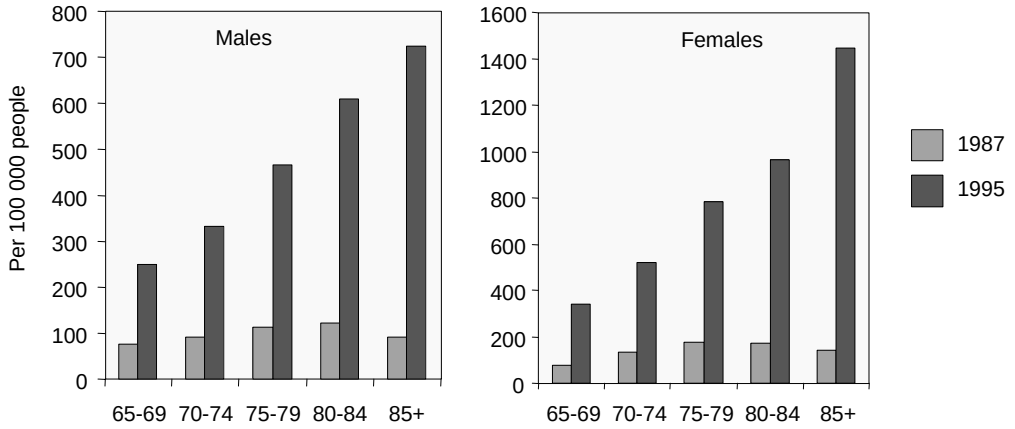
The propositions about 'older but healthier' if true, would tend to flatten the age-cost profile over time. There are greater risks, however, that the profile may steepen. In other words, growth rates in health care spending could be greater for older than younger people, implying bigger pressures on the health system than the Commission has projected. Several forces could bring this about.

- One is that more medical procedures can be performed safely. (While this may be costly, it is beneficial for the old, and may save resources in other parts of the system, such as aged care.) US data show that the incidence of hip replacements in the old has increased most rapidly among the oldest old (figure 15). This reflects less traumatic surgical techniques and better anaesthesia that have improved prognoses for such operations. Increases in interventions among the old are less pronounced using Australian data, but already average annual growth in hospital treatment (separations per person) have grown proportionately more for the old than the young. And for privately insured

patients, costs of prostheses, mainly for the old, have increased substantially in just a few years.

- Social perceptions about treating older people have been changing. As one nurse put it: 'When I was in an intensive care unit 20 years ago, somebody over 75 would have a tough time getting in. They are now 85 and they are having complicated and major surgery.'
- Research and technological developments tend to focus on where the disease burden is greatest — illnesses associated with ageing.
- Finally, there are several emerging public health risks that may *raise* morbidity levels among older Australians. In particular, the sharp rise in obesity rates in advanced countries is associated with a rapid increase in the incidence of diabetes II, with its direct treatment costs and long-run risks for cardiovascular disease, blindness and kidney disease.

Figure 15 **Hip replacement trends among America's aged**



What if most costs were associated with the *end* of life?

A related claim by some health economists is that ageing may not affect heath costs significantly because most of a person's lifetime health costs are concentrated in the period before death, regardless of how long he or she lives. However, this argument is flawed on two counts.

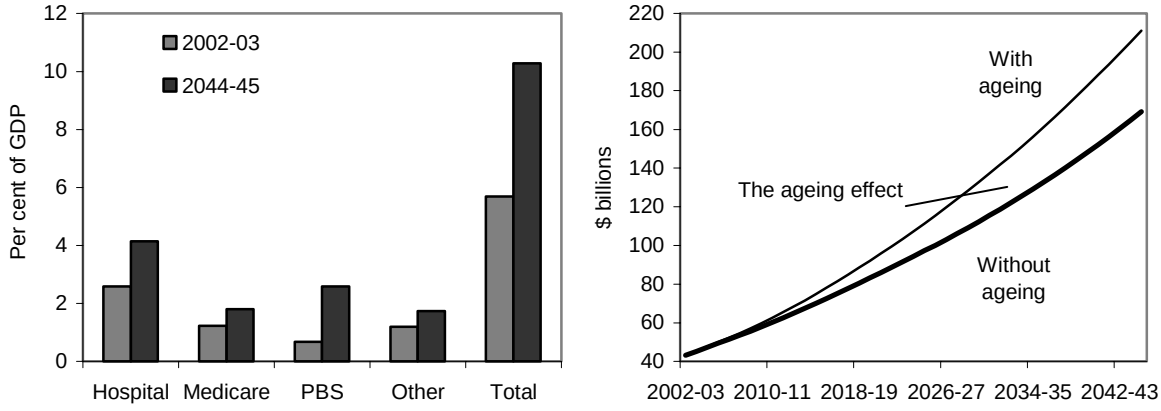
First, most of the evidence suggests that while health costs are important in the year or two preceding death, they do not comprise the bulk of a person's lifetime costs. Ongoing health costs for people who are not close to death still appear to account for most spending (and such health costs still rise with age).

Second, population ageing is not just due to increases in longevity, but also to changes in the historical patterns of fertility and migration inflows. The continuous decline in fertility after the baby boom is particularly important in an Australian context. This created a bulge in the age distribution, which means that ageing will involve a dramatic increase in the incidence of deaths in the population. The number of deaths per 1000 people is expected to rise around 50 per cent between now and 2044-45. So even if costs incurred at the end of life *did* explain most of the upward slope of the age profile of health expenditure, an ageing population would still lead to a major increase in health expenditure in Australia.

Pressures on health care spending

While higher costs at the end of life do not alter the emerging picture of burgeoning health costs in Australia, it is appropriate to take account of this phenomenon when projecting future health costs. Under the assumption of a fixed age-cost profile, population ageing, rising demand and technology trends, and the importance of higher costs at death, the health expenditure of the combined State and Australian governments is projected to increase from 5.7 per cent to around 10.3 per cent of GDP in 2044–45. (Incorporating 'proximity to death' costs only slightly reduces the fiscal pressures associated with health care compared with a projection model that ignored this phenomenon.) All components of health expenditure are projected to rise (figure 16).

Figure 16 **Projected Government health expenditure**



Hospital expenditure remains the largest component of expenditure, although its share is projected to fall slightly. Pharmaceutical expenditure is projected to increase by the greatest relative amount, with Medicare and other expenditure maintaining broadly stable shares of expenditure.

Aged care needs will increase

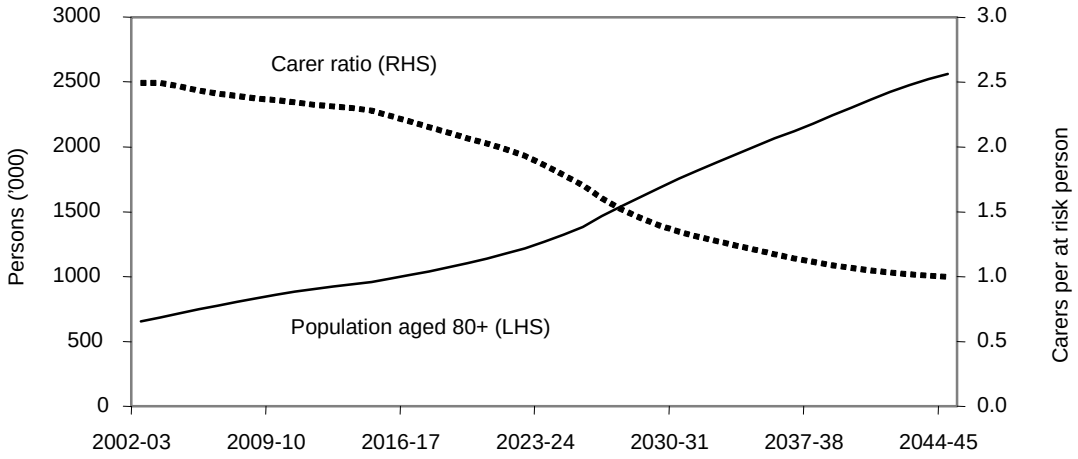
The use of formal aged care increases rapidly after 80 years of age. The proportion of people aged 80 years or more is expected to almost treble, from 3.3 per cent of the population in 2002-03 to 9.1 per cent in 2044–45, suggesting that ageing will exert substantial pressure on aged care expenditure.

This trend may partly be offset by lower profound and severe age-specific disability rates — though the evidence is not clear cut. As in the Hogan report, the Commission has incorporated a modest reduction in the disability rates that are relevant for institutionalisation. Were these reductions not to be realised, the number of residents and associated costs would rise by significantly more.

- With modest reductions in disability rates, the number of low and high care residents is projected to increase by around 215 per cent between now and 2044-45.
- If there were no reductions in disability, the comparable rise would be around 250 per cent.

Changes in the care mix — between residential and community care — will continue, but do not offer a panacea for cost pressures. Per person costs are significant for formal community care, and in any case, the capacity for a significant re-balancing of care to the community is likely to be constrained over the longer run by the availability of informal carers (figure 17).

Figure 17 **The number of carers will not match the growth in the aged**



Ultimately, the costs of aged care are expected to increase by around 2.6 times more than the growth of GDP over the next forty years. As a share of GDP, costs are projected to rise from 0.85 per cent in 2002-03 to around 2.24 per cent in 2044-45.

‘Fiscal pressure’ will build

Fiscal pressure is defined in this report as the extent to which increases in government spending outpace revenue growth. Generally, this study focuses on those revenue and spending areas where at least a significant proportion of spending is age-related (such as health and education). It should be stressed that while the main projections of fiscal pressure in this study are related to ageing, they are not attributable solely to it. For example, as noted earlier, technological change in health care is likely to increase overall costs, and this will occur to a significant degree regardless of population ageing. Where factors other than ageing are important — as they are in health care — the Commission has explored their relative importance.

Moreover, as State governments pointed out, the fiscal position could be exacerbated (or relieved) by non-demographic trends in spending areas where ageing plays a minor or no role. The Commission has assessed the extent to which such trends relieve or aggravate fiscal pressures, and has concluded that their impacts are broadly neutral in aggregate

The incidence of fiscal pressure is complicated by the financial dependence of the States and Territories (‘States’) on the Australian Government. Changes in the payments made by the Australian Government to the States as a result of ageing pressures can shift budget pressures between the different tiers of government. The implication of this is that *aggregate* fiscal pressure borne by governments collectively is the best single measure of the fiscal consequences of ageing, because it is not sensitive to assumptions that affect how it is distributed.

The pressure is expenditure-related

Demographic change has modest effects on the tax revenue shares of GDP. For governments as a group, tax revenue is projected to rise by less than 0.1 percentage points of GDP from 2003-04 to 2044-45.

The more striking story is on the expenditure side. Here, across all levels of Government, spending is projected to rise by around 6.5 percentage points of GDP over the same period. Health care costs are the single most important contributor to future spending pressures. Also significant are the pressures associated with aged care and age pensions. However, educational costs and some social safety net payments, such as unemployment benefits and family-based payments, decline in relative importance, as the age structure shifts away from the young. In the absence of ageing, the aggregate fiscal gap on the spending side is projected to be only around 0.9 per cent of GDP. Accordingly, when aggregate fiscal pressures are

expressed as a share of GDP — the most appropriate measure for assessing whether policy action is needed — population ageing emerges as the dominant source of pressure.

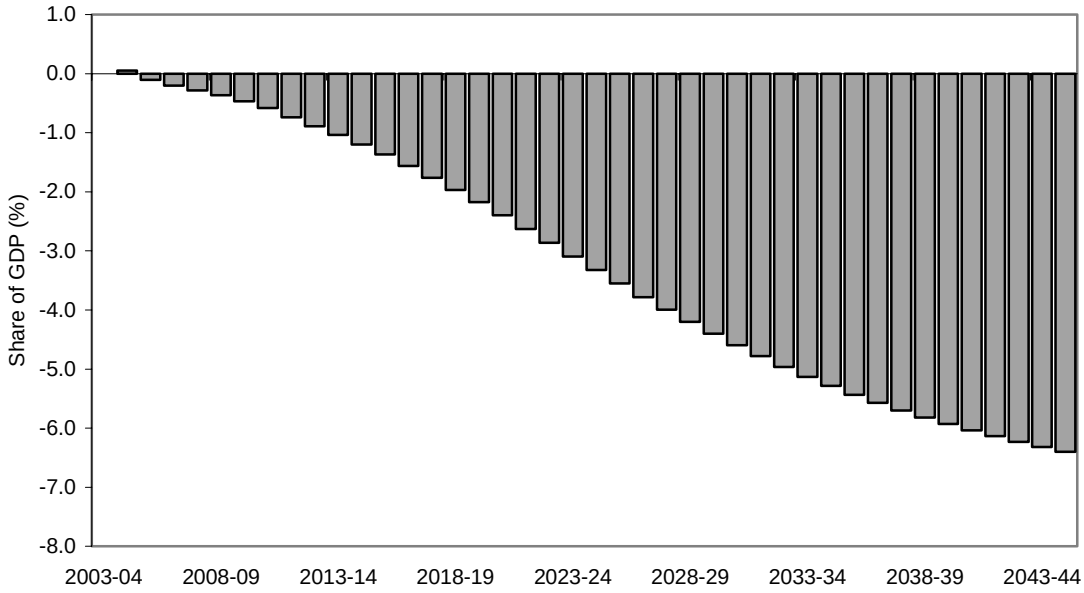
Table 1 **How much fiscal pressure nationally will there be?**
Age-related government spending to GDP ratios

All Government summary	*2003-04*	*2044-45*	*Difference*
	%	%	Percentage points
Health care	5.7	10.3	4.5
Aged care & carers	1.1	2.4	1.4
Age pensions	2.9	4.6	1.7
Other social safety net	3.8	3.1	-0.6
Education	5.2	4.7	-0.5
Total	**18.7**	**25.2**	**6.5**

Fiscal pressure rises smoothly over time for combined governments (figure 18), reflecting the fact that population ageing is a gradual and continuous process.

Overall, as a result of these spending and revenue trends, governments collectively are projected to have a fiscal gap of around 6.4 per cent of GDP by 2044-45 — a pressure that builds gradually (figure 18).

Figure 18 **The pressure builds gradually**
Net fiscal position to GDP relative to 2003-04



Cumulatively, the value in 2002-03 dollars of the fiscal gaps projected from 2003-04 to 2044-45 is around $2.2 trillion ($2150 billion), ignoring the costs of

financing such gaps. Were the gaps to be progressively financed by issuing debt, the stock of debt is projected to be around $4150 billion by 2044-45 in 2002-03 prices (at a 5 per cent interest rate) — around double Australia's GDP at the time.

Which jurisdictions bear most pressure?

In the Commission's 'base' projections, the fiscal pressures on the Australian Government are projected to be higher than for State governments, and indeed somewhat higher than found by the Intergenerational Report.

The lower pressures on the States in the base case reflect several influences:

- Given their rationale, it is assumed that special purpose payments (SPPs) from the Australian Government to the States rise with service needs, rather than say being fixed in real per capita terms. The Commission acknowledges that there are other possibilities, especially over the shorter term. Different assumptions about the growth rate of SPPs by the Australian Government to the States make a substantial difference to the distribution of fiscal pressures between jurisdictions. For example, were SPPs to grow only with inflation and population, then the spending pressure on the States would treble by 2044-45, whereas that on the Australian Government would fall by around 30 per cent.
- The States have a relatively minor role in age-related social welfare, while being fiscally advantaged by their significant role in education funding. Two forces are at work here. First, population ageing results in a lower share of Australians of school age (the area of education for which the States have the greatest responsibility). Second, the Australian Government is a major funder of private schools, which are growing relatively rapidly, displacing students from State-funded public schools.

The Commission has also estimated the 'apparent' fiscal pressure measure for each State, excluding the impact of GST grants. The pressure is more apparent than real, because the future size of the GST grants made to the States recognise their relative spending and revenue-raising disadvantages. For example, Tasmania ages relatively more than other States and so faces steeper health and age care costs. It can, accordingly, expect to receive a greater share of GST revenue to 'equalise' its position relative to other States.

There are fiscal pressures for local governments too, reflecting their involvement in aged care, community transport and a range of other human services. However, the effects on local governments are highly variable, reflecting differential involvement in the provision of age-related services and the wide variation in demographic

change at the regional level. Coastal areas, in particular, have higher concentrations of older people and are expected to 'age' rapidly, with consequently greater fiscal impacts.

Some key implications

Population ageing is *not* a crisis

Notwithstanding the projected magnitude of the fiscal gap, the predominant view in policy discussion is that these potential impacts do not constitute a crisis, at least not yet. There are several reasons for supporting this view:

- An ageing population is predominantly a reflection of beneficial trends — improved life expectancy and voluntary reductions in fertility. At least historically, there was a trade-off between female participation rates and fertility rates. Had many more children been born in Australia in the 1970s and 1980s, our current and impending population structure would have been younger, but our workforce would have included far fewer, and less highly educated, women. Given that education also promotes productivity, two of the 'Ps' bearing on economic growth — participation and productivity — would have been significantly lower.
- Unfunded pension liabilities, while significant, will not exert as much pressure on Government budgets as they will in many other OECD countries.
- Health care expenditure, while burgeoning, will promote community wellbeing and may reduce the need for other age-related outlays, such as residential nursing home care.
- Australia will also be a richer country when these impacts are felt, having a greater capacity to absorb the additional costs of its ageing population. Average per capita incomes in 2044-45 will be almost twice as large as they are today.
- People contribute more to a society than just through their marketplace labour. Older Australians play a significant role as volunteers, carers and community members. The Commission estimates that the value of volunteering will rise from 1.8 to 2.1 per cent of GDP. In any case, the extra leisure that older people are enjoying has value like other activities; it just does not get picked up in GDP estimates.
- Finally, the ageing of the population is a gradual phenomenon and its economic and fiscal impacts will also gradually build up over time. Events with long lead times cannot be considered crises as long as there is scope for anticipatory countermeasures.

There are significant policy challenges

Ageing still raises major policy challenges. The fiscal pressure is substantial and any fiscal gap must be financed. No single policy can plausibly remedy the fiscal problems, without raising other problems. Given the magnitude of the pressures, their resolution will require actions on a number of fronts.

Population policies have limited potential

Since ageing is the outcome of demographics, it might be thought that population policies could significantly ameliorate it. However, such policies have some limitations. For a start, plausible changes in the total fertility rate and in net migration levels make relatively small differences to Australia's age dependency ratios over the projection horizon of this study.

In any case, fertility rates are not very sensitive to policy and it is hard to devise measures that do not provide substantial and tax-inefficient transfers to people who were going to have children anyway. As well, any reversal of declining fertility would initially increase the aggregate dependency rate, with adverse implications for per capita labour supply growth, economic growth and accumulated fiscal gaps in the initial decades.

Increases in net migration are likely to be more amenable to policy action, since Australia is a small country and there are queues of willing migrants. Increases in net migration can partly reduce the fiscal pressures associated with ageing, and could help to overcome some skill deficits. However:

- Migration has a much bigger impact on population numbers than on Australia's age structure, which raises issues of congestion and sustainability.
- A focus on skilled migration could yield a bigger payoff. But migration targets for skilled labour may be difficult to achieve in the future, with other ageing countries competing for skilled migrants and with the potential for greater future emigration of skilled Australians.

But there is scope to lift participation

Increasing Australia's aggregate labour participation rate could raise Australia's future labour supply growth rates. The fact that Australia's present rate is only in the middle ranking of OECD countries suggests this is a viable objective. New Zealand, for example, has a significantly higher aggregate participation rate, a reflection of a different policy mix. Policies that discourage premature retirement and overcome obstacles to work could be effective in stimulating Australia's labour

participation rates. They could also generate significant savings in social welfare payments, such as reduced outlays on Disability Support Pensions.

While such policies may well be worthwhile in their own right, again they can only comprise part of the solution. Even large increases in age-specific participation rates could only claw back part of the decline in aggregate participation. And GDP is unlikely to increase by the same proportion as aggregate participation rates, because on average 'new' participants typically acquire lower productivity jobs and work fewer hours.

Productivity performance is critical

As noted, in the long term, society's capacity to generate income to meet the costs of ageing will depend largely on productivity growth. As the Commission has shown in its recent report on National Competition Policy, there remains considerable potential for Australia to improve its productivity performance through policy reforms that heighten the incentives and the capabilities for firms to be efficient and innovative.

A future reform agenda to enhance Australia's productivity performance needs to be wide-ranging, including economic and social infrastructure, labour markets, taxation, natural resource management, innovation policy and regulatory processes generally. The agenda encompasses all levels of government.

The income gains from higher productivity (or indeed higher labour participation) while clearly desirable, may nevertheless have a limited effect on fiscal pressure. This is because some of the ageing-related costs will rise with productivity (for example, wages of nurses in aged care facilities) and people's expectations of services generally rise with income (as in health care). But, at some point, such expectations may be moderated if the incremental value of such services were to fall, or if taxes and consumer charges needed to be raised greatly to sustain service levels.

Productivity gains would also provide fiscal relief associated with a slower take up of the Age Pension as some people exceed asset and income eligibility thresholds in a higher income economy, and as the value of CPI-indexed allowances falls relative to GDP. And the fiscal benefits from productivity would be more evident were fiscal pressures to be at least partly financed through income taxes. In that case, higher productivity raises real household incomes and, at given real marginal tax rates, increases average tax revenues, alleviating fiscal pressures.

While economy-wide productivity gains are critical to future living standards generally, improvements in the efficiency of Australia's health system would play a

direct role in reducing the costs associated with the demographic transition. There is considerable scope for such gains, including through better coordination across services and jurisdictions, a more flexible healthcare labour market, and better preventative health care.

A need for early action

Population ageing is a slow process, and the impacts on budgets are also gradual. This is fortunate, because in many areas the responses needed to mitigate or accommodate the costs of ageing will themselves take some time to implement and bear fruit. Early intervention would avoid the need for inefficient or inequitable 'big bang' interventions, such as excessive tax increases or service rationing, which would also face considerable public resistance. There are credible risks that the demographic or cost pressures might raise the fiscal stakes of ageing higher than those projected by the Commission. Early action would also help mitigate such risks. Population ageing can only be conceived as a crisis if we let it become one.

1 Introduction

As one participant in this national study put it: 'ageing is us'. By 2044-45 one in four Australians will be 'old' (65 years or more) — double the present share. At that time, the old will comprise around 7 million Australians, up from the present 2.5 million. This demographic transformation is a result of our success in improving longevity and controlling fertility. But it also poses some challenges for public policy.

This study — commissioned by the Council of Australian Governments — is about the economic implications of such a large proportion of the population ageing together. It continues a stream of other Productivity Commission research into ageing.[1]

1.1 Scope of the study

The terms of reference (p. iv) set out the broad scope of this study.

The imperative for implementing any policy measure depends on where, when and by how much ageing affects the economy. This report is intended to inform such policies by examining the origins of population ageing and quantifying its effects on:

- the *supply-side* of the economy — labour supply, productivity and economic growth to 2044-45 (including informal labour through volunteering and caring for people);
- *spending* — the funding of age-related government services, such as health and aged care, education and social security payments; and
- *taxation revenue* — such as GST receipts and payroll taxes.

[1] The Commission has undertaken studies into nursing home subsidies (PC 1999b); the general policy implications of ageing (PC and Melbourne Institute 1999); some of the potential productivity links to an ageing workforce (Barnes et al. 1999); aged care projections (Madge 2000) and pricing in residential aged care (PC 2003).

The study is complementary to, but updates and builds on, the Australian Government's 2002 *Intergenerational Report*.[2] A major distinguishing feature of this study is that detailed projections are made for the States and Territories, as well as the Australian Government. State and Territory Governments also have substantial budget exposure to ageing and have their own policy challenges associated with the impacts of ageing. Ageing has a local dimension too, taking place in disparate communities. So the challenges for government at this level — local government — are also considered in this report.

The report has a strong methodological vein. It explores new methods for making and interpreting projections that may be useful for policymakers. It uses more recent data than were available for the Intergenerational Report and new underlying population projections — which are the major reasons for some of the (relatively small) differences with that report.

What is the nature of the projections in this study?

The terms 'projections' and 'forecasts' are often distinguished in exercises that look into the future. A projection is a 'what if' experiment. It indicates what will happen *if* a certain set of conditions are met. Often, different projections are made, showing the results of different sets of assumptions. For example, the Australian Bureau of Statistics produces three major scenarios for Australia's future population (and offers many other tailor-made choices to users) — users then choose the series they believe is most appropriate for their purpose. In contrast, a forecast is an assessment of the most likely outcome.

The Commission's assessment of the impacts of ageing are based on projections. The horizon for most projections is 2044-45. The projections are intended to be a sensible guide to what will happen under existing Government policies and if people's behaviour continues in much the same way as it has recently. But they are not forecasts in the sense that they are expected to occur. Indeed, it should be anticipated that they will be wrong because they will elicit policy and behavioural responses that deal with the adverse consequences they reveal. For example, governments will almost certainly avoid large fiscal deficits through a mix of strategies, such as increasing taxes, reducing services, improving the cost-effectiveness of services or changing their funding sources. The projections could be right only if governments chose to do nothing.

[2] Throughout the remainder of this report it is referred to as the Intergenerational Report, with references to specific pages as IGR (p. x). However, the formal reference in the back of this report is Australian Government (2002).

It is appropriate in the context of this study to exclude from our projections the specific government reactions to the challenges posed by ageing. An analogy for the approach is the situation in which someone spies a large boulder on a train track. Their *projection* is that there will be a rail disaster and many deaths if the boulder is not moved or the train not stopped. Their *forecast* is that someone will move the boulder, averting the accident. The projection — the conditional forecast — is much more useful for policy (and was generally endorsed at a roundtable meeting of senior officials from all governments).

The Commission's projections also do not take account of any new Government policy that has been announced, but not yet implemented. For example, the Australian Government has announced policy changes that would tighten eligibility for the disability support pension, but so far the measures have not been passed by the Senate. Similarly, the Australian Government has also announced that it will provide new funding for vocational education and training outside the existing State-based arrangements, but these have not been implemented yet. It is sensible to exclude such policy changes from the projections because their final form is not yet known. However, the Commission's judgment is that such changes — if implemented — would not make a large difference to its overall conclusions about the impacts of ageing.

That said, apart from ignoring the likely reactions of government, the projections are the Commission's best judgements about what Australia will be like as it ages over the next 40 years. Those judgments are, of course, accompanied by some uncertainty. There are many things affecting the future that are unguessable or very hard to predict. For instance, cost-effective treatments for dementia could emerge which would free many from residential nursing homes. On the other hand, the rising trend of obesity levels may create a future epidemic of diabetes II. Fertility rates may not drop as much as forecast. Or more people may work on into later ages in the future than anticipated. It is certain that new technologies will be developed, but in the past, people have been poor at guessing what these will be, let alone their significance over long time frames.

In the face of such uncertainty, the appropriate stance is to model a variety of possible futures so that policymakers can determine the best overall responses. Consequently, sensitivity analysis is used throughout this study.

1.2 Participation in the study

The Commission has consulted with a wide range of people, institutions and governments about the implications of ageing (appendix A). Consultation took

place with the Australian Government, all State and Territory Governments, and representatives of local government. Submissions were sought from interested parties — 41 were received prior to the draft report and 33 subsequently.

1.3 Structure of the report

This report is structured in three parts.

The first outlines the dimensions of expected demographic change in Australia over the next 50 years (chapter 2) and examines the impact of this change on the supply side of the economy —the availability of labour (chapter 3), productivity (chapter 4), and economic growth (chapter 5).

The second presents a series of chapters on the Commission's projections of the impacts of the ageing population on governments' expenditure and revenue. The key spending areas associated with ageing are health (chapter 6) and aged care (chapter 7). The picture for personal benefits (chapter 8) is more complex, because some payments are made to predominantly young people (such as parenting payments), while others are for the old (the aged pension). For education spending, demographic change is a source of potential fiscal relief (chapter 9). There are also a range of other expenditure areas in which ageing may be important (chapter 10), but where quantitative estimates of its effects are difficult (for example, transport and housing). Ageing also has effects on Government's tax revenue prospects (chapter 11). While the focus of the quantitative estimates of the impact of ageing are on Australian, State and Territory Governments, ageing will have local effects too. These impacts are explored in chapter 12.

Finally, the Commission examines the projected net fiscal burden under current government policies and raises some broad policy implications of ageing (chapter 13).

Supporting detail about the Commission's projections and methodologies is provided in appendices. Additional technical material, such as data, the demographic model and technical papers are on the attached CD-ROM.

2 Ageing of the Australian population

Key points

- Australia's population is rapidly ageing. The share of the population aged over 65 years is projected to rise from 13.0 to 24.5 per cent from 2003-04 to 2044-45. An even bigger relative change is anticipated for the oldest old — those over 85 years. Their share increases from 1.5 to 5.0 per cent over this period.
- Currently, there are 5.2 people in the potential workforce for every person aged 65 or more years (an aged dependency ratio of 19 per cent). By 2044-45, this will have fallen by more than a half, to less than 2.4 (a ratio of 41 per cent).
- The youth dependency ratio will fall, partly offsetting this rise in aged dependency, but not by very much. In any case, the fiscal costs associated with the young are less than those associated with the old.
- Some Australian jurisdictions will age more than others. Tasmania and South Australia stand out as those in which the share of the aged will be greatest 40 years from now, while the Northern Territory will have the least ageing — a consequence of its unique demography.
- The main factors underlying population ageing in Australia are increases in life expectancy and, to a lesser extent, reduced fertility rates. The post-war baby-boom, often credited as a major source of ageing, has actually delayed ageing in Australia, although making its onset more pronounced.
- There is limited scope to moderate population ageing through demographic policies.
  - Much of ageing is testimony to successful attempts to prolong life through technology and public health initiatives — a process few would like to see reversed.
  - Feasible fertility increases can slow the ageing of the population, but not by much.
  - Despite popular thinking to the contrary, immigration policy is also not a feasible countermeasure. It affects population numbers more than the age structure. For example, stabilisation of the existing age structure would require annual migration rates of 3.1 per cent of the population, resulting in an Australian population of 85 million by 2044-45 and annual net migrant intake at that time of 2.5 million.
- On plausible assumptions, the future extent of ageing could be greater or less than projected. Better than expected gains in mortality rates and to a lesser extent, lower fertility outcomes than anticipated, could intensify population ageing. For example, it is conceivable that by 2044-45, the aged dependency ratio could be as high as 50.1 per cent and in 2100-01, 67 per cent. But with higher fertility and lower life expectancy, the ratio could be as low as 35.5 and 38.4 per cent for these two years (still nearly double the current ratio). This suggests the importance of long-term policy approaches that are flexible enough to deal with quite different population ageing outcomes.

2.1 Introduction

Australia, like other advanced economies, is experiencing a major demographic transition towards an ageing population. This should not be seen as a 'bad' development. It is testimony to the historically unprecedented conjunction of several positive demographic and economic factors — including improved life expectancy and control over reproduction. But the changes that are occurring are nevertheless profound, with potentially large implications for Australians and their governments.

This chapter provides the starting point for the analysis in this report. It considers the extent of the demographic transition, why it is occurring, and whether policies popularly advocated for abating it would be likely to have much effect.

2.2 The extent of the demographic transition

How can we know the future?

Gauging Australia's future population size and structure depends on knowing what will happen to births, deaths and net migration. Forecasts are difficult because, based on past experiences, the phenomena that affect fertility, mortality and migration have a tendency to change in unexpected ways. For example:

- enhanced family planning methods (particularly the introduction of the contraceptive pill) played an important part in the fertility declines of the 1960s and 1970s, but were not predicted at the time. Changing social attitudes to children (and their care), variations in biological fertility and policy measures that affect costs associated with having children may reverse or accentuate present trends in the overall fertility rate;
- unforeseen epidemics and wars, changes in lifestyle choices and the development of new health technologies may affect mortality rates in unanticipated ways; and
- even existing migration flows are subject to significant measurement problems. That, with unexpected changes to geopolitical and economic circumstances and to immigration policy, combined with shifting global patterns of competition for skilled migrants, limit the capacity for accurate migration forecasts.

Nevertheless, barring large departures from historical demographic trends, useful projections of Australia's population and (particularly) age structure can be

produced. Projections are less reliable for long projection horizons, which is why this report considers several scenarios.

For most of this report, the Commission relies on demographic projections for the States and Australia determined in consultation with an expert group, comprising the Australian Bureau of Statistics (ABS) and two leading Australian demographers, Professor Peter McDonald and Dr Rebecca Kippen. The ABS produced population projections consistent with the recommendations of this group, although the series are not official ABS series. For ease of description, the series is referred to as the PC-M (for medium) series.

The new projections update those of the ABS Series B, which were developed two years ago (and which were used as the base case in the Commission's draft report).[1] Since then, the two years of new fertility data suggest that total fertility is less likely to fall over the next decade and indeed could rise slightly. This was highlighted by Alan Hall in a submission to the Commission (sub. DR51, p. 5). In addition, despite the many problems associated with measuring net overseas migration, it appears that net (inwards) overseas migration may be sustained at levels above the 100 000 assumed in Series B.

The new projections are premised on:

- a small increase in total fertility rates from the current level (of about 1.75) to 1.8 babies per woman of fertile age by 2013 (and then staying constant over time);
- net overseas migration to Australia of 115 000 persons per year to 2050-51;
- a gain in life expectancy of 7.2 years for men and 5.3 years for women from 1999-2000 to 2050-51 (as in the original B series);
- long-term net interstate migration for Tasmania and NSW of -1 000 and -17 500. This represents a lower net outflow from Tasmania than under the B series (and a slightly higher net outflow from NSW). The Tasmanian Government (sub. DR69, p. 7) considered that less net out-migration from Tasmania was warranted by recent trends; and
- the estimated resident population at end June 2004 as the base year.

[1] The B series assumed that total fertility rates fell to 1.6 babies per woman of fertile age by 2011 (and then stayed constant over time), that net overseas migration fell from 125 000 to 100 000 by 2005-06 and then stayed fixed to 2050-51 and that long-term net interstate migration for Tasmania and NSW was -1 500 and -17 000 respectively. Despite the differences in underlying assumptions, the ABS B series and the new series suggest a similar degree of population ageing (technical paper 1).

It should be emphasised that the projections are conditional predictions, not forecasts per se. They show what will happen if the assumptions are valid and if policies in line with the present settings continue. Clearly, there is considerable uncertainty about the underlying assumptions. For example, it is possible that fertility rates may again decline (in the past there have been short recoveries in fertility rates, followed by a continued fall).

Accordingly, the Commission has developed its own demographic projection model to simulate the effect of several different scenarios on the age structure of Australia's future population. The Commission has also developed population models to simulate past Australian demographic trends and to understand and project the unique demographics of one jurisdiction: the Northern Territory. These models have drawn on advice and estimates of the ABS, the Northern Territory Government and several demographers (technical paper no. 1). To avoid confusion, this report uses the PC-M series, unless otherwise flagged.

The sensitivity of the projections to different assumptions is discussed separately for each of the major demographic drivers of population ageing (below). But it is important to emphasise from the start that all credible models of Australia's future population show significant population ageing.

Population ageing in Australia

Population ageing — an increasing proportion of the population accounted for by older age groups — is gathering pace in Australia (table 2.1, figures 2.1 and 2.2). Over the next forty years, the number of children is projected to grow at about a third of the rate of overall population growth. In contrast, the number of old people will rise strongly. And the significance of the very old is projected to grow even more. At the moment, there are around 300 000 people aged 85 or more in Australia — roughly the size of a small city like Canberra. By 2044-45, the metropolis of the very old will have grown to 1.4 million. By 2050-51, just six years later — their number would have swelled by a further 175 000. The number of centenarians, now a rarity, will grow more than 11 fold from 4300 in 2003-04 to 50 000 by 2044-45. Just six years later there will be over 70 000 Australians of this advanced age.

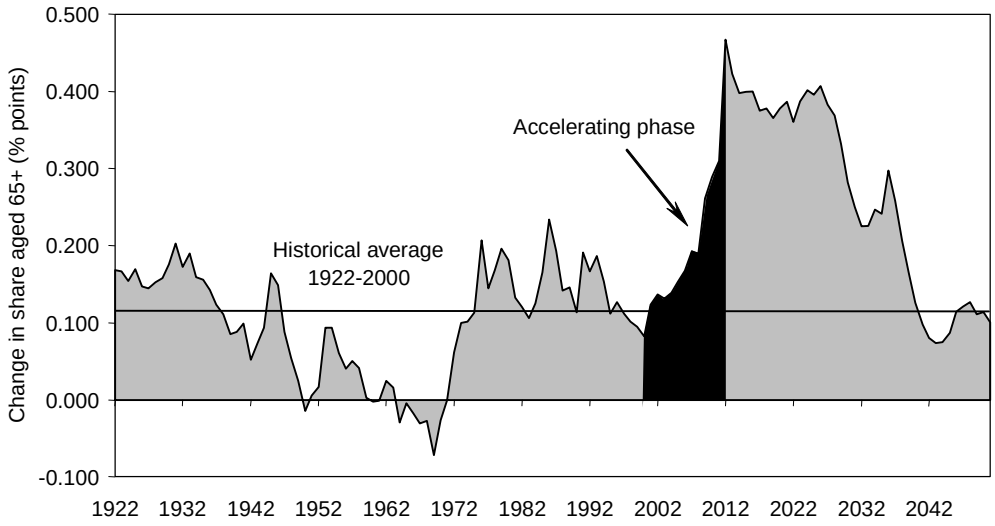
Table 2.1 **Ageing of the Australian population**
2003-04 to 2044-45

Age	*Increase in numbers*	*Percentage change*
	People	%
0 to 14	549 053	13.8
15 to 64	3 325 141	24.6
65 plus	4 318 162	165.8
65 to 74	1 664 505	121.4
75 to 89	2 133 957	189.1
90 to 99	474 166	471.8
100 plus	45 534	1051.8
All ages	8 192 356	40.7

Source: PC-M series.

As a consequence, the *share* of the population that is old will rise significantly. Indeed, by 2018-19 the share of the population aged 65 years or more will exceed those aged less than 15 years. While population ageing occurs in each year of the next four decades, the extent of ageing accelerates from now to 2012 (figure 2.1).

Figure 2.1 **Ageing, 1922 to 2051**[a]
Yearly change in the share of the aged



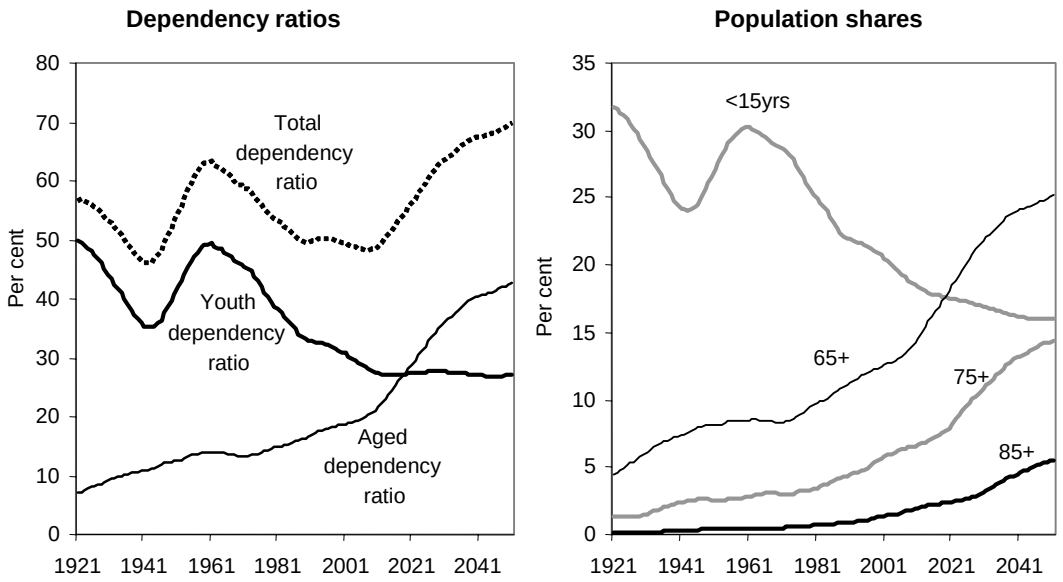
a All years in which the change is positive represent an ageing population. Where the change is growing, ageing is accelerating.

Data sources: Based on yearly change in the population share of 65+ year olds estimated using data from Commonwealth Bureau of Census and Statistics (*Australian Demographic Bulletins*, 1921-1970); ABS (*Australian Historical Population Statistics*, Cat. No. 3105.0.65.001), table 19, 1971-2003); and PC-M series projections 2005 onwards. All data are end June.

This shift in Australia's age structure means that, over the next forty years, the aged dependency ratio — the number of people aged 65 years and over relative to the

population aged 15-64 — will rise significantly (figure 2.2). Currently, there are about 5.2 people in the potential workforce for every person aged 65 or more years. By 2044-45, this will have fallen by more than a half, to less than 2.4.

Figure 2.2 **The demographic transition, 1921 to 2051**



Data sources: Commonwealth Bureau of Census and Statistics (*Australian Demographic Bulletins*, 1921-1970); ABS (*Australian Historical Population Statistics*, Cat. No. 3105.0.65.001 table 19, 1971-2003), and PC-M series projections 2005 onwards. All data are end June.

The aged dependency ratio — while commonly used in demographic descriptions to suggest vulnerability to ageing pressures — has to be interpreted carefully. First, it only reveals broad trends in the availability of people available for work, and ignores the fact that people over 65 years can still participate in the workforce or make valuable social and economic contributions in other ways. The term 'dependency' need not imply financial or economic dependency by the old.

Second, growing aged dependency is partly counteracted by a decrease in the dependent young. The ratio of those aged under 15 years to the 15-64 year age group will fall over the next half-century. However, the counteracting effect of falling youth dependency is not as important for the economy and the Government's fiscal positions as might be thought:

- The fall in the youth dependency ratio is only sufficiently big to counteract the effects of the rise in the aged dependency ratio to 2008 (where the *total* dependency ratio reaches the lowest level since 1946). But from 2008, the total dependency ratio rises steeply to a new historical high.

- Young dependents attract less Government-funded spending than older Australians, so a fall in their share has less fiscal impact than an equivalent rise in the aged dependency share.
- The young are the main source of future labour force growth. So falling youth dependency presages low labour force growth and, other things being equal, weaker future economic growth.

It is clear from figures 2.1 and 2.2 that population ageing is not a new phenomenon for Australia. Indeed, the demographic transition has been occurring for more than a century. In 1870, 42 per cent of the Australian population were aged less than 15 years and only 2 per cent were aged 65 years and over (McDonald and Kippen 1999a, p. 3). The proportion of people aged less than 15 years declined strongly in the 20th century — with the notable exception of the 'baby boom' years[2] — to reach about 20 per cent by June 2004. By contrast, the proportion of people aged 65 and more has risen over all years to reach around 13 per cent by June 2004.

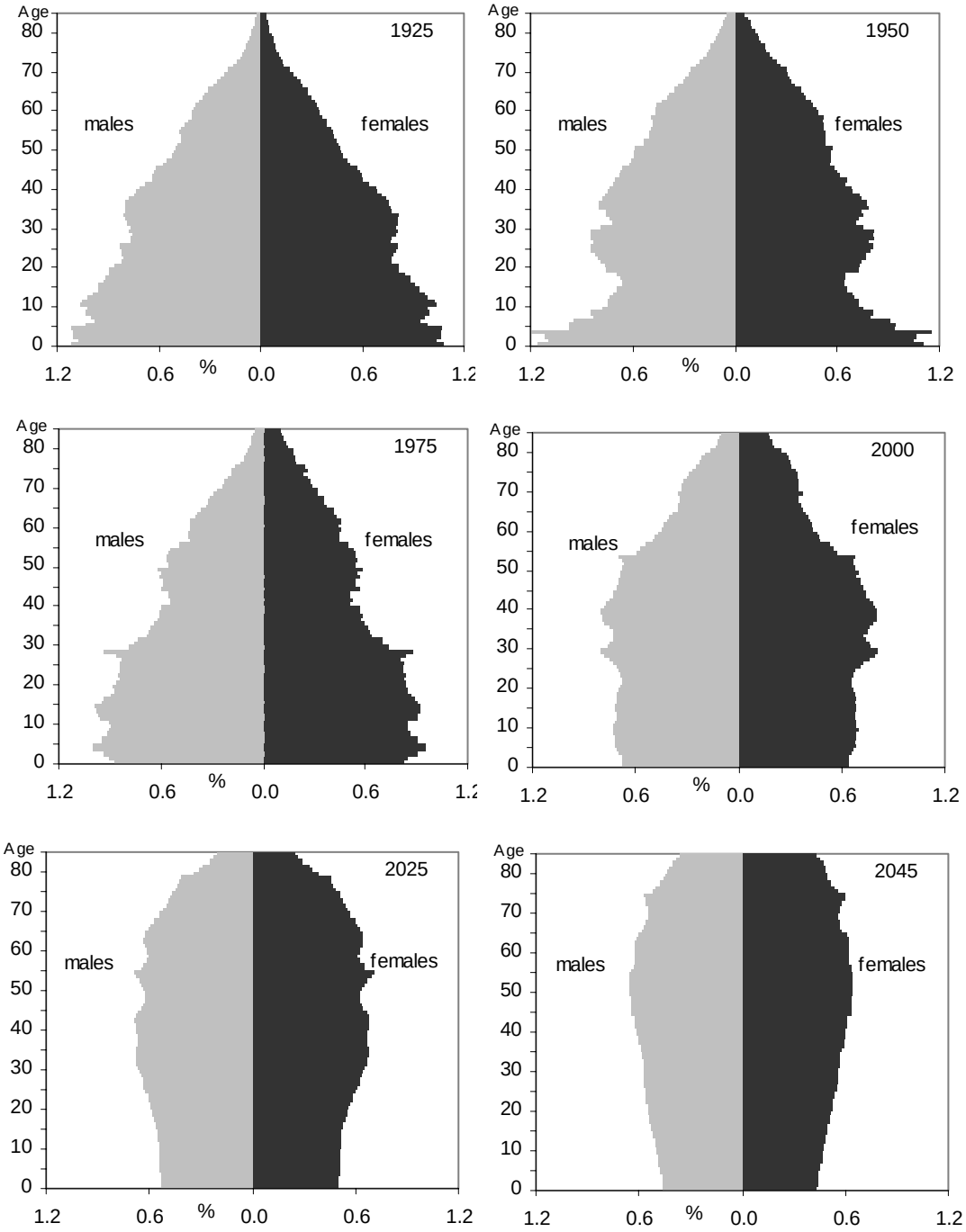
The so-called 'population pyramid', which depicts the relative size of population segments by single year of age, provides another way to visualise the ageing of the Australian population (figure 2.3). As the average number of births per women and the incidence of death in all age groups continued to decline, the Australian population pyramid early in the 21st century has, in line with those of other developed economies, increasingly begun to resemble a beehive. Given current trends, the population pyramid will continue its inversion and begin to resemble a coffin (McDonald and Kippen 2000).

Demographic change in the States and Territories

With the exception of the Northern Territory (see below), the ageing pattern is much the same for most Australian jurisdictions, though more accentuated in some than others (table 2.2). South Australia and Tasmania stand out as the States that will have the greatest concentrations of the old by 2044-45. This reflects their present above-average representation of the old and the tendency for migration patterns to disproportionately extract the young. In Tasmania, for example, there will be 6 people aged 65 years or more for every 10 people aged 15 to 64 years in 2044-45.

[2] The so-called 'baby boom' was a period of elevated fertility after World War II, commonly applied to the years 1946 to 1965 (ABS 2004e). Some people argue that the term 'boom' should only be applied to the shorter period to 1952, where fertility *growth* was particularly strong (Hall, Sub. DR51, p. 6). The Commission has used the conventional period given its wide application and because the whole period was one of high fertility rates.

Figure 2.3 **Percentage of population by single year of age**
1925 to 2045



Data sources: Data are end June. Data are for single years of age up to 84 years, with truncation of 85+ year old data to avoid a spike at that age interval. Data are from: Commonwealth Bureau of Census and Statistics (*Australian Demographic Bulletins* for 1925 and 1950); ABS (*Australian Historical Population Statistics*, Cat. No. 3105.0.65.001, table 19 for 1975 and 2000); and PC-M series for 2025 and 2045.

However, the relevant factor for ageing pressures on the States is the *change* in the proportion of the aged, rather than the actual proportion of the population that is old

by 2044-45. This is still the highest for Tasmania and South Australia, but it is also significantly higher for Western Australia than others (table 2.2).

While it is conventional to represent people aged 65 or more as 'old', many of the costs and challenges associated with ageing occur with the *oldest* old — those aged 85 years or more. For example, the probability of entry to high level residential nursing homes increases substantially at the oldest ages.

Table 2.2 **Ageing varies across jurisdictions**
2003-04 to 2044-45[a]

	Share of age groups in the population									
	NSW	VIC	QLD	SA	WA	TAS	NT (PC-M)	NT (Alt)	ACT	Total
	%	%	%	%	%	%	%	%	%	%
2003-04										
65+	13.5	13.3	12.0	15.0	11.6	14.3	4.4	4.4	9.3	13.0
75+	6.4	6.4	5.5	7.5	5.3	6.7	1.5	1.5	4.2	6.1
85+	1.6	1.5	1.3	1.8	1.3	1.6	0.3	0.3	0.9	1.5
90+	0.5	0.6	0.5	0.7	0.5	0.5	0.1	0.1	0.3	0.5
ADR	20.2	19.8	17.8	22.7	17.0	21.8	6.3	6.3	13.1	19.3
2044-45										
65+	24.1	24.6	24.2	28.5	24.4	30.2	10.5	12.1	21.1	24.5
75+	13.4	14.0	13.3	17.1	13.8	18.0	4.3	4.9	12.0	13.7
85+	4.9	5.2	4.8	6.6	5.1	6.8	1.2	1.3	4.5	5.0
90+	2.1	2.3	2.1	3.0	2.2	2.9	0.4	0.5	2.1	2.2
ADR	40.5	41.2	40.7	50.3	40.8	55.5	15.8	17.6	33.7	41.1
Change	points	points	points	points	points	points	points	points	points	points
65+	10.7	11.3	12.2	13.5	12.8	15.9	6.1	7.7	11.8	11.5

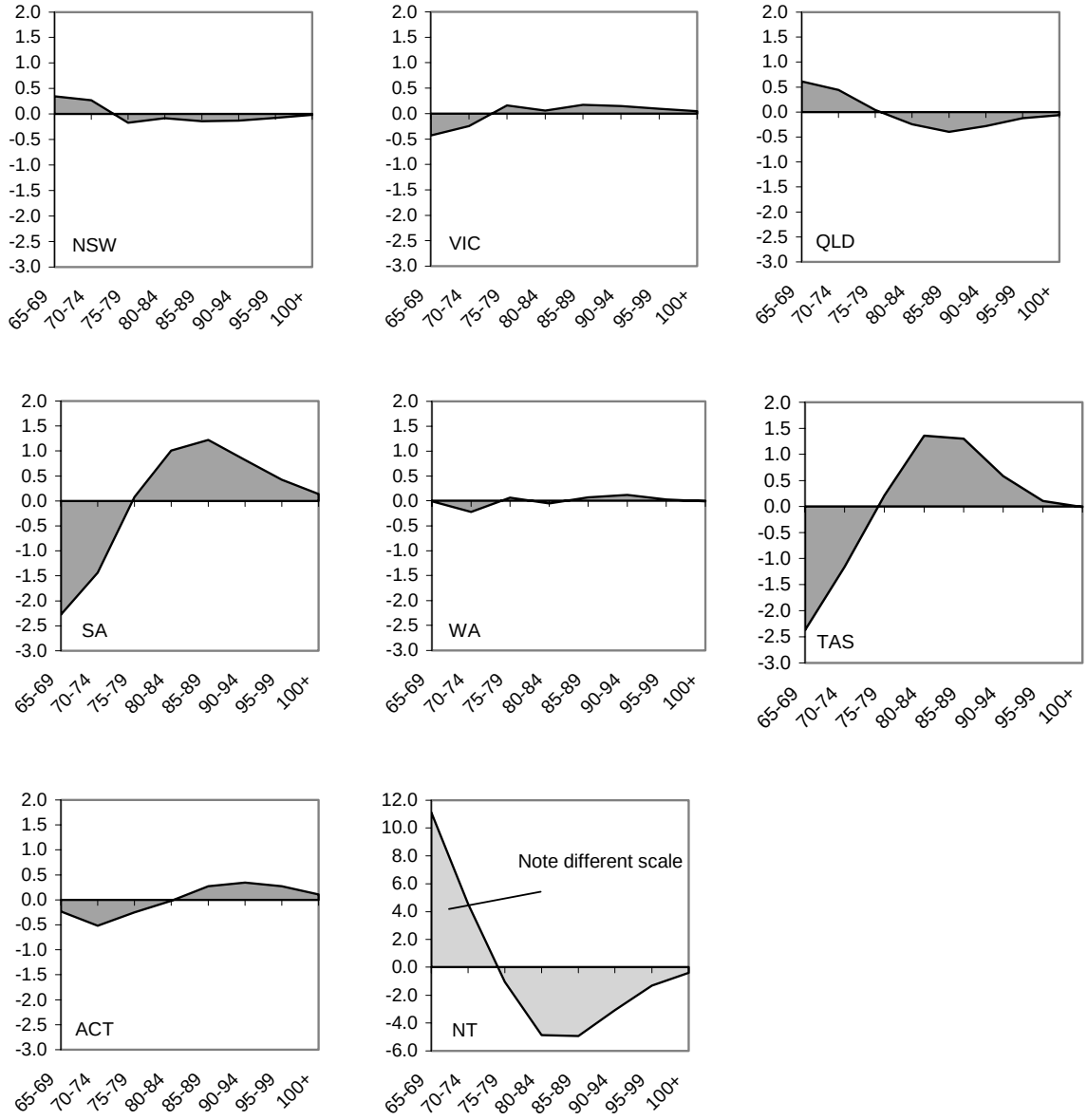
[a] ADR is the aged dependency ratio (calculated as the number of people aged 65 years and over as a percentage share of the population aged 15-64 years old).

Data sources: PC-M series and alternative PC projections for Northern Territory shares (PC-NTALT). The PC-NTALT projections combine separate projections for the non-Indigenous and Indigenous populations. In particular, Indigenous projections for this jurisdiction use different mortality and fertility assumptions than is typical for non-Indigenous Australian populations (technical paper 1). The alternative PC projections are much closer to the original 2003 ABS series C projections for this jurisdiction.

In that sense, it is important to consider the age structure of the old as well as just the total share of people aged over 65 years. This differs substantially between jurisdictions too. The Northern Territory (and Queensland to a lesser extent) has a greater representation of the younger old among their aged by 2044-45 (figure 2.4). In contrast, Tasmania and (at the oldest ages, even to a greater extent) South Australia have a greater share of the oldest old among their aged.

Figure 2.4 **The age structure of the aged**

Percentage points difference between each jurisdiction and Australia, 2044-45[a]



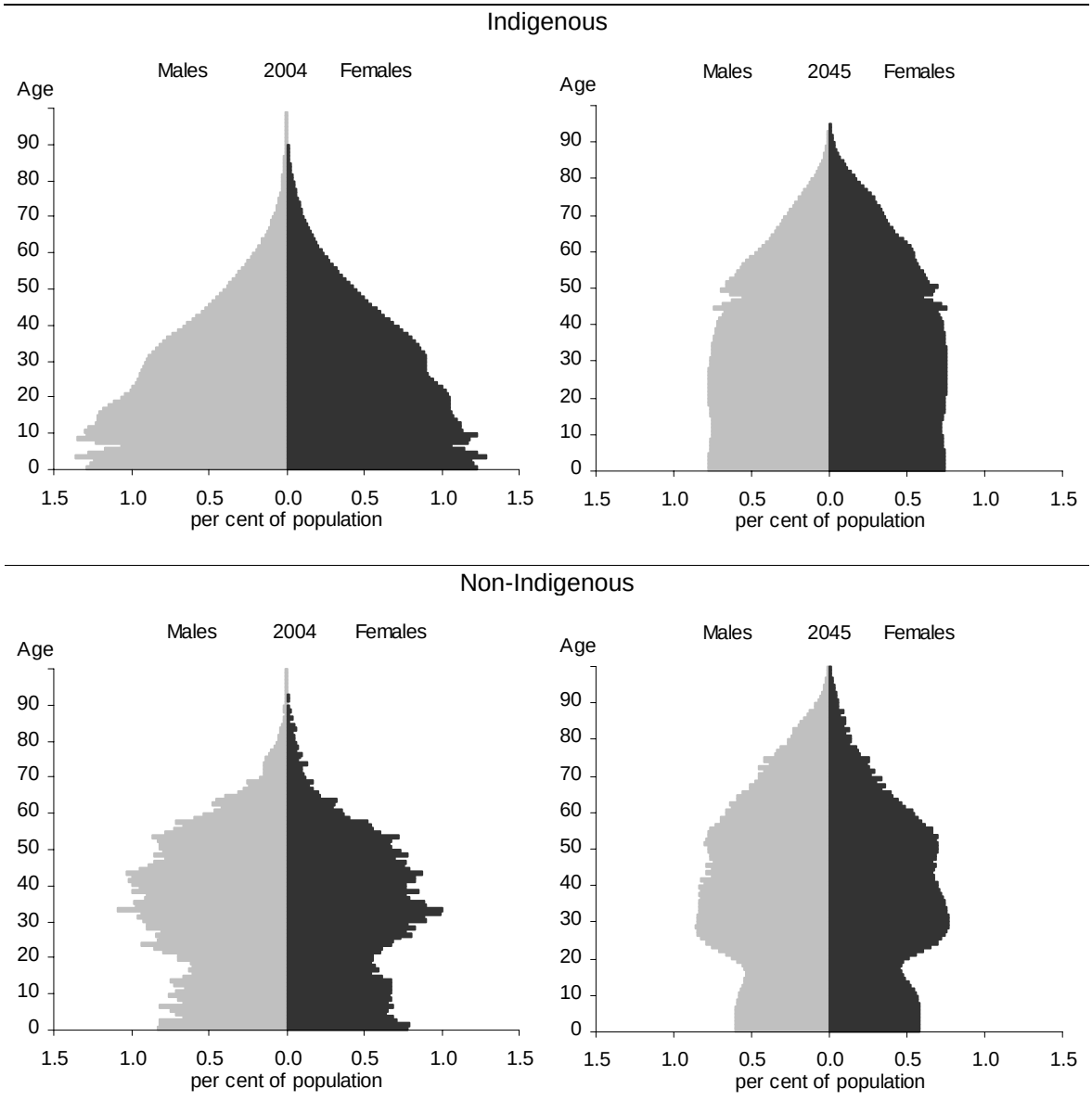
a The graphs were calculated as follows, using the PC-M series for 2044-45 (except Northern Territory, which uses the alternative PC-NTALT series). First, for each jurisdiction, the numbers of people in the quinquennial age groups, 65-69, 70-74, 75-79, 80-84, 85-89, 90-94, 95-99 and 100+ were expressed as a share of those aged over 65 years old. Then the equivalent shares for Australia as a whole were subtracted to derive the difference in percentage points. Thus, a positive (negative) value represents an over-representation (under-representation) of an age group in the aged in a jurisdiction compared with Australia as a whole.

Data sources: Data are end June 2044-45 from PC-M projections and the PC-NTALT series.

The special case of the Northern Territory

The Northern Territory has two other features that sharply distinguish it from other jurisdictions. First, roughly 30 per cent of the population is Indigenous. This sub-population has an age structure weighted far more to the young, reflecting high fertility rates and relatively low life expectancy (figure 2.5). Second, many non-Indigenous Territorians do not stay in the Northern Territory at older ages. As a result, the conventional measure of ageing — the change in the share of those aged 65 years or more — is less in this jurisdiction.

Figure 2.5 **The special case of the Northern Territory**
Age structures in 2004 and 2045



Data source: Data are end June. Data are for single years of age up to 99 years, with truncation of 100+ year old data to avoid a spike at that age interval. The data are based on PC projections (technical paper 1).

Nevertheless, significant changes occur in the age structures of the two sub-populations. Interstate migration and falling fertility rates hollow out the young and the very old in the non-Indigenous population, resulting in a unique 'arrowhead' age structure by 2044-45 (figure 2.5).

In the Indigenous case, (assuming significant reductions in fertility and mortality rates) the population structure shifts from a third-world pyramid with a wide base represented by the young, to a more first-world age structure. While there is only a modest shift in the share of the aged, the *proportional* change in the share of the aged is high by Australian standards. In the Northern Territory the share increases by 2.8 times, whereas on average the share roughly doubles in Australia as a whole.

It should also be emphasised that the age threshold used to define 'oldness' depends on the social and economic effects of ageing. Indigenous people in the Northern Territory currently have a life expectancy roughly 20 years less than their non-Indigenous counterparts and experience older people's diseases at much younger ages (for example, cardiovascular disease and diabetes II). Accordingly, many Indigenous people aged in their 40s and 50s have disability and morbidity characteristics that are more akin to those of older Australians. In that sense, the younger apparent age structure of the Northern Territory, now and (and to a lesser extent) in forty years time, belies a significant burden of disease present at younger ages. This has implications for health budget forecasts (chapter 6).

Global patterns of ageing

The shift towards older populations is a worldwide trend — reflecting general reductions in fertility rates and reduced mortality risks. Only six of 193 countries reveal a decrease in the projected age dependency ratio from 2000 to 2050.[3] In fact, the *rate of change* to older populations is fastest in developing economies, such as Thailand, Brazil, Mexico, China, Vietnam and most Middle Eastern countries.

In absolute terms, however, it is the developed economies that will have the most aged populations by 2050 — particularly Japan and European countries, like Italy, Greece and Switzerland (table 2.3). When measured by the aged dependency ratio, Australia, along with other Anglo-Saxon countries (the US, UK and New Zealand), will experience relatively moderate ageing compared with many other developed countries.

[3] These are six of the poorest countries: Lesotho, Guinea-Bissau, Malawi, Angola, Zambia, Zimbabwe and Swaziland (see the source from table 2.3).

Table 2.3 **Patterns of ageing in selected economies[a]**

	Aged dependency ratio			*Population share aged 65+*		
	1950	2000	2050	1950	2000	2050
	%	%	%	%	%	%
Japan	8	25	72	4.9	17.2	36.5
Spain	11	24	68	7.3	16.8	35
Italy	13	27	65	8.3	18.1	34.4
Greece	11	26	62	6.8	17.5	33.2
Czech Republic	12	20	59	8.3	13.8	32.2
Switzerland	14	24	55	9.6	16	30.8
Republic of Korea	6	10	55	3	7.1	30.5
Austria	16	23	55	10.4	15.5	30.6
Singapore	4	10	54	2.4	7.2	30.5
Portugal	11	23	53	7	15.6	29.7
Hong Kong	4	15	53	2.5	10.6	29.6
Ukraine	12	20	50	7.6	13.8	28.6
Poland	8	18	50	5.2	12.1	28.4
Germany	14	24	49	9.7	16.3	28
Belarus	13	20	49	8.6	13.7	28.1
Sweden	15	27	47	10.3	17.4	27
Puerto Rico	7	17	47	3.9	11.2	27.4
Belgium	16	26	47	11.1	17	27.2
Russian Federation	10	18	46	6.2	12.5	27
France	17	24	46	11.4	16	26.4
Finland	11	22	46	6.7	14.9	26.4
Norway	15	24	44	9.7	15.4	26.1
Canada	12	18	44	7.7	12.6	25.7
Netherlands	12	20	42	7.7	13.6	24.7
Denmark	14	22	42	9.1	15	24.9
Ireland	18	17	41	10.7	11.3	24
Iceland	12	18	41	7.7	11.7	24.3
Australia	**12**	**18**	**40**	**8.1**	**12.3**	**23.9**
United Kingdom	16	24	38	10.7	15.9	23.3
New Zealand	14	18	38	9	11.8	22.9
China	7	10	37	4.5	6.8	22.9
Luxembourg	14	20	35	9.8	13.7	21.7
United States	13	19	32	8.3	12.3	20
Mexico	8	8	32	4.4	4.8	20
Turkey	6	9	28	3.2	5.5	18.2
Malaysia	9	7	24	5.1	4.1	15.7

a The aged dependency ratio is the ratio of people aged 65+ to those aged 15-64 years. The data for Australia and the projections are those of the UN, not the PC-M.

Source: United Nations (online version, *2003 World Population Prospects, the 2002 Revision*, United Nations Population Division, available from http://www.un.org/esa/population/unpop.htm).

What is the cause of the demographic transition?

The age structure of the population at any point in time is determined by the historical experience in fertility, mortality and net migration. Looking at past patterns in these demographic drivers has two benefits. First, it explains why we are where we are now. Second, analysis of trends in these factors underpins the assumptions used to derive long-run projections of the population age structure of the kind shown in section 2.2. These trends are considered in the following three sections, with a summary of their overall effects in section 2.6.

2.3 Mortality rates have been falling

Average mortality rates have been declining strongly over the last century (figure 2.6). For example, the number of deaths per 1000 population (the crude death rate) fell by about 70 per cent over the last 150 years from 20.9 in 1860 to 6.7 in 2003.[4] This occurred despite a rising concentration of older people, who are more likely to die. If adjustments are made for the effect of an older age structure by using the standardised death rate (SDR),[5] the fall in mortality is even more pronounced. The SDR almost halved in the past 30 years alone, falling from 12.7 deaths per 1000 population in 1971 to 6.4 in 2003.

Much of this improvement stems from a decline in infant mortality. For example, a one year old child was about 80 times more likely to die in 1886 than a child of the same age in 2002 (figure 2.6). Although this is the peak reduction in mortality by single year of age, it is apparent from the figure that the likelihood of dying at a specific age has fallen substantially for all but the oldest age groups. Moreover, there have been substantial reductions in the likelihood of death at most ages even in recent times. For example, over the 30 year period from 1971 to 2002, there has been at least a 50 per cent reduction in the probability of death for every age from 42 years to 77 years for both genders. As a consequence of falling mortality rates, life expectancy has increased by more than 30 years for both sexes since the 1880s (figure 2.6).[6]

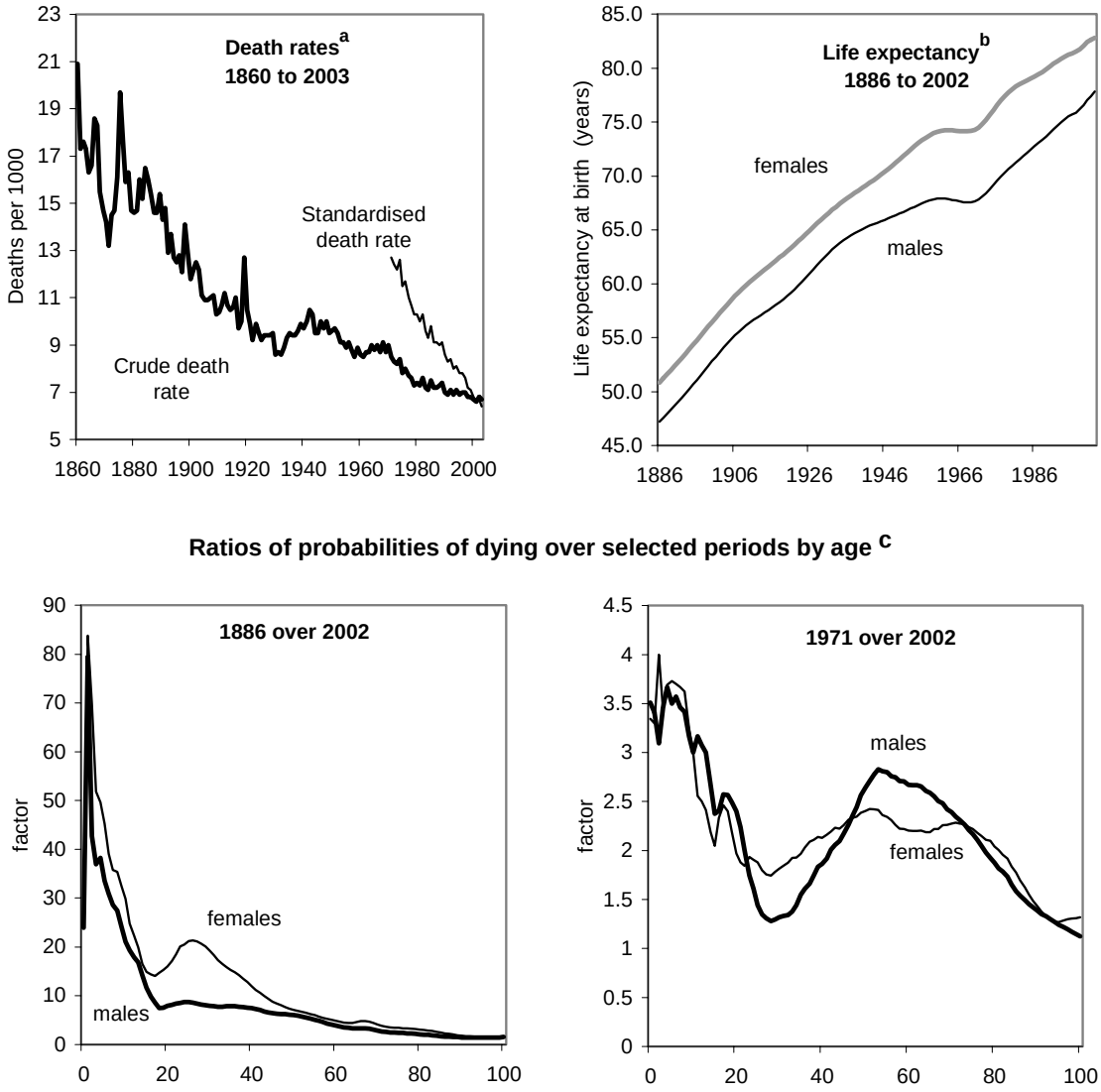
---

4 ABS (*Australian Demographic Statistics*, Cat. No. 3101.0).

5 The standardised death rate (SDR) enables the comparison of death rates between populations with different age structures by relating them to a standard population. Unless the age-specific death rates are unreliable (for example, for small populations), the SDR gives the overall death rate that would have prevailed in the standard population if it had experienced the death rates of the population under study.

6 It should be noted that life expectancy is just a synthetic measure of the impact of cumulative age-specific mortality rates recorded at a given time. It records the average life expectancy of a person at birth, were that person to experience the age-specific mortality rates observed in the

Figure 2.6 **What has happened to mortality in Australia?**



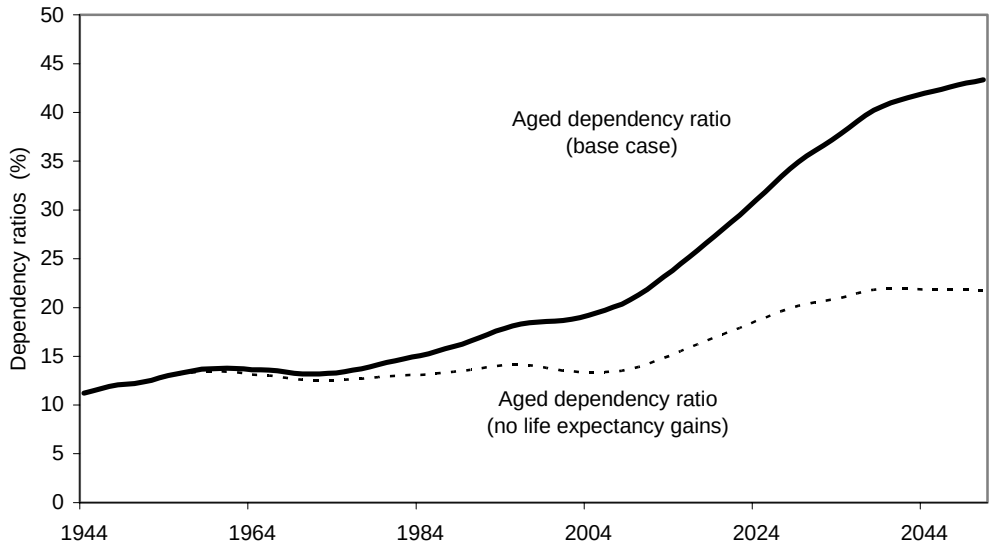
a The SDR is standardised to the 2001 population structure. **b** Life expectancy was interpolated for some years using a cubic spline. Data run from 1886 to 2002. **c** These graphs show how probabilities of death (termed q_x in life tables) have changed over time for different ages. The q_x for the years shown are averages over a span of years. For example, 1886 is the average for 1881 to 1891 and 2002 is the average for 2001 to 2003.

Data sources: Data are from ABS (*Australian Historical Population Statistics* Cat. No. 3105.0.65.001), updated for the last year by ABS (*Deaths, Australia*, Cat. No. 3302.0).

current population for future years of their life. In fact, mortality rates are declining over time. Accordingly, a person born at a time where mortality rates are still falling will live on average for more than the recorded life expectancy at that time. For example, so-called cohort life tables, which take into account future changes in mortality rates, suggest that a male born in 1997 will live for more than six years longer than the recorded life expectancy for 1997 (ABS 2002).

The effects of reductions in mortality rates on population ageing can be visualised by imagining an Australia in which no such gains had been made since the Second World War (figure 2.7). In that adverse case, Australia would have a much younger age structure than otherwise — both now and in forty years time.[7] Even so, some ageing would still occur, with the age dependency ratio doubling from 2001-02 to 2044-45 (reflecting the fact that ageing is still partly shaped by migration and fertility patterns). This thought-experiment reveals that population ageing is the inevitable consequence of the beneficial transition from high mortality societies to low ones. Ageing does raise policy challenges, but few people would want to reverse the demographic factors that have underpinned the transition.

Figure 2.7 **What a difference increased life expectancy makes[a]**



a The base case is calculated as a simulation in which historical trends in fertility, mortality and net overseas migration are used to project the population from the 1944 base year to 2004. PC-M series projection scenarios for these demographic variables are used to continue the simulation until 2051. The base case closely matches the actual dependency ratio recorded for historical data and the PC-M series to 2051, indicating that the simulation method is sound. The counterfactual case is then simulated in the same way, but with no changes in mortality rates from 1944 (and therefore no gains in life expectancy).

Data source: Commission estimates.

What is the future for mortality?

Most demographers expect further gains in life expectancy in the future. However, gauging the extent of the likely long-run gains is difficult.

[7] But while the aged dependency ratio falls, the ratio of young people to those aged 15-64 hardly changes.

It is hard to forecast the factors that may reduce mortality rates. The history of mortality reduction reveals that major gains stemmed from quite disparate sources, with different patterns in different periods (box 2.1). It is possible that there will be far more effective treatments for the major causes of death (such as cancer, strokes and cardiovascular disease). It is also possible that further preventative public health strategies might reduce mortality from some sources. However, the past patterns of mortality reductions reveal that people surviving one condition go on to be exposed to others.

In any case, quite apart from the uncertainties associated with the development of new medical and health technologies, there are potential new disease risks (such as SARS and antibiotic-resistant bacteria) and lifestyle factors that may raise mortality (such as those associated with the rising incidence of obesity and diabetes II). For example, using the latest available data, around one in five Australians are obese, one of the highest rates among developed countries. There is a significant trend to greater obesity over time for all ages (AIHW 2003a, 2004f) and strong evidence of adverse health and mortality effects (AIHW 2004e). Some commentators even suggest that if unchecked, rising obesity may actually reduce future life expectancies (Olshansky 2004), though most experts see this as pessimistic.

Box 2.1 **Why have mortality rates fallen?**

Improvements to sanitation are credited with reductions in infectious diseases causing many of the infant and young children deaths early in the 20th century (Cumpston 1989). Better nutrition, improved access to clean water, better education and smaller family sizes are also likely to have contributed to better infant health and increased resistance to infection (AIHW 2000). The introduction of antibiotics in the 1940s further reduced death rates from infectious diseases and helped maintain the declining mortality trend for younger age groups, as well as having broad benefits for all other age groups.

Australia, like many other developed countries, experienced a 'health transition' from infectious to chronic diseases. During this transition, some falls in the incidence of infectious diseases, especially for older age groups, were offset by the rising incidence of chronic diseases. For example, coronary heart disease, stroke and cancer death rates increased from the 1920s and 1930s (AIHW 2000).

The increasing incidence of some chronic diseases was arrested and subsequently reversed in the second half of the 20th century. Aside from lifestyle factors and nutrition, improvements in medical knowledge, procedures and technology contributed to this reversal (AIHW 2000), especially in regard to circulatory diseases from the 1970s. This explains the more recent reductions in mortality experienced by older age groups.

The majority view is that life expectancy will continue to rise, despite some of the risks. However, many demographers doubt that past growth rates in life expectancy

can be maintained indefinitely, because of biological limits to life. In that case, extrapolations of past trends may tend to overstate future reductions in mortality rates. Reflecting this, in its B series projections the ABS assumed a slowing in life expectancy gains over time (with the Intergenerational report adopting a similar approach). The Commission has used these assumptions in the PC-M projections. However, it is not certain that the limits to longevity will constrain life expectancy growth in the next 40 years. The ABS's past projections have systematically been below actual life expectancy gains because the trends failed to slow as predicted (Booth and Tickle 2003, 2004).

Uncertainty about future longevity suggests the need to test the sensitivity of ageing projections to a range of mortality scenarios (especially since it is evident from figure 2.7 that mortality patterns have a large impact on the extent of ageing). The Commission compared four alternative scenarios with the projections based on the PC-M series (table 2.4). The different longevity scenarios are based on the Commission's judgments about alternative mortality rates, and confidence intervals for mortality econometrically estimated by Heather Booth of the Australian National University (box 2.2).

Table 2.4 **Effects of varying assumptions about mortality on ageing[a]**

	PC-M series		*Alternative longevity scenarios*			
			PC		Booth	
			low	high	low	high
Medium term projections						
Horizon (end June)	2004	2045	2045	2045	2045	2045
Aged 65+ years (%)	13	24.5	23.2	26.6	22.9	27.7
Aged 85+ years (%)	1.5	5	4.3	7.1	4.2	7.8
Aged <15 years (%)	19.8	16	16.3	15.5	16.4	15.3
Aged dependency (%)	19.3	41.1	38.4	45.9	37.6	48.7
Total dependency (%)	48.7	68	65.3	72.7	64.6	75.5
Life expectancy						
Males (yrs)	78.4	83.7	82.5	90.2	82.5	90.9
Females (yrs)	83.6	87.4	85.7	93.3	85.9	96.1
Long term projections[b]						
Horizon (end June)		2151	2151	2151	2151	2151
Aged dependency (%)		46.0	43.0	58.8	43.3	61.4

a Booth's high and low longevity scenarios are based on the 95 per cent confidence interval around the forecasts of mortality derived from applying the Lee-Carter method to age-specific central death rates (box 2.2). The Commission's high and low longevity series are described in technical paper 1. All other assumptions of the cohort-component model are as in the PC-M model. **b** The projections to 2151 are based on no changes in life expectancy, total fertility or net overseas migration after 2050. The dependency rates are close to that which would be found in a stationary population with the mortality profile for 2050 (technical paper 1, table 1.2 and Alan Hall sub. DR56).

Source: Commission estimates.

Box 2.2 Alternative estimates of future life expectancy gains

Booth and Tickle (2003) forecast Australian age-specific death rates[8] to 2031 using an adaptation of the Lee Carter method (technical paper 1) This method has several advantages:

- it avoids the problems associated with projecting on the basis of cross-sectional measures, such as life expectancy, since it uses age-specific measures of mortality;
- it is a replicable and less subjective technique than making judgments about future life expectancy; and
- as it is statistically estimated, it provides statistical confidence intervals around the point estimates of mortality rates. Against this, any misspecification invalidates such confidence intervals, as well as biasing any forecasts. Different methods, such as functional data analysis, have been shown to give different results for identical data sets.

At the request of the Commission, Booth updated these forecasts and extended them to 2050. On that basis, forecast life expectancy reaches 92.2 years for females and 88.0 years for males by 2050, compared with ABS medium projections of 87.7 and 84.2 years in 2050. However, the ABS's medium assumption still lies within Booth's lower 95 per cent confidence interval for 2050 of 86.5 and 83.3 years. The ABS's high assumption projects a life expectancy at birth of 95.0 years for females and 92.2 years for males by 2050, which is close to Booth and Tickle's higher 95 per cent confidence level of 97.8 and 92.5 (figure 15, ABS 2003a).

The Intergenerational Report, like the ABS's medium assumption, also assumes a stronger decline in life expectancy gains than Booth's forecasts, with life expectancy projected to be 87.5 and 82.5 for females and males respectively by 2042 (compared with Booth's point estimate for 2042 of 90.8 and 86.5).

Booth's estimates have a larger gap between male and female life expectancy than the ABS and the Intergenerational Report. This is because they use a longer time horizon from which to project (using mortality data from 1968) and the gap between male and female life expectancy has been narrowing particularly fast in the latest decade.

The Commission analysed the impacts of using Booth's high and low estimates.

The results suggest that relatively modest changes in life expectancy trends over the next forty years can make a significant difference to the age structure of the population, particularly for the oldest old. For example, under Booth's high longevity scenario, people aged 85 years or more account for nearly 8 per cent of the population in 2044-45, more than 50 per cent higher than the share suggested by the PC-M projections. In raw number terms, under this high life expectancy scenario, there would be around 2.3 million people aged 85 years or more and

[8] The age-specific death rate (ASDR) gives the number of deaths at a specified age per 1000 of the population of the same age (or age group).

1.3 million people aged 90 years or more in 2044-45 (compared with about 1.4 million and 0.6 million under the PC-M projections respectively). These scenarios indicate that demographic transition over the next 40 years, while already remarkable, could be even greater. If realised, this would have even larger fiscal implications than those projected by the Commission under the PC-M case.

It should also be noted that the effects of gains in life expectancy on the age structure continue long after the gains are exhausted. For example, were there to be no more gains in life expectancy after 2050 (the standard ABS assumption in its longer run projections), the aged dependency ratio still climbs steadily and plateaus at around 46 per cent by 2151 under the PC-M case and higher than 61 per cent in Booth's high scenario. This reflects the long transition to stable populations as bulges in the age distribution work their way through.[9]

2.4 Fertility has been falling

The Australian fertility experience has fluctuated widely over the long term (figure 2.8). After World-War I, the total fertility rate[10] declined from about 3.1 in 1921 to reach a trough of 2.1 babies per woman when the great depression was at its worst, before building up again in the post-World-War II years to reach a peak of 3.6 in 1961. There were sharp falls in fertility rates from the early 1960s to the late 1970s. This reduction in fertility rates reflected many influences[11], such as:

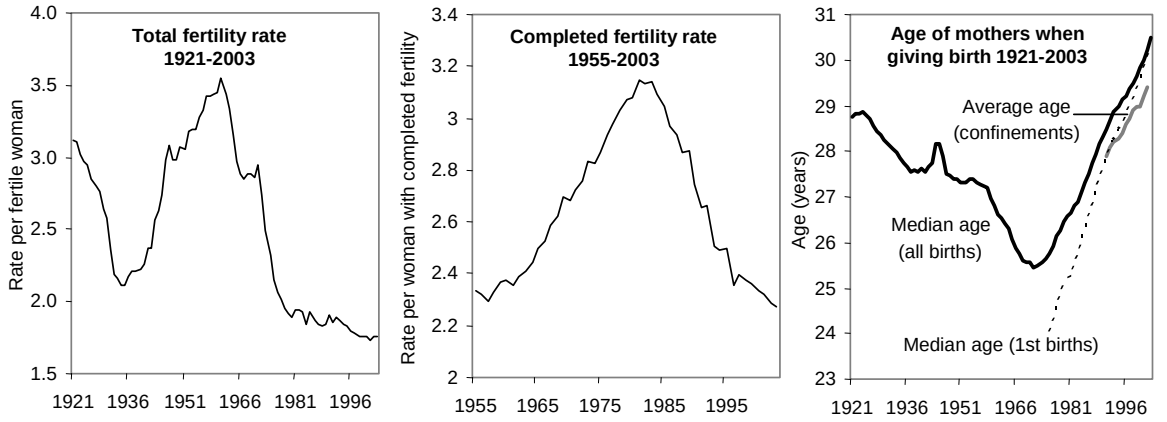
- increased access to family planning methods;
- advances in medical technology and changes to the interpretation of abortion law made it safer and easier to terminate unintended pregnancies; and
- increases in labour force (and education) participation by women in the late 1960s and 1970s and other socioeconomic changes that motivated smaller family size and postponement of child bearing.

9 Strictly speaking, Australia's population does not become stable (ie with a fixed age structure) even under the assumptions of long-run constant mortality and fertility rates because of continued migration (Rowland 2003, pp. 300ff), but is very close to stable in the long run.

10 The total fertility rate (TFR) is the unweighted sum of the age-specific fertility rates (ASFR) of all women in a given calendar year: $TFR_t = \sum_a ASFR_{a,t} / 1000$, where $ASFR_{a,t}$ is the number of live births per 1000 women of age a in calendar year t. The division by 1000 is performed because total fertility rates are reported per woman, whereas the age-specific fertility rates are expressed per 1000 women. The TFR represents the number of children a group of women would bear, on average, during their lifetime, if they experienced the age-specific fertility rates that apply in a given year at each age of their reproductive lives.

11 Thorburn (1999); de Vaus (2002); PRB (1999); Carmichael (1998); ABS (1998); McDonald (2000, 2002) and Sobotka (2004).

Figure 2.8 **Patterns of fertility in Australia[a]**



a The AIHW statistics on average age are for confinements and so include still births, whereas the ABS figures on median age only include live births. The completed fertility rate (CFR) is the number of children ever born to a woman whose fertility is completed (assumed to occur at age 49 years). The dates for the CFR relate to the date at which a cohort has completed its fertility (eg the 2003 data relate to the CFR of the birth cohort of 1954 who complete their fertility in 2003). Unlike the total fertility rate, which measures the number of children that a hypothetical women would have if she were to conform to the age-specific fertility rates of a given year, the completed fertility rate captures the average number of children actually born to any given cohort of women aged 49 years and over.

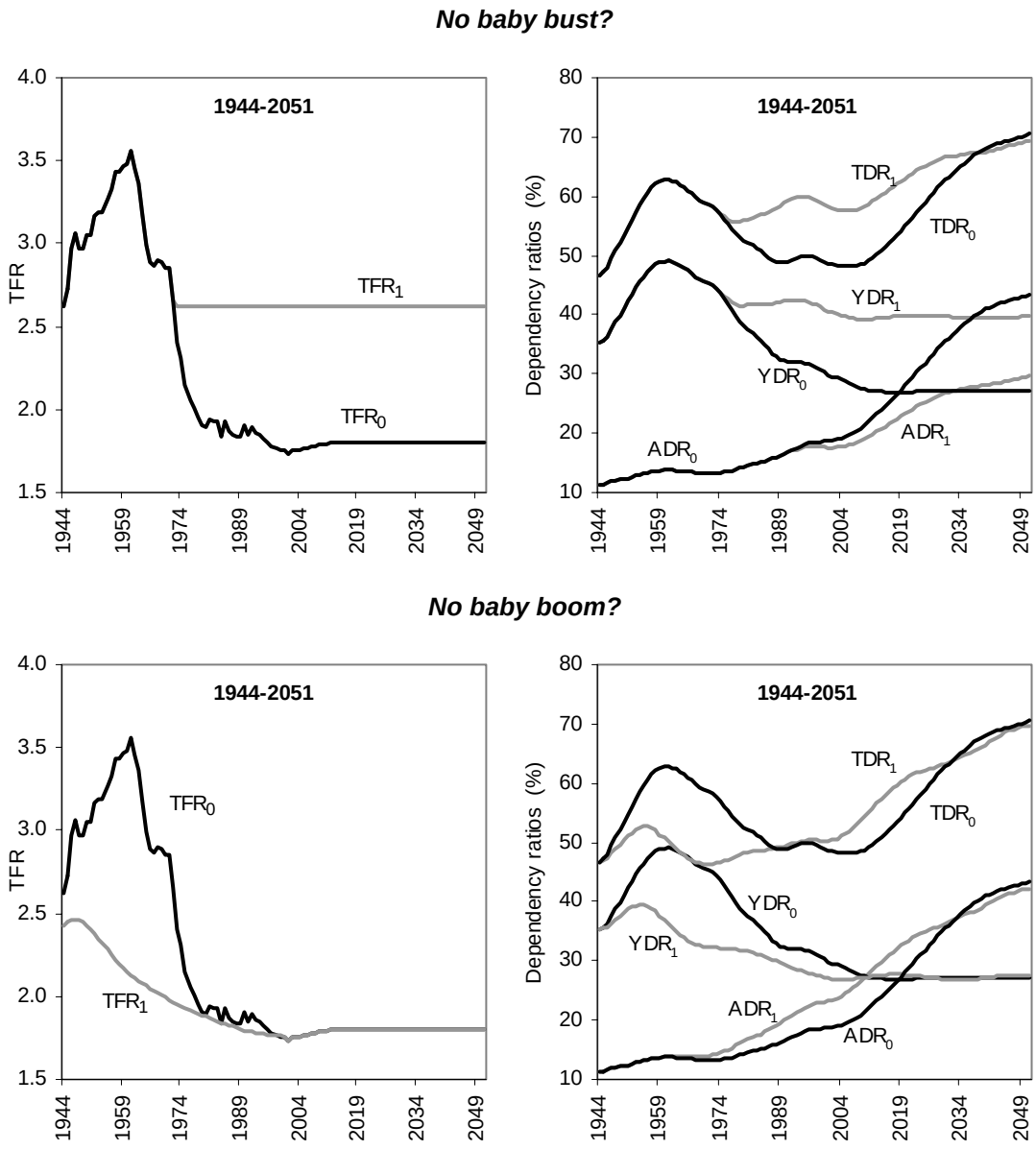
Data source: Total fertility rates and median age of mothers are from ABS (*Australian Historical Population Statistics* Cat. No. 3105.0.65.001 and *Births, Australia* Cat. No. 3301.0). Data on the average age of mothers at birth are from AIHW (various issues, *Australia's Mothers and Babies*, National Perinatal Statistics Unit report). Completed fertility rates were calculated from unpublished ABS data (age-specific fertility rates by single year of age, 1921 to 2003). The data stop at the cohort born in 1954 because they are the last cohort for whom the full set of fertility data are available (ie up to age 49 years by 2003).

Since the late 1970s, total fertility rates (TFRs) have continued to fall, but at a gradual rate — reaching a TFR of around 1.75 in the 2000s. This is roughly half that of the peak in 1961. This prolonged reduction in fertility rates reduced the number of children who otherwise would have been born over the last forty years, but it obviously had no impact on the number of people currently aged over 40 years. Accordingly, during a transition to lower fertility rates, the ratio between the young and older aged groups falls, raising the share of the old in the population.

As in the case of mortality, it is possible to gauge the effects of past fertility trends on population ageing by considering various 'what if' scenarios (figure 2.9). Had fertility stabilised at its 1944 level in 1973, instead of rapidly declining (avoiding the baby 'bust'), then the aged dependency ratio (ADR_1) would rise by much less than currently projected (ADR_0). On the other hand, there would be many more young children, with the implication that the young dependency ratio would remain relatively stable over time. This has the implication that the *total* dependency ratio would be higher from the mid 1970s to around 2030 than under the base case. So while higher fertility in the past would have assuaged present and future ageing, it

does not avoid the potential difficulties of a relatively small workforce that may need to finance the needs of the young and the old.

Figure 2.9 **What would happen if fertility had been different?[a]**



TDR — Total dependency ratio; TFR — Total fertility rate;
ADR — Aged dependency ratio; YDR — Youth dependency ratio;
0 — Base case; 1 — Counterfactual

a See note to figure 2.7 for a description of the base case (*with* the baby boom). The 'no baby boom' case assumes that the TFR rose slowly from 1944 to a peak in 1947 and then gradually declined to the TFR level of 2003 (and following PC-M assumptions thereafter). The 'no baby bust' assumes that the TFR does not decline after 1973.

Data source: Commission estimates.

It is sometimes argued that the imminent retirement of baby-boomers is largely responsible for population ageing. However, population ageing is not just about the number of the aged, but their relative number compared with those of younger ages. The long-term reduction in fertility rates after the baby boom means that there will be relatively fewer younger people in the coming decades. It is this, more than the baby boom itself, that has affected Australia's future age structure. Simulations reveal the true effects of the baby boom (figure 2.9).[12] In its absence, population ageing would have been brought forward in time and would generate a greater age dependency ratio than with the baby boom until the mid 2030s (and then with little difference to 2051). The baby boom deferred population ageing in Australia and has not accentuated it overall.[13] However, as apparent from figure 2.9, it has made the *onset* of population ageing more rapid.

Uncertainty over future fertility rates

While the general view is that mortality rates will continue to decline for Australia, even the direction of trends in total fertility rates is uncertain. The original ABS medium scenario (B series) assumed convergence to around 1.65 babies per woman, a figure also used by McDonald and Kippen (1999). The ABS also considered high and low long-run TFR scenarios of 1.8 and 1.4 babies per woman respectively. On the basis of data on cohort measures of birth rates, Kippen (2003) examined four possible long-run TFRs, 1.85, 1.78, 1.65 and 1.52 babies per woman, favouring the lower two scenarios as more probable.

However, most recently there appears to have been a small revival in TFRs. The TFR rose from around 1.73 in 2001 to around 1.76 in 2002 and 2003. On the basis of these new data and emerging longer-term trends, the expert group advising the Commission (which included Kippen and McDonald) suggested that the TFR may now stabilise at around 1.8 babies per woman. This was the basis for the medium scenario used by the Commission in its PC-M series. This projection is consistent with underlying trends in age-specific fertility rates and with credible shifts in the distribution of births by parity (that is, whether a woman has 0,1,2,3 etc babies in a lifetime).

Of course, the recent revival in the TFR may not persist. 'Revivals' have occurred in the past, only to be followed by further declines. For example, there were

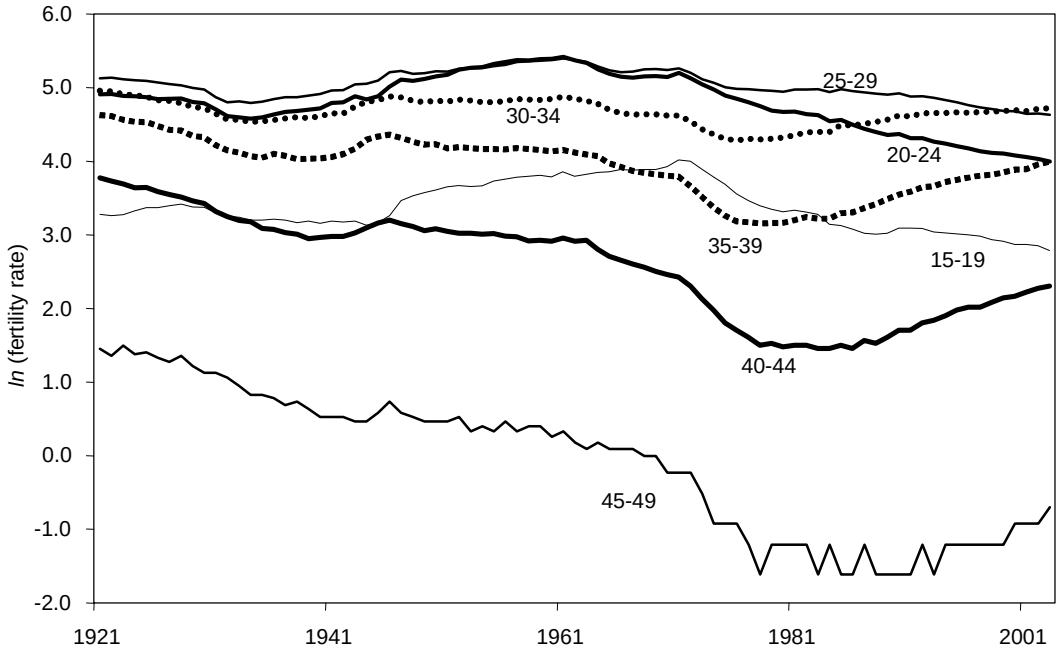
[12] In this scenario, the fertility rates were made to rise slowly from a TFR of 2.37 in 1942 to a peak of 2.47 in 1947 and then gradually decline to reach the reported TFR of 1.76 in 2003. This compares with the actual historic peak of 3.56 in 1961.

[13] The flip side is that the youth dependency ratio would have been lower without the baby boom to around 2010, and, as a consequence, the overall dependency ratio would have been lower until around 1990.

increases in the TFR of 4 per cent and 2 per cent for 1990 and 1992 respectively, but the TFR then declined for every year from 1992 to 1999.

The uncertainty about the future TFR reflects the fact that it is a synthetic measure of fertility that conceals complex fertility developments for women of different ages. The recent period of gradual decline masks strong declines in fertility among younger women and rises in fertility at later ages (figure 2.10). These changes reflect a continuing trend in the postponement of childbearing over the past three decades. The median age of mothers at confinement has risen steadily from 25.4 years in 1971 to reach 30.5 years in 2003 (figure 2.8).

Figure 2.10 **Fertility rates by age group**
Australia 1921-2003



Data source: Total fertility rates and median age of mothers are from ABS (*Australian Historical Population Statistics*, Cat. no. 3105.0.65.001 and *Births, Australia*, Cat. no. 3301.0).

During a period when mothers are postponing births, the TFR provides misleading evidence about future fertility rates (the 'tempo' effect).[14] What matters most for long-run population growth (and ageing) is the *completed* fertility rate (CFR) and not, as measured by the TFR, *when* in their lives women have babies. During the transition to a new stable set of ages at which women have babies, tempo effects

[14] There is substantial evidence that delayed parenthood is a continuing phenomenon (Kohler and Ortega 2002; Kohler, Billari and Ortega 2002). However, in some countries, including Denmark and the United States, the relevance of this effect has been weakened over time (Morgan and Ridnfuss 1999).

mean that, all other things being equal, the TFR will at first decline and then recover. At the nadir of this transition, it may appear that fertility is in crisis, when in fact completed fertility rates for all cohorts of women are still adequate. For example, Sobotka (2004) found that tempo effects gave a deceptive impression of excessively low fertility rates in all 27 European countries. For example, the 1995-2000 total fertility rate of Sweden of 1.57 would be 1.85 when adjusted for tempo effects (a tempo effect of -0.28). Many of the recoveries in fertility witnessed around the world, such as in Denmark, the US, Netherlands and Finland, are likely to reflect the playing out of earlier tempo effects.

Of course, tempo effects are not the only forces at work on fertility in Australia (or other countries), since it is evident that the CFR has also been falling and is now around 2.3 babies for the cohort that were 49 years old in 2003 (figure 2.8).[15] For a population with long-run constant age-specific fertility rates, the TFR and the CFR converge. It is likely that the CFR will continue to decline over the next 40 years, as shown in figure 2.11, reflecting continuing increases in the share of women who will be childless (McDonald 1998 and de Vaus 2002) and reductions in the share of women who have three or more babies in their lifetime (Carmichael and McDonald 2003). A continued decline in the CFR is also consonant with parenting intention surveys that most women aged 18 to 24 years today are *planning* to have around 2 children in their lifetime, with *realised* fertility rates expected to be less than planned rates.[16] The TFR, however, may well increase from its present level, converging to the CFR from below as tempo effects fade.

But disentangling trend declines in completed fertility rates from the effects of women merely shifting childbirth to older ages makes it particularly difficult to forecast the exact pattern and timing of the long-run convergence of the TFR and the CFR.

- It is quite possible that CFRs (or long-run TFRs) could be higher than 1.8 per woman. For example, it is possible that age-specific fertility rates for older ages could continue to increase strongly, as women 'catch-up' on babies forgone at earlier ages, while the declining fertility rates for young women eventually wane. In this case a TFR as high as 2.05 is possible by the mid 21st century. (This would still be associated with a long-run reduction in the completed fertility rate.) It is also notable that around one quarter of women (and their

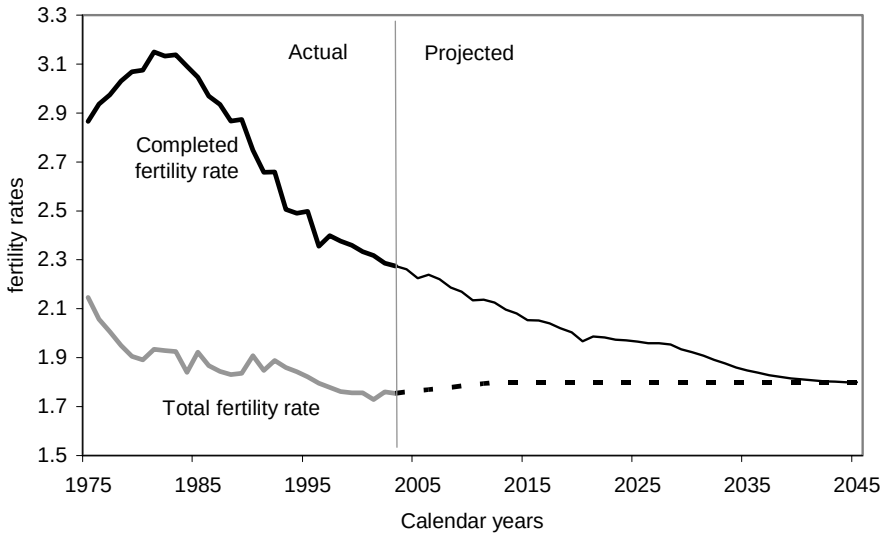
[15] Almost certainly, some future declines in the CFR will occur. For example, it is likely that the CFR for the 1963 cohort (that is, the lifetime fertility achieved by women aged 49 years in 2012) will be around 2.1. This estimate assumes a continuation of modest rises in the age-specific fertility rates of older women. The estimate is likely to be reasonably accurate even were there errors in this assumption, since such women have already gone through the most fertile part of their lives by 2003.

[16] Melbourne Institute of Applied Economic and Social Research (2002) and Weston et al. (2004).

partners) who have currently completed their fertility say that they have had fewer children than they would have wanted (survey evidence cited by de Vaus 2002).[17] This suggests that there is an unmet demand for children. Were the social and economic circumstances that generated this gap to change, then women might have more children.

- On the other hand, it is also possible that completed and (long-run) total fertility rates could drop below 1.8 babies per woman if the growth in childbearing in older women abates.

Figure 2.11 **Actual and projected fertility rates (PC-M)**
1975-2045



Data source: Commission estimates.

The Commission simulated the consequences for Australia's population of divergent views about fertility trends over the next 40 years and compared these with the base case (table 2.5).[18] While the effects on population *numbers* of plausible increases in the TFR above the Commission's medium scenario are significant, they only modestly decrease the aged dependency ratio by 2044-45. For example, even a large increase over the next decade to a TFR of 2.05, the level prevailing 30 years ago, still results in an increase in the aged dependency ratio from 19.3 per cent in 2003-04 to 39.1 per cent in 2044-45 — an increase in the ratio

[17] A much smaller share say they have had too many children.

[18] The low scenario represents the rough average of the low TFR scenarios given by Kippen and the ABS.

of 103 per cent (compared with a 113 per cent increase under the base case).[19] The reason for this modest effect is that fertility changes generally occur slowly. Even by 2044-45, they do not make a sufficient difference to the working age population to offset the large numbers of future older Australians. Indeed, the biggest short-term structural effect of increased fertility is to raise the number of the young, so increasing the young dependency ratio. This raises the overall dependency ratio over a 40 year projection horizon.

However, the *longer run* effects of increased fertility rates on the age structure are more substantial. For example, were the TFR to remain at 2.05 after 2013, then by 2151 the aged dependency ratio stabilises at around 41 per cent (compared with 46 per cent in the base case). By contrast, were the TFR to remain at 1.55 after 2013, then the long-run aged dependency ratio stabilises at around 51 per cent. Accordingly, (plausible) changes in fertility rates can make a significant difference to the age structure of Australia's population, but these take a long time to be realised.

While the fertility rate has implications for ageing over such long horizons, it is important not to misunderstand its influence. There are several misconceptions and myths about the role of fertility in ageing and population sustainability:

- There may be good reasons for increasing fertility rates, such as better meeting people's aspirations for having children or maybe longer term population policy (chapter 13). However, there should no expectation that, even if successful, fertility policy could act as a significant moderator of ageing over 'short' horizons, such as the focus of this study to 2044-45. Plausible fertility scenarios make only a modest difference to population ageing over this period.
- The view that population ageing is largely due to a sustained fall in fertility rates below replacement levels is incorrect. While fertility patterns have played a significant role, large ageing effects still remain over *any* projection horizon, even with higher fertility rates (as shown in table 2.5). Improvements in longevity are the major cause of *long-term* ageing.
- It is also not true that if fertility falls below the replacement rate (around 2.1 children per woman) for long enough then, excepting an implausibly large immigration program, the population will fall indefinitely. In fact, with a long-run TFR of 1.8, net inwards migration can fall significantly below current rates from about 0.57 to 0.23 per cent by 2013, with the population continuing to rise until 2068-69, before stabilising.

[19] Even in circumstances in which the TFR was to gradually rise to 3 babies per woman by 2050-51, the aged dependency ratio would still be around 38 per cent by 2044-45.

Such myths are compounded by misunderstandings of the limitations of the headline measure — the total fertility rate — as a reliable indication of the fertility experience of any given woman over her lifetime. It is important to clarify these issues if policy debates on fertility are to be well-informed.

Table 2.5 **Effects of varying assumptions about fertility on ageing in Australia**

	Share aged 65+ years	*Share aged 85+ years*	*Share aged <15 years*	*Aged depend. ratio*	*Total depend. ratio*	*Population*
	%	%	%	%	%	million
PC-M (TFRLR = 1.8)						
2003-04	13.0	1.5	19.8	19.3	48.7	20.1
2044-45	24.5	5.0	16	41.1	68.0	28.3
2150-51	26.6	6.3	15.6	46.0	73.0	36.6
PC-low (TFRLR = 1.55)						
2044-45	25.9	5.3	14.1	43.3	66.7	26.7
2150-51	29.1	7.1	13.5	50.7	74.2	26.7
PC-high (TFRLR = 2.05)						
2044-45	23.1	4.7	17.9	39.1	69.4	30.0
2150-51	24.0	5.5	17.8	41.4	72.0	50.4

Source: Commission estimates using methods set out in technical paper 1.

2.5 The role of migration in population ageing

Overseas migration

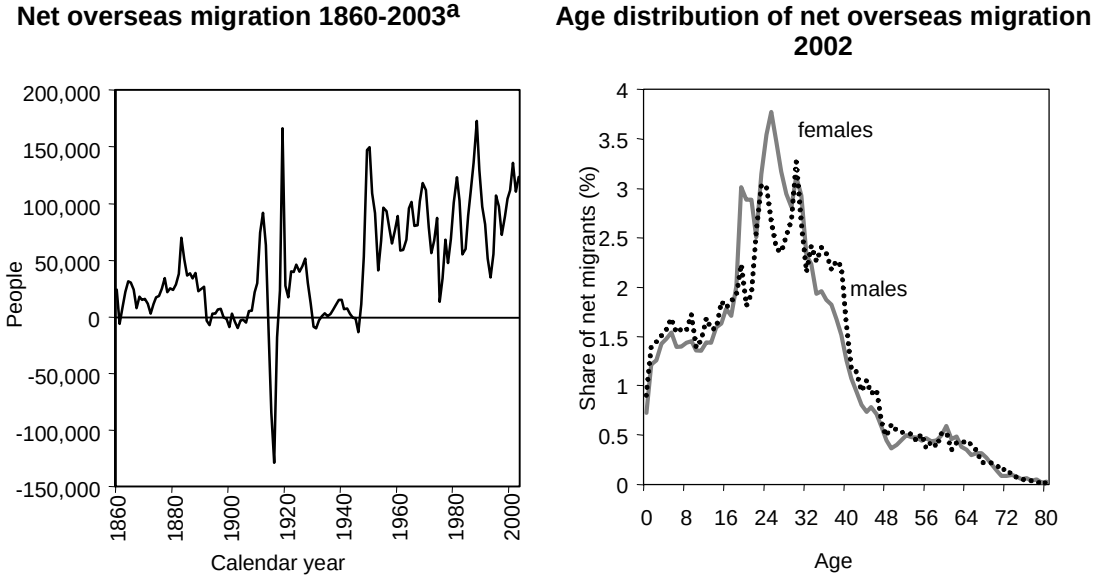
It is clear that net inflows of migrants[20] have strongly influenced population *numbers* in Australia (figure 2.12). Almost one quarter of the current Australian population was born overseas and net migration into Australia totalled over five million over the past century.

But how does migration affect the *age structure* of the population? Net migration largely adds to the working age population of Australia, with relatively small shares of people aged over 50 years (figure 2.12). Accordingly, in any given year, inflows

[20] Net overseas migration, as currently defined in the ABS statistics, consists of: (1) net permanent migration — new permanent settler arrivals in Australia, minus permanent departures of Australian permanent residents; (2) net long-term migration — arrivals minus departures of Australian permanent residents who were absent for more than one year plus arrivals minus departures of visitors staying in Australia for one year or more; and (3) category jumping — changes to travel intentions from short term to permanent or long term and vice versa.

of migrants reduce the aged dependency ratios in that year. However, the long-run effects need not be large because migrants themselves age. The degree to which the ageing of past migrants can be offset, and thus the ageing of the population delayed, also depends on the rate of growth of net migration over time.

Figure 2.12 **Patterns of net overseas migration into Australia**



a Until 1925 net overseas migration was measured simply by subtracting total overseas departures from total overseas arrivals. From July 1925, only long-term and permanent arrivals and departures were counted and from 1976 an adjustment was made for the fact that changes to travel intentions from short term to permanent or long-term and vice versa occur (category jumping). Due to problems identified in the processing of information on traveller intentions, adjustments for category jumping were dropped by the ABS in September 1997 pending a review of the method, but were re-introduced several years later. The data therefore reflect somewhat different measures of net overseas migration over this long period.

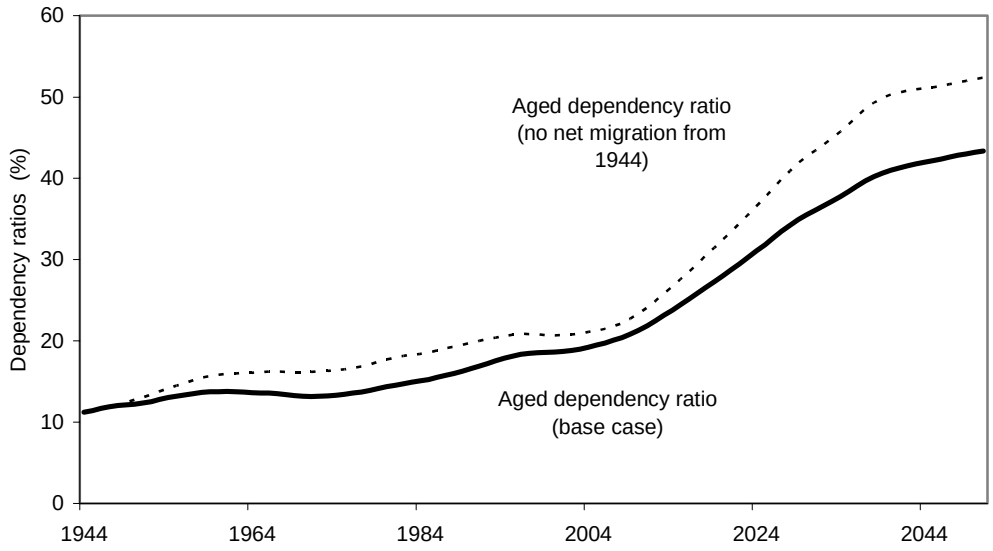
Data sources: ABS (*Australian Historical Population Statistics*, Cat. no. 3105.0.65.001 and *Australian Demographic Statistics*, Cat. no. 3101.0 for latest years).

Net migration has been significant and has generally grown over the last 50 years. While this has had large impacts on population numbers, its impact on Australia's age structure has been much smaller. Had there been no net migration to Australia from 1944 to 2051:

- Australia's population would have been only 13.2 million in 2044-45 and only 12.9 million by 2050-51 —roughly half of that projected in the base case. The long-run population would be declining because fertility is projected to be below replacement levels.
- the aged dependency rates in 2003-04 would be only several percentage points higher than that which actually prevailed (figure 2.13). The impact of zero net migration is bigger in the longer term, resulting in an aged dependency ratio

around 9 percentage points higher than the base case by 2044-45.[21] But significant population ageing still occurs in both instances. Accordingly, the aged dependency ratio is projected to increase by around 2.1 times from 2003-04 to 2044-45 under the base case, but would rise by only a little more (2.4 times) had there been no net migration after 1944.

Figure 2.13 **The aged dependency ratio with zero net migration**



a See technical paper 1 for a description of the base case. The counterfactual case is then simulated in the same way as the base case, but with zero net migration from 1944.

Data source: Commission estimates.

The implication is that while past (large) net migration inflows *have* moderated the rise in aged dependency rates, it has not prevented (and, at present levels, will not prevent) significant ageing of the population.

The question then arises about the *future* prospects for net migration and the extent to which it could affect population ageing over the next 40 years. At least in the near term, the Australian Government can largely determine the size of net migration inflows by altering quotas. Accordingly, of all the factors affecting population ageing, net migration rates might be seen as the most policy malleable (political economy considerations aside). Some analysts — most notably, Withers (2002) — claim that changes in immigration policy could make a significant difference to future policy ageing, while others have questioned this (Young 1990, 1994, McDonald and Kippen 1999b).

21 This is based on observed historical net migration levels and a steady state of 115 000 net migrants per year from 2005 to 2051.

The perspectives on this issue depend on two broad factors. First, they are based on judgments about what constitutes a 'significant' effect.

Second, they reflect different views about appropriate underlying demographic assumptions; namely:

- what assumptions should be made about the fertility of new immigrants? If they are higher (lower) than the host country then this will dampen (accelerate) future ageing. The Commission's projections incorporate the assumptions of the official ABS projections, with no difference in fertility (or mortality) rates by birth place;
- what assumptions should be made about the age distribution of net migrants? If the age structure shifts more to the young, then there is greater potential for net migration to affect the age structure. The Commission's projections adopt the ABS assumption that future migrants have the same age distribution as present migrants (which is already weighted towards younger people); and
- should future net migration flows be modelled as fixed population numbers or as a fixed share of the population, in which case, net inflows would increase over time? In each case, what assumption about the level or rate is appropriate?

At present, immigrant fertility is close to that of resident Australians (McDonald and Kippen 1999b). As noted by McDonald and Kippen, and acknowledged by Withers (2002), it is hard for the Government to select immigrants with higher fertility rates. One mechanism — choosing more people from non-English speaking backgrounds (who tend to have higher fertility rates) — would be contrary to Australia's non-discriminatory entry policies (and possibly conflict with other entry criteria, eg skill levels). In any case, simulations undertaken by McDonald and Kippen suggest that large differences in total fertility rates of immigrant compared with existing resident women would be required to make even a 1 percentage point difference in the share of those aged 65 years or more by 2048.

Alvarado and Creedy (1998) examined the impacts on ageing were there to be a shift in the age structure of net migrant inflows from 60 per cent being aged under 30 years to 80 per cent being aged under 30 years. In their particular experiment, this reduces the share of the population aged over 65 years by around 1.6 percentage points by 2050. However, Alvarado and Creedy's alternative assumption represents a de-facto 'orphans preferred' immigration policy because it produces an age distribution with unrealistically large numbers of children relative to adults.[22] More credible shifts to a younger age structure of migrants reduce the population share of

[22] Around 2.4 people aged 0-9 years per person aged 30-39, as against an actual historical experience of 0.7 (McDonald and Kippen 1999b).

people aged 65 years or more by only 0.6 percentage points by 2048 (McDonald and Kippen, 1999b). In any case, there are difficulties with targeting young families as migrants, because it would tend to increase youth dependency ratios and reduce the average skill levels of migrants.

The projections used in this report are based on an assumption that net migration is fixed at 115 000 per year from 2005. The alternative scenarios assume a ten year transition to a fixed (higher or lower) net migration levels from present levels. If the population is growing, this has the implication that net migration rates are falling over time, and the capacity for them to influence the age structure must also fall.

Withers (2002) considers that a fixed rate assumption may be more appropriate, given that the ability of a population to absorb a larger number of migrants rises as the population itself grows.

Past evidence does not indicate decisively which approach should be used:

- Calculations of trends in either rates or levels are complicated by some difficulties in categorising immigration (box 2.3).
- The historical evidence suggests that very different migration *rates* have applied at different periods in Australia's past (figure 2.14). That said, the observation by McDonald and Kippen (1999b) that the migration rate has had a sharp negative trend over the past half century appears to be influenced by the strong migration levels just after WWII, and does not apply consistently for the full period. For example, the rate appears to have been more stable (at under 0.6 net migrants per 1000 residents) since the early 1970s.
- Similarly, trends in *levels* appear to shift over time (figure 2.12). The linear trend line for the number of net migrants is positive in the last half-century. For example, from 1947 to 2003, the average rise is around 400 a year (translating to around 20 000 extra migrants every 50 years).[23] But the results are often not statistically significant. It is still quite possible that the best statistical description of net migration levels is that they are fixed at a given value, but subject to large random swings on a year to year basis.

[23] The long-run implied growth in migrants over a 50 year period depends on the exact starting date. Varying the starting date for calculating the trend from between 1945 and 1955 leads to growth in annual net migration of between 11 000 and 33 000 net migrants over a 50 year horizon. However, at conventional significance levels, the trend growth rates are only statistically significant for 6 out of the 11 starting dates.

Box 2.3 **Difficulties in measuring net overseas migration**

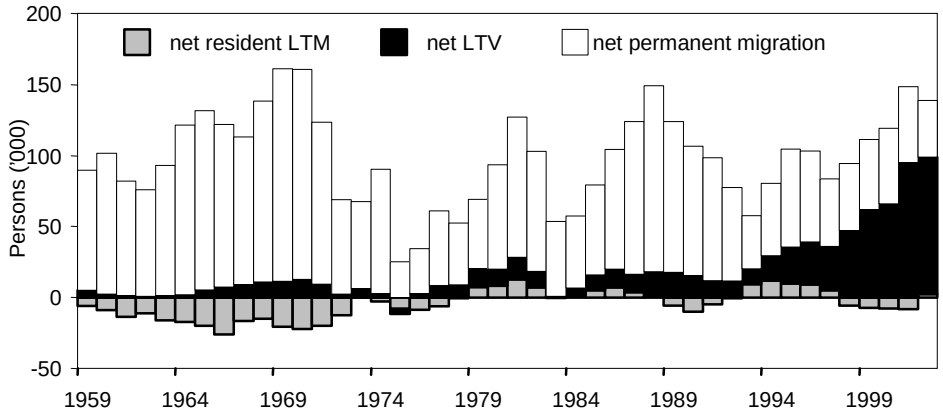
Measurement of net overseas migration is controversial, with different 'adjustment' methodologies employed at various times. The ABS suspended adjustments to net overseas migration from September 1997, but has re-introduced them recently. Apart from the adjustment for differences between intended and actual duration of stay, the new ABS net overseas migration adjustment also includes an element of adjustment for people being added to or taken out of the estimated resident population many times in the same quarter. The revised net overseas migration estimate is approximately 110,000 for 2001-02, down from the previously published net overseas migration of 134,000.

Some of Australia's leading demographers consider that even the large downward adjustment made by the ABS for 2001-02 may be too small (McDonald, Khoo and Kippen 2003). An alternative approach — the 'stock' method[24] — yields an estimate of net overseas migration of 96 000 for 2001-02, about 14 000 below the ABS's revised estimate and about 38 000 below the previously published ABS figure. While the stock method also has limitations, these results highlight some of the difficulties in measuring present levels of net overseas migration. The ABS acknowledges the need to continue developing new approaches (ABS 2004).

It is also worth noting that recent net overseas migration numbers increasingly reflect the growth in net long-term visitors (ABS 2003b). However, this growth will not be sustained, even if the number of long-term arrivals and departures reaches equilibrium at high levels.

These measurement problems complicate inferences about future migration numbers from recent trends.

Figure: **Components of net overseas migration[a]**

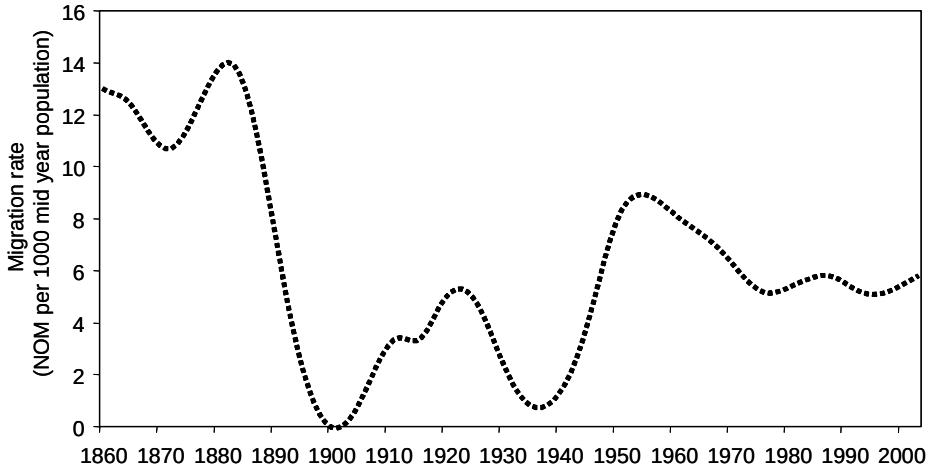


a Excludes category jumping. LTV denotes long-term visitors and LTM denotes long-term migration.

Data source: ABS (*Australian Historical Population Statistics*, table 57, Cat. no. 3105.0.65.001).

24 The stock method defines Net Overseas Migration as follows: NOM = (net permanent and long-term movement of Australia residents) + (the change in the stock of persons on long-term temporary visas) + (conversions on-shore to permanent residence) + (newly issued temporary protection visas) + (the change in stock of New Zealanders staying in Australia on a long-term basis).

Figure 2.14 **Net migration rates over the long run**[a]
Australia, 1860 to 2003



a Based on the net overseas migration data shown in figure 2.12, normalised by the mid year population, and then smoothed using a Hodrick-Prescott filter.

Data source: As in figure 2.12.

There are other factors that tend to support projections based on roughly fixed migration levels:

- It may not be the size of the resident population that is relevant for absorption of new migrants, but the size of the resident population of a similar age profile to migrants (McDonald and Kippen 2002b). If there were a fixed ratio of migrants to this re-defined Australian population base, the actual numbers of migrants would not change much over time, because the Australian population aged between 15 and 40 years (the dominant migrant age range) does not grow very much. Using a fixed ratio to the overall population would miss this effect.
- Australia is experiencing a rising number of emigrants. This leads to a need to absorb a larger number of immigrants, just to maintain the number of net migrants at a specific level.
- A fixed rate approach presumes that Australia can readily increase migrant inflows as our own population grows. But increasing competition for skilled migrants around the world means that it will progressively become more difficult to attract skilled migrants. These make up a growing proportion of migrants sought in the Australian migration program. Global competition for skills also has the potential to further increase skilled emigration from Australia, also acting as a possible constraint on increases in net inflows.
- The long-run population implications of a fixed rate rather than a level are substantial (as noted later), and may not be sustainable.

The Commission has used the fixed level approach in its base case, in line with past ABS practices and the advice of its expert group. However, there are reasonable arguments for either of the two approaches. Accordingly, the Commission considered the impact of a fixed migrant *rate*, as well as various other fixed *level* scenarios, on population ageing (table 2.6).

It is apparent that moderate levels of net migration of around 115 000 people per year — roughly Australia's present level — make a significant difference to population ageing to 2045 compared with *zero* future net migration. For example, where net migration is maintained at this level, the aged dependency ratio in 2044-45 is about 8 percentage points less than under the zero migration scenario.

Table 2.6 **What impact would different immigration policies have on population ageing in Australia by 2044-45?**

Migration scenarios	*Share aged 65+ years*	*Share aged 85+ years*	*Share aged <15 years*	*Aged dependency ratio*	*Total dependency ratio*
	%	%	%	%	%
Fixed migration levels					
PC ranges					
90 000	25.1	5.2	15.8	42.5	69.3
115 000	24.5	5.0	16.0	41.1	68.0
140 000	23.8	4.8	16.2	39.8	66.8
Other ranges					
0	28.1	6.0	14.9	49.2	75.3
30 000	27.0	5.7	15.2	46.7	73.0
60 000	26.0	5.4	15.5	44.5	71.0
120 000	24.3	5.0	16.0	40.8	67.7
150 000	23.6	4.8	16.3	39.3	66.3
300 000	20.8	4.0	17.1	33.6	61.2
330 000	20.4	3.9	17.3	32.8	60.4
Fixed migration rates					
0.57%	23.6	4.8	16.3	39.4	66.5
3.08%	12.9	2.0	20.1	19.3	49.2

a The projections assume the same fertility and mortality assumptions as in the base case, with only the net migration levels being varied. For all scenarios (other than the base case), it is assumed that there is a ten year (linear) transition from 2005 to the selected net migration level (or rate), which then stays fixed for the remaining years of the projection. The ABS used the ranges 70 000, 100 000 and 125 000 people per year for NOM in its 2003 projections.

Source: Commission estimates.

However, zero migration is obviously an extreme (and unrealistic) counterfactual. A more reasonable test of the impact of migration on ageing is whether credible deviations around the *existing* migration levels make much difference. The Commission estimated the Australia's age structure in 2045 were net overseas

migration to be 25 000 higher or lower than the base case of 115 000 net intake a year.[25] An increase to the upper range of 140 000 net migrants a year makes only a slight difference to the pace of population ageing. As noted by McDonald and Kippen (1999b), the marginal reductions in aged dependency from extra migration fall the higher the base level of migration.[26] Another possibility is a long-term decrease in inflows to 90 000 reflecting, for example, increased global competition for skilled migrants and population stagnation in younger age groups in developed countries (still the major source for Australia's migrants). This accentuates ageing by slightly more than the shift to a higher level retards it.

Moreover, unlike fertility, whose effects on ageing are amplified over time, the impacts of fixed migration levels are diluted over longer periods. For example, the aged dependency ratio in 2151 is projected to be 46 per cent under the base case, 46.7 per cent with net overseas migration of 90 000 and 45.4 per cent with net overseas migration of 140 000. This dilution mainly reflects the fact that migration falls as a share of the population.

Accordingly, it is also important to test the implications for ageing were the government to sustain migration as a fixed share of the population, rather than a fixed level. Fixing migration rates reduces ageing by more than fixing levels, but the impact is still small over a 40 year horizon. With a migration rate of 0.57 per cent — about the current level — the aged dependency ratio would rise from 19.3 per cent in 2003-04 to 39.4 per cent by 2044-45, only 1.7 percentage points less than under the base case for 2044-45. The divergence is bigger over the longer run. By 2151, the aged dependency ratio would rise to 41.3 per cent, around 4.7 percentage points less than the base case. However, the reason for the long-run difference is strong underlying population growth. This is not likely to be sustainable as environmental impacts, resource constraints and congestion mount.

An extreme example illustrates vividly the population growth/ageing trade-off.[27] In order for the aged dependency ratio in 2044-45 to be as low as its 2003-04 level, the migration rate would have to be raised to 3.08 per cent — more than five times its

[25] The ABS used a similar margin around its 100 000 base estimate in its 2003 projections.

[26] For example, the fall in the aged dependency ratio associated with an extra 30 000 people is 0.8 percentage points if the migration level is 320 000 a year, whereas the fall in the aged dependency ratio associated with an extra 30 000 people is 2.5 percentage points if the annual net migration intake is zero.

[27] The results even for the modest 0.57 per cent migration rate case are still significant. For example, under the base case, Australia's population is projected to rise to 29 million, 36.5 million and 41 million by 2051, 2151 and 2251 respectively, whereas under a fixed 0.57 per cent migration rate, it is projected to rise to 31 million, 56 million and 101 million for the same years (with the ratios of the population sizes of the alternative to the base scenario growing over time).

present rate. But this scenario is associated with an Australian population of around 85 million by 2044-45 and 108 million by 2050-51 (compared with the base projection of 28.3 million and 29.0 million for these two years respectively), with annual migrant intakes of 2.5 million a year in 2044-45 and 3.2 million a year in 2050-51.

Sustainability issues suggest that a reasonable long-run perspective may be one of zero population growth. In those circumstances, migration would need to eventually drop to around 0.25 per cent of the population (at the projected fertility and mortality rates) and the steady state aged dependency ratio would settle at around 48 per cent. Ultimately, increased migration flows can only temporarily and modestly reduce population ageing.

The lesson from these 'what if' scenarios is that net overseas migration cannot realistically be engineered to avoid or even substantially moderate Australia's demographic transition to an older population. However, as noted in chapter 13, higher net migration may still have important fiscal implications.

Interstate migration

It is very difficult to forecast interstate migration flows, because, unlike overseas migration, there are few barriers to the free movement of people. The flows will be affected by changes in the economic circumstances of different jurisdictions, competing policies for attracting and retaining people, diverging regulations affecting employment and schooling, and the respective population sizes and age structures of the donor and recipient jurisdictions. Jurisdictions sometimes have aspirations for net migration inflows that are inconsistent with other jurisdictions. Clearly, any forecasts of interstate migration must ensure that the gross inflows and outflows of different jurisdictions match.

Differences in the methodologies employed to forecast future interstate migration flows can have large effects on annual net flows for all jurisdictions and on population numbers and population structure for some. For example, Wilson and Bell (2002, p. 40) show that, depending on the approach used to estimate net flows, by 2050-51:

- Tasmania could have net internal migration flows of between -1 500 a year and +2 500 a year;[28]

[28] The Tasmanian Government (sub. 40) used the assumption of zero net migration for most of its modelling.

- Queensland could have net internal migration flows of between 41 000 a year and 6 200 a year; and
- South Australia could have net internal migration flows of between -2 500 a year and 4 700 a year.

Generally, for the more populated jurisdictions, differences in assumptions about net interstate migration do not make large differences to the projected age structure. This is not true, however, for some of the smaller jurisdictions, particularly the Northern Territory, South Australia and Tasmania. Accordingly, by 2050-51, Wilson and Bell (2002, p. 41) show that the aged dependency ratio could be:

- as high as 70.5 per cent and as low as 57.7 per cent in Tasmania (a discrepancy of 14 percentage points);
- as high as 29.5 per cent and as low as 16.3 per cent in the Northern Territory (a discrepancy of 13.2 percentage points); and
- as high as 60.6 per cent and as low as 54.3 per cent in South Australia ((a discrepancy of 6.3 percentage points).

The discrepancies arising from different assumptions are much smaller for other jurisdictions (for example, only 1 percentage point for Victoria).

The sensitivity of population ageing in individual jurisdictions to net interstate migration assumptions is much greater than the sensitivity of Australia's overall population structure to net overseas migration. However, the broad economic implications of this sensitivity are not as substantial as the actual discrepancies in aged dependency rates. This is because:

- what matters most in terms of economic growth and fiscal impacts is the aggregate age structure of the national population, not where in Australia the young and the old are located; and
- the Grants Commission's funding processes recognise the fiscal burdens of ageing (among other things), and take these into account when recommending the distribution of funds. Accordingly, there is limited scope for a jurisdiction to avoid the fiscal pressures associated with ageing through interstate population rivalry with other jurisdictions. Were a jurisdiction to attract the young and repel the old, the funding formulas would adapt to restore a roughly equable share of the aggregate fiscal burden associated with ageing.

2.6 Putting the jigsaw of effects together

Barring catastrophes, much of the population structure and numbers apparent at a given time are the legacy of demographic factors that have been at work for many years. For example, the baby boom in post-war Australia and the subsequent protracted reduction in fertility rates created bulges and gaps in population shares that progressed through age groups over lengthy periods of time. In contrast, demographic changes over the past few years have had a limited impact on the present population structure.

This inertia has the implication that a significant part of the future ageing of Australia's population reflects the influence of demographic patterns that have already been set — principally the effects of historically falling fertility rates and longer life expectancy.

Even were fertility rates, net migration levels and mortality rates to stay fixed at their current values, population ageing would still continue apace (table 2.7). For example, the aged dependency ratio would still rise by 16 percentage points from 2003-04 to 2044-45. This compares with the 22 percentage points rise in the aged dependency ratio under the base case (reflecting falling mortality rates).

Table 2.7 **Stuck in 2004 — a demographic thought-experiment[a]**

	Aged dependency ratio		*Youth dependency ratio*		*Total dependency ratio*	
	2004	2045	2004	2045	2004	2045
	%	%	%	%	%	%
Base case	19.3	41.1	29.4	26.9	48.7	68.0
All demographic drivers fixed at 2004 values	19.3	35.5	29.4	26.4	48.7	61.9

a The 'stuck in 2004' scenario is simulated with fertility and mortality rates at their 2003-04 values and net overseas migration levels fixed at 115 000 for all projection years. All data are reported for the June end of the year.

Source: Commission estimates.

Notwithstanding the importance of the past in shaping Australia's future demographic structure, it is also clear from this thought-experiment that around 6 percentage points of the 22 percentage point projected change in the aged dependency ratio *is* due to future changes in demographic factors.

This chapter has shown that this 6 percentage points could be significantly higher or lower, were different outcomes for fertility, mortality or net migration to prevail than the base case. In particular, different outcomes for mortality have the greatest

potential to accentuate or decrease population ageing, with less significant effects from credible changes in either fertility or net migration. That said, each of the experiments conducted in previous sections held two of the three determinants of the population age structure fixed. To get an impression of the *overall* range of uncertainty, the Commission also simulated (table 2.8) the outcomes for the age structure when simultaneously:

- *Scenario P1* — the total fertility rate rises to 2.05, life expectancy only increases to 83 and 86 years for males and females respectively and net migration levels increases to 140 000 per year (which will give the least aged population structure); and
- *Scenario P2* — the total fertility rate falls to 1.65, life expectancy increases to 92.2 and 95 years for males and females respectively by 2050-51[29] (equivalent to the life expectancy assumption made in the ABS A series) and net migration levels drops to 90 000 per year. Among the range of plausible scenarios, this produces the most aged population structure.

Table 2.8 **A range of possible futures**

Measures of ageing in 2044-45 and 2100-01[a]

	2044-45			*2100-01*		
Ageing measures	PC-M	P1	P2	PC-M	P1	P2
	%	%	%		%	%
Share aged 65+ years	24.5	21.4	28.9	26.6	22.7	35.2
Share aged 85+ years	5.0	3.9	7.8	6.3	4.7	13.6
Share aged <15 years	16.0	18.4	13.4	15.6	18.2	12.2
Aged dependency ratio	41.1	35.5	50.1	46.0	38.4	67.1
Total dependency ratio	68.0	65.9	73.3	73.0	69.1	90.4

[a] While the Commission has generally used 2044-45 as the end year for projections, the duration of demographic transitions are very extended. Accordingly, measures of the age structure for 2100-01 are also shown for the different scenarios.

Source: Commission estimates.

These scenarios reveal how different Australia's demographic futures could be. It is quite conceivable that the aged dependency ratio could be as high 50 per cent or as low as 36 per cent by 2044-45 (with even greater disparities over a century). The share of the population that are very old — those aged 85+ — could be as big as 8 per cent or as small as 4 per cent (and this widens to between 14 and 5 per cent over a projection horizon of one hundred years).

A recent assessment of Australia's population futures using probabilistic population models has also found a relatively wide range in possible aged dependency ratios

[29] Data for 2050-51 are used to match published ABS data on its alternative scenarios.

(Wilson and Bell 2004). This study estimated that there was a two-thirds probability that the aged dependency ratio would be between 45.0 and 54.6 per cent in 2051, with a median of 49.6 per cent.[30] They found significant population ageing to be inescapable.[31]

At the State level, even greater uncertainties exist for the smaller jurisdictions — South Australia, Tasmania and the Northern Territory — because net migration flows are hard to predict.[32] This is exacerbated in the latter case by the difficulties in projecting Indigenous populations (technical paper 1).

These uncertainties about the future extent of ageing suggest continued monitoring of population trends and the development of long-term policy approaches that are flexible enough to deal with quite different population ageing outcomes.

The other important message from such modelling is that the timeframe to 2044-45 required for this study does not represent the apogee of ageing. The transition is more protracted, especially in scenarios that visualise continuing increases in longevity. Even under the base case used by the Commission, there is a further increase in the aged dependency ratio of 5 percentage points from 2044-45 to 2100-01. Population ageing is likely to be an enduring process in Australia, and other developed economies.

[30] The median is nearly 6 percentage points higher than the PC-M projection for 2051 of 43.0 per cent. The Wilson and Bell study used a lower long-run expected TFR, a higher life expectancy at birth and lower net inward migration flows than the PC-M, which explains their higher median measure of aged dependency.

[31] The most recent ABS A and C population projections released in 2003 do not provide such dramatically divergent views of Australia's possible future age structures. For example, the aged dependency ratio lies between 46.0 and 50.8 per cent by 2050-51. This reflects two features of the main ABS scenarios. Firstly, they were intended to provide high and low estimates of population *numbers* — rather than high and low perspectives on the extent of ageing. Secondly, the ABS scenarios only have a medium and a high life expectancy assumption.

[32] For example, the Tasmanian Government (sub. 40, p. 10) identified considerable demographic uncertainty for that State, using a wide range of demographic scenarios in their modelling.

3 Ageing and labour markets

Key points

- Labour participation rates — the proportion of people in a job or looking for one — are inherently lower at older ages. By increasing the proportion of older people, population ageing will depress aggregate participation rates.
  - Over the next 40 years, aggregate labour force participation rates in Australia are projected to fall by around 7 percentage points from their current level of 63.5 per cent to 56.3 per cent by 2044-45.
  - Falling aggregate participation rates still occur even in scenarios in which labour participation rates for specific age/sex groups, such as older males, increase substantially.
  - There are few prospects that the demographic effects on participation can be significantly offset except through government interventions that raise participation rates broadly.
- Average weekly hours worked per employee are projected to fall. This reflects the rising incidence of part-time work generally and the increasing labour market share of older workers, who have a greater tendency to work part-time than others.
- Ageing has a small positive twist for unemployment. This reflects the fact that unemployment rates tend to be highest for young people, being in transition from education to work, and lowest for older people, who have the alternative of retirement.
- The negative effects of ageing on participation and average hours worked far outweigh the positive influences via lowered unemployment.
- Overall, labour supply grows much more sluggishly as a result of ageing.
  - In the 7 years from 2003-04 to 2010-11, the number of workers is projected to grow by around one million, while it would take nearly the full 21 years from 2023-24 to 2044-45 for the same growth to occur.
  - In the next 40 years, effective labour supply growth will grow more slowly than the population (unlike in the past), so that hours worked per capita decline by around 10 per cent.
- Relatively small increases in the average age of employees are anticipated over the next 40 years — roughly 1.8 years for males and 2.6 years for females.
- Even with the projected decline in participation, the ratio of employees to the total population will be higher in 2045 than at almost any time in the last century.
- Volunteering rates are likely to increase modestly in the next 40 years. This is mostly attributable to the decline in the population share of young people, who tend to have relatively low volunteering rates.

3.1 Why does ageing matter for the labour market?

At the turn of the 20th century, many older Australian males worked until near death, enjoying a relatively brief retirement. Consequently, in that era, workforce ageing did not have much effect on the total male labour supply.

In the ensuing century, Australians gained around 20 years of extra life expectancy and earned nearly five times more income per capita — fundamentally altering the nature of their expectations about leisure and work. Today, many males are anticipated to participate in the formal labour force for less than half of their (roughly) 80 year life expectancies.[1] Labour force participation for *both* sexes is now concentrated in the ages from 20 to 55 years.[2] People have lower participation rates at earlier ages (when acquiring education) and at higher ages (when many have voluntarily or involuntarily retired, or have cut back their involvement in work).

If this pattern persists, then the shift in the age structure of the population over the next half century will imply that many more Australians will be in age groups that have lower labour market involvement. Other things being equal, this can be expected to slow labour supply and, in turn, economic growth. Since governments fund services through taxes on current income, a fall in economic growth will affect the future ability of Australian governments to generate revenue to meet health, aged, education and other obligations.

Ageing may also have other labour market consequences. Today's generation of older workers have different characteristics to middle-aged and younger workers. For example:

- they are more experienced, but on average less educated and receive less training;
- they appear to be more productive than younger workers, but slightly less so than middle-aged workers;
- they are less likely to become unemployed than other age groups, but once unemployed take longer to find a new job;
- in any given year, they tend to change jobs less often and are less willing or able to move jobs to another location; and
- they tend to have a greater incidence of disability and ill health, and suffer some general physical and cognitive declines.

[1] The labour force includes those *with* jobs and those *looking* for work.

[2] Box 3.1 gives the usual definition of participation and other standard definitions of labour supply.

Box 3.1 **Definitions of terms used in labour supply**

There are several measures of labour markets and their links to the population. These are useful building blocks for describing the past and in modelling future scenarios.

- The *prime workforce* is the population aged between 15 and 64 years inclusive, covering those years when formal employment is most likely. This is more commonly referred to as the *potential workforce*, but this label can be misunderstood since it inaccurately implies that labour force participation rates are zero at ages after 64 years.
- The *effective labour supply* is the total supply of hours worked.
- The *feasible workforce* is the number of people who could feasibly be in the labour force and is measured as the civilian population. It is the base used to determine the labour force participation ratio.
- The *aged dependency rate* is the ratio of the 'old' (those aged 65 years and over) to the prime workforce.
- The *youth dependency rate* is the ratio of the 'young' (those aged below 15 years) to the prime workforce.
- The *labour force* includes all people in the civilian population who are in work (the *employed*) or actively looking for work (the *unemployed*).
- The *civilian population* is the Australian resident population aged 15 years and over, less permanent defence personnel.
- The *participation rate* is the share of the labour force in the civilian population (that is, as a share of the feasible workforce).
- The *unemployment rate* is the share of the labour force who are unemployed.
- An overall summary of the extent to which a country's population is actively employed is given by the *employment to population ratio* — the share of the population who are employed.

To the extent that these differences persist, they suggest that an ageing population may reduce unemployment, but also decrease labour market flexibility. The variations in worker productivity over different ages, combined with possible macroeconomic effects of ageing on capital accumulation and innovation, suggest that ageing may affect worker productivity too (chapter 4).

Of course, the old of tomorrow are likely to be different from the old of today, and this may also affect labour market outcomes. For instance, at given ages they may be healthier and more highly educated. This may mean higher labour market participation rates and productivity than would be anticipated from the characteristics observed among the current old.

It should be emphasised that the labour force does not count non-market activities as 'employment'. It excludes unpaid work, such as home activities like cooking, cleaning and childcare, and volunteering generally. Ageing may affect the amount of these economically and socially valuable activities. For example, per capita unpaid contributions outside the home made by people aged over 65 years are greater than those made by the young, but less than those made by middle aged groups (de Vaus et al. 2003). While they may not be counted as part of GDP and the labour force, some account needs to be taken of age-related trends in these activities in reaching a view about how well off Australians will be in generations to come.

In sum, ageing matters for labour markets and prosperity in numerous ways. This chapter is one of three that pieces together the jigsaw of effects that ageing may have for labour markets, aggregate labour supply and economic growth over the next half century. This chapter:

- sets out the framework for estimating future labour supply and economic growth;
- examines past trends in key labour supply measures;
- explores the mechanisms that will shape the impact of population ageing on labour markets, using the past as a guide to what may be important in the future; and
- provides projections of labour supply.

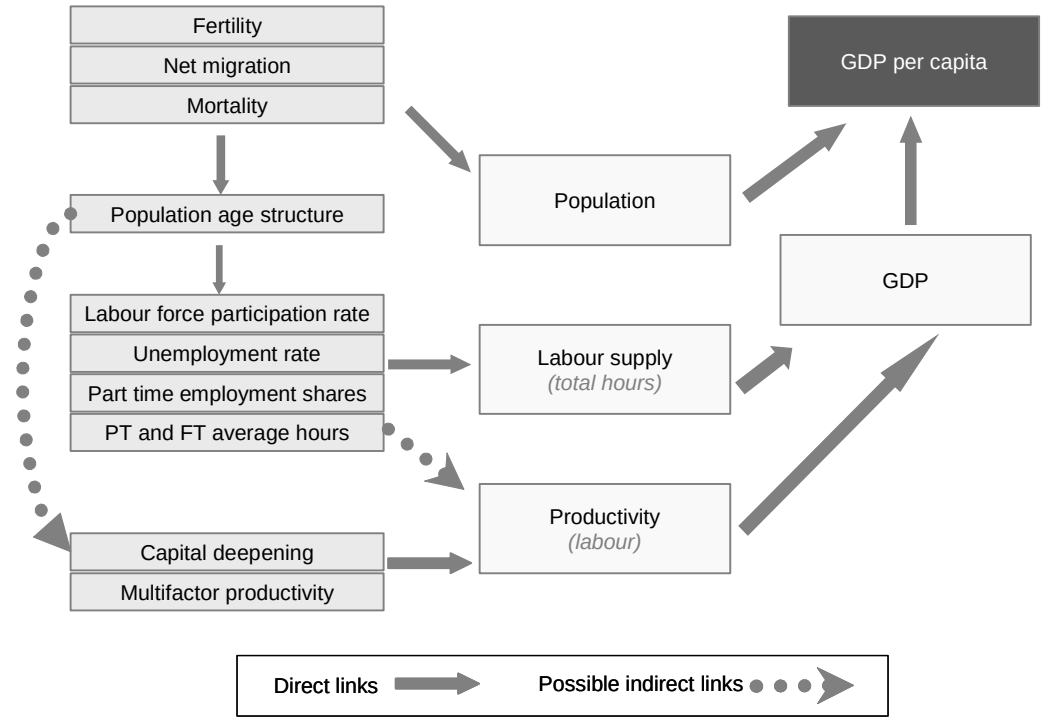
Chapter 4 provides evidence on the possible labour productivity effects of an ageing population. Finally, chapter 5 brings these elements together into projections of economic growth (and the contributing role of ageing) for Australia and its individual States.

3.2 The determinants of economic growth

The sum of a nation's (recorded) economic output per capita (measured as GDP per capita) depends broadly on three things, now popularly referred to as the three 'Ps' (figure 3.1):

- *population* — the total number of people (*and* the associated number of people of working age);
- *participation* — the amount of work measured as the number of hours of work undertaken in any given year; and
- *productivity* — labour productivity or output per hour.

Figure 3.1 **The three Ps of national economic output[a]**



a The figure expands upon the conceptual framework outlined by Henry (2003).

The first P has been discussed and projected in chapter 2. This chapter and the next are devoted to projecting the latter two Ps.

Estimating future economic growth is like peeling an onion. GDP per capita can be represented as the multiple of a chain of other labour market and other economic variables (box 3.2).[3] The percentage increase in GDP per capita in any given year is approximately equal to:

- the percentage increase in the labour participation rate;
- minus the change in the unemployment rate (*not* the percentage change);
- plus the percentage change in average hours worked per employee;
- plus the percentage increase in the ratio of the civilian population (civilians aged 15 years and above) to the total population; and
- plus the percentage change in labour productivity.

[3] A similar approach was adopted by Bacon (1999) and the Intergenerational Report.

Box 3.2 **The algebra of economic growth**

In formal terms, growth can be broken into its various constituent parts as follows:

$$\frac{GDP_t}{POP_t} \equiv \frac{LF_t}{CPOP_t} \times \frac{EMP_t}{LF_t} \times \frac{Hours_t}{EMP_t} \times \frac{CPOP_t}{POP_t} \times \frac{GDP_t}{Hours_t}$$
$$= \frac{LF_t}{CPOP_t} \times (1 - UR_t) \times \frac{Hours_t}{EMP_t} \times \frac{CPOP_t}{POP_t} \times \frac{GDP_t}{Hours_t}$$

where CPOP is the civilian population, POP is the total population, EMP is employment, LF is the labour force, GDP is (real) gross domestic product, Hours are total hours worked and UR is the unemployment rate.

In turn, this identity can be reformulated in growth terms, so that:

$$\Delta \log\left(\frac{GDP}{POP}\right)_t \equiv \Delta \log\left(\frac{LF}{CPOP}\right)_t + \Delta \log(1 - UR)_t + \Delta \log\left(\frac{Hours}{EMP}\right)_t +$$
$$\Delta \log\left(\frac{CPOP}{POP}\right)_t + \Delta \log\left(\frac{GDP}{Hours}\right)_t$$

noting that for small changes, Δlog x is close to the percentage change in x.

This simple formulation provides a basis for a modular approach to projecting GDP per capita — projections for each component can be made separately and simply added together. This report uses many methods for deriving the components, such as cohort analysis, econometric models of trends and educated assumptions.

Generally, each of the layers is examined at the 'age-gender-state-time' specific level and, in some cases, at even more disaggregated levels. For example, in the case of average hours worked per week, the total is derived by separately projecting average hours by sex, age group, State location, and part-time or full-time status from 2003-04 to 2044-45. When weighted by employment shares, these sub-components give an estimate of aggregate average hours worked.

By considering how any given labour market characteristic varies by age, it is possible, by keeping age shares fixed, to conjecture what would have happened had population ageing not occurred. However, it should be emphasised that the validity of such 'thought experiments' depends on whether other variables do not also change as the age structure changes (box 3.3).

Box 3.3 **Accounting for feedbacks**

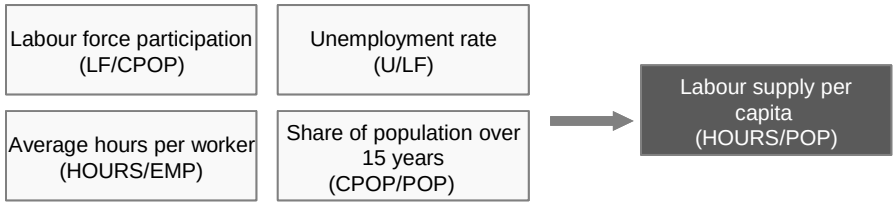
While each component of labour supply can be considered separately, there may be feedbacks from one component to another.

- As well as affecting population growth, changes in fertility rates may influence the propensity of women to participate in the labour force (and vice versa).
- Productivity shocks may be associated with changes in labour participation, since they affect wage rates and the attractiveness of working (while aggregate productivity rates may reflect compositional effects associated with shifts in the age structure of the workforce).
- The biggest effects on average hours worked arise from shifts in the composition of labour participation from full-time to part-time work, from males to females, and from younger to older workers, rather than a change in average hours worked for full-time or part-time jobs per se.
- Several interacting processes affect the labour force over the business cycle. It may be important when undertaking trend analysis of participation and unemployment rates to *control* for these business cycle impacts, so as to better estimate any trend components for projections. But such cyclical effects on participation rates are unlikely to matter for the long-run projection of participation rates.
- There may be links between increases in participation rates and part-time work for some older age groups, as people marginally attached to the labour force are more likely to secure part-time jobs than full-time jobs.

3.3 Labour supply trends: the view backwards

This section briefly considers each of the major components used to derive effective labour supply (figure 3.2) and their links with ageing as suggested by past patterns.

Figure 3.2 **Deriving total hours worked (labour supply) per capita**

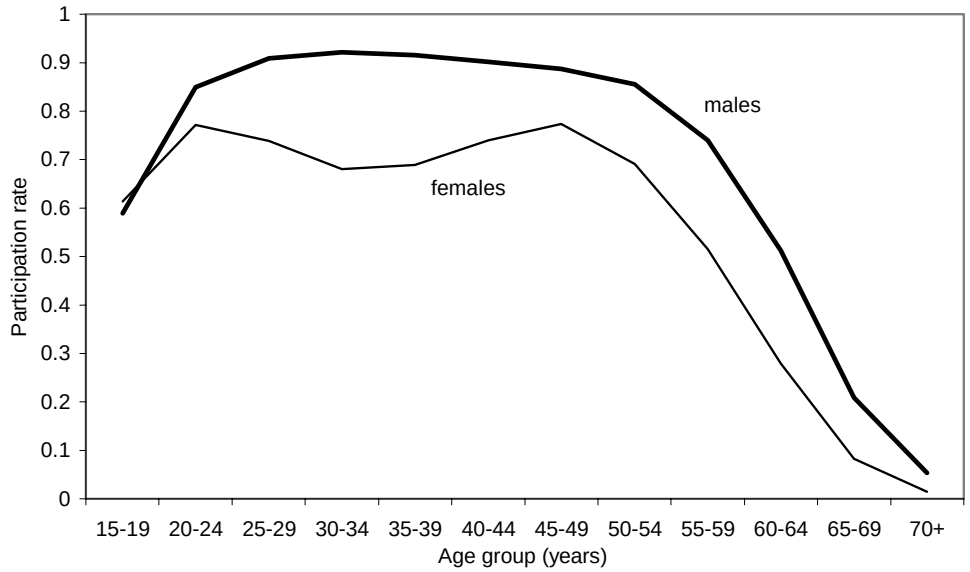


Labour participation rates

A major feature of labour participation is that different age groups have persistently different likelihoods of participating in the labour market, with lower participation

rates for the very young (reflecting involvement in education) and for older Australians (mainly reflecting retirement preferences and disability). This age profile of participation rates underlies the importance of the changing age structure of the workforce in shaping aggregate participation rates (figure 3.3).

Figure 3.3 **Participation rates are higher for males than females**
2003-04



Data source: ABS (*Labour Force, Australia, Detailed*, Cat. no. 6291.0.55.001).

There have been large shifts in participation rates over time. After a long gradual slide in the participation rate from the mid 1850s (with more women in the population), Australia's participation rate climbed by around 10 percentage points from the Second World War to the new millennium (reflecting a rise in female participation). At around 63 per cent, it is currently at an historical peak for the post-war period (figure 3.4). It is likely that most of the long-term trends are explained by slow changes in social and institutional factors, particularly changing attitudes to and preferences by women for paid employment.

Superimposed on the long-run trend are short-term swings in participation associated with the business cycle — usually regarded as reflecting the so-called 'encouraged/discouraged worker' effect. Since job search is costly, a lower probability of getting a job reduces the payoff from seeking a job. This discourages active participation when the probability of getting a job is low, such as during economic slowdowns, and increases it in times of economic buoyancy. Working against this 'encouraged/discouraged' worker effect is the 'added' worker effect, which occurs when a member of a household enters the labour market during an economic downturn to provide substitute income for a partner who has lost his or

her job. The empirical evidence suggests that the added worker effect is not significant, and as a consequence, labour participation rates are procyclical.

The Department of Employment and Workplace Relations (DEWR sub. DR71, pp. 4-6) suggested that net encouragement effects would generate long-run increases in participation rates, and that the Commission should build these into its projections:

> As long as cycles in the economy continue, this asymmetry [between encouragement and discouragement] will tend to increase participation rates.

This conjecture was based on evidence of a long-run relationship between participation rates and employment to population rates, which DEWR saw as capturing encouraged/discouraged worker effects. However, the finding that cyclical effects of this kind have such protracted impacts may be associated with deficiencies in the employment to population ratio as a measure of job search success. As noted by Reserve Bank of Australia research (Debelle and Vickery 1998), the employment to population ratio has drawbacks in this role. For a given ratio of the civilian population aged 15+ to the population, the participation rate is exactly equal to the employment to population ratio plus the unemployment to population ratio. Given this, while higher employment to population ratios may 'cause' higher participation rates, the causality may also run the other way. Anything that increases participation rates will tend also to increase employment to population ratios, unless unemployment rises.[4] Consequently, while there are clearly relationships between the employment to population ratio and participation, they are not easily interpreted.

Most models using the employment to population ratio as a measure of job likelihood do so in a form that picks up short-run labour supply effects only (for example, the Treasury TRYM model — Stacey and Downes 1995). Other measures that attempt to pick up the ease of finding a job are effectively non-trending over the long run, suggesting that encouraged-discouraged worker effects are best seen as a short-run phenomenon. For example:

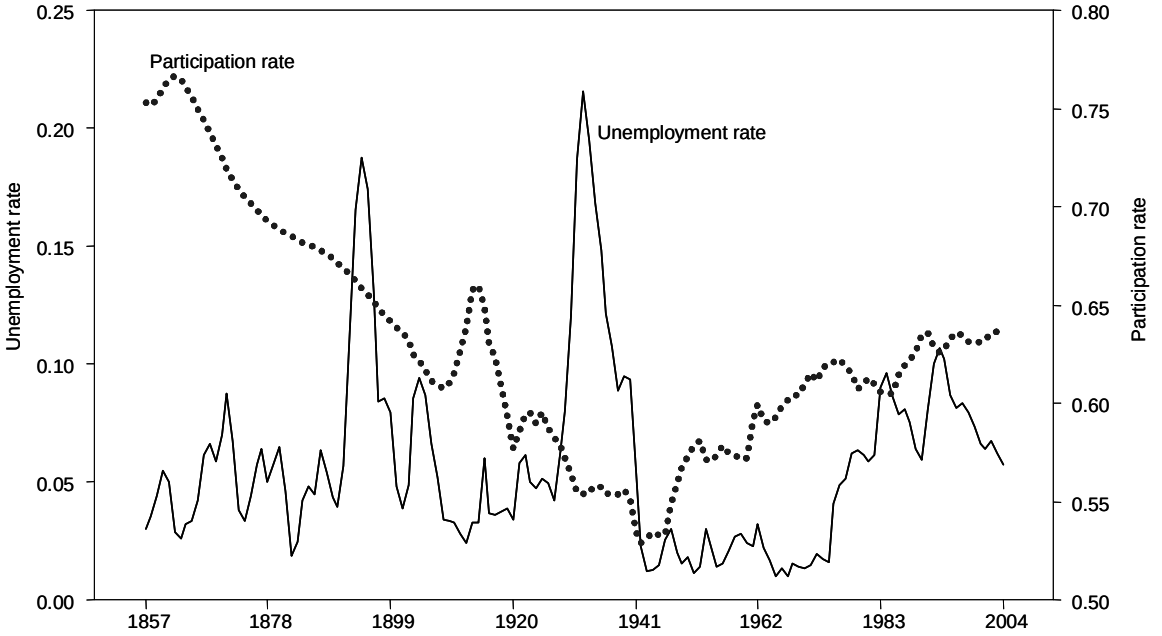
- There is no apparent long-run link between unemployment rates and trends in participation rates (figure 3.4).[5]

[4] Debelle and Vickery consequently use more direct measures of employment probability — the vacancy rate or the vacancy rate relative to the pool of unemployed. This reveals strong discouraged worker effects during periods when the vacancy rate is low.

[5] Though unemployment rates also have some disadvantages as a measure of finding a job, as noted by DEWR.

- Over a shorter time span (1979-2004), using peak to peak methods, the vacancy rate does not appear to have a strong trend, suggesting that it is probably not associated with the long-run movement in participation rates.

Figure 3.4 **Labour participation and unemployment rates**
1856-57 to 2003-04[a]



a Data from 1856 to 1947 are derived from population, unemployment and workforce data, adjusted for estimates of the proportion of the population aged 15 years and over, sourced from ABS (*Australian Historical Population Statistics*, Cat. no. 3105.0.65.001); Withers et al. (1985, p. 89, pp. 96-97, pp. 133-135 pp. 203ff) and Vamplew (1987, p. 30-35, p. 44). Data for series from 1948 to 1963 were estimated by splicing ABS labour force data from Butlin (1977, p. 91) onto the more recent estimates. Data for series from 1964 to 1977 were estimated by splicing ABS labour force data from Foster and Stewart (1991, p. 151) onto the more recent ABS estimates. Data for the series from August 1977-78 to 2003-04 are from the ABS (*Labour Force, Australia, Detailed* - Electronic Delivery Cat. No. 6291.0.55.001). A possible puzzle in the above data is the high aggregate participation rate in the 19th century, given that available evidence on female participation (at least at the end of the 19th century) suggested low female participation rates. One explanation is the higher male to population ratio in 19th century Australia, in part, prompted by immigration resulting from the gold rush in the 1850s (McLean 2004).

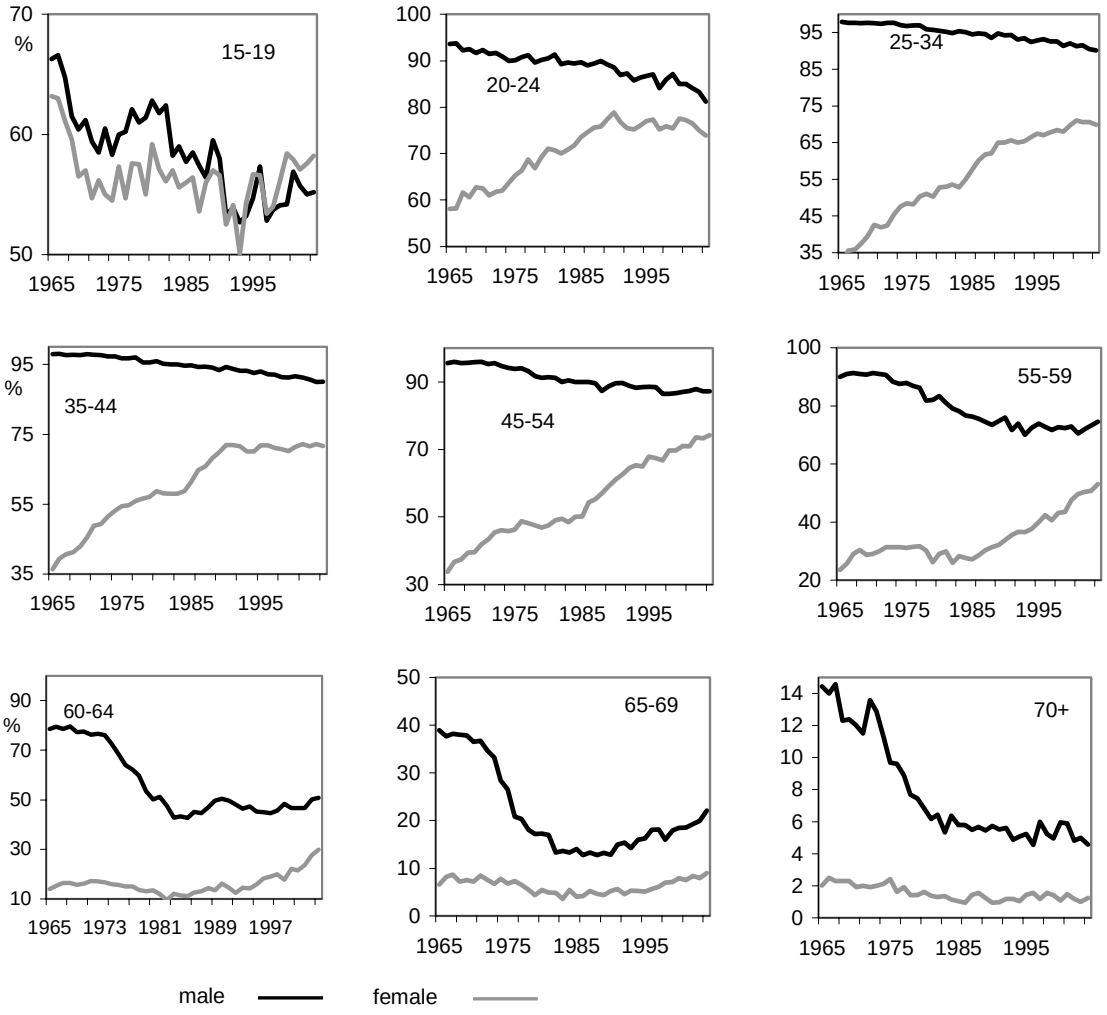
Data sources: ABS (*Labour Force, Australia, Detailed* Cat. No. 6291.0.55.001 and *Australian Historical Population Statistics*, Cat. no. 3105.0.65.001); Foster and Stewart (1991); Butlin (1977); Vamplew (1987); and Withers et al. (1985).

The aggregate story hides many of the underlying demographic and social currents that have affected labour force participation. Understanding these forces may be important for realistic projections. Data on historical participation rates reveal large, sometimes countervailing, changes in participation rates for *given* age-gender groups (figure 3.5). In particular:

- female participation rates have risen for all but the youngest and oldest groups;

- male participation rates have generally declined. In percentage terms, this decline has been greatest for older males; and
- over the longer run, the increasing duration of education among younger people has delayed their entry to the workforce. However, youth participation rates have risen in the last decade despite rising educational attendance — a trend associated with the increased availability of casual and part-time jobs.

Figure 3.5 **Participation rates by age groups, male and female**
August 1965 to August 2004



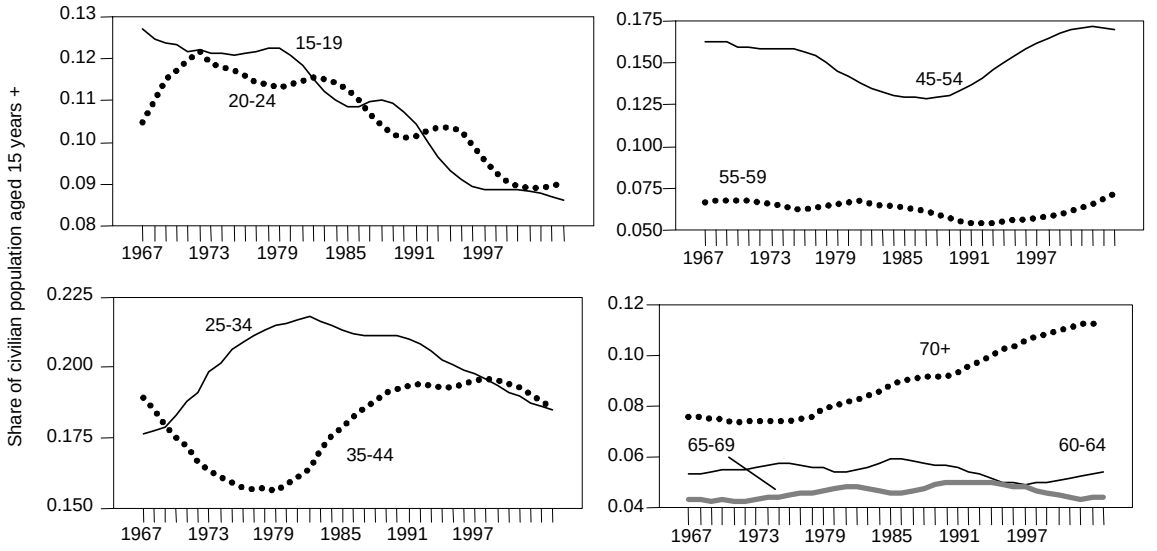
Data sources: Data for 1965 are from Foster and Stewart (1991) (with data for 55-59, 60-64, 65-69 and 70+ age groups estimated from data on 55-64 and 65+ age groups). Data for 1966 to 1977 are from ABS (*The Labour Force, Australia, Historical Summary 1966 to 1984*, Cat. no. 6204.0), while data for 1978 to 2004 are from ABS (*Labour Force, Australia, Detailed* - Electronic Delivery Cat. no. 6291.0.55.001, including unpublished data for the 65-69 and 70+ age groups and estimation of August 2004 data for these two age groups from June 2004 data).

There have been significant shifts in the age structure of the civilian population potentially available for work (those aged 15 years and over) over the past 25 years

(figure 3.6). But with the exception of the growing importance of people over 70 years old, the direction of the demographic shifts has not, so far, particularly favoured high or low participation age groups. This is because people aged 20-54 years have similar (high) labour participation rates. So the adverse effect on aggregate participation rates of the reduced population share of the young since the 1980s has been largely offset by the favourable effect of the increased population share of mature workers aged 35-54 years.

Figure 3.6 **Trends in population shares by working age groups**

Shares of civilian population over four decades



Data source: ABS (*Labour Force, Australia, Detailed* Cat. no. 6291.0.55.001) and ABS (*The Labour Force, Australia, Historical Summary 1966 to 1984*, Cat. no. 6204.0).

This is confirmed by more formal analysis that breaks down changes in the aggregate participation rate into those that can be attributed to shifts between age groups with differing participation rates — the ageing effect — and those that can be attributed to trends in participation rates within age groups. Over the four decades from August 1966 to August 2004, the trend effects have been the main source of change in the aggregate participation rate. Of the 2.75 percentage point change in the participation rate over this period, 5.3 percentage points can be attributed to trends in participation rates within age groups and -2.55 percentage points to shifts in the age structure of the population (age effects). Over this period, population ageing has had modest negative effects on Australia's overall labour participation rate and has been more than offset by trend rises in participation rates within age groups.[6]

6 Over the *very* long run, workforce ageing seems to have played a more significant role. But even this assessment changes on closer scrutiny. Over the period from 1911 to 2003, trend increases in

Overall, the greater general tendency for increased female participation has been the driving factor behind the increasing aggregate labour participation rate in the last 25 years. Had no other changes occurred, the labour participation rate would have increased by 6.1 percentage points from 1978-79 to 2003-04. The fact that the observed increase was actually only 2.7 percentage points largely reflects the offsetting influences of declining male participation trends and workforce ageing.

Cohort effects

The labour market behaviour of people born in different periods — cohorts — can be quite different. Analysis of cohort participation rates, rather than trends in age-specific participation rates, can produce a better understanding of past and likely future trends. The generational differences that underpin cohort analysis reflect:

- different social attitudes (for example, attitudes to the role of women in the workforce after marriage or childbirth);
- varying aptitudes (due to different levels of education and different lifetime exposures to technology and opportunities for learning by doing); and
- the enduring effects of historical events (such as higher disability rates among combatants in the world wars or the 'scarring' effects of mass unemployment).

It is clear, for example, that younger people are on average much better educated than their older brethren, and that better educated people generally have higher participation rates, an issue that is re-visited in section 3.4.

The generation into which a person is born makes a big difference to his or her lifetime labour force participation patterns.[7] This is particularly so for women. Lifetime female participation in the labour force has increased dramatically since Federation and its time profile has also altered (figure 3.7).[8]

---

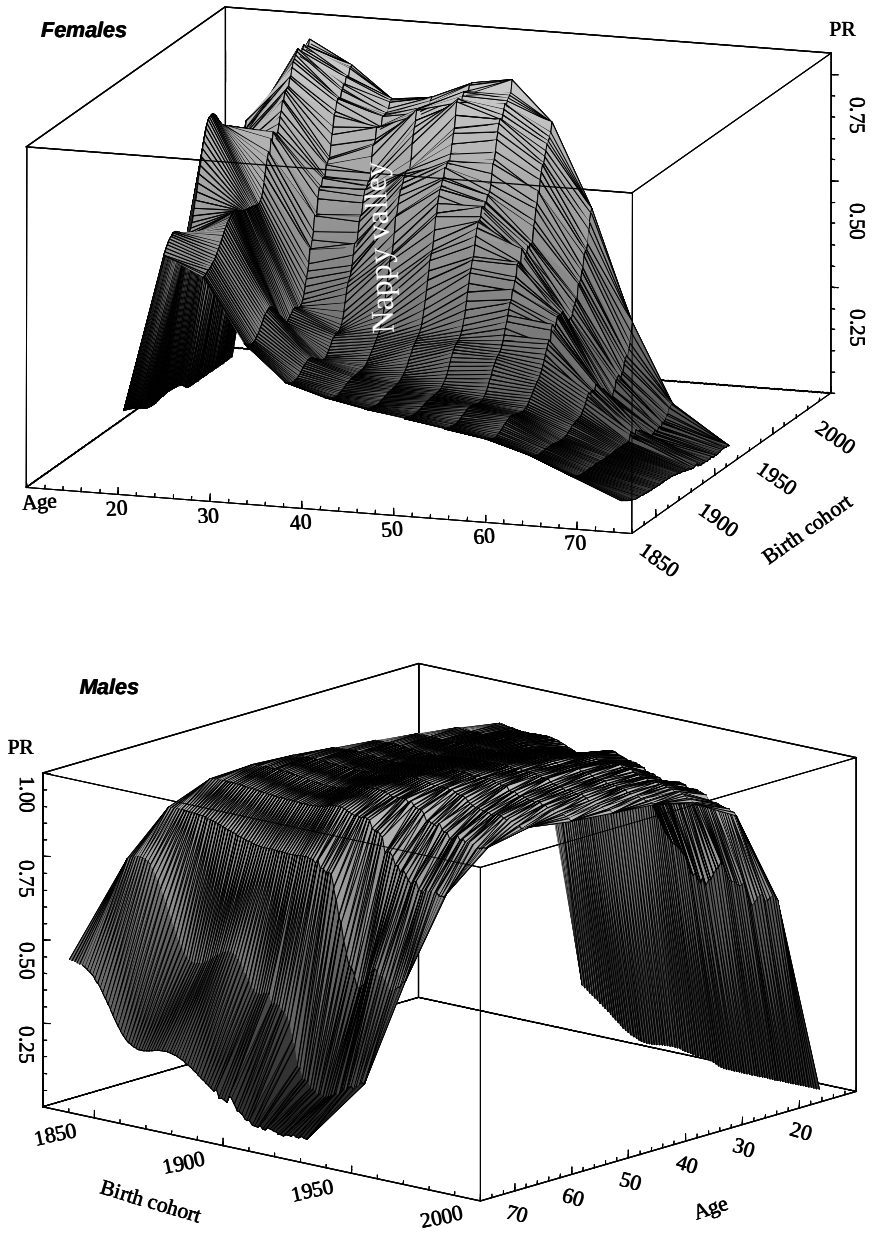
age-specific participation rates accounted for a 7.6 percentage points increase in the aggregate rate. In contrast, compositional shifts in the age structure of people aged 15 years and over accounted for a 6.6 percentage points fall in the aggregate rate. But this assessment ignores the historical role played by 10 to 14 year olds in Australia's labour force. For example, in 1911, 16 per cent of boys and 5.3 per cent of girls aged 10 to 14 years participated in the labour market. (By 2003, this group had no measured labour market role.) This suggests that over this long time span, participation rates should be calculated using the population aged 10 years and more — in line with the labour market involvement of this group in earlier years. In this case, shifts in age-specific participation rates increase the aggregate participation rate by 5.7 percentage points while population ageing reduces the aggregate rate by around 3.2 percentage points.

7 This is confirmed by statistical analysis undertaken by the Commission and by the ABS (Ravindiran et al. 2002).

8 Separate participation rates by gender are not available on a systematic basis for earlier periods. The high aggregate participation rates shown in figure 3.4 for the 19th century are not inconsistent

Figure 3.7 **Lifetime patterns of work for different cohorts: participation rates by age and birth year of cohort**

All birth years from 1834-38 to 1988-92[a]



a The orientation of the graphs is different so as to reveal particularly salient features of changes in participation rates for different cohorts. Data on ages and birth cohorts are the midpoints of 5 year spans.

Data sources: Technical paper 3 based on various labour force series from the ABS and Withers et al. (1985).

with the co-existence of relatively low female participation rates, because the male population was significantly higher than the female one (reflecting the 1850s gold rush).

A woman born around Federation would typically have participated in the formal labour market while very young (aged 10 to 19 years), and withdrawn from paid employment with marriage and child bearing. After having (several) children, she generally never returned to a paid job. The section of figure 3.7 depicting participation rates in the childbirth years — 'nappy valley' — is wide and deep for such early cohorts.

A woman born just before the Second World War also had her peak participation rate when young, but her withdrawal from the labour market with the advent of childbearing was temporary.

Later female cohorts have significantly lower participation rates than pre-1920 cohorts when young, reflecting greater involvement in secondary schooling and tertiary education. But against this, the dip in participation associated with childbearing is smaller and less protracted — 'nappy valley' is now shallow and much narrower. This is because women have become better educated, with fewer children and greater access to part-time jobs and childcare. The peak involvement of women in the labour force is now around 40-44 years — in stark contrast to their great-grandmothers.

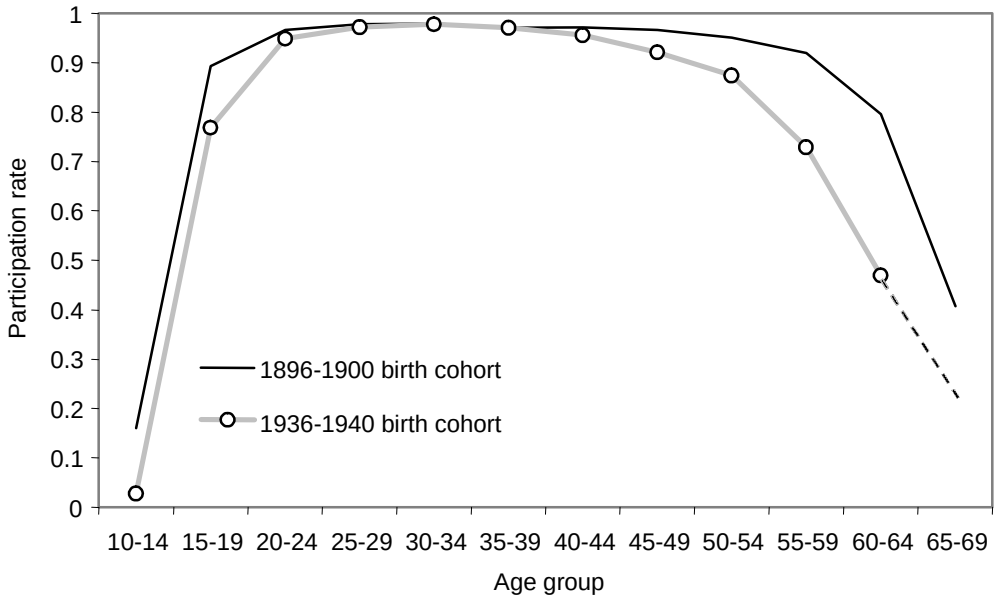
Several factors suggest that more recent birth cohorts will, when older, participate to a greater extent than the group of women currently aged 55 years and over. First, cohort effects are strong, and their effects on older age groups have yet to be fully played out. For example, cohorts born before 1950 have participation rates that are around 10 percentage points higher than the 1936-40 birth cohort. This greater lifetime propensity to be in the labour market can be expected to affect their participation when aged over 55 years. The phased deferral of access to the Age Pension from age 60 to 65 years is likely to further increase female participation rates for later birth cohorts.

Cohort effects are much less pronounced for males than females, and their long-run impact has been to *reduce* rather than increase labour force participation.

- At Federation, the lifetime participation profile of males hardly varied between ages 15 and 60 years, with steeply decreasing rates before and after this age range — like a building with a flat roof and steep sides.
- For later cohorts, the 'roof' started to collapse with older ages (more easily seen in a sample of the data — figure 3.8). For example, the participation rate of males aged 60-64 years was around 80 per cent for the 1896-1900 birth cohort, but some 30 percentage points less for the 1936-40 birth cohort.

Later in this chapter the Commission uses techniques that capitalise on these cohort differences to project labour participation rates.

Figure 3.8 **Comparing male participation rates by age for two cohorts**
Those born 1896-1900 and those born 1936-1940



Data sources: Technical paper 3 based on various labour force series from the ABS and Withers et al. (1985).

Unemployment

Participation rates measure whether people are available for work — but not whether they are actually in a job. Accordingly, it is necessary to subtract the unemployed when projecting the effective labour supply.

Unemployment rates vary by age group (figure 3.9). Young people have higher average unemployment rates, reflecting the matching and search costs associated with a first job. The oldest workers have low unemployment rates, largely because they can often leave the labour force and take up retirement benefits if jobs are hard to find. This suggests that the age structure of the feasible workforce may have an impact on aggregate unemployment rates. However, the size of the effect has been relatively small (figure 3.9).

Hours worked

While the overall participation rate has continued to rise from the 1980s, the most vigorous job growth has been in part-time jobs, while male full-time jobs have decreased at a rapid rate. This implies that the changing mix of part-time and full-time jobs will have had a significant impact on total hours worked (and accordingly effective labour supply and economic growth) — a trend that is

expected to persist. This points to the importance of projecting full and part-time participation rates and average hours worked, rather than just participation rates per se.

Figure 3.9 **Unemployment rates and ageing**
1978-79 to 2003-04[a]

a The age-adjusted measure of the unemployment rate is calculated by aggregating age-specific unemployment rates over time using 1978-79 population shares to determine the appropriate weights for the labour force. This then gives an idea of what unemployment would have been with no labour force ageing after 1978-79.

Data source: ABS (*Labour Force, Australia, Detailed* Cat. no. 6291.0.55.001).

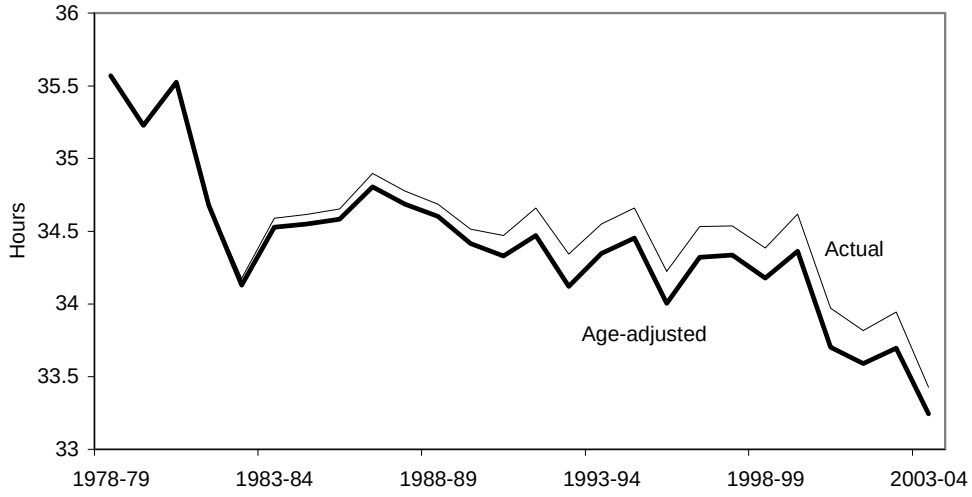
Over the past two decades, average weekly hours worked by full-time employees have risen for both genders and all age groups excepting those aged 65 years and over. Part-time hours worked have followed a more complex pattern:

- for males, average part-time hours fell significantly for most age groups from the early 1980s to the early 1990s — and have since risen generally, though in most cases not recovering to their 1980s levels; and
- average part-time hours increased throughout the two decades for some female age groups (for example, for females aged 25-34, 35-44 and 45-54 years), but showed the same pattern as for males for other age groups (for example, females aged 15-19 and 20-24 years).

Overall, average part-time weekly hours and full-time weekly hours have increased by around 4 and 3 per cent respectively from 1978-79 to 2003-04. But changes in the mix of employment between gender, age and full-time versus part-time status has meant that, in aggregate, average weekly hours worked have *fallen* by 6 per cent over the last 25 years (figure 3.10). This reflects several important structural changes in employment that may also be relevant for future projections of total hours worked:

- part-time work has increased significantly (from 5.1 per cent to 14.7 per cent of employment for males, 34.1 to 45.6 per cent for females and 15.5 per cent to 28.4 per cent overall);
- female participation rates have increased (as noted above). Females have a higher inherent likelihood of working part-time, and within their choice of full-time or part-time work, work less hours on average than males;[9] and
- changes in the age distribution have (over this period) shifted employment to age groups that work longer hours, though the effect is small. Had the age distribution of employment stayed at its 1978-79 levels, average hours worked would have fallen by 2.3 hours per week (or a 6.5 per cent reduction). As it was, shifts in the age distribution meant that hours worked only fell by 2.1 hours or a fall of 6.0 per cent.

Figure 3.10 **Average hours worked per week**
1978-79 to 2003-04[a]



a The age-adjusted hours worked were calculated by

$$AgeH_t = \sum_{w=1}^{2}\sum_{s=1}^{2}\sum_{a=1}^{12}\left(\frac{EMP_{w,s,a(1979)}}{EMP_{w,s(1979)}} \times AVHRS_{w,s,a,t} \times \frac{EMP_{w,s,t}}{EMP_t}\right)$$

where w, s and a are work type (full time and part time), sex and age categories. AVHRS are average hours worked for each category and EMP is employment. The difference between AgeH and the unadjusted series reflects shifts in the age distribution of employment. This method for calculating age effects does not take into account the impacts of changes in the age distribution of the population on part time work shares — which is an additional way in which ageing can affect average hours worked.

Data source: ABS (*Labour Force, Australia, Detailed* Cat. no. 6291.0.55.001).

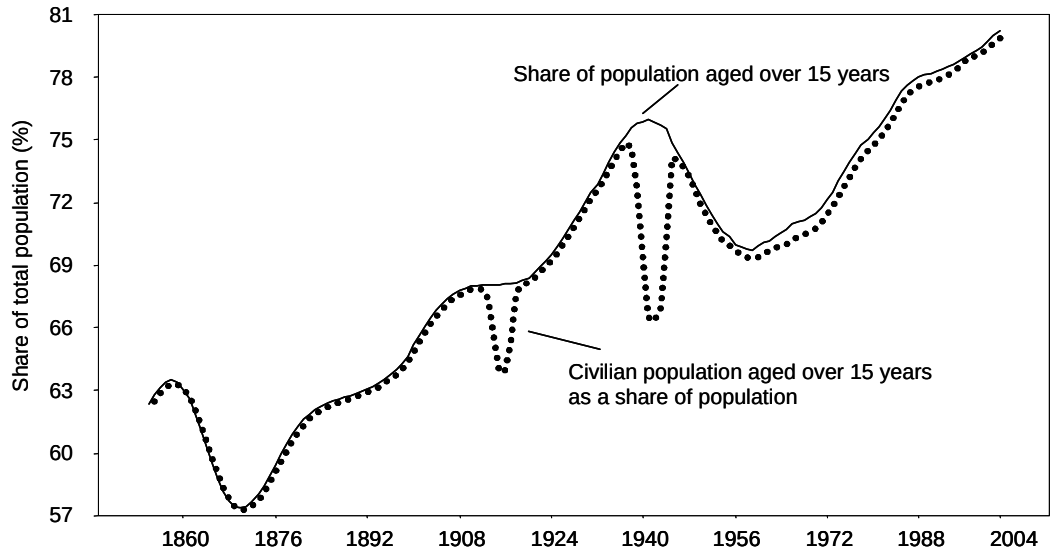
9 With the exception of part-time working hours for young people aged under 24 years, where male and female patterns of hours worked are indistinguishable.

The feasible workforce

The negative effect of population ageing on labour participation rates provides an exaggerated picture of the effects of ageing on output per *capita* because it does not take account of the reduced number of young people (those under age 15 years) who have to be supported. With population ageing, the aggregate labour force participation rate inevitably falls as more people shift into the retirement age bracket where the labour force participation rates are very low. But a typical corollary of ageing is that the proportion of the population aged below 15 years also falls. Accordingly, the effects of ageing on per capita income (as opposed to income per person aged 15 years and over) are moderated.

Historically, like most other developed economies, the relative size of the population aged 15 years and over, which is the maximum size of the workforce, has been generally growing over time (figure 3.11). For example, this demographic feature has meant that, from 1961-62 to 2003-04, real GDP per person aged 15 years and over grew by 123 per cent, while real GDP per capita grew by around 157 per cent, or more than 30 percentage points more. This demographic feature will be a significant restraining influence on the adverse effects of ageing on per capita income growth in the future.

Figure 3.11 **Relative size of the feasible workforce**
1855-56 to 2003-04[a]



[a] Two measures are shown. The first (the strict definition) excludes defence personnel from the feasible workforce so as to be consistent with the basis on which participation rates are measured (This is: CPOP/POP, the ratio of the civilian population to the total population). The second includes such defence personnel and so is simply the share of people aged 15 years and over in the population (POP15+/POP).

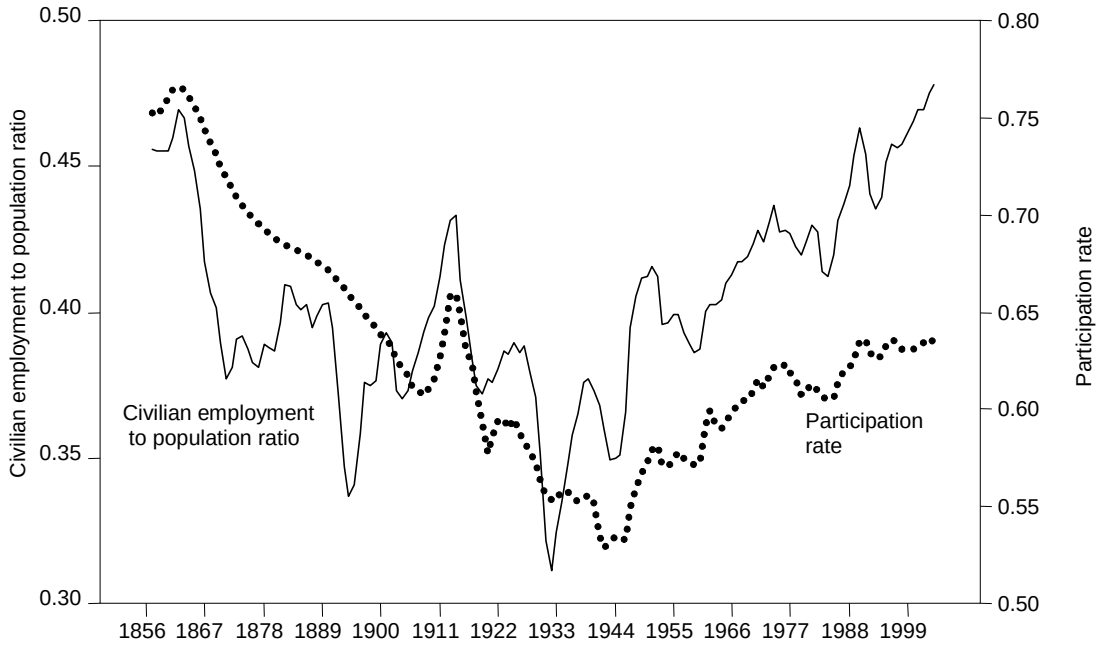
Data sources: Vamplew (1987, pp. 30-35, p. 44) and ABS (*Australian Historical Population Statistics*, Cat. no. 3105.0.65.001 and *Labour Force, Australia, Detailed* Cat. no. 6291.0.55.001).

Another way of identifying the importance of this factor, as well as any long-run shifts in unemployment rates, is to note that GDP per capita can be written as the following identity:

$$\begin{aligned} GDP/POP &\equiv Productivity \times (1\text{-}Unemployment\ rate) \times Participation\ rate \\ &\quad \times Civilian\ population\ to\ population\ ratio \\ &\equiv Productivity \times Employment\ to\ population\ ratio \end{aligned}$$

The employment-to-population ratio picks up the effects of reducing youth dependency, as well as changes in unemployment and participation rates — and is probably the best summary measure of labour supply trends in the economy (figure 3.12). Testimony to the effects of declining youth dependency, the employment to population ratio grew by 24 per cent from its post-war low in 1958-59 to 2003-04 in comparison with the 11 per cent growth in the participation rate over the same period.[10]

Figure 3.12 **Employment to population changes and participation rates**
1855-56 to 2003-04[a]



a Data prior to 1900-01 have been interpolated on ten year data using a cubic spline. The data on participation rates and employment were obtained from the sources described in figure 3.4, while those on the population are described in figure 3.6.

Data sources: ABS (*Australian Historical Population Statistics*, Cat. no. 3105.0.65.001 and *Labour Force, Australia, Detailed* Cat. no. 6291.0.55.001); Butlin (1977); Foster and Stewart (1991); Vamplew (1987) and Withers et al.(1985).

10 These growth rates are the percentage changes in the relevant rates, not the percentage points difference in rates. For example, the change in the participation rate is calculated as $100*(PR_{2004}\text{-}PR_{1959})/PR_{1959}$ per cent.

Remarkably (and unlike the participation rate), the present employment-to-population ratio is the highest it has been since useable economic records have been kept for Australia. Ageing will shift the ratio down from this historical peak, but (as shown later) not to levels that are very low by past standards.

What are the lessons from the historical trends?

Quite apart from the fact that projections are partly extrapolated on previous trends, the historical experiences are useful in other ways.

- Even though significant ageing occurred over the 20th century, ageing has so far played second fiddle to other social forces affecting labour market participation.
- Cyclical downturns are relatively unimportant influences over the very long term. This is significant because there may be cyclical downturns over the next forty years. However, their timing and likelihood is conjectural. Since such downturns matter over the short and medium terms only, it is appropriate to use long-term average trends in economic variables in projections, rather than to try to forecast any particular cyclical shocks.
- Participation rates can change markedly in a short period — for example, participation rates for males aged 65 and over halved from the mid 1970s to the early 1980s.
- There are significant switches in trends in participation rates. For example, 65-69 year old male participation rates fell by a trend rate of 1.6 per cent per year from August 1965 to August 1984, but increased by a trend rate of above 0.5 per cent per year from August 1990 to August 2004. It is doubtful that the resurgence in participation rates from 1990 could have been readily predicted beforehand. This underlines the difficulties in projecting participation rates on the basis of past trends.
- The effect of population ageing on the aggregate participation rate was more than offset by within age-group effects — such as increased female participation — over the past 25 years. In the future, these effects will continue, but are unlikely to be as strong. Accordingly, population ageing effects are likely to be bigger. The future will not look like the past — simple extrapolations on the basis of the *aggregate* labour participation rate would be highly misleading because they fail to take account of compositional effects.

3.4 Projections of Australia's labour supply

What will affect future labour supply?

The dynamics of the labour force can be likened to a leaky tub being filled by a hose. Retirement and other moves out of the labour force deplete it, while it is replenished mainly by new younger recruits and women re-entering the workforce after childbirth. The ageing of the population has big effects on these flows by increasing outflows due to retirement, while stemming inflows of new young workers. Much of the future labour supply story is purely demographic — a reasonable approximation to future labour supply growth is the change in the population aged 15 to 64 years (figure 3.13).

Figure 3.13 **Growth in worker numbers is set to decline**

Yearly percentage change in the number of people aged 15-64, 1944-45 to 2044-45

Data sources: PC-M population projections and ABS historical population data for earlier years.

However, there are a myriad of factors apart from the purely demographic that may affect participation rates and therefore labour supply. To get a more precise grasp of labour supply involves peeling the onion of its potential contributing components. To do this requires assumptions about future labour market trends, which can depend on:

- the role of labour shortages;
- trends in future education;
- changes to pension and retirement income policy;
- trends in disability rates; and

- slow moving social trends — such as improved access to paid work for women.

The role of labour shortages

There are well-founded concerns of at least temporary shortages in specific occupations, such as the health care professions, as their workforces age while demand for their services rise (DEWR sub. 71, pp. 8ff, AIHW 2004a, Tasmanian Government sub. DR69, p. 9, Queensland Nurses Union sub. DR59 and MCEETYA 2003). The prospects of specific occupational shortages, however, is often popularly transmuted into a broader concern that the dampening impacts of population ageing on labour supply growth will create lasting economy-wide labour shortages. It is claimed that these widespread shortages will decrease unemployment rates and increase participation rates as people outside the labour force respond to the high demand for workers, thus alleviating these supply limits autonomously.[11]

Labour shortages refers to difficulties experienced by employers generally in employing particular occupations at what were previously adequate wages and conditions (DEWR 2004b) — the demand for people in these occupations at a given wage, exceeds their supply. Such specific skilled labour shortages are on-going features of any market economy as shifts in consumption and production occur (for example, shortages of geologists during the mining boom and bricklayers during the housing boom). Generally, such specific occupational skill shortages (and excesses) are transitory, as training institutions respond to demand, industry structures change and relative occupational wage rates vary. Ageing may create more enduring shortages in some health care professions, reflecting entry barriers and insufficiently attractive regulated wages and conditions in these areas. But whether temporary or long-lived, such *specific* shortages do not loom very large for the whole labour market and therefore cannot significantly affect overall participation rates, primarily shifting *where* people are employed.

In contrast to specific skill shortages, the concept of *economy-wide* labour shortages is more difficult to define and measure (OECD 2003b, pp. 103ff). It does not mean that there are x jobs to fill and only x minus y people available to fill them. This is because an excess demand for labour by businesses (many vacancies) may coexist with a substantial excess supply of labour (unemployment). Among other factors, this can reflect a mismatch between the skills and attributes of the unemployed and available job vacancies, or geographic immobility of labour. So even to the extent

[11] For example, Visco (2001) suggests that labour scarcity may increase real wages in OECD countries generally, increasing participation rates (though he equally suggests that tax increases to fund social measures associated with ageing may have the opposite effect).

that there were labour shortages arising from demographic pressures, these would not mean that there would be jobs for all.

However, it is not clear that ageing would generate on-going *economy-wide* labour shortages in Australia. First, ageing does not actually result in a reduction of available labour inputs, merely a gradual slowing in their growth rate (figure 3.13).[12] Output, capital accumulation and consumption would still grow. However, they would grow at slower rates than had labour supply grown faster. Businesses would therefore generally not face demands for their goods and services that they could not meet with their existing workers and capital.

Suppose, however, a more extreme situation in which labour supply actually fell because of ageing. Realistically, this will not happen in Australia, but it is the fate of several European countries.[13] In this case, as people retired faster than they could be replaced, businesses would have a given quantity of jobs, given demand, but not enough people to fill them. **This situation is exactly the same as that arises when an economy overheats.** Economic analysis suggests that the outcome of overheating should be the same whether the cause be underlying demographic pressures, excessive consumer confidence or low interest rates. Overheating does not generate large permanent increases in the labour force. As an economy overheats (as incipient labour shortages develop), the long-term job vacancy rate rises. Businesses now accept, at existing or higher wages, people that they used to reject. Unemployment rates would start to fall, and some people outside the labour force would be encouraged into the labour market. But wage pressures would rise with decreasing unemployment, and so too inflation (Layard, Nickell and Jackman 1991 and Cahuc and Zylberberg 2004). Government macroeconomic policy would then target inflation by raising real interest rates and dampening demand (and thus raising unemployment) to restore a stable inflation rate.[14] Equilibrium would be achieved at the output that was given by the original labour supply.

This story is the same one that says it is difficult to solve present unemployment with demand management without raising inflation. The essential point is that jobs are not fixed, but respond to feedbacks from the wider economy. Unemployed people and people outside the labour force are generally different from the employed (in skill, motivation and aptitude). They cannot simply occupy vacant

[12] In an open economy this could be expected to result in continued capital accumulation that approximately maintains capital labour ratios at their counterfactual levels and (for given productivity levels) constant real wages (See Kotlikoff and Burns 2004, p. 114 for this mechanism). The absence of real wage increases associated with labour supply changes means there is no signal for people not in the labour force to increase their participation rates.

[13] Borsch-Supan (2001) forecasts a 15 per cent decline in the labour force in Germany to 2035.

[14] Called the non-accelerating inflation rate of unemployment or NAIRU.

jobs without creating wage pressures that invite macroeconomic responses that restore equilibrium unemployment rates. This is why government policies to improve the employability of people currently without jobs or increasing intakes of skilled migrants are important for raising labour supply without inflationary pressures.

If the dampening effect of ageing pressures on labour supply could autonomously trigger offsetting changes in unemployment and participation rates, then it would be expected that this would hold in the reverse were demographic change to increase the size of the potential workforce. This is not borne out by studies of the effect of large net migration inflows, which find that they proportionately raise labour supply with negligible effects on unemployment rates.[15]

So the direct effects of ageing on labour supply growth are unlikely to generate an autonomous increase in participation rates and decrease in unemployment (other than through the small effect from the changing age structure of unemployment). The emphasis here is on the word autonomous. It may well be highly desirable for Governments to pursue policies that mobilise Australia's large currently non-employed latent labour force, prompted in part by the challenges of ageing. But the pressures posed by ageing will not elicit this labour market change *without* Government intervention. The projections in this chapter are based on a 'no policy change' assumption. To do otherwise would obscure where policy was needed (chapter 1). Chapter 13 sets out some of the policy directions to stimulate participation rates.

Trends in future education

Educational attainment is strongly linked to labour participation rate outcomes (figure 3.14). Older people currently have low levels of post-school education, but cohort analysis of educational attainment rates suggest that in several decades, older workers will have higher average rates of educational attainment than younger

[15] For example, Australia experienced a massive migration intake after WWII, that increased the pool of available labour significantly. But this did not result in an excess supply of labour nor increased unemployment. Jobs expanded to use the bigger pool of able labour, and output grew accordingly. That said, countries with strong demand and labour supply constraints on growth are more likely to ease immigration quotas. Nevertheless, the international literature on migration flows also finds small effects on native unemployment in cases where the migration flow is indisputably a supply shock. Examples include the Mariel Boatlift of 125 000 Cuban immigrants to Miami in 1980, the return of Portuguese colonialists from Africa, the influx into France of pied noirs from Algeria during the early 1960s, and the mass migration to Israel following the lifting of emigration restrictions in the former Soviet Union. The general view of the literature on mass immigration is that it adds to labour supply with an essentially zero impact on other labour market conditions (Gaston and Nelson 2001).

workers (figure 3.15). This occurs for two reasons. First, the current generation of young have relatively high educational attainment rates — and by the middle of this century, they will be the next generation of the old. Second, people continue to acquire education as they age.

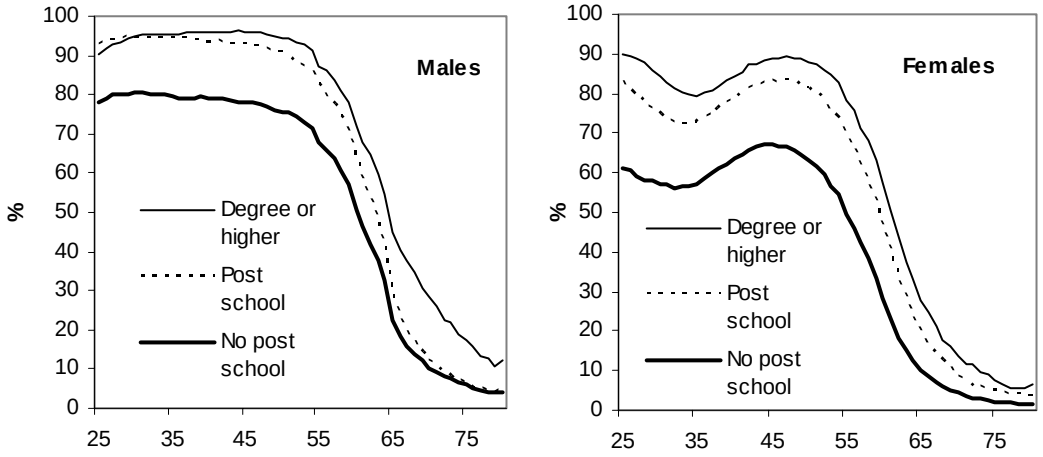
This striking change in the age distribution of educational attainment can be expected, all other things being equal, to stimulate labour force participation rates for older workers to some degree — a point emphasised in several submissions to this study (CPA sub. DR60, p. 13 and ABARE sub. DR50, pp. 3-4) and in some recent studies (Gruen and Garbutt 2003, Kennedy and Hedley 2003). Gruen and Garbutt (2003, pp. 25-27) assessed the impact of rising education on future labour participation by assuming that age-specific rates of labour participation by education stay at their current level. They find that labour participation rates increase for all ages and both sexes, with particularly large increases for people (and especially women) aged over 55 years.

However, future rises in educational attainment of older people may not increase their labour participation rates by as much as might be suggested by the current cross-sectional association between education and participation (appendix B).

- The extension of higher education to many more people changes the mix of people who hold differing levels of educational attainment, with likely impacts on the participation rates they achieve. For example, of the one in 16 women aged 65 years currently holding degrees, most acquired their degrees in the 1960s, when entrance to university was highly limited. The women concerned are likely to be generally more able as a group than the one in four women currently aged 25 who have a degree or higher.
- The continuing decline in the demand for low skill jobs — particularly for males — may accentuate the disadvantage associated with no post-school education, leading to even lower participation rates for these groups.

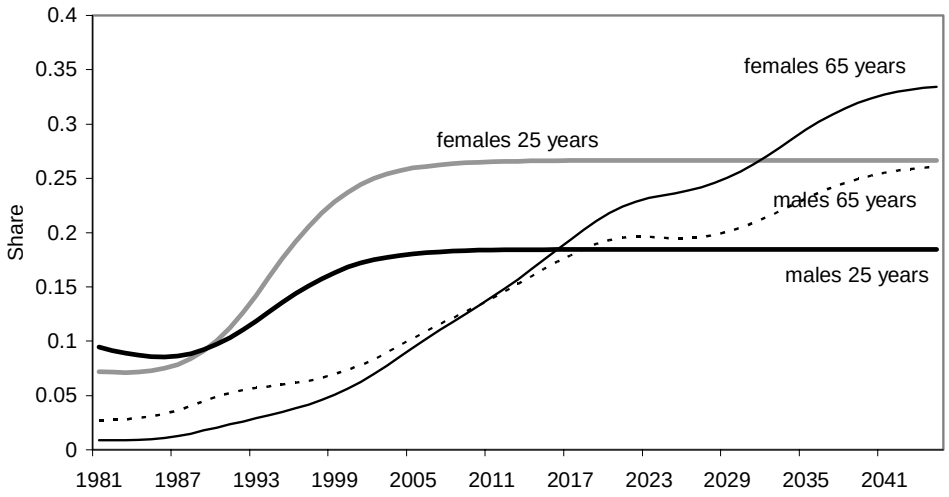
Consistent with these forces, OECD data suggest that the participation rate associated with a given level of tertiary attainment rate has fallen over time for both women and men of older ages (figure B.4 in appendix B). Continuation of this trend implies that the present relationship between participation rates and educational attainment will not give reliable indications of the future impacts of educational attainment.

Figure 3.14 **Labour force participation rates**
By age and highest educational attainment, 2001



Data source: ABS 2001 Population Census data provided by the Australian Government Department of the Treasury.

Figure 3.15 **Relative educational attainment (holding a degree or more) by sex and age**
1981 to 2045



Data source: Commission estimates based on cohort analysis of ABS Population Census data.

If the projection technique used by Gruen and Garbutt (2003) is applied to 1981 data, it predicts strong increases in participation rates for males and females by 2001. In fact, male participation rates generally fell across age groups from 1981 to 2001. Indeed, the absolute size of the (negative) prediction errors from applying this technique were, on average, higher for those age groups where the percentage

change in degree attainment rates were higher. These prediction errors are likely to arise partly because the relationship between educational attainment and participation is not stable, but also because there are other factors that are highly influential in determining participation rates.

It is likely that higher educational attainment would, all others things being equal, still partly stimulate future participation rates, but clearly, just as in the past, there are other forces at work that may offset these gains. A potential advantage of the Commission's cohort approach (technical paper 3) is that it may capture the general trend towards higher participation (since it has been an enduring feature of labour supply over some decades), as well as other general trends that either reinforce or weaken the benefits of this for labour force participation.

Pension and retirement income policy

The two most important recent policy changes are to the Age Pension and private superannuation arrangements.

Early access to the Age Pension for females is being progressively removed. Ultimately, females will be eligible for the Age Pension only after age 65 years, placing them on the same footing as males. This could be expected to progressively increase participation rates among females aged 60-64 years, although this would be weakened by increased uptake of the Disability Support Pension (DSP).

The introduction of the Superannuation Guarantee in 1992 mandates employers to make superannuation contributions on behalf of their employees. In its initial form, the design of the system provided incentives for early retirement (Bateman and Piggott 2001 and Atkinson and Creedy 1997). Employees (males) who may have delayed retirement to age 65 years to access the Age Pension, could access retirement benefits earlier (age 55 years). Since they could also withdraw superannuation benefits as a lump sum, they could also gain later access to the Age Pension. This financial windfall also encourages earlier retirement, since it reduces the number of years of contributions required for a reasonable standard of living while in retirement.

The Government has made some changes to limit 'double dipping' and encourage later retirement. These include encouraging withdrawal of benefits as an income stream rather than as a lump sum, tightening asset tests for eligibility for the Age Pension, allowing some access to superannuation assets prior to full retirement, and a gradually phased increase in the preservation age (age of access to benefits) (DEWR sub. DR71, p. 13-14, Inglis 2000, Australian Government 2004). In the shorter term, there is a legacy of past superannuation policies that may continue to

encourage early retirement among some groups. In the longer term, the reforms will tend to encourage higher participation rates among older people, but the size of the effects are unknown. Other developments, such as the emergence of agencies that specialise in superannuation planning to maximise access to the Age Pension, may partly counteract the influences of these measures.

Trends in disability rates

While measuring trends in the age-specific prevalence of disability remains a contested field, there is little doubt that the impact of a given level of disability on labour force participation has been accentuated over the last few decades. The number of people — particularly men — accessing the Disability Support Pension (DSP) has increased rapidly for most age groups. For example, from 1978-79 to 2003-04 there was a near quadrupling in the number of males aged 40-49 years claiming the disability pension. This trend reflects the relative attractiveness[16] of the DSP compared with unemployment benefits for people with a disability facing labour market difficulties.

People on DSP are generally classed as outside the labour force — and indeed the uptake of this benefit appears to be a major contributor to the historical decline in the labour force participation rates of older males (ABS 2005). For instance, had those males aged 60-64 years on a disability pension stayed in the labour force, then labour participation rates for this age group would have *increased* 1.5 percentage points from 1978-79 to 2003-04 instead of falling by 5.4 percentage points.[17] In other words, these simulation results suggest that effectively all of the decline in the participation rate of males aged 60-64 years could be attributed to the increased use of the DSP.

However, the adverse impact of DSP uptake on participation rates has been waning. Indeed, DSP rates have even dropped for males aged 50-64 years over the last five years, while rates for younger people, though still rising, look likely to stabilise in the next few years. Accordingly, one of the major drivers of falling participation rates for men (and one of the significant frictions that prevented older female participation rates from rising even further) is set to play a more marginal role in the future. Nevertheless, both cohort and other projection methods suggest that DSP rates will stabilise at relatively high rates, particularly for males aged 45-64 years old. For example, DSP rates for males aged 55-59 years are expected to be around

16 Higher benefits and the absence of activity testing.

17 DEWR notes that a small proportion of people on DSP are in the labour force (sub. DR71, p. 6). For the purposes of the calculations made here, it is assumed for ease that all DSP beneficiaries are outside the labour force.

10 per cent in the long term. Without policy or other changes, this limits the scope for substantial rises in participation rates for older men.

Notably, ABARE (sub. DR50, pp. 1-3) considers that technological change in health care, such as biotechnology and nanotechnology, will improve the capacity of workers to stay in the workforce. Developments in this area have the potential to reduce inflows into DSP and more generally curtail early retirement. ABARE also argues that to the extent that such improvements extend life expectancy, older people will have to delay retirement in order to build up sufficient capital to last their extended lives. However, improvements in health care technology and life expectancy gains are not new. Indeed, gains in life expectancy will probably be less in the future than the past. Yet despite such historical improvements in technology and life expectancy, DSP numbers swelled, as did earlier exits more generally from the labour market. It may well be that technology has the potential to increase participation *if* all other determinants are held constant. But the trends that militate against higher overall workforce participation (such as increased income) are also set to continue, and may well offset the gains from technology, as they did in the past.

Other trends and cohort analysis

Many of the factors that have led to changes in labour participation rates — including those above — reflect broad technological, social and commercial trends. For example, expansion of flexible casual and part-time job opportunities in the service sector have allowed people, particularly women, to combine childcare and work responsibilities. Falling fertility rates and rising divorce rates have also increased female participation rates, as have increasing educational attainment rates. Collectively, these trends have been major influences on aggregate labour participation rates — and many are likely to continue.

But how can such trends be adequately captured in projections, given that each factor is hard to model separately? The Commission's projection approach recognises that many of these trends operate at the cohort level. For example, educational attainment and cultural attitudes to work are factors that depend on a person's cohort. It is also apparent that occupational and industry choices are often made early in life and so are partly dependent on a person's cohort. DEWR (sub. DR71, p. 6) cites another example of cohort effects for males aged 60-64 years. It noted that ex-service pension conditions appear to have reduced full-time labour participation rates for this group in the past, but that this will not apply to future cohorts of this age group.

Adopting a broad cohort modelling approach to participation rates will collectively pick up many of these broad trends. Cohort methods can also pick up recent shifts in trends too — such as the fall in age-specific DSP rates for older males. The method — which extends an approach derived by the OECD (Burniaux et al. 2003) — relies on estimating the probability that a person of a given age exits or enters the labour market over the next period. Trends in exit and entry rates are modelled over the past, so they can pick up likely future shifts in cohort behaviour. The method used is explained in detail in technical paper 3, as are detailed results.

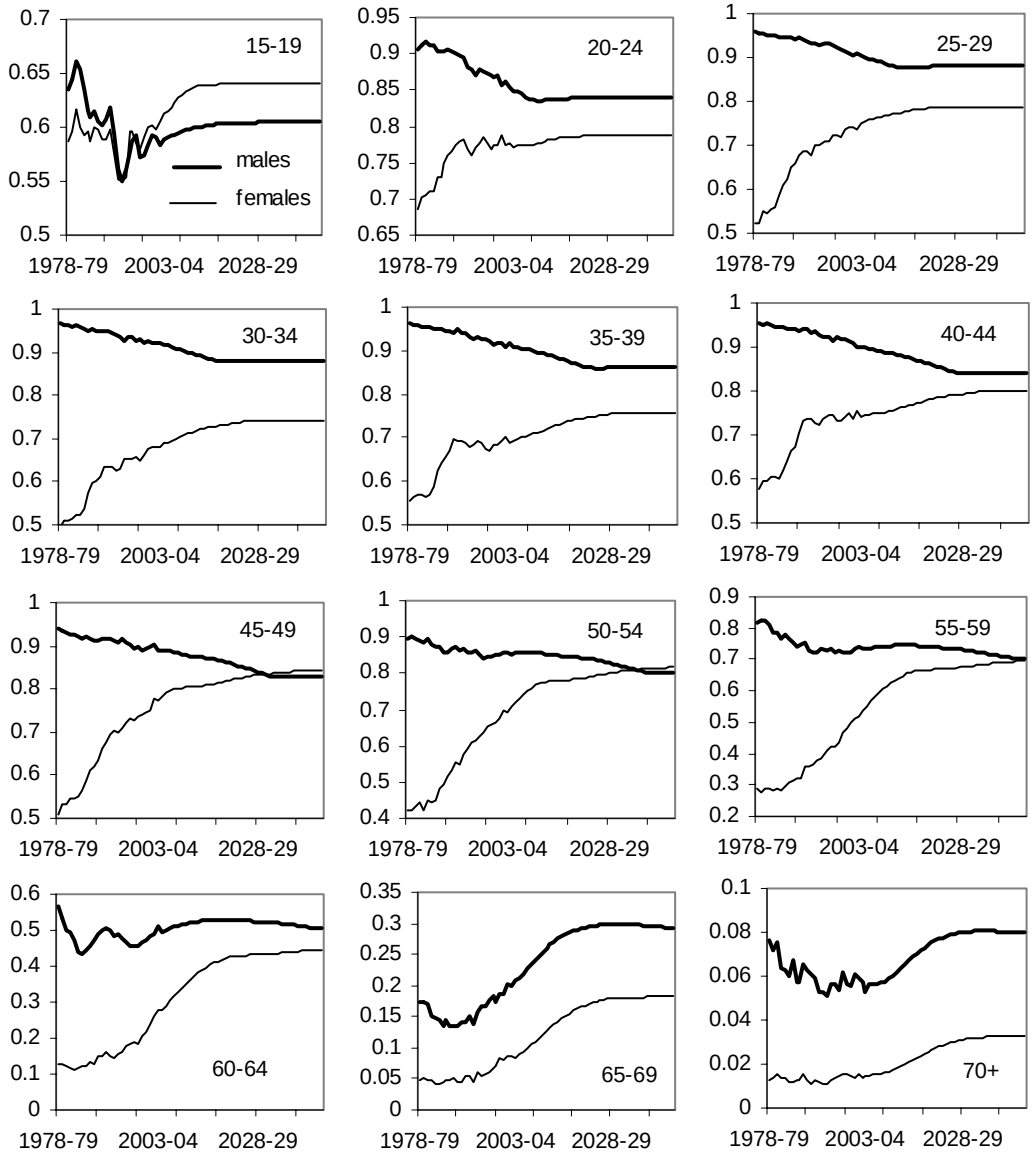
Labour participation rate projections

Taking account of these changing cohort patterns, the Commission generated projections of participation rates for different age groups by gender for Australia as a whole (and for all States). The projections (figure 3.16) show a continuing tendency for greater female participation for all ages over 25 years, with proportional increases greatest at the oldest ages. For example, female participation rates are expected to grow between 2003-04 and 2044-45 by 18, 35, 59, 124 and 125 per cent (not percentage points) for ages from 50-54 to 70+ respectively. For the core years of work from 25 to 59 years, female patterns of workforce involvement increasingly resemble that of males.

There is an abating trend for lower participation rates by males aged from 25 to 59 years. However, participation rates for males aged 65 years and over are expected to rise significantly in the next 40 years (by around 40 and 50 per cent for those aged 65-69 and 70+ years respectively), but still remain low relative to other ages. The greater involvement by older males reflects the trend towards lower exit rates from the labour force for this age group.

The aggregate labour force participation rate for Australia is calculated by weighting the age-specific rates by the relevant age population shares. Over the next forty years, aggregate labour force participation rates in Australia are projected to fall by over 7 percentage points from their current level of 63.5 per cent to 56.3 per cent. (figure 3.17). Had there been no change in the age structure of the population, participation rates would have *risen* by around 2.5 percentage points, reflecting the continued importance of rising female participation. Accordingly, by 2044-45, the difference in participation rates attributable to ageing amounts to nearly 10 percentage points — a margin that would have large effects on Australia's growth prospects.

Figure 3.16 **Projected participation rates by age and sex**
Australia, 1978-79 to 2044-45



Data source: Commission estimates from 2004-05 using a dynamic cohort approach (technical paper 3). Otherwise rates are derived from the ABS (Labour Force Survey, Supertable LM8).

These projections corroborate the findings in the Intergenerational Report, based on older ABS population projections and labour force data, and different methods for forecasting age-specific participation rates. The Intergenerational Report found an aggregate participation rate of around 56 per cent in 2041-42, which is within half a percentage point of the Commission's estimate for the same year.

The effect of the demographic transition on Australia's labour force in the next four decades is much greater than has occurred in the last 30 years. And in contrast to the

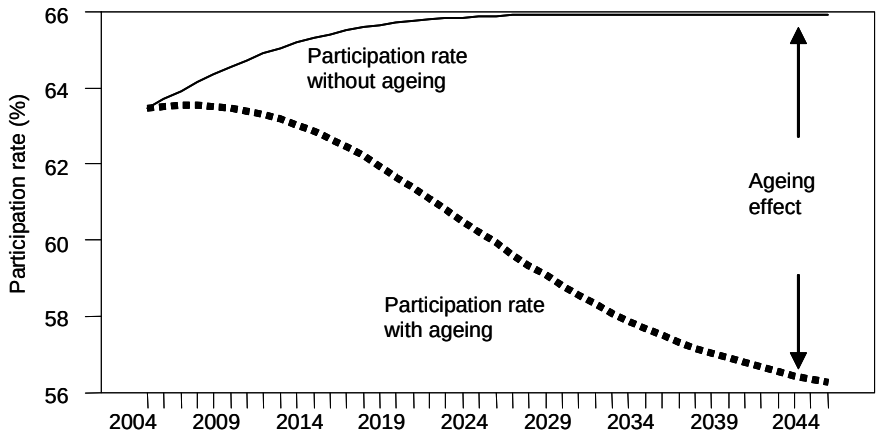
earlier experience, these ageing effects are not offset by trend rises in age-specific participation rates. Past ageing gives a very poor guide to the dramatic effects of future ageing on Australia's labour force.

Uncertainty in the projections

A question remains as to whether the age-specific trends underlying this aggregate projection are likely to be realised. The results for females pass a basic credibility test. It is highly likely that female participation will continue to rise, because the factors that have been driving rising participation are still at work (such as increased education and better matching of female job preferences). But there can be less confidence in the extent of stagnation (and recovery) in labour participation for males aged 20-59 years, because it is unclear that the historical forces that lowered participation thus far will continue. As emphasised by CPA Australia, there is inevitably much uncertainty about long-run participation rates:

> … there have been fundamental changes in the demographic structure of families, social attitudes concerning the role of women and the labour market opportunities available to women. Consequently, the experiences of older cohorts may provide a poor guide to the future outcomes for today's younger cohorts… There remains a significant degree of uncertainty about the likely participation rates of younger cohorts as they age and approach the retirement window. (sub. DR60, p. 11)

Figure 3.17 **Aggregate participation rates fall with ageing**
2003-04 to 2044-45



Data source: Commission estimates.

The Commission's projection approach has the advantage that it can potentially pick up such cohort effects better than examining age-specific participation rates and merely extrapolating them on the basis of historical trends. Nevertheless, it is clear that there must be a significant and widening band of uncertainty surrounding

estimates over a 40 year horizon. It is notable that past projections of participation rates have sometimes erred by large amounts. For example:

- Sam and Williams (1982) developed a sophisticated model of Australian participation rates and produced projections from 1980-81 to 2000-01. Their model correctly predicted that male rates would fall and female rates would rise, but the prediction errors were substantial. Male rates fell by 6.1 percentage points over this period, three times the magnitude predicted by the study. Married female participation rates rose by 14.3 percentage points, double the predicted 7.4 percentage point rise, while unmarried female rates rose by 4.1 percentage points compared with a small predicted fall; and
- the ABS's (1999) set of labour participation projections for 1999-2016 were already significantly astray after just five years for specific age groups,[18] though these errors cancelled to produce an accurate *aggregate* participation rate for end June 2004.

These cases highlight the difficulties in producing accurate projections even over relatively short periods, let alone 40 years, and demonstrate the need for sensitivity analysis (table 3.1 and box 3.4).

Such analysis reveals that, with a few exceptions, the *aggregate* participation rates are relatively robust to different assumptions about trends in age-specific participation rates. Indeed, had age-specific rates stayed fixed at their base levels — a common assumption in labour force projections — but ageing had still occurred, the aggregate participation rate by 2044-45 would be 53.4 per cent (scenario B). This is only about 3 percentage points below the participation rate projected by the Commission. This underlines the point that the most important determinant of the future aggregate participation rate is the shift in the age structure of the population.

However, other futures are possible.

- Large changes in participation rates for selective age/gender groups (scenarios C, D, E and F) have relatively modest impacts on the aggregate participation rate.
- Major increases in participation rates for a *broad* group of age-sex groups would be necessary to significantly curtail the effects of ageing on labour force growth

[18] For example, the ABS projected a small 0.8 percentage points reduction in the participation rates of males aged 20-24 years by 2004. In fact, by 2004 the rate fell by 5.1 percentage points to 82 per cent, a level that was actually below the projected participation rate for 2016. On the other hand, for females aged 60-64 years, the ABS projected an increase of 1.8 percentage points from 1999-2004, compared with an actual increase of 11.7 percentage points (using ABS Cat. no. 6260.0 values for the base year). In fact, the actual level for 2004 exceeded the ABS's projected value for 2016 for this group by nearly 6 percentage points.

(scenario G, H and I). Even such broad increases in participation rates cannot fully offset the impact of ageing (none of the scenarios in table 3.1 and box 3.4 get close to the 65.9 percentage points required for equalisation).

As noted in the Intergenerational Report (p. 28), the relative insensitivity of the aggregate participation rate to changes in age-specific trends has some policy implications. Policies that elicit participation increases for the old alone cannot, by themselves, realistically act as an antidote for the sluggish labour supply growth arising from ageing.

However, to the extent that policy overcomes barriers to participation that confront older Australians and results in outcomes that they desire, then such increases are worthwhile in their own right (and may also be part of a suite of policies aimed at better growth prospects — chapter 13).

Table 3.1 **How different is aggregate participation under different age/gender scenarios?**

	Scenario	*Participation rate in 2044-45*
		%
A	**Base case**	**56.3**
B	No change in age-specific participation rates after 2003-04	53.4
C	Age-specific female rates rise by half the base case increment[a]	54.5
D	Age-specific rates for males aged 20-59 do not fall after 2003-04	57.5
E	Age-specific rates for females aged 60+ converge on males[b]	57.4
F	Age-specific rates for males 55+ yrs 10 points above 2044-45 base	58.3
G	Age-specific rates for both genders 55+ yrs 10 points above 2044-45 base[c]	60.6
H	Age-specific rates increase to OECD 80% percentile by 2044-45[d]	60.9
I	Age-specific rates reach the maximum level between 1978-79 to 2044-45[e]	59.5

[a] In this case, female participation rates climb by half the amount between the base case age-specific values in 2044-45 and the starting year (2003-04). [b] A scenario of this kind was suggested by ABARE (sub. DR50). It is implemented by having older female rates reach the male level by 2044-45. This implies very high growth rates in participation rates by females. [c] The scenario implies particularly large increases in participation rates for some age categories. For example, it would result in a female participation rate for 70 year olds 8.5 times higher than the maximum rate apparent from 1978-79 to 2003-04. [d] The data for the OECD 80% percentile were provided by the Australian Government Treasury. The age-specific rates converge to the values used by Gruen and Garbutt (2003) where these are above the existing participation rates, but do not fall if the PC's projected base case value for 2044-45 already exceeds their estimates. This exception is relatively frequent for females, suggesting that in fact this thought experiment really represents Australia approaching a rate somewhat above the 80% percentile. [e] The data used for this calculation are the ABS actuals from 1978-79 to 2003-04 and the Commission's base case projections from 2004-05 to 2044-45.

Source: Commission estimates.

Box 3.4 **Exploring participation scenarios**

Less rapid growth for women: It may be that female participation rates start to plateau more quickly than under the Commission's base case (scenario C), but this would still only reduce aggregate participation rates by around 2 percentage points.

More male involvement: Several factors may halt the historical fall in prime age male participation rates. These include changes to labour market programs aimed at DSP beneficiaries (mainly males) and policies that reduce entry into DSP, accompanied by a general suite of policies aimed at encouraging more active participation (DEWR sub. DR71, pp. 11ff explores some existing and prospective policies in this area). If it is assumed that male participation rates for those aged 20-59 years stayed at 2003-04 rates (scenario D), the gain relative to the base case in the aggregate participation rate by 2044-45 would be around 1.2 percentage points. It is a moot point whether changes in male participation rates stemming from re-connecting DSP beneficiaries to the labour force would have the same proportional impact on *employment* rates by age group (which, as shown below, are what matters for economic growth). This is because many of those on disability payments would have (and have had) great difficulty obtaining jobs (chapter 5).

Convergence for older women: ABARE (sub. DR50) considered that the absence of convergence of female participation rates by 2045 for older women was unrealistic, citing pension changes, greater work equality and the risk of inadequate retirement savings (an issue also raised by Dr Diana Olsberg, sub. DR54) as forces that could achieve greater convergence. In principle, these drivers are already captured in the Commission's cohort analysis, which factors in trends in exit rates from participation by age. Nevertheless, were this convergence to occur, it would raise the aggregate participation rate by just over 1 percentage point above the base case (scenario E).

Increasing participation rates by older workers: If this were restricted to males (scenario F), the aggregate participation rate would be 2 percentage points more than the base case. (These are close to the results found by the Intergenerational Report in running a similar experiment, p. 28). This is an extreme assumption for the oldest males, implying that participation rates for males 70 years and over and 65-69 year olds in 2044-45 are around 2.1 times greater than the maximum recorded from 1978-79 to 2003-04. This is probably most unrealistic for the last open-ended age interval, since the share of older males (80+) in this group will rise from 30 to 45 per cent over the projection horizon. If participation rates were to rise for both genders (scenario G), the impacts double.

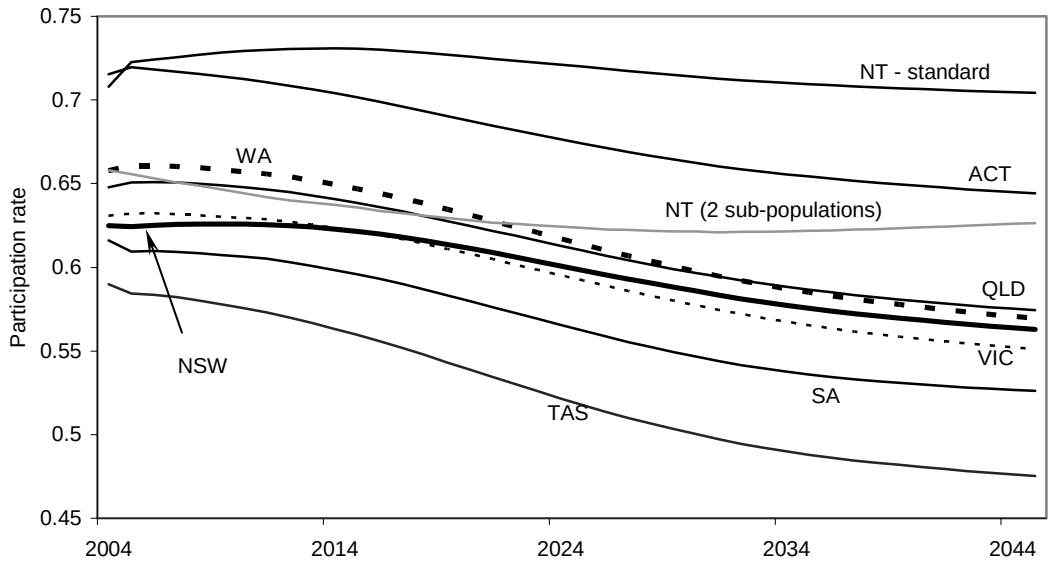
'Becoming Scandinavian': The Commission estimated the impact of reaching the *higher* of either the 80th percentile of a select group of OECD countries or the Commission's projected base case participation rate in 2044-45 for each age/sex group (adapted from a 'what if' experiment run by Gruen and Garbutt 2003). In this case (scenario H), Australia would have age-specific participation rates more like New Zealand and several Scandinavian countries. The result would be an aggregate participation rate in 2044-45 that mitigated the participation effects of ageing by around 50 per cent. This experiment somewhat resembles that of scenario I, with male participation rates that are close to (and sometimes exceeding) the historical maximum over the past 25 years and female rates that are roughly in line with those projected by the Commission.

Return to a golden past: Under scenario I, the aggregate participation rate in 2044-45 is still around 4 percentage points below the 2003-04 level and 6.4 points below the rate in 2044-45 had no changes occurred in the age structure of the population. This scenario is a relatively extreme one. For example, it returns male participation rates to peaks of over 96 per cent for males aged 25-39 years old (which is up to 10 percentage points above the level projected by the Commission for 2044-45 for these age groups), while still allowing female participation rates to grow at strong levels over the next forty years.

State results

The cohort method was also applied to individual States to generate labour force and participation rate projections (figure 3.18 and table 3.2). While most jurisdictions follow a similar pattern, two exhibit more extreme results. There are large declines in participation rates in the most 'greying' jurisdiction — Tasmania. The Tasmanian Government agreed with this assessment, projecting participation rates would fall by between 10.9 and 13.5 percentage points by 2042 (sub. 40, pp. 12-14). In contrast, the standard projection for the Northern Territory suggests that participation rates will hardly decline there at all. This is because demographic projections for the Northern Territory population show much less ageing than other populations.

Figure 3.18 **Participation rates in Australian States and Territories**
2003-04 to 2044-45[a]



[a] NT-alt is based on combining separate projections for the Indigenous and non-Indigenous populations. Data are averages over the fiscal years ending June.

Source: Commission estimates.

However, the Northern Territory result is partly a statistical anomaly. Its two underlying populations have very different characteristics and trajectories, which get conflated if they are modelled as one population (chapter 2). On advice from the Northern Territory Government, the Commission re-calculated participation rate projections for this jurisdiction by generating separate demographic projections and

participation rate models for the two sub- populations.[19] This resulted in a somewhat bigger decrease in participation rates, but one that was still much less significant than that facing other jurisdictions. However, labour force participation is not the same as labour supply. The labour force includes people who are unemployed or on labour assistance programs, such as Community Development Employment Projects (CDEP). Accordingly, projections of labour force participation for the Northern Territory, even when adapted for the two sub-populations, will significantly overstate effective labour supply. Moreover, as emphasised by the Northern Territory Government (sub. DR58), the projections require many assumptions about highly uncertain factors, such as the integration of Indigenous Territorians into mainstream work. The projections should be seen as experimental.

The degree to which jurisdictions face declining participation rates reflects two forces. They face different underlying trend growth rates in age-specific participation rates. But overwhelmingly, the major contributor to their differing experiences is the different extent of population ageing (table 3.2).

Table 3.2 **Ageing effects on participation rates by jurisdiction**
2044-45 relative to 2003-04

Jurisdiction	*Aggregate participation rates (with ageing)*				*Without ageing*	*Ageing effect*
	2003-04	2024-25	2044-45	Change 2003-04 to 2044-45	2044-45	
	%	%	%	%	%	%
NSW	62.5	59.8	56.3	-6.2	65.1	8.9
VIC	63.1	59.2	55.1	-8.0	64.5	9.3
QLD	64.8	61	57.4	-7.3	68.1	10.6
SA	61.6	56.2	52.6	-9.0	64.2	11.5
WA	65.8	61.4	57	-8.8	67.2	10.2
TAS	59	51.7	47.5	-11.4	60.4	12.9
ACT	71.5	67.4	64.4	-7.1	75.3	10.9
NT	70.8	72	70.4	-0.4	75.2	4.7
NT alternative[a]	65.8	62.4	62.6	-3.2	68.8	6.2
Australia	**63.5**	**59.9**	**56.3**	**-7.2**	**65.9**	**9.6**

a These estimates are based on combining separate projections for the indigenous and non-indigenous populations. The difference between the estimates for the starting year (2003-04) reflects the use of extrapolated ABS Population Census data (2001-02) in the alternative estimates, rather than the use of labour force data from the ABS Labour Force Survey.

Source: Commission estimates.

19 These projections were not undertaken using cohort methods because of data limitations. It was assumed that there would be some 'catch-up' with non-Indigenous Territorians by the Indigenous population. The details are available on request.

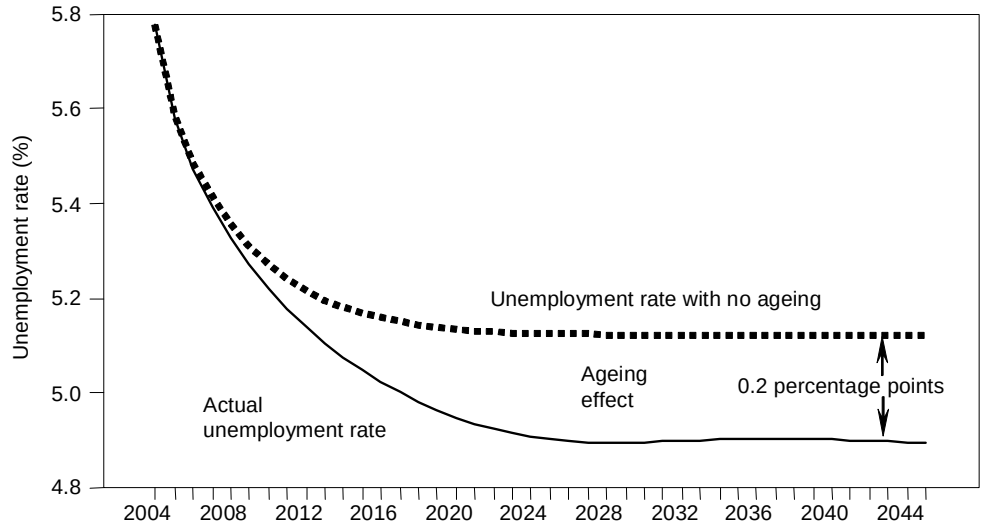
Projections of unemployment and hours worked

Participation is only part of the labour supply story. The other two important elements are unemployment and hours worked.

The dual drivers of the aggregate future unemployment rate is the long-run unemployment rate associated with a stable inflation rate (the so-called 'non-accelerating inflation rate of unemployment' or NAIRU) and demographics that weight individual age-sex unemployment rates. The NAIRU is projected to be just above 5.1 per cent in 2044-45 were the population age structure to be fixed at 2003-04.[20]

The actual long-run unemployment rate is a little less than this because ageing is likely to have a positive twist for unemployment. This reflects the fact that the highest unemployment rates are experienced by young people, in the transition from education to work, and the lowest by older people, who have the alternative of retirement. Consequently, the shift in the age structure of the workforce is likely to lower measured unemployment rates, although the effect is quite small at around 0.2 percentage points (figure 3.19). The result implies that the *effective* labour supply for a *given* participation rate will be higher than in the absence of ageing.

Figure 3.19 **Ageing and aggregate unemployment rates**
2003-04 to 2044-45[a]



a The measure of unemployment rate with no ageing is calculated by weighting age-sex specific unemployment rates by labour force shares that would occur without ageing.

Data source: Commission estimates.

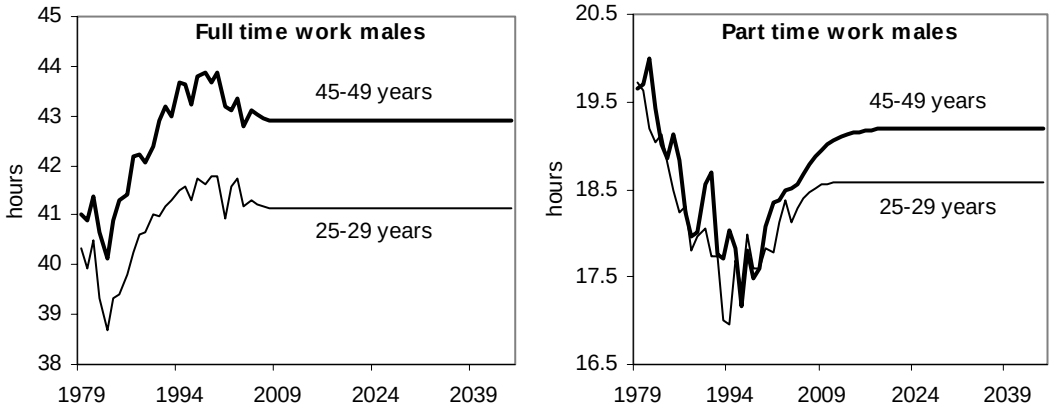
20 DEWR (sub. DR71, p. 7) suggested a lower rate — such as 4 per cent — might be credibly applied. Were such a rate used it would have no long-run effect on economic growth per capita, but would raise GDP permanently by around 1.3 per cent. It would also reduce unemployment benefits by 25 per cent.

Of course, unemployment is not only determined by job matching and search costs, but by broader imbalances in the demand for and supply of labour. Given there will be relatively fewer young people in the labour force, it would be expected that unemployment associated with insufficient demand would more commonly occur among older people, pushing up their unemployment rates. Nevertheless, Australia is currently experiencing a period of stable macroeconomic performance, and this is the basis on which projections in this and other chapters are made. In that context, it is appropriate to project age-specific unemployment rates and then to use demographics and labour force participation rates to derive an aggregate unemployment rate.

The story for average hours worked is different again. Average hours worked are generally projected to increase modestly for part-time workers of most ages, while being stable for full-time workers generally (figure 3.20). However, the *incidence* of part-time work will continue to rise for Australians of most ages (particularly for males). Contributing factors include the preferences of many people for part-time jobs and the ascendancy of the service sector. That, and the fact that older workers have a much higher tendency to work part-time anyway, mean that average weekly hours per employee are projected to fall (figure 3.21).

So ageing has a 'double whammy' depressive effect on labour supply — reducing participation rates and cutting average hours worked. These greatly outweigh the positive influences via lowered unemployment (as is shown in the following section).

Figure 3.20 **Selected projections of average hours worked per week**
Males, 1978-79 to 2044-45



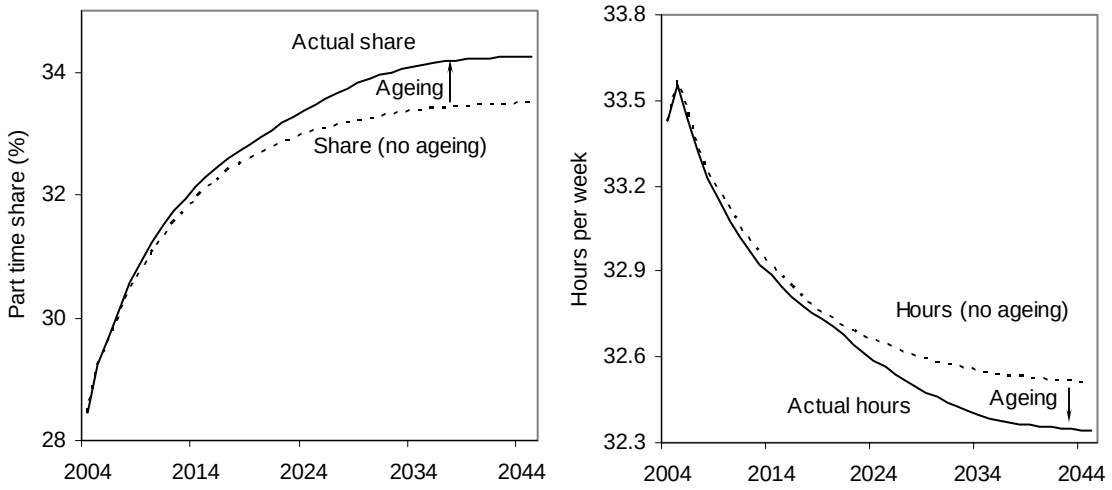
Data sources: Commission estimates and ABS Labour Force Survey data.

Labour supply projections

These components of labour supply — participation, part-time and full-time work, average hours and unemployment — can be assembled into two perspectives on labour supply:

- employment; and
- the total number of hours actually worked per year (the effective labour supply).

Figure 3.21 **Effects of ageing on part-time employment rates and average hours worked**
2003-04 to 2044-45



Both employment and hours worked change sluggishly as a result of ageing (table 3.3 and figure 3.22). For example, the number of workers is projected to grow by over one million in the seven years from 2003-04 to 2010-11. This is about the same growth in the labour supply that occurs over the entire 21 years from 2023-24 to 2044-45. Annual trend growth rates in the two decades to the 21st century are about four times greater than the annual trend growth rate in the three decades from 2011-12. Indeed, after 2011-12, the pace of effective labour supply growth is slower than population growth (unlike in the past). From their peaks in 2011-12, employment and hours worked per capita decline by around 8 and 10 per cent respectively to 2044-45. Had the population structure not changed, hours worked per capita would have actually risen slightly (figure 3.22).

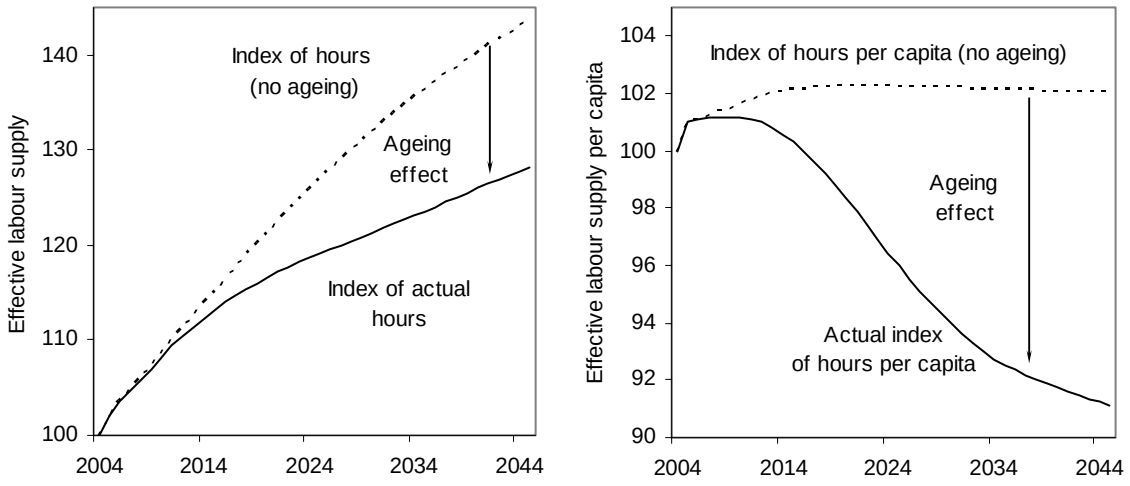
Table 3.3 **Labour supply growth slows with ageing[a]**

Period	*Trend growth rates*			
	Employment	Hours worked	Employment per capita	Hours per capita
	%	%	%	%
1979-80 to 1999-00	1.84	1.74	0.50	0.41
1999-00 to 2011-12	1.58	1.24	0.43	0.10
2011-12 to 2020-21	0.76	0.66	-0.25	-0.35
2020-21 to 2030-31	0.45	0.38	-0.38	-0.45
2030-31 to 2044-45	0.39	0.37	-0.16	-0.18
1999-00 to 2044-45	0.70	0.60	-0.17	-0.28

a Growth rates are based on regressing the logged value of the labour supply measure against a time trend.

Source: Commission estimates.

Figure 3.22 **Ageing and effective labour supply**
Australia 2003-04 to 2044-45

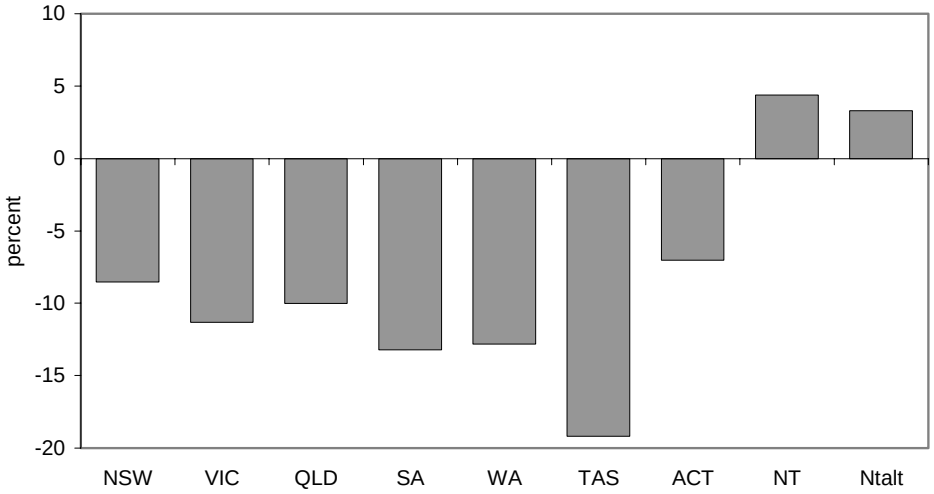


Data source: Commission estimates.

There are significant differences between jurisdictions in trends in hours worked per capita (figure 3.23). This reflects their divergent patterns of population ageing and labour market prospects.

Figure 3.23 **Changes in effective labour supply per capita vary by jurisdiction**

Percentage change in total hours worked per capita, 2003-04 to 2044-45[a]



[a] The increase in total hours per capita in the Northern Territory case reflects the combination of a relatively younger population and assumptions about the increasing engagement of Indigenous Territorians in the Northern Territory labour market. The NTalt series is based on separate modelling of Indigenous and non-Indigenous labour market trends.

Data source: Commission estimates.

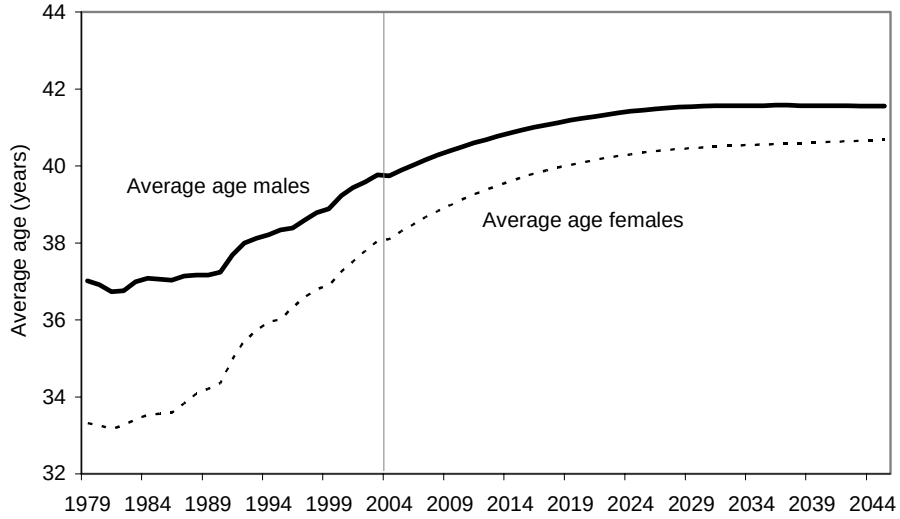
Hours worked per capita is probably the single best indicator of dependency since it takes account of actual employment and hours worked, rather than just the changing age structure of the population in each State. Tasmania stands out particularly as a jurisdiction in which the available hours per capita fall precipitously as a result of ageing.

Average labour supply age

The labour supply projections allow the estimation of the average age of employees over the next forty years — which provides a simple measure of labour supply ageing (figure 3.24). Relatively small changes in average age are anticipated — around 1.8 years for males and 2.6 years for females.[21] Indeed, there was much more ageing of the labour supply between 1978-79 and 2003-04 (around 4.8 years for females and 2.8 years for males) than is projected for the next forty years.

[21] This is because while the labour supply shares of the old increase dramatically (for example, the labour supply share of 70 year olds and over increases fourfold), they still account for a very small share of the total labour supply. Accordingly, they provide little weight to older ages in computing average ages.

Figure 3.24 **Average age of employees**
Australia, 1978-79 to 2044-45[a]



a Average age is calculated by taking the midpoint of the 5 year age spans as the representative age for each age-sex group and weighting these ages by shares of hours worked.

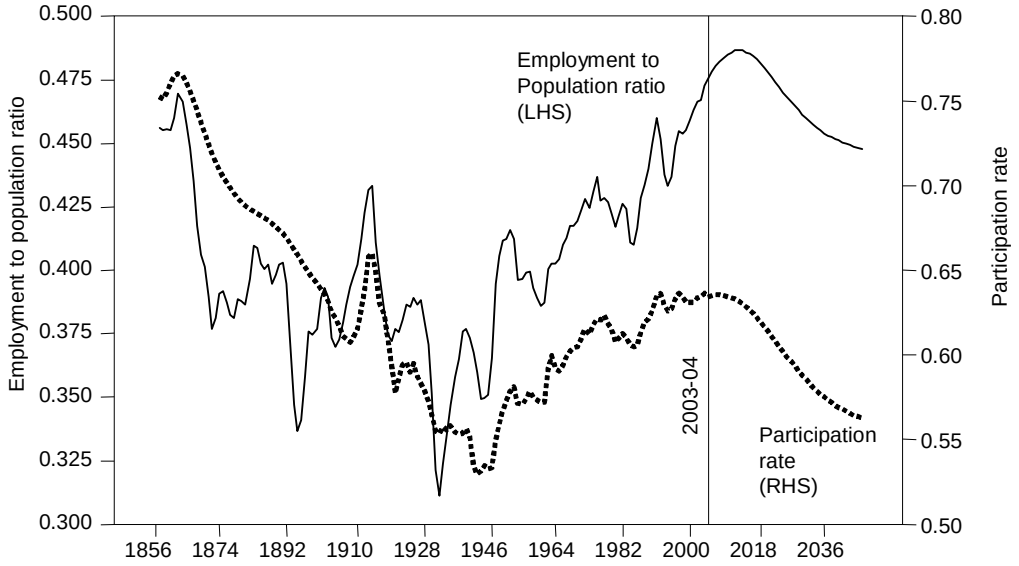
Data source: Commission estimates.

So population ageing does not necessarily translate to a very significant ageing of the workforce (reflecting the fact that participation rates are still highest for younger age groups). Moreover, workforce ageing will vary significantly by industry and occupation. Industries with declining employment shares — such as agriculture — will tend to age more than rapidly growing industries. Even some professions that might initially age rapidly — such as nursing — might expect this trend to reverse as retiring older workers are replaced by new younger entrants.

The labour 'problem' in historical perspective

Adding the Commission's projections to figure 3.12 provides a two hundred year perspective of the Australian labour market (figure 3.25). Adopting this perspective reveals a more positive story than told by the projected outcomes for the next forty years alone. For one thing, it becomes clear that the employment to population ratio over the next forty years is not historically low. Even with the projected decline in participation, the ratio of employees to population will still be higher in 2044-45 than at almost any time in the last century. (This reflects the decline in the ratio of people aged under 15 years to the total population)

Figure 3.25 **Taking a long view: 200 years of Australian labour supply**
1856-57 to 2044-45[a]



[a] These data were constructed from many historical data series — with interpolation based on econometric estimates and cubic splines for some earlier data.

Data source: Commission estimates based on ABS Labour Force data, Vamplew (1987), Withers et al. (1985), and Foster and Stewart (1991).

It is misplaced to *blame* ageing for any economic pains, since the flip side of ageing has been an earlier era of economic gains.

- A significant source of ageing (and the accompanying projected decline in the employment to population ratio over the next 40 years) was the general decline in fertility rates after the baby boom.
- But the presence of the baby boomers and the relative absence of their progeny was a major factor behind the *rise* in employment to population ratios after the Second World War and its current apex. The baby boomer phenomenon produced a big economic growth bulge, which will inevitably vanish as the boomers age.

3.5 Volunteering

This chapter has so far focused on conventional measures of the labour force. While falling outside standard measures of GDP and the labour force, it is also important to consider the contribution made by unpaid labour. This section briefly examines the implications of an ageing population on volunteering.

Volunteering and age

In 2000, nearly one third of Australians aged 18 years and over were engaged in voluntary work through an organisation, contributing over 700 million hours of unpaid work (ABS 2000, Cat. 4441.0).

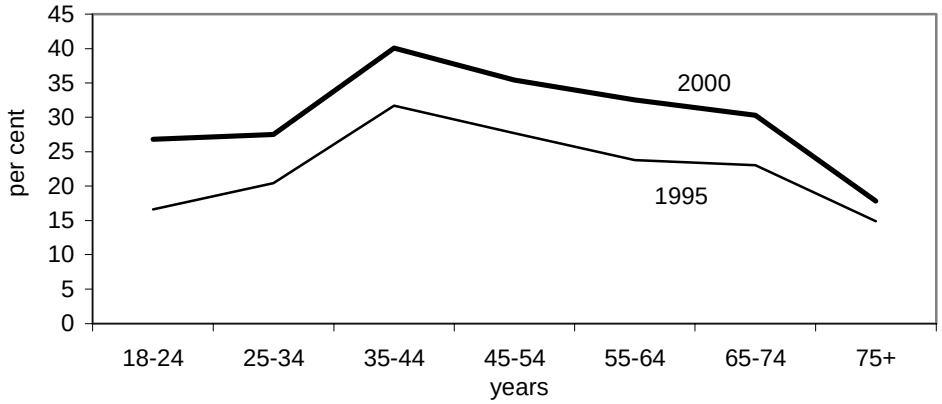
Participation rates for volunteering in organisations increase up to 35 to 44 years and then progressively decrease with age (figure 3.26). However, actual time spent volunteering tends to increase with age, whether the definition of volunteering includes only that undertaken through organisations or includes informal volunteering (such as caring for a sick neighbour).

Age also influences the type of voluntary work undertaken. People aged over 55 years volunteer predominantly in the areas of community, welfare and religion, 35 to 44 year olds volunteer mainly in education, training and youth development and younger volunteers participate principally in sport and recreation.

Projections

Data on participation rates in volunteering were applied to demographic projections to estimate the number of volunteers by age and gender over the next 40 years. Given data limitations, only volunteering through organisations was modelled. It is likely that this will understate the effect of demographic change on volunteering because older people are particularly important providers of caring services to other adults.

Figure 3.26 **Voluntary work through an organisation**
Participation rates by age group, 1995 and 2000



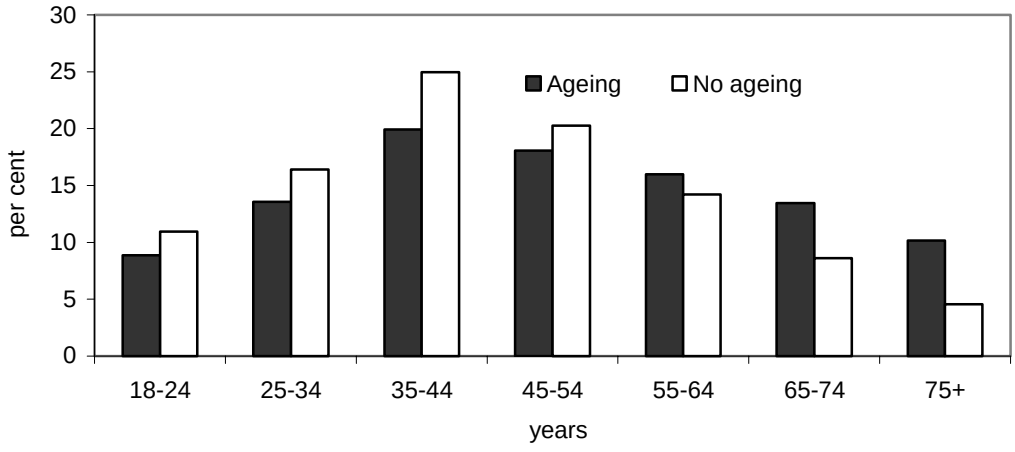
Data source: Data source: ABS, 2000 (*Voluntary Work*, Cat. no. 4441.0).

The number of volunteers is projected to increase from 4.75 million in 2002-03 to 6.84 million in 2044-45, an increase of 44 per cent. Growth in volunteering can primarily be attributed to a growing population. In the absence of population ageing, the number of volunteers would be marginally lower, growing to about 6.77 million in 2044-45.

The likely growth of volunteers was seen as a positive feature of ageing by several participants in this study. For example, Australians for an Ecologically Sustainable Population (sub. 7) noted that this aspect of ageing tended to be overlooked in some negative portrayals of ageing. The Victorian Government (sub. 29, p. 51) and the Australasian Centre on Ageing (sub. 9) considered that, as well as strengthening communities, volunteers significantly contributed to the economy. Several participants recognised the role of volunteers in informal care (for example, the Tasmanian Government, sub. 40, p. 30). (Carers are further examined in chapter 7.)

Although Commission projections found that ageing is likely to have only a limited impact on the overall growth in the number of volunteers, it is likely to have a significant effect on the age structure of volunteers. For example, in the absence of ageing the Commission projects that 25 per cent of volunteers would be aged 35-44 years compared with 20 per cent in an ageing population and 5 per cent of volunteers would be aged 75 years and over compared with 10 per cent in an ageing population (figure 3.27).

Figure 3.27 **Projected share of volunteers by age group 2044-45**
With and without ageing



Data source: Commission estimates.

This is likely to have implications for organisations that rely on younger volunteers. Some participants are concerned that shortfalls in volunteering may occur in areas, such as emergency services (Victorian Government sub. 29, p. 99**)** and sport and

recreation, education, training and youth development (Volunteering Australia sub. 28, p. 6).[22]

This is also consistent with the Commission's projections, which suggest that there will be shifts in the relative importance of different types of volunteering activity. The growth in the number of volunteers is expected to be higher in community and welfare areas, but significantly lower in sport, recreation and education (appendix E).

[22] The Securities Institute (sub. 22) noted another risk. It considered that moves to increase the labour force engagement of older people, while increasing formal labour supply, might come at the expense of a smaller pool of volunteers and unpaid workers.

4 Productivity and ageing

Key points

- Population ageing can affect aggregate productivity because average productivity levels differ across age groups.
  - Both cross-sectional wage data and empirical estimates suggest that average productivity levels initially increase with age before declining after middle age. Consequently, changes in the age composition of the labour force may affect aggregate productivity.
  - Experimental estimates suggest a mostly negative, but negligible, effect over the 40 year projection period. This small effect arises because the bulk of workers remain in the most productive age range. Moreover, the beneficial productivity effects of a smaller proportion of young workers largely offsets the effects of a greater proportion of older workers.
- Demographic change may have a role in investment and technical progress — two of the major sources of labour productivity gain. However, such effects are expected to be small.
  - Global ageing will change global demand for and supply of savings and thereby affect interest rates and capital flows. Specific effects on growth of capital deepening in Australia are not clear from existing empirical studies. Moreover, rates of growth in capital deepening have been remarkably stable over the last 40 years in Australia, against a backdrop of significantly changing global investment and demographic conditions.
  - Innovation, entrepreneurship and incentives for technical progress may be linked to demographic change, but there is little persuasive evidence that there will be notable effects in Australia.
- Annual labour productivity growth has averaged about 1.75 per cent over the last 30 years. To the extent that population ageing, itself, is likely to have little effect on aggregate productivity growth, this rate provides a useful starting point for modelling the long term effects of population aging. The Commission has also simulated the effects of average growth rates of 1.45 and 2.05 per cent.

4.1 Introduction

Rising labour productivity has been the main factor behind aggregate economic growth over the past fifty years. As the labour supply will contract relative to Australia's population over the next half century, the significance of labour productivity growth will be further accentuated.

As explained in chapter 3, modelling the budgetary and economic growth impacts of an ageing population requires an estimate of future labour productivity growth.[1] This chapter explains the assumptions used by the Commission.

Labour productivity growth is the result of a complex interaction of many factors. While the historical pattern of year-on-year productivity growth can be quite volatile, long-run projections need only pick up the anticipated trend. Consequently, the Commission's baseline approach (like that of the Intergenerational Report and the Access Economics model of State budgets) assumes a constant average annual labour productivity growth rate over the projection period, rather than elaborate, but potentially spuriously detailed, annual projections. Given some uncertainty about the long-term trend, the Commission has also considered a range of averages more or less favourable than the baseline assumption.

A particular focus for this study is whether labour productivity growth may be impeded or enhanced by population ageing. This issue warrants serious consideration because some research suggests significant effects of ageing on productivity. For example, Lindh and Malmberg (1999) estimate that age effects alone may have reduced average productivity growth rates from 1990 to 1995 by an average of 0.2 percentage points per year, for a sample of 23 OECD countries.[2]

There are several mechanisms by which population ageing could affect labour productivity. At some age, the physical and mental effects of ageing are likely to offset the benefits of experience, so that productivity levels of older people may be less than those of middle-aged people. Depending on when such an effect manifests itself, this implies that changes in the age structure of the workforce could affect aggregate productivity growth. On average, shifts towards very young or very old workforce age structures would be associated with reduced productivity growth. Of

[1] Growth in labour productivity (real output per worker hour) can be decomposed into the growth in the capital-labour ratio (capital deepening) and growth in multi-factor productivity (which is the 'residual' growth in value added not directly attributable to the measured growth in the quantity and quality of labour and capital inputs).

[2] Similar studies of the role of the age structure in productivity or economic growth include Malmberg (1994), Sarel (1995), Persson (1999), Nahuis et al. (2000), Andersson (2001), Feyrer (2002) and Navaneetham (2002).

course, the relative productivity of different age groups may not be stable over time, because the characteristics of the groups may change (such as better education for older cohorts).

Population ageing may also affect productivity growth rates through macroeconomic effects on savings, investment and innovation. For example, to the extent that older people draw down savings to fund their retirement, there would be reduced scope for investment and capital deepening — as noted later, one of the major sources of labour productivity growth.

Another important consideration for this study — which examines the implications of ageing for all Australian jurisdictions — is whether there may be long term convergence or divergence in State labour productivity growth rates.

The chapter is organised as follows:

- section 4.2 summarises the labour productivity assumptions used in some recent Australian studies of the economic effects of demographic change;
- section 4.3 examines past productivity growth rates and what the future may hold;
- section 4.4 considers whether there may be differences in the average level of productivity of workers across age cohorts;
- section 4.5 examines the potential role of demographic change for growth in capital deepening and technical progress; and
- section 4.6 considers whether there may be convergence or divergence in labour productivity growth between the States.

4.2 Labour productivity assumptions used in previous studies

When comparing studies of the estimated long-term impact of demographic change on economic growth and government budgets, it is important to be aware that small differences in assumptions about future productivity growth rates, compounded over many years, can greatly alter projected outcomes. These differences in assumed growth rates can arise from two sources:

- different views about the effects of ageing on productivity; and
- different views about economy-wide productivity changes that are not linked to ageing.

Different views about ageing and productivity

Most Australian studies have not included explicit links between ageing and productivity. The most common base case assumption is that all workers have the same productivity level (value added per hour worked), which grows at the same average annual rate. This is the same as assuming a fixed rate of productivity growth for the economy as a whole. This approach was used in the Intergenerational Report, the Access Economics model used by State governments, the base case of Day and Dowrick (2004) and a recent Australian Government Treasury paper (Gruen and Garbutt 2003). It is also used as the base case in the Commission's projections in this study.

An alternative approach is to assume that average productivity levels differ across demographic groups, so that a change in the age composition of the workforce affects overall productivity. This approach was used, for example, in one scenario by Gruen and Garbutt (2003). They assumed that, in the future, the average level of productivity of workers of different age and gender would be proportional to recent average hourly wages paid to workers in these groups. Workforce ageing produced a slight difference in overall productivity compared with their baseline scenario.

This approach can be further extended by taking into account any cohort effects. For example, average education levels will rise in the old as the current, well-educated young begin to age. In one of their modelling scenarios, Day and Dowrick (2004) explored these cohort effects. They estimated that, by 2041, the average years of education across age groups will have risen by 1.2 years (from 13.0 presently) and this would raise annual labour productivity growth by an *additional* 0.22 percentage points.[3]

Different views about general economy-wide productivity trends

The long-run productivity assumptions used in other studies diverge, not because of different views about the possible effects of ageing, but rather due to different judgments about the relevance of past growth rates and future key drivers.

The Intergenerational Report assumed future labour productivity growth (real output per hour worked) of 1.75 per cent per year on the basis of the past 30 year average for the economy as a whole. It also considered a high growth scenario of 2.0 per cent per year (about the average for the 1990s) and a low growth scenario of 1.2 per cent per year (about the average for the 1980s).

[3] This consists of a positive effect of 0.9 percentage points, due to the higher *level* of education, less 0.68 percentage points, because the *rate* of increase in education levels will be slower than in the past.

Day and Dowrick (2004) assumed a labour productivity growth rate of 2.0 per cent per year for their baseline scenario. This corresponded to the average for the market sector (not the economy as a whole) since 1978-79. They argued that this is a conservative assumption, because education levels are forecast to increase and this is expected to increase the rate of labour productivity growth; their optimistic scenario assumes a rate of 2.2 per cent per year. They also considered a pessimistic scenario of 1.5 per cent per year growth in labour productivity, which they say may arise if, for example, institutional or policy settings discouraged investment, or because slower labour force growth resulted in less benefit (than the past) from scale economies, or because an ageing workforce may be less dynamic.

Gruen and Garbutt (2003) assumed a long-run average annual growth rate of 1.75 per cent, in line with the Intergenerational Report. However, they gave three reasons why growth might be faster. First, the world's technological frontier may expand faster than in the past because of increasing applications of information and communications technology (ICT), with spillover benefits for Australia. Second, they cited empirical evidence that finds a strong and stable statistical correlation between slower labour force growth and faster labour productivity growth. Third, like Day and Dowrick, they argued that the expected rise in the average level of educational attainment should increase labour productivity growth, though they did not posit an estimate. Notwithstanding the possible contributions of these factors to stronger productivity growth, Gruen and Garbutt noted that it may be a big step to assume, for now, sustained long term growth higher than 1.75 per cent without a continuing policy focus on economic reform.[4]

In submissions to this study, State governments adopted the following assumptions in their analyses:

- The New South Wales Government (sub. DR45, p.21) assumed labour productivity growth of 1.8 per cent per year, noting that this was conservative relative to recent New South Wales growth (2.4 per cent per year for 1989-90 to 2001-02).

[4] The West Australian Government (sub. 39, p. 29) commented that as there was some risk that recent strong productivity growth may not continue, policy settings in Australia must be supportive of continued growth. The Department of Employment and Workplace Relations (sub. DR71, pp. 20-21) considers there is scope for productivity growth higher than 1.75 per cent. It suggested that labour productivity could be increased by increasing the proportion of workers covered by Federal enterprise agreements, increasing the proportion of skilled workers within total employment, increasing the capital to output ratio, increasing the share of ICT in the overall capital stock, and increasing the share of GDP devoted to business research and development. The Australian Nursing Federation (sub. DR72, p.5) expressed concern about the impact on workers and their productivity of the Australian Government's proposed industrial relations changes but agreed that productivity gains will need a concerted investment in research.

- The Victorian Government (sub. 29, p.80) used a base case of 1.75 per cent and an alternative assumption of 2.0 per cent.
- The Queensland Government (sub. 17, p.32) used an annual labour productivity growth rate of 2 per cent for the 'medium' scenario — in line with Queensland's recent experience — and 1.75 per cent and 2.5 per cent for the 'low' and 'high' scenarios, respectively.
- The South Australian Government (sub. 23, p.17) used a rate of 1.75 per cent.
- The West Australian Government (sub. 39) used a base rate of 1.75 per cent and 1.25 and 2.25 for sensitivity tests.
- The Tasmanian Government (sub. 40) applied a rate of 1.75 per cent and compared it with a 'low' rate of 1.25 per cent.
- The ACT Government (sub. 21, p.18) used a rate of 2 per cent per year, but noted that it was reasonable to assume that the productivity gains of the past decade will not be maintained over the next 40 years, and so a rate more in keeping with historical levels (1.6 per cent) was also examined.

4.3 Past and future productivity growth

As these studies recognize, Australia's past productivity record is a reasonable starting basis for illustrating potential future economic impacts of ageing.

A methodological caveat

One obstacle to interpreting the past record is that the output of non-marketed services (such as certain public health) is measured by the value of labour inputs. This imposes a zero productivity growth rate on these sectors and is, therefore, likely to underestimate overall productivity growth in the economy.[5] Accordingly, Day and Dowrick (2004) argued that labour productivity for the market sector is a more reliable measure than for the whole economy, and use past trends in market sector productivity in their projections. However, when forecasting the economic growth effects of ageing, Day and Dowrick assumed that the market sector productivity growth rate applies to the whole economy. This raises several issues.

- It assumes that the unmeasured productivity growth in the non-market sector is the same as that of the market sector. This is unlikely to be true, although it is probably better than assuming zero growth (as is implicit in the orthodox approach).

[5] The ABS' National Accounts measure of labour productivity for the whole economy for the last 25 years averaged about 0.5 per cent per year less than for the market sector.

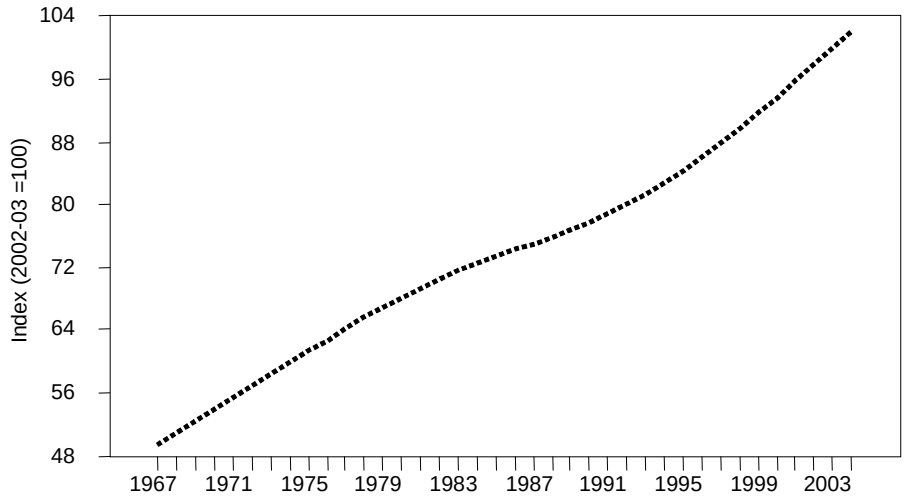
- A more problematic issue is one of consistency. Projecting the implications of ageing on tax revenues and government spending often relies on assuming the continuation of past trends, expressed as a ratio to the existing ABS' National Accounts definition of GDP. Such historical ratios could not be used if future GDP was measured by taking into account non-zero productivity in the non-market sector. For example, such an approach would produce upwardly biased tax revenue projections.

To avoid these consistency problems, this study has used the existing ABS National Accounts approach to the measurement of GDP — with its underlying assumptions — but also looked at the implications of different productivity growth projections.

What does history tell us?

The last forty year span of labour productivity (based on GDP per hour for the whole economy) reveals several shifts in long-run trends (figure 4.1), with a slowdown evident in the 1980s and an acceleration during the 1990s (hence the 'miracle' decade).

Figure 4.1 **Labour productivity,1966-67 to 2003-04**
Index of GDP per employee hour worked[a]



[a] The labour productivity series has been smoothed by a Hodrick-Prescott filter, so that growth rates can be calculated for any period without being affected by cyclical variations.

Data sources: Commission estimates; ABS (*National Accounts*, Cat. no. 5204.0).

Based on cyclically-adjusted data (table 4.1), the long-term growth rate from 1966-67 to 2003-04 is 1.78 per cent per annum — very close to the long-run value of 1.75 per cent used in the Intergenerational Report. This rate is 0.3 percentage points below the vigorous productivity growth apparent over the period from

1992-93 to 2003-04, but about 0.5 percentage points above the sluggish performance from 1985-86 to 1992-93, when growth was 1.27 per cent per year.[6]

Table 4.1 **Labour productivity growth rates, 1966-67 to 2003-04**
Market and non-market sector, Australia[a]

Period	*Compound growth rate (unsmoothed series)*	*Trend growth rate (unsmoothed series)*	*Trend growth rate (smoothed series)*
	%	%	%
Peak to peak			
1969-70 to 1978-79	2.23	2.32	2.38
1978-79 to 1985-86	1.63	1.66	1.49
1985-86 to 1992-93	1.10	1.02	1.27
1992-93 to 1998-99	2.21	2.18	2.02
1998-99 to 2003-04	1.84	1.89	2.12
1992-93 to 2003-04	2.05	2.18	2.09
1969-70 to 1992-93	1.70	1.68	1.71
1969-70 to 2003-04	1.81	1.70	1.71
Entire time period (non-peaks)			
1966-67 to 2003-04	..	..	1.78

a In order to avoid biases associated with the influences of the business cycle, peaks in GDP per hour worked were identified by smoothing the data using a Hodrick-Prescott filter and forming the ratio of the smoothed to the unsmoothed data. However, it should be emphasised that it is too early to determine whether the end year (2003-04) will be the peak in the latest cycle. It should also be noted that these peaks are not the same as those identified by the ABS using market sector data (and a slightly different smoothing technique). Growth rates were then calculated on the unsmoothed data across the identified peaks (the first two columns). The third column represents trend growth rates calculated across various periods using the smoothed data. This method can also — with caution — be applied to non-peak to non-peak periods, since the influence of the business cycle is significantly reduced. This enables an assessment of an even longer run productivity growth rate — as shown in the last row of the table. The trend growth rates for both columns 2 and 3 were calculated by regressing the natural log of the relevant productivity measure against a time trend using Ordinary Least Squares.

Source: ABS (*National Accounts*, Cat. no. 5204.0 and 5206.0).

In deciding on a range of likely future outcomes, the past acts as a check. For example, it would be difficult to justify averages for the next 40 years lower or higher than the extremes of the last 40 years. The Commission has accordingly assumed a range of 1.45 to 2.05 per cent as being useful for this study. The upper bound matches the strong productivity growth of the 1990s, while the lower bound provides approximate symmetry around the long-term average of around 1.75 per cent.[7] Box 4.1 sets out some of the circumstances that may be associated with higher or lower productivity outcomes.

6 These results are for economy-wide output per hour worked, and should not be confused with figures for the market sector (which comprises about two-thirds of total output).

7 A complementary approach is to work backwards and calculate the 'minimum' productivity growth rate in order that the level of real output per capita is maintained, despite the impacts of

Box 4.1 **The scope for sustaining recent productivity growth**

The strong, sustained Australian productivity performance since the early 1990s has prompted examination of the factors that lay behind it and the scope for maintaining it. Four aspects are often highlighted. First, there are likely to be further gains from the diffusion ICTs. ICTs are a source of significant capital deepening effects. For example, the innovative use of ICTs played a key role in the uplift in productivity in the wholesale trade sector, which was a major contributor to Australia's productivity surge. As a general purpose technology, there should be further scope for ongoing user adaptation. In addition, ICTs may enhance the ability for older workers to remain in the workforce by way of a reduction in physical demands and enhancement of flexibility in job change.

Second, Australia appears to be below the levels of productivity achieved in some other OECD countries. For example, in terms of GDP per hour worked, in 2002, Australia was at 83 per cent of the US level, up from 76 per cent in 1990, but only slightly above the 1950 relativity. Notwithstanding qualifications about international productivity measurement and the feasibility of a relatively small economy to achieve US benchmarks, this suggests the scope for productivity catch-up.

Third, forecast increases in education levels (human capital) are expected to be beneficial to productivity growth. Increases in education levels should directly increase the level of productivity of workers. There may also be implications for the rate of capital accumulation, technology absorption and technology advancement, labour supply participation and fertility. However, at some point, the returns to education may begin to diminish.

Fourth, as identified in the recent review of National Competition Policy (PC 2004b), governments have scope to implement further reforms that could stimulate productivity.

While the above factors may strengthen productivity growth, there may be some challenges facing Australia that could undermine productivity growth. For example, salinity, droughts and climate change could dampen agricultural performance, with sizeable effects on other sectors. Externally, global ageing is expected to slow growth in output in many advanced economies, and may have damaging impacts on global entrepreneurship and innovation. This could reduce demand for Australian goods and services (with possible scale effects) and slow the growth in the value of foreign technological spillovers that have been an important source of past productivity growth.

The baseline productivity assumption should be viewed as a useful starting point for this exercise, matching that of the Intergenerational Report and consistent with the long-run historical trend. It should not be seen as the Commission's *forecast* of Australia's future productivity growth.

ageing. For example, in the case of New Zealand, Guest et al. (2003) estimate a labour productivity growth rate of 0.27 per cent would suffice.

4.4 Relative productivity of current workers

A common view is that an individual's productivity rises until some middle age peak, after which it begins to decline. The basis for this view is largely two-fold. First, the physical and cognitive effects of ageing mean, on average, 70 year olds are less capable at certain tasks than when they were 35 years old. Second, human capital theory predicts that productivity increases with experience, at least in the early years, while education and training rates diminish after some middle age peak, such that skills depreciate.

A counter view is that there is no decline in productivity in later years, nor are older workers any less productive than younger contemporaries (box 4.2). The claim is that any decrements in physical and cognitive capacities are relatively small during working years and, even when they do occur, do not materially undermine performance in most tasks. In addition, it is sometimes claimed that certain attributes of older workers, such as greater experience, less absenteeism and lower job turnover, make older workers of comparable (or greater) value to employers than younger workers.

In light of these divergent views, it is important to obtain an objective assessment of the actual impacts of ageing on productivity. Measuring the relative productivity of current workers of different age is challenging. Three broad approaches have been tried:

- examining the age profile of worker characteristics that may be related to productivity — for example, education, training, job turnover and absenteeism;
- using the economy-wide cross sectional pattern of earnings across age groups; and
- econometrically estimating the relationship between age of workers and their productivity, using large samples of diverse workers — in one case, covering almost three million concurrent workers.

Box 4.2 **The positive view — age does not affect productivity**

The research … indicates that there is strong support for a finding that an ageing workforce is not necessarily linked to lower productivity. Improving health and higher levels of educational attainment for older workers are associated with the maintenance or improvement of productivity. Certainly there is no overwhelming support for suggesting workers' productivity declines with age. (DEWR 2003, p. 5)

'The overall finding from more than 100 research investigations is that there is no significant difference between the job performance of older and younger workers.' (Warr 1994 p. 309)

'There are only small declines in reaction time and physical strength and almost all research into the productivity of older workers has shown it to compare quite favourably with that of other workers from other age groups … precisely because of seniority.' (HREOC 1999, p. 16)

'The bulk of the evidence (Reid (1989), McNaught & Henderson (1990), Encel (1992), Salthouse (1994) and Waldman and Avalio (1986) suggest productivity declines little with age, and that in many applications (notably work involving intellectual skills) productivity may rise with age.' (Access Economics 2001)

'… all the research evidence suggests older workers are just as productive, trustworthy, stable and conscientious and as adaptable to change as younger workers.' (NSW Anti-discrimination Board 2004)

'A number of factors have contributed to the decline in labour marker participation by those aged 55 and over. They include … discriminatory attitudes towards older workers, based largely on myths about their supposed inability to be efficient and productive workers.' (South Australian Government, sub. 23, Background Paper on Employment and Older People, p. 4)

Worker characteristics and age

A popular approach to assessing the relationship between productivity and age is to examine, one at a time, the age pattern of certain worker characteristics that may be expected to have a bearing on individuals' productivity. The Commission has examined several characteristics in some detail.

The gerontological evidence reveals some decline in capabilities

Disciplines such as industrial gerontology and applied psychology have intensively examined changes with age in physical and cognitive capacities (including traits such as reasoning speed, numerical and verbal capabilities, problem solving and memory recall). The general picture that emerges is that some capacities decline from some stage in adulthood (Skirbeck 2003).

It is less clear what effect this has on work performance.

- It is likely that the effects depend upon the nature of the task and the role of experience in compensating for what in practice, are slow and subtle changes in capacities. Warr (1994), for example, concluded that experience can compensate in some tasks, but not others.
- The impact on economy-wide productivity of biological ageing may also be muted if workers, when confronted with decline in certain biological capacities, leave the workforce or change to jobs in which those capacities are not important.[8]
- There is also some evidence suggesting that targeted training programs may soften or halt age-related decline (Skirbeck 2003, p.5).

Older workers tend to be less educated and less trained

Historically, the average education attainment level of older workers has been much lower than for younger contemporaries. Educational differences play a key role in job and wage differences between older and younger workers and would be expected to at least partly explain statistical differences in average worker productivity across age groups.

The incidence of training is significantly lower among older workers (Wooden et al. 2001). This could reflect the benefits and costs to employers of training older workers. For example, the period over which an employer can obtain a return from training is lower for workers close to retirement. However, some commentators question whether employers misperceive the benefits and costs of training older workers.

Two skills which may be important for productivity in a modern society, literacy and computer skills, are lower among older workers, even after accounting for education differences between age groups (Miller and Mulvey 1997; OECD 1998).

Staying and moving around — patterns of worker mobility

Long service with an organisation (tenure) — commonly seen as an indicator of certain worker qualities — is much more prevalent among older workers. This is partly an artefact because, clearly, younger workers under, say 40 years of age, have had less scope for 20 years of service. Nonetheless, longer experience with an

[8] Both the Queensland Government (sub. 17, p. 27) and Victorian Government (sub. 29, p. 42) also came to the view that the effects of biological ageing and experience tend to work in opposite directions.

organisation increases the likelihood of better performance, *if* the job entails firm-specific skills and knowledge.[9] However, some empirical evidence suggests that, on average, earnings and productivity increase little, if at all, beyond about 10 years tenure.

Job turnover is much lower among older workers. From an employer's perspective, low turnover should reduce hiring and training costs. On the other hand, from an economy-wide perspective, low turnover may impede the diffusion of knowledge and the efficient matching of employers and employees (Jovanovic 1979). Ilmukannus et al. (1999) found empirical support for a positive relationship between firm productivity and turnover in Finland manufacturing.

Older workers are probably less healthy

The probability of poorer health and disability clearly increases with age among the *population.* There is less comprehensive evidence on the prevalence of poorer health and disability among different age groups in the *workforce*, but most of what is available suggests ill-health rises with age.

That said, it is likely that differences in health status by age in the workforce are less marked than differences between age groups in the population generally, because people with particularly poor health are more likely to be unemployed or to exit the labour force.

Somewhat paradoxically, surveys reveal lower than average sick leave *incidence* rates for the oldest workers. To some extent, this reflects greater use of sick leave for family reasons by younger workers. In any case, sick leave incidence is only one part of the health productivity story, as it does not capture the impacts of chronic conditions on performance while at work. Nor does it consider the duration of sick leave, which may also vary by age. For example, the total duration of leave on workers' compensation, as a proportion of total hours worked by age cohorts, was highest for workers over 50 years.[10]

---

[9] The South Australian Government (sub. 23, Background paper on Employment and Older People, p. 5) expressed concern about a huge potential loss of corporate memory in the public sector over the next 10 years — about 18 per cent of the current workforce is expected to retire by 2011.

[10] New cases accepted in 2000-01 involving at least one weeks absence.

But overall absences from work are lower for the old

Surveys find that the incidence rate for all forms of absences (approved and unapproved leave) is slightly lower among older workers. However, the pattern, duration and forewarning of absences, and the nature of the work (such as team-based versus individual work), are probably also important in determining whether such absences have significant productivity effects. The age dimension of these aspects is unknown.

Ageing will add to team diversity

Increasingly, the view is put that a more age-diverse workforce enhances business performance (and productivity). For instance:

- age diversity is said to yield greater team problem-solving abilities; and
- businesses with older workers are predicted to more likely attract, and be better able to, service older customers, who will become increasingly representative in an ageing society.[11]

However, the effects on firm performance of age-diverse teams are still unclear. Gibbons and Waldman (1999) discuss the large sociology literature on this issue. Moreover, two empirical economic studies did not find a benefit from customer age matching or age-diverse teams.[12]

The characteristics of the old are changing

Some of the characteristics of older workers may change in a way that affects their average productivity and overall productivity growth rates:

- future cohorts of the old will have educational levels much closer to those of younger cohorts, reducing productivity disparities by age;

[11] Access Economics (2001, p. 9) state 'the productivity of employees can be turbo-charged by the advantages of matching [the age of] an organisations customer base'. It identified examples such as hardware and music shops where customer demographics are matched by staffing.

[12] Leonard and Levine (2003) used a sample from 800 retail stores employing over 70 000 individuals. They found that race and gender diversity did not predict sales or sales growth, but that age diversity predicted low sales. There was little benefit to employers from 'matching' except when the customers do not speak English. Hamilton et al. (2004) studied the productivity of workers in a garment plant that had shifted from individual piece rate payments to team piece rate payment. They found that teams with greater diversity in age were less productive, while teams with greater diversity in worker abilities were more productive, as were teams composed of one ethnicity (Hispanic in this case).

- the health profile of older workers may improve due to less exposure to, or better treatment of, illnesses (reflecting changes in the occupational mix of jobs, new health technologies and improved Occupational Health and Safety practices), also raising average productivity levels; and
- average labour participation rates at older ages are likely to rise (chapter 3). While there may well be significant personal and output benefits from such increases, the 'new' older workers are likely to have lower skills and poorer health status than older workers already in employment — depressing average labour productivity levels.[13] Of course, there is still a gain to output from their involvement, but it should not be assumed to be as great as other older workers more strongly attached to the labour market.

On the whole, it is likely that the gains from the first two effects will dominate the third. Consequently, average disparities in productivity of older and middle-aged workers may decline over time.

Summing up

The productivity of *individual* workers is determined by a host of characteristics — for example, education and skills, experience, motivation, inherent intellectual and physical capabilities, their team work and personality. Some of the worker characteristics most important for productivity performance — such as cognitive and physical functioning — decline after some age. That age varies enormously by the individual, and, in many cases, will occur largely after retirement. There are offsetting advantages with age too, and compensation strategies that are likely to ameliorate ageing effects. Nevertheless, the evidence on changes in worker characteristics and age is consistent with *some* decline in *average* labour productivity levels after middle age. (As shown below, this finding is reinforced by data on productivity and wages.) The disparity between older and middle-aged workers may reduce in the future.

The emphases on 'some' and 'average' are important. First, it is far from clear whether the productivity effects are large (as discussed below). Second, while averages matter, for an assessment of the effect of ageing on economy-wide productivity, they are irrelevant to judgments about the suitability of older people

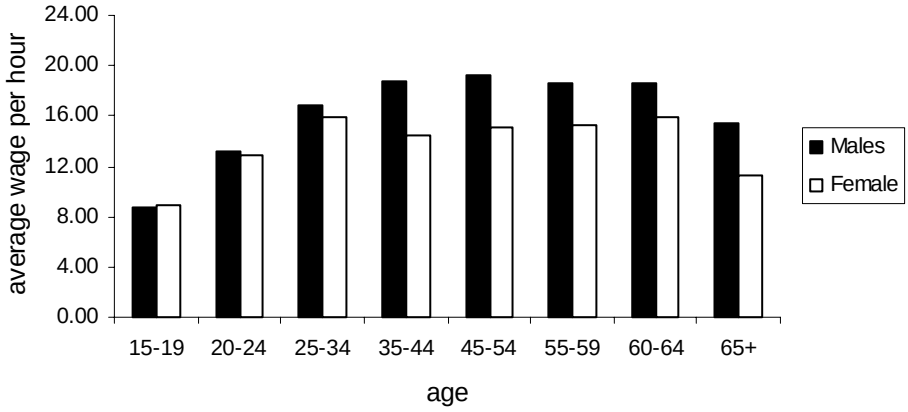
[13] Bryant et al. (2004) assumed differences in the productivity of 'new' and existing workers in estimating the GDP effect of higher participation rates in New Zealand, on the basis that survey evidence showed that people who are not currently employed differ systematically from people who are currently employed in ways that affect hours and productivity — for example, those currently not employed are more likely to have young children, and lower education. They used estimates of average wages for people not in employment (by age and sex) which are about 65 to 75 per cent of the average for those currently employed.

for jobs. Age is a very poor predictor of ability or productivity. Many older people will have superior performance to younger people.

Cross sectional earnings as a proxy for workers' relative productivity

As noted above, Gruen and Garbutt (2003) used the recent economy-wide, cross-sectional age pattern of wages per hour as an estimate of the relative productivity across age and gender cohorts (figure 4.2). Several submissions also suggested this as a possible approach (including Queensland Government, sub. 17, p. 28 and Nigel Fitzpatrick, sub. 31).

Figure 4.2 **Average wages by age and gender, 1999-2000**



Data source: Gruen and Garbutt (2003, figure 7).

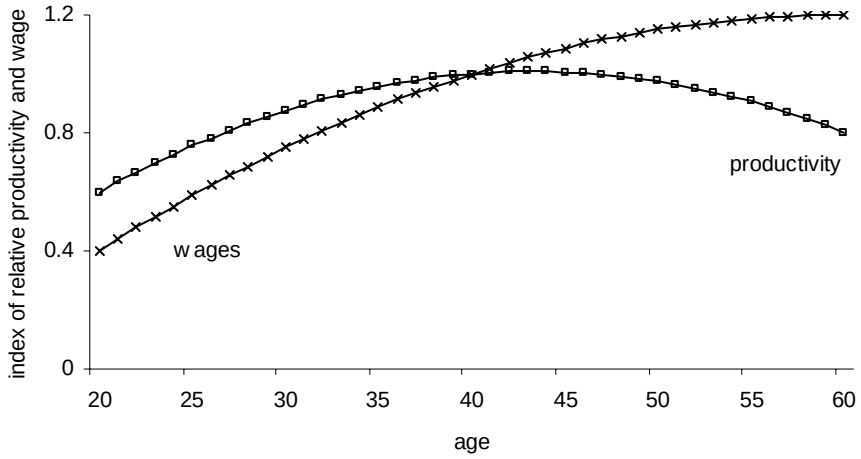
It is important to dispel any possible misunderstandings about the productivity interpretations of this wage pattern. It does not measure a typical individual's lifetime pattern of earnings: indeed, longitudinal data typically shows that individual's (hourly) earnings largely rise with age. Rather it reveals that among current workers, the youngest and oldest are on average in lower-paid jobs, whatever the reasons.

It could reasonably be expected that wages broadly reflect the scarcity value to society of employing labour in those activities — and so figure 4.2 may provide an adequate proxy for present day relative productivity differences for the current age structure (with their given other worker characteristics). The use of the wages profile as a proxy for productivity differences between age groups also has the attraction of providing evidence encompassing the entire paid employment sector.

However, actual productivity in the future may not exactly match this wage profile for two reasons:

- relative wages of older workers may be higher in the future, reflecting changes in education profiles;[14] and
- there is evidence (using large sample studies) that, on average, younger workers tend to be paid less than their marginal productivity and older workers more.[15] Accordingly, the wages profile above may underestimate the productivity decline associated with age and overestimate the productivity gain made as young people gain experience (figure 4.3).

Figure 4.3 **Empirical cross section productivity-wage patterns**



Statistical estimates of differences in worker productivity between age groups

The age distribution of wages reflects factors like education, occupation and industry, as well as those factors directly associated with the biological impacts of ageing. In order to just consider the direct effects, several studies of worker

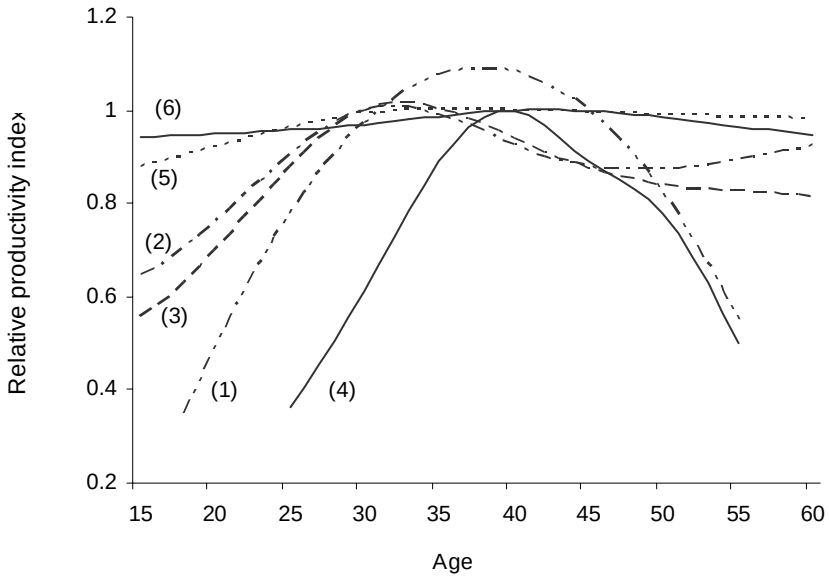
[14] Though, against this, Borland and Wilkins (1996) found that the hump shaped age-earnings profile for full time male employees (in their main job) changed very little between 1975 and 1994, despite changes over the period in educational attainment rates across age groups. But changes in other factors may make it hard to identify an education effect.

[15] For example, Medoff and Abraham (1980), Kotlikoff and Gokhale (1992), Haegeland and Klette (1999), Crepon et al. (2002), Ilmakunnas and Maliranta (2002), Ilmakunnas et al. (2004). For a survey of theories of divergence in wages and productivity, at a point in time, (Hutchens 1989). Such theories include those based on firm specific human capital and incentive wages.

productivity control for measurable differences between age groups in their underlying characteristics (such as education, firm tenure and plant vintage).

The results (figure 4.4) from these large scale cross-sectional studies point to a robust inverted U-shape pattern between productivity and age. The estimated peak occurs around 35 to 40 years. The average rate of decline after the peak, until age 55, ranges from about 0.1 to 3 per cent per year. In most cases, the oldest workers were still more productive than the youngest workers.

Figure 4.4 **Estimated relative productivity across age groups[a]**



a The vertical axis compares the average productivity of groups of workers of different age in index form. The most productive age group has a productivity index of one. All other age groups have lower indices. For example an age group with an index of 0.8 is 20 per cent less productive than the peak age group. The studies did not estimate a continuous function, as above. Rather there were discrete point estimates for broad age groups (for example 25 to 34 years). For the purposes of graphical illustration, the Commission used a spline function to fit a smooth curve to the discrete point estimates of each study. For example, if the productivity index estimate was 1.0 for an age group ranging from 15 to 24 years and 1.5 for the age group 25 to 34 years then the midpoint of the age group was taken as representative and a smooth, continuous curve fitted, subject to the constraint that it passed through the given estimates at the midpoint age.

Data sources: (series 1) Haegeland and Klette (1999), table 5 (manufacturing). (series 2) Crepon et al. (2002), table 4 (manufacturing). (series 3) Crepon et al. (2002), table 4 (non-manufacturing). (series 4) Ilmakunnas et al (1999), figure 2, profile 5 (manufacturing). (series 5) Ilmakunnas and Marilantra (2002), table 2, model A-G (manufacturing). (series 6) Ilumakunnas and Marilantra (2002), table 3, model E (business sector).

The variability in the estimated age patterns makes it difficult to choose a representative pattern for modelling purposes.[16] However, a consistent finding is

16 Note that differences in the estimated age patterns in figure 4.4 could be due to genuine differences in relative productivity patterns of workers between the samples. It could also be due

that, after controlling for *measurable* differences in worker characteristics, average productivity levels are highest for middle aged workers. (The disparity in actual productivity between the older age group and other age groups will be greater than those shown in figure 4.4. This is because older workers in the samples have lower education and work in older plants, which are themselves associated with lower productivity levels.)

Are there differences in the productivity-age pattern across sectors?

From an economy-wide modelling perspective, it is also relevant whether the productivity-age pattern is the same across all sectors. Only two of the studies illustrated in figure 4.4 compared samples of manufacturing and non-manufacturing workers and the results provide no basis for assuming significant sectoral differences in the age pattern of productivity of workers.[17]

Is the productivity-age pattern different for males and females?

Finally, since chapter 3 estimates future labour participation rates by gender as well as age we should consider whether the relative productivity-age patterns is the same within the male and female sub-groups. The broad evidence suggests that, qualitatively, similar profiles apply.[18]

Summing up the links between ageing and worker productivity

Although the evidence suggests there are differences in average productivity levels across age cohorts and genders, there are two arguments in favour of ignoring these in the base case projections:

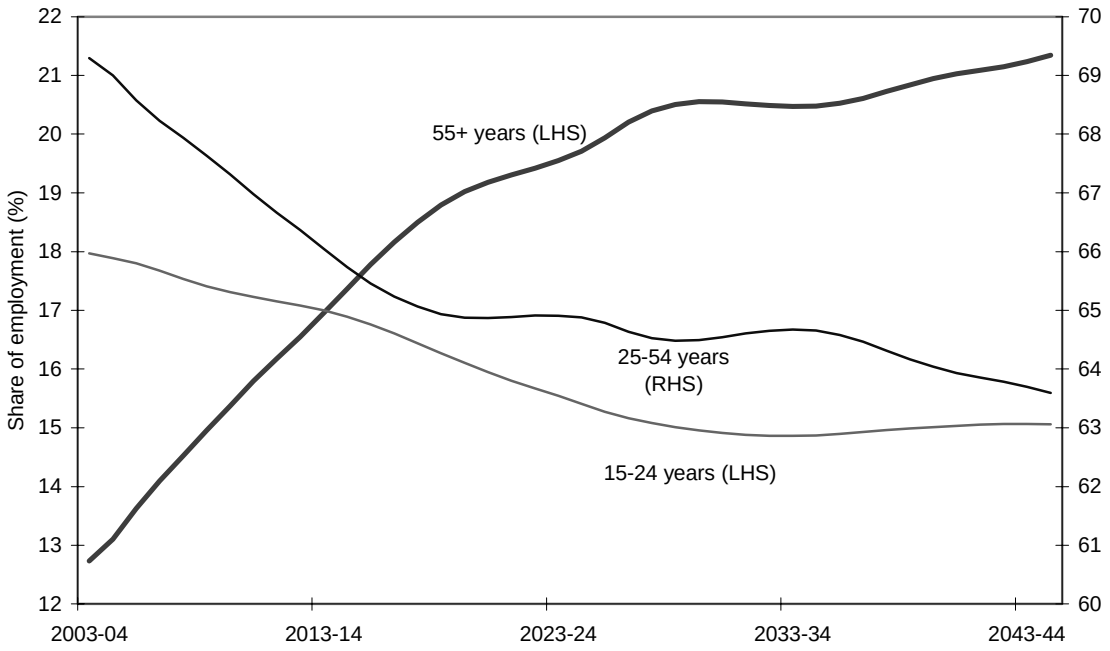
to differences between the models. For example, education is not measured the same in each study – Haegeland and Klette measure years of schooling, divided into four groups, and Ilmakunnas while Maliranta identify eight groups of education attainment. Notwithstanding, the same general inverted U-shape pattern emerges.

[17] It is incorrect to compare the 'flattish' profile for the business sector (line 6 in figure 4.4) with the highly curved profiles for manufacturing (such as lines 1 and 4) because they are different studies with different models. A more valid approach is to compare manufacturing and non-manufacturing samples of workers from the same country, for the same period using the same model and estimation technique.

[18] For example, Crepon et al. (2002) estimate the age-productivity differential between the peak and oldest workers, in manufacturing, to range from 5 to 17 per cent for males and from 2 to 14 per cent for females. In non-manufacturing, the age differential ranges from 5 to 24 per cent for males and 14 to 27 per cent for females.

- experimental estimates that take account of variations in productivity levels between age groups did not make a big difference to aggregate projections, a result confirmed in analysis by the Queensland Government (sub. 17, p. 28).[19] The main reason for this is that age distribution of employment shifts away from younger (less productive) workers, largely offsetting the small adverse effects of productivity decline among older workers (figure 4.5). The ageing effects may well be even smaller if future increases in the educational attainment and health status of older workers reduce existing disparities between old and middle-aged workers; and

Figure 4.5 **The age distribution of employment**
2003-04 to 2044-45



Data source: Commission estimates.

- it simplifies the analysis and enables other experiments about the effects of productivity on ageing to be conducted more readily (as in chapter 13).

Accordingly, the Commission has assumed equal productivity levels across age groups in the base case, as in the Intergenerational Report and the Access Economics models used by State governments. Nevertheless, the effects on

19 The Queensland Government found a small effect from relaxing the assumption of equal levels of productivity. It calculated that the long term average annual productivity growth rate would be 0.05 per cent per year *higher* than otherwise, under its medium participation scenario, if productivity levels by age and gender conformed to the profile of average weekly earnings in 1997.

aggregate productivity growth and output per capita of relaxing this assumption are examined in chapter 5 (box 5.1).

4.5 Capital deepening, technical progress and ageing

Section 4.4 examined the potential effect of a change in the age structure of the workforce on the average quality of direct labour inputs. This section examines the implications of demographic change on the other components that determine labour productivity growth:

- the capital to labour ratio (capital deepening); and
- 'technical progress' or multi-factor productivity.

Global demographic effects on savings and investment

Investment in capital has to be funded from savings. Since Australia is an open economy, the relevant pool of savings is a global one. This then raises the question of the capacity for continued strong long-run inward investment flows into Australia. Among other things, this depends on:

- global demographic trends; and
- the effects of global ageing on labour supply growth, investment demand, and lifecycle savings and consumption behaviour.

The first is straightforward in qualitative terms. There are clear signs that the shift to older age structures is not an Australian, nor even a developed country, peculiarity. China, for example, is expected to experience profound population ageing over the next half century. However, for empirical purposes, the precise timing, nature and extent of population ageing matters. For instance, it matters whether the ageing arises from reduced fertility or increased longevity, since life cycle savings theory suggests that different savings responses should ensue.[20]

The second issue is more complex:

- while the aged run down superannuation assets and tend to liquidate fungible assets, such as bank deposits, during retirement, they often do not draw down illiquid assets, like housing (though this may change in the future — chapter 10). The effects on the household savings rate, properly measured, are therefore

[20] On the issue of timing, Tosun (2001) estimated that living standards of both the developed countries (as a group) and developing countries (as a group) are higher than otherwise if ageing occurs earlier in the developing countries than in the base case.

muted (and sometimes ambiguous). In any case, the precise effect on savings at any time depends on the particular consumption-savings behaviour of different age groups and changes in the global age structure;

- public savings are expected to decline because of the effects of ageing populations on government expenditure and revenue (though many countries are expected to reform public retirement pension arrangements and/or take other actions to limit the increase in public debt as a consequence of ageing);[21] and
- the amount of capital required to achieve the desired capital-labour ratio will fall as the growth of the labour supply slows. At given factor prices, this depresses investment demand.

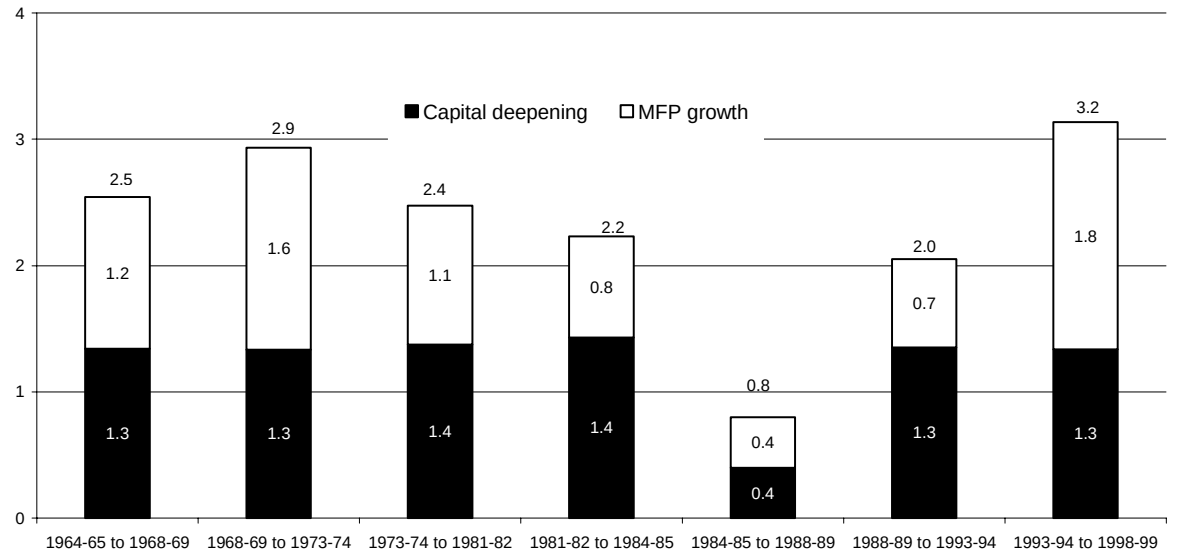
Several studies have attempted to unravel the forces at work, using multi-region, general equilibrium models, intended to capture the differential impacts across countries and the important linkages between countries.[22] Some of these analyses suggest higher world interest rates (and therefore lower investment levels). This occurs because, even while investment requirements are lower with ageing, existing national savings are lower still, creating an excess demand for investment. Some results also point to large swings in current account balances and an increase in the 'intensity' of world capital flows. However, as noted by the Queensland Government (sub. 17, p. 29), the collective findings from global modelling are not clear cut from the perspective of Australia. This points to the importance of using sensitivity analysis for productivity growth rates when projecting the impacts of ageing.

That said, past trends in capital deepening in Australia do not portend a crisis in investment because of ageing. There have been large changes in global capital markets over the past 40 years and significant changes in Australia's (and global) demographic structure. Yet, in the past 40 years, the contribution of capital deepening to Australia's labour productivity growth has been remarkably stable over productivity cycles (figure 4.6).

[21] A number of empirical studies allow for some fiscal policy response over the long term in order to limit budgetary impacts of ageing, though budget positions still worsen somewhat. Some models even allow fiscal expenditure to be responsive (endogenous) to changes in the median voter age, reflecting evidence that people of different age have different attitudes/preferences for government expenditure and vote so as to increase the chances their preferences will be fulfilled — Auerbach and Kotlikoff (1992) comment that 'one of the greatest unknowns is how the political process will change as an increasing fraction of the voting population becomes elderly'.

[22] For example, Masson and Tryon (1991), Turner et al. (1998), Brooks (2000) and Guest and McDonald (2004).

Figure 4.6 **Components of labour productivity growth, 1964-65 to 1998-99**
ABS productivity cycles for the market sector



Source: PC (2003).

The effects of ageing on technical progress

A major underlying reason for labour productivity growth is 'technical progress' in its broadest sense — better ways of doing things — whether in people's heads, new institutional structures, or embodied in capital. Some see this as the prime route by which ageing affects labour productivity (Feyrer 2002).

Ageing could affect technical progress in several ways:

- on the negative side, an older population may be inherently less creative and less entrepreneurial, or their depreciating skills may create impediments to the adoption and diffusion of new knowledge;
- on the positive side, a slowdown in the rate of labour supply growth might create incentives for labour saving innovation.[23] Other forces — such as fiscal pressures facing governments in areas such as health and aged care — might also prompt better ways of doing things.

The potential links between ageing and technical progress are not well understood.

[23] Aside from innovation effects, a slow down in the rate of labour supply growth may also stimulate capital deepening and the out-sourcing of labour intensive activities to labour 'rich' countries.

Age of inventors and entrepreneurs

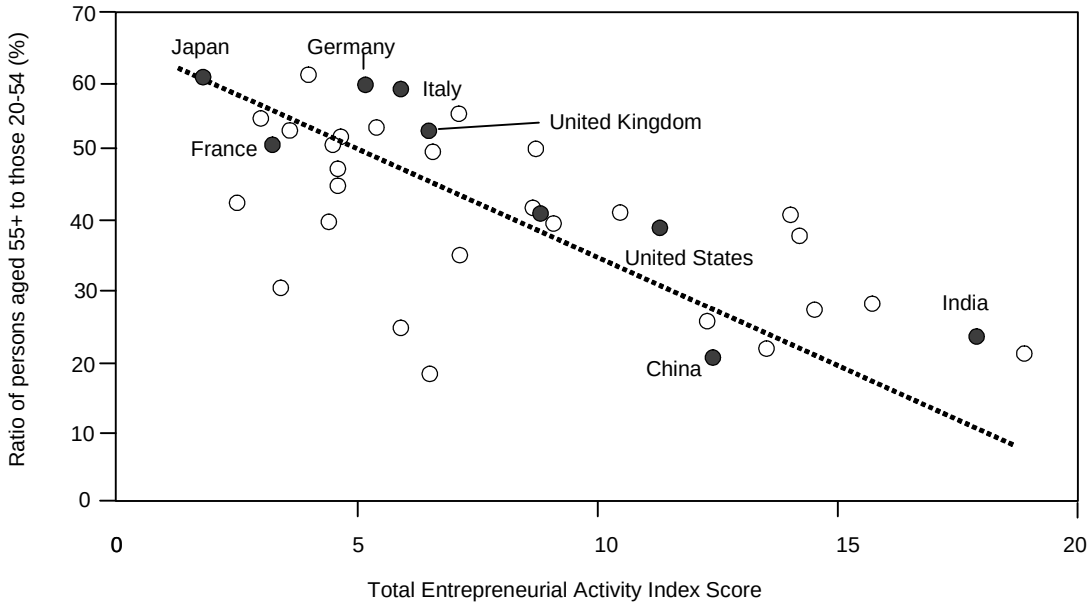
If productivity growth is driven by innovation, then the ages at which workers are generating and implementing new ideas may be important. Creative output in science and invention varies substantially by age, with the peak generally between ages 30 and 40.[24] Thus, slower growth in the absolute number of younger people may reduce the pace of major creative breakthroughs.

For most countries, however, idea *adoption* may be more relevant than idea creation. Entrepreneurial activity is one way in which new technologies are introduced into the economy. While it is possible that older people may have greater access to capital for starting their own businesses (and are generally believed to have better skills and understanding of the target industry through experience), some evidence suggests that entrepreneurial activity is higher among younger people. For example, Feyrer (2002) notes that the median age of Chief Executive Officers (CEOs) of the 500 fastest growing companies in the US was 42 years in a 2001 survey (compared with 56 years for Fortune 500 CEOs). He also noted that Zacharakis et al. (1999) found that the majority of those involved in a sample of 'start-up' companies across ten OECD countries were aged 25 to 44 years. Schieber (2003) found a negative relationship between a measure of entrepreneurial activity and ageing (figure 4.7). On the other hand, the Queensland Government (sub. 17, p. 30) pointed out that many new products and services are brought to market by large firms, which obscures the link between entrepreneurial activity and individual demographics.

[24] Lehman (1953) is often cited as evidence. A more recent study (reported by the *Canberra Times*, 17 July 2003, p.19) was said to have found that two-thirds of 280 eminent scientists had made their most significant contributions before their mid-30s.

Figure 4.7 **Ageing and entrepreneurship**

Ratio of persons aged 55+ to those 20-54 by Entrepreneurial Activity Index Score



Data source: Schieber (2003).

Labour scarcity as a spur to innovation

A well-known saying is that 'necessity is the mother of invention'. Greenspan (2003) noted that economic historians have argued that one reason the United States surpassed Great Britain in the early nineteenth century as the leader in technological invention was its relative scarcity of labour. As supporting evidence he pointed out that:

> … patent records of this period show that innovation did respond to economic incentives and that the scarcity of labour clearly provided incentives to develop new methods of production.

Empirical studies of cross country economic growth have consistently found a statistically significant negative association between annual labour force growth and annual labour productivity growth — the estimates suggest that a one per cent per annum slowdown in labour supply growth is correlated with an increase of about 0.5 per cent per year in labour productivity growth (as cited by Gruen and Garbutt 2003, p. 29). Correlation need not imply causation, though Romer (1987) argued that incentives to generate labour-saving forms of knowledge are likely to be stronger when labour force growth is slower. Were the relationship valid, the projected slow growth in annual labour supply relative to the past (chapter 3) would imply an addition to present labour productivity growth rates of around 0.5 per cent.

However, in the Commission's judgment, there is insufficient basis to project radical improvements to labour productivity of this extent when the evidence about the direction of causality or even the mechanism at work is unsubstantiated.[25]

Industry structure considerations

The implications of demographic change for economy-wide growth in labour productivity could, in principle, be more closely assessed by examining:

- the differential impacts of ageing across industries; and
- any shifts in the structure of industries arising from ageing (as raised by the Queensland Government, (sub. 17, p. 31).

Industries differ in their age composition, labour intensity, scope for technical change and existing productivity levels. This suggests that ageing may have differential effects on productivity across industries.

The Department of Industry, Tourism and Resources (ITR) (sub. 33) examined differences across broad industry groupings in age, gender, skill and working hours profiles, in order to more clearly draw out the labour input implications of a decline in the growth in the overall workforce. For example, it identified that future mining growth is expected to come mainly from capital investment. On the other hand, cultural and recreational services have exhibited low labour productivity and are relatively labour intensive.[26]

As noted above, ageing may also have implications for capital deepening and technical progress. Thus, while mining is unlikely to be constrained by labour shortages, it may face greater obstacles to growth if interest rates or capital flows are adversely affected by global ageing.

As well as influencing labour and capital inputs — with differential impacts on industries and their growth prospects — ageing will also have profound impacts on the composition of demand (technical paper 11), particularly increasing growth in health care and other ageing-related services. The productivity of the these sectors is

[25] Others have adopted a similarly position (for example, Turner et al. 1998; Guest and McDonald 2004; and Byrant 2003, p. 13).

[26] The department noted that accommodation, cafes and restaurants; and cultural and recreational services exhibit low labour productivity, suggesting the potential of some special challenges in a tightening labour market. However, it also observed that these two industries display relatively high levels of part-time and female employment. These two characteristics may indicate a potential to raise labour input through lifting average hours worked by existing employees. It noted that scope for this may depend, in part, on the (dis)incentives arising from the interaction between the welfare and tax systems and employer workplace flexibility.

poorly measured — but there clearly could be potential for ageing to have aggregate productivity effects through industry/demand compositional change.

In sum, a disaggregated industry approach offers scope for a better understanding of the economy-wide effects on productivity of ageing, but as yet, does not give precise guidance to any economy-wide impacts.

4.6 Convergence or divergence in State productivity growth?

Another issue is whether the same long-term average labour productivity growth rates should be assumed for each State. Average labour productivity growth rates since 1984-85 show some differences across jurisdictions (table 4.2).

Table 4.2 **State and Territory average labour productivity growth**
1984-85 to 2002-03, All sectors

	1984-85 to 2002-03	*1984-85 to 1989-90*	*1989-90 to 1993-94*	*1993-94 to 2002-03*
	per cent per year	per cent per year	per cent per year	per cent per year
NSW	1.6	0.8	1.3	2.1
VIC	1.6	-0.2	2.0	2.4
QLD	1.4	-0.1	2.0	2.0
SA	1.5	1.2	0.3	2.2
WA	2.1	1.3	2.2	2.6
Tas	1.1	-0.6	1.9	1.8
NT	2.1	2.4	0.5	2.8
ACT	1.5	2.1	0.4	1.6
Australia	**1.5**	**0.2**	**1.6**	**2.2**

Source: Commission estimates using ABS (DX data 2004, GSP by State) and ABS (labour force super-table 2004, hours worked by State).

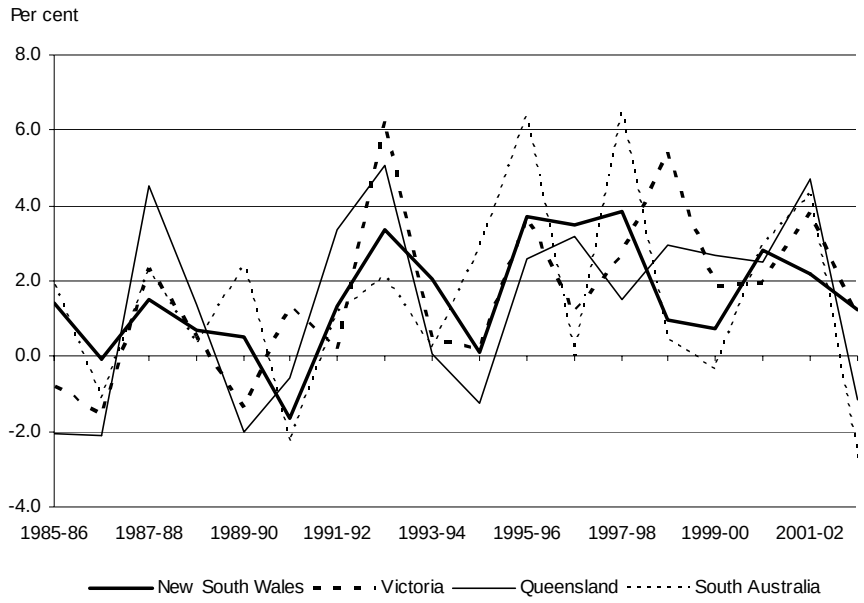
Some of this variation is likely to be due to statistical errors, random differences in supply and demand shocks that may not persist, or to structural and policy differences between jurisdictions.[27] The cyclical movements of productivity appear to be similar for all jurisdictions (figure 4.8), suggesting some common economic

drivers of productivity growth. But it is also clear that rankings in productivity growth are highly volatile from year to year.

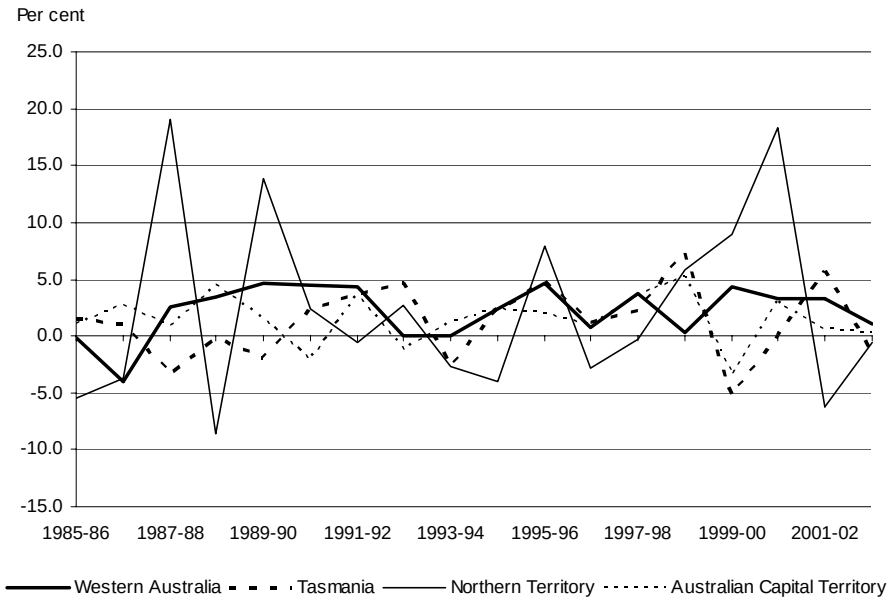
[27] The Victorian Government (sub. 29, p. 42) stated that 'productivity growth can be influenced by state policy levers, particularly in education and training, research and development, infrastructure investment, and in legal and institutional arrangements such as natural resource allocation frameworks and a regulatory framework that fosters competition and innovation.'

Figure 4.8 **Annual labour productivity growth, 1984-85 to 2002-03**

New South Wales, Victoria, Queensland and South Australia



Western Australia, Tasmania, Northern Territory and the ACT



Data source:, ABS (DX data 2004, GSP by State; labour force super-table 2004, hours worked by State); Commission estimates.

The neoclassical model of economic growth suggests there would be long-run convergence in interstate per capita income *levels* (and labour productivity levels). In turn, this implies that economies with lower levels grow faster, and vice versa, until a steady state in which all economies trend towards the same productivity

growth rate.[28] Nguyen et al. (2003) found no empirical evidence that labour productivity *levels* across the six Australian states either converged or diverged between 1984-85 and 1998-99 — meaning *growth* rates were neither positively nor negatively correlated with initial levels, as suggested by the neoclassical model. There was some evidence that the dispersion in the levels of labour productivity had increased. However, if mining was excluded (which underpins some of the high average growth in the period for Western Australia) there was no statistically significant increase or decrease in the dispersion of levels. Bodman et al. (2003) found evidence of a tendency towards stable gaps between productivity *levels* across the six states for the same period — which is consistent with similar cross-State productivity *growth* rates.

In the absence of evidence to the contrary, the simplest characterisation of inter-state productivity is appropriate. Accordingly, in the Commission's projections, average long-term productivity growth rates have been assumed to be the same for each jurisdiction.[29]

[28] In the neoclassical model, the process of convergence is driven by increases in the rate of investment in poorer economies (capital deepening), because developing economies face a higher return to capital, until their capital-labour ratio and the return to capital is equalised with that of higher income economies. Lower income economies also have the opportunity to absorb the latest technologies available in higher income economies. The convergence hypothesis is usually used in relation to countries. Within Australia we could expect less differences between States in the relative price of capital to labour and in technologies, compared with cross country samples, in which case interstate differences in labour productivity growth must be due more to other factors such as industry mix and policy environments, which are not subject to 'natural' convergence.

[29] Moreover, assuming otherwise is problematic — aside from the difficulty of how they may diverge, compounding of different rates may result in unrealistic differences in income levels as well as possibly complicating the central focus on the effects of ageing on government budgets.

5 Economic growth implications

Key points

- Population ageing will depress Australia's economic growth. Growth rates of GDP per capita are projected to fall steadily over the next 20 years, before gradually recovering in line with long-term productivity growth.
  - With an assumed baseline productivity growth of 1.75 per cent per annum, GDP per capita growth would slump to nearly 1.25 per cent a year by the mid 2020s — roughly half its rate in 2003-04 and one-third lower than without ageing.
- The main way in which ageing affects economic growth is by constraining labour supply growth.
  - The available evidence suggests that the biological aspects of ageing and other changes in the mix of worker and job traits accompanying ageing will make a negligible difference to Australia's aggregate growth performance.
  - Feasible demographic changes, such as increased migration or fertility, do not make a substantive difference to Australia's prospective GDP growth per capita.
- Policy measures that increased Australia's age-specific labour force participation rates would stimulate economic growth. However, GDP is unlikely to increase by the same proportion as aggregate participation rates, because on average 'new' participants would be in lower productivity jobs and work fewer hours.
- In the absence of any resurgence in workforce shares, economic growth over the next four to five decades would depend on productivity growth.
- Notwithstanding a projected growth slowdown, by 2044-45 per capita incomes will be nearly double those of 2003-04 in real terms. Moreover, conventional measures of output tend to understate the true increase in living standards in Australia.
  - Following standard National Accounts conventions, the calculations pre-suppose no productivity gains in sectors such as education and health, where output is hard to measure.
  - They do not take account of the benefits from increased volunteering rates. Over the next 40 years, the value of volunteering is expected to rise from 1.8 to around 2.1 per cent of GDP, mainly due to the growing share of adults in the population.
  - The projections also do not take into account the value of increased leisure associated with a greater share of retirees in the population.

The elements of the labour market 'jigsaw' (chapter 3) can be combined with productivity assumptions (chapter 4) to give a picture of how economic growth may fare over the next half century. This chapter provides an account of Australia's economic growth prospects under several scenarios.

Section 5.1 describes the baseline outcomes for economic growth, including by jurisdiction. Section 5.2 considers the effects of ageing *per se* on productivity and economic growth. Section 5.3 examines how Australia's economic growth would be affected under different demographic, labour participation and productivity scenarios. Section 5.4 places the impacts of ageing on economic welfare in perspective.

5.1 Economic growth over the next forty years

Population ageing clearly depresses economic growth. Australia's GDP per capita growth rates are projected to fall steadily until 2025, with a partial recovery in the next 20 years (figure 5.1 and table 5.1). For example, given the assumed baseline productivity growth rate of 1.75 per cent per annum, GDP per capita growth would slump just below 1.25 per cent a year in the mid 2020s — roughly half the rate in 2003-04 and one-third lower than in the absence of ageing. This is primarily due to the effects of ageing on labour supply growth relative to population growth, compounded by the baby-boom phenomenon. Despite the slowdown in growth, GDP per capita still rises to around $73 000 in 2002-03 prices — more than $30 000 more than its 2003-04 level.

Table 5.1 **Australia's growth prospects**

Period	*1990s*	*2000s*	*2010s*	*2020s*	*2030s*	*2040s*
Average growth in GDP per capita (%)	2.14	1.95	1.46	1.27	1.50	1.61

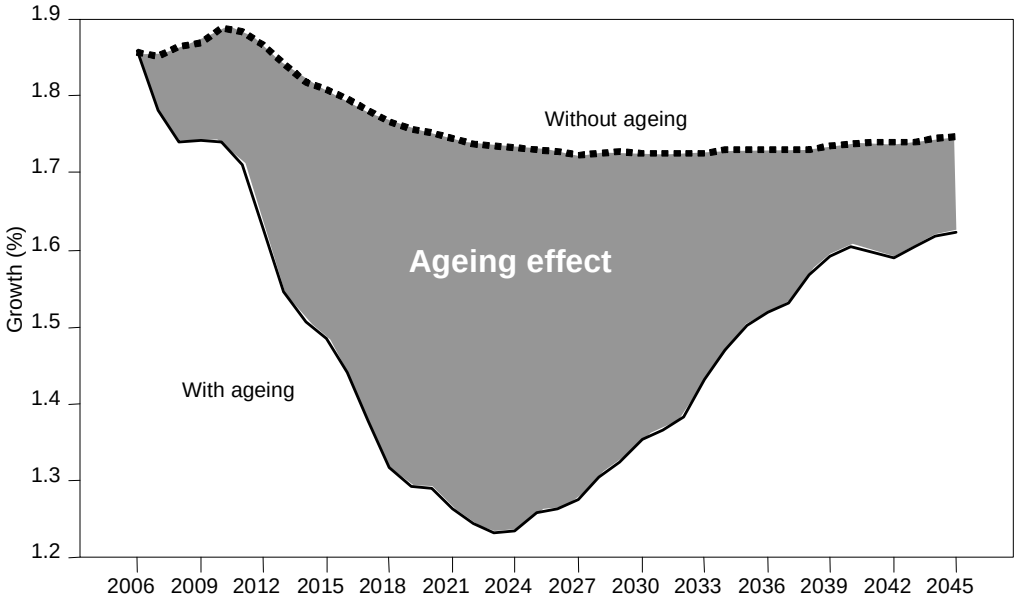
a GDP is in 2002-03 prices, while it is assumed that the labour productivity growth is 1.75 per cent per annum after 2003-04. Growth rates for the 1990s is based on actual data.

Source: Commission estimates.

In the long run, the age structure of the population could be expected to be roughly stable, so that labour supply growth *per capita* will be close to zero (even if the overall population continues to grow). As a result, Australia's long-run per capita economic growth rate will depend on the rate of productivity alone. To put this is context, in the prosperous decade from 1992-93 to 2003-04, hours worked per capita grew by a trend rate of about 0.5 per cent per annum. This meant that growth in hours per capita contributed around one-fifth of the overall increase in GDP per

capita over this period. This is a transitional demographic benefit that is initially reversed, because of ageing, and then will disappear in the long run.

Figure 5.1 **Economic growth in Australia — a 40 year projection**
Per capita GDP, 2005-06 to 2044-45



Data source: Commission estimates, assuming long-term labour productivity growth of 1.75 per cent per annum.

State and Territory economic growth

The pattern of projected economic growth follows a similar profile over time in all jurisdictions (except the alternative Northern Territory estimates). The reduction in growth rates is steeper, relative to the Australian total, in those States characterised by more ageing — such as Tasmania and South Australia (figure 5.2 and table 5.2). The ACT appears to be the jurisdiction with the least volatile growth rates over the next forty years (though not with the highest average growth rate).

5.2 The role of ageing

Per capita GDP in 2044-45 will be significantly less than if there were no population ageing for any given rate of productivity growth. For example, with an annual productivity growth rate of 1.75 per cent.

- In 2044-45, GDP per capita without ageing would be 12 per cent more than with ageing (equivalent to $8 800 per person in 2002-03 prices).

- Ageing creates a $4 100 billion dent in cumulative national output from 2004-05 to 2044-45. On (an average) per capita basis, this is a loss of about $167 000 per person over this period.

Table 5.2 **Average GSP per capita growth rates over** 2000-01 to 2044-45[a]

Jurisdiction	*2000-01 to 2009-10*	*2010-11 to 2019-20*	*2020-21 to 2029-30*	*2030-31 to 2039-40*	*2040-41 to 2044-45*
	%	%	%	%	%
NSW	1.77	1.53	1.32	1.50	1.59
VIC	2.04	1.43	1.22	1.44	1.58
QLD	2.12	1.44	1.30	1.52	1.62
SA	2.17	1.33	1.14	1.49	1.64
WA	2.34	1.38	1.18	1.43	1.56
TAS	1.48	1.13	1.02	1.43	1.56
NT	2.49	1.68	1.57	1.69	1.72
NT alt[b]	1.50	1.52	1.67	1.90	1.91
ACT	1.63	1.42	1.40	1.59	1.65

[a] Commission estimates based on baseline effective labour supplies for each jurisdiction and the assumption of 1.75 per cent per year productivity growth in each jurisdiction. [b] The alternative Northern Territory data are based on separate estimates of Indigenous and non-Indigenous populations (chapter 2), separate participation rates (chapter 3) and make assumptions about the relative productivity levels of CDEP versus mainstream Indigenous productivity levels. Details are available on request. These alternative estimates of GDP for the Northern Territory are used throughout this report. They are especially sensitive to assumptions about Indigenous demographic and labour force patterns, and should be used with caution.

Source: Commission estimates.

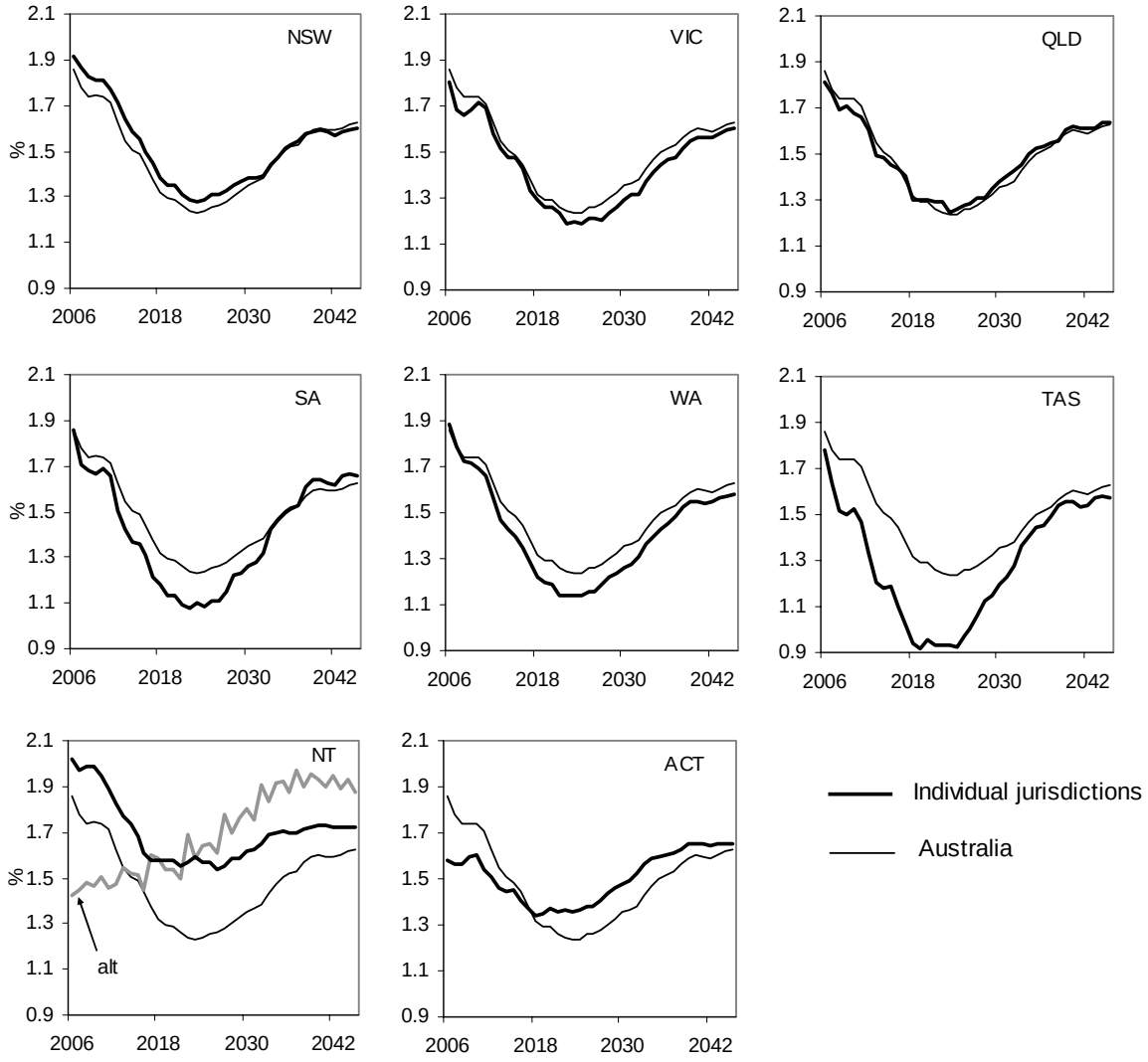
The magnitude of these effects is driven mainly by the influence of ageing on Australia's labour supply — with effective labour supply failing to grow as fast as the population over the next 40 years (chapter 3).

In contrast, the available evidence suggests that the biological aspects of ageing and other changes in the mix of worker and job traits accompanying ageing will make a negligible difference to Australia's aggregate productivity and economic growth performance. This was established by undertaking a simple simulation (box 5.1).

Despite using large age-sex variations in productivity levels, the impacts on productivity and growth are small (figure 5.3 and box 5.1). In most years, productivity growth is close to the long run value of 1.75 per cent. The total accumulated loss in national output is around $470 billion in constant 2002-03 prices by 2044-45.

Figure 5.2 **Projected state GSP growth rates over the next 40 years**

Fiscal year growth rates June end 2005 to June end 2045



a Commission estimates based on baseline effective labour supplies for each jurisdiction and the assumption of 1.75 per cent per year productivity growth in each jurisdiction. In the case of the Northern Territory, the alternative growth rates are based on splitting the Territory into two groups — Indigenous and non-Indigenous (see notes to table 5.2).

Data source: Commission estimates.

This is small in comparison to the slowdown in economic growth stemming from the labour supply effects of ageing, discussed above. This outcome is not surprising for two reasons. First, the average age of employees (weighted by hours worked) only increases slightly over the next 40 years (chapter 3). Second, changes in the demographic structure place less weight on the less productive young as well as more weight on the less productive old.

Box 5.1 **Simulating the effects of productivity variations by age**

Productivity levels have generally been found to follow an 'inverted u' profile with increasing age (chapter 4). In undertaking the simulation, a particular age-productivity profile was assumed, based on the wage profile over age, corrected for some of the biases in wage rates as productivity measures (figure A).

In each year of the projection, an index of productivity (V) was calculated as a weighted average of the hourly productivity of workers, with the weights based on the share of hours worked by the relevant age/sex groups:

$$V_t = \sum_{a=1519}^{70+} \sum_{s=male}^{female} w_{a,s,t} \times P_{a,s} \times \lambda_t$$

where $w_{a,s,t}$ is the ratio of hours worked by each age (a) sex (s) group at time t to total hours, $P_{a,s}$ is the productivity level of each age, sex group in 2003-04 and λ is a general productivity index that starts at 1 in 2003-04 and grows by 1.75 per cent per year.

The proportional change in productivity (DV) can then be calculated as:

$$DV_{t+1} = \frac{\sum_{a=1519}^{70+} \sum_{s=male}^{female} w_{a,s,t+1} \times P_{a,s} \times \lambda_{t+1}}{\sum_{a=1519}^{70+} \sum_{s=male}^{female} w_{a,s,t} \times P_{a,s} \times \lambda_t} - 1 = \frac{\sum_{a=1519}^{70+} \sum_{s=male}^{female} (w_{a,s,t+1} \times P_{a,s} \times (1.0175)}{\sum_{a=1519}^{70+} \sum_{s=male}^{female} w_{a,s,t} \times P_{a,s}} - 1$$

If the shares, w, do not alter then DV = 1.75 per cent or the general rate of productivity. In fact, the changing age structure of employees implies that a greater share of hours will be supplied by older workers in lower productivity jobs (and that, offsetting this, fewer hours will be supplied by younger workers in lower productivity jobs). In this case, DV will usually differ from 1.75 per cent after 2004-05 (figure B). In all cases, the deviations are small. The worst outcome is an annual productivity growth of around 1.69 per cent (only 0.06 percentage points below the counterfactual result). This occurs early in the projections as a result of stronger growth in the shares of hours worked by older relative to prime age workers. The average deviation is only -0.025 percentage points. The new productivity estimate can be combined with projections of hours and population data to estimate GDP per capita growth rates (figure 5.3).

Figure A: Relative productivity levels by age

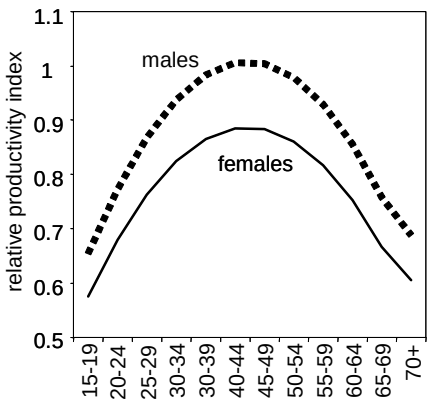


Figure B: Impact of demographic change on productivity growth rates

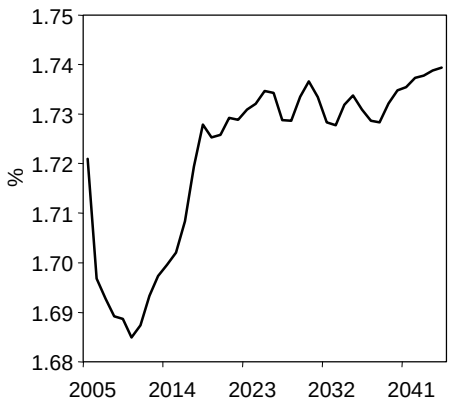
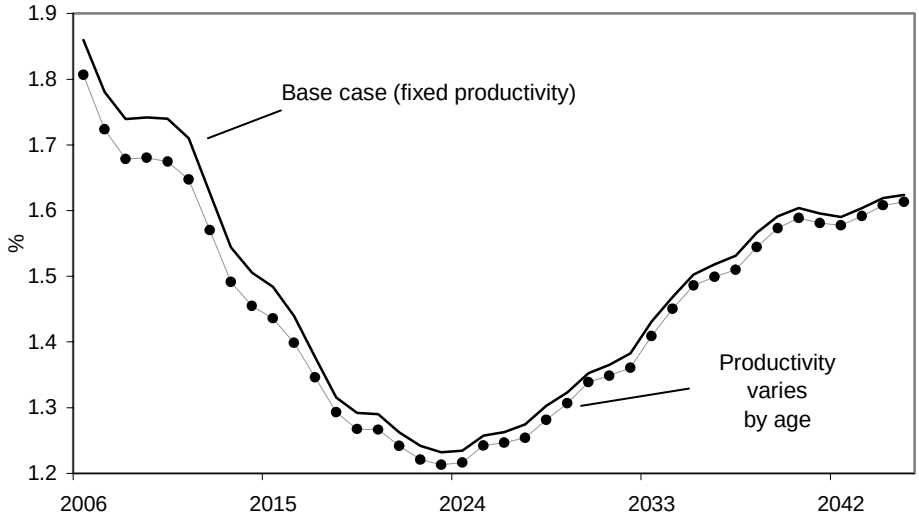


Figure 5.3 **The effects on economic growth of varying productivity levels by age**
2005-06 to 2044-45[a]



[a] See Box 5.1 for the basis for these calculations.

Data source: Commission estimates.

The direct impacts of ageing on productivity are swamped by uncertainties about the future rates of productivity growth associated with technical change, increased efficiency and capital deepening.

5.3 Exploring other scenarios for Australia's economic future

As emphasised in chapters 1 to 3, there is considerable uncertainty about Australia's long-run age structure and labour force. Moreover, there is strong interest in considering the effects of policies that might successfully raise Australia's future output by increasing productivity, participation rates and working force populations. Accordingly, this section examines how economic growth outcomes are affected by different assumptions about future demographics, participation and productivity.

Differences in labour participation rates

How much difference would greater labour participation by older people make to economic growth?

Older Australians, particularly males, tend to have lower labour participation rates than in many other developed countries. The Commission projects that, given existing policy settings, participation rates for older Australians will rise somewhat over the next 40 years (chapter 3), but still be below those achieved currently by other comparable countries.

While clearly a significant proportion of older people voluntarily withdraw from the labour market, others would like a job, but have generally given up actively searching.[1] Such older workers face obstacles to labour market participation. These include the effects of disability and ill-health; lower average educational attainment rates and skill levels; poorer job mobility; adverse employer attitudes; and mismatch between their skills and available jobs. Some women have experienced long spells of absence from the workforce associated with child rearing and home duties, so that recent work experience may be low. There are strong policy grounds for reducing the impact of barriers to work improve the financial and social wellbeing of older Australians. This also has the potential to reduce welfare outlays (for example, on disability support pensions) and to raise aggregate output somewhat.

More significant increases in participation rates by this group are likely to require significant policy changes (chapter 13). What would be the effect on economic growth were higher participaton rates for older people to be achieved?

The impact on economic growth of any policies that raise labour participation by older people depends on how much it increases aggregate:

- *participation rates*. This depends on the share of potential workers who are old and the feasible rise in their participation rates.
- *employment*. Participation rates just measure whether someone is in the labour market, not whether they are actually employed. Unless the obstacles to employability are effectively tackled, many 'outsiders' drawn into the labour force will find it hard to get jobs, and be categorised as unemployed. Notably, a large share of Disability Support Pension (DSP) beneficiaries moved from prior long-term unemployed status or from multiple spells of unemployment (counted as 'in the labour force') to better benefits on the DSP (generally 'not in the

[1] In 2003, there were around 120 000 people aged 55 years or more who were not in the labour force, but wanted to work (ABS Cat. 6220.0, September 2003 edition).

labour force').[2] Any increase in participation rates associated with rising unemployment has no beneficial economic output effects.

- *hours worked*. Older workers are more often employed on a part-time basis (reflecting their preferences and skills), so that the proportional increase in hours worked is less than the proportional increase in participation rates.
- *productivity*. Reflecting their skills, experience and occupational choices, older workers drawn back into the labour force could be expected to be generally employed in jobs with productivity levels below the average.

The potential to shift people on DSP into the labour force illustrates the potential economic effects of raising participation rates, especially as growth in beneficiaries appears to have been a major source of lowered older male participation rates (chapter 3). The Department of Employment and Workplace Relations (DEWR 2004a) has evaluated a pilot program to encourage DSP recipients to find jobs (figure 5.4). Participation was voluntary, so that the pilot program probably attracted people with lower inherent barriers to work. For example, participants in the pilot were less likely to be aged 50 or more years and to have been on DSP for 10 years or more than the general population of DSP recipients.

Of the 1100 people initially considered for the pilot, around 500 did not ultimately participate or subsequently exited (because they declined to participate further, often due to poor health, or were found to be not eligible or suitable). Of the stayers, 59 per cent remained unemployed (around 10 times the average unemployment rate), 38 per cent got jobs and the small remainder entered educational courses.[3] Of the successful job seekers, most got casual jobs (42 per cent) or part-time jobs (34 per cent), with only 24 per cent getting full time non-casual jobs. This contrasts with the economy as a whole, where the respective employment shares in these work categories are 28 per cent, 11.8 per cent and 60.6 per cent respectively. The Pilot did not evaluate the productivity of the jobs in which DSP beneficiaries were placed, but the nature of the jobs obtained suggests lower than average productivity levels. The Pilot suggests that (even the best) marginal entrants to the labour force from the DSP differ significantly from the average.

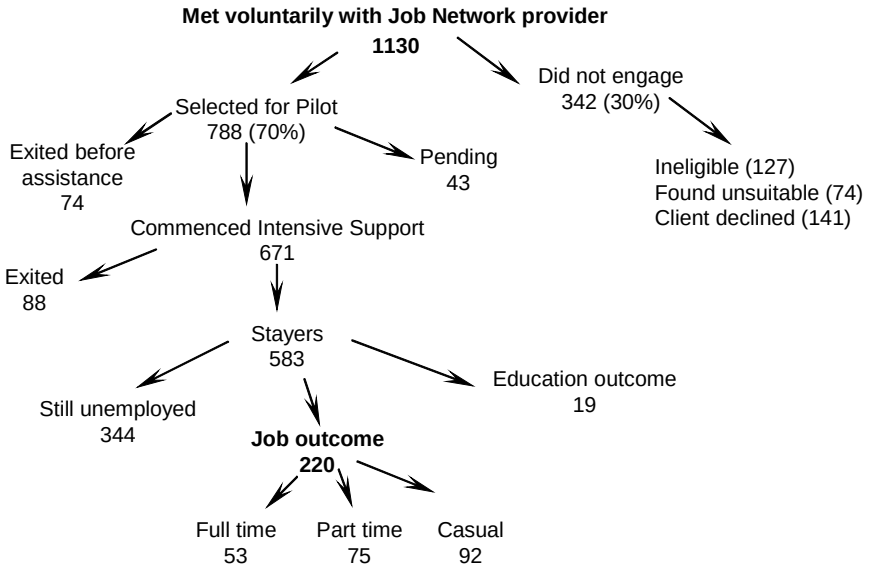
Of course, people outside the labour force are a highly heterogenous group. Policies to increase participation among older Australians could be aimed more broadly than DSP beneficiaries (such as women generally, and those people not seeking work in older age due to incentive effects or age discrimination). Such workers are more

[2] Cai (2004), Cai and Gregory (2003, 2004).

[3] DEWR (sub. DR71, p. 14) reports somewhat improved outcomes with the most recent data (see note to figure 5.4).

likely to have less skill and productivity disadvantages than DSP beneficiaries, but are still likely to prefer part time work.

Figure 5.4 **The Disability Support Pension Pilot Program**
Australia 2004



a These data are based on the interim evaluation report. DEWR (sub. DR71, p. 14) updated estimates to 14 January 2005. It reported job outcomes had since increased to 296 (44 per cent of those commencing Intensive Support). So far, 152 interim outcomes (13 weeks retention in employment or education) had been achieved under the Pilot, of which 140 were employment outcomes.

Data source: DEWR (2004a).

Overall, it is highly likely that any large-scale policy measures to recruit the potential labour force represented by older people would involve some offsetting increases in unemployment rates, somewhat lower productivity jobs for the 'new' workers (especially for males, since the pool of available workers is smaller as a share of the feasible workforce than for females) and shorter than average working hours.

As an illustrative exercise of the effects of policies that encouraged greater older *male* participation, suppose that:

- by 2044-45, male workers aged 55 years and over could achieve a participation rate 10 percentage points higher than under the baseline case (scenario F in table 3.1 in chapter 3);
- their average productivity levels were 70 per cent of existing workers;

- new participants aged under 65 years[4] had employment rates 90 per cent of the current average for their age and sex;
- new participants had half the average propensity to work full time; and
- they worked 80 per cent of the average hours per week of existing part time or full time employees.

Relative to the base case in 2044-45, this (relatively optimistic) scenario would give rise to a:

- 3.7 per cent (not percentage points) boost in aggregate participation;
- 2.0 per cent increase in total hours worked;
- 1.4 per cent improvement in GDP per capita, and
- 0.8 per cent increase in the cumulative value of GDP over the period from 2004-05 to 2044-45 above the base case.[5]

In this illustration, the percentage output gains in 2044-45 are around one third of the growth rate in participation rates, while the value of the income stream over the projection horizon changes little from the base case. The *aggregate* economic growth benefits of a policy shift to higher older male participation rates are relatively small, a finding also made by the Intergenerational Report (p. 61).[6] However, it should be emphasised that the relevant group of old still benefit substantially from participation in the labour market, and that there are significant savings for taxpayers from reducing reliance on social welfare benefits. These gains alone may justify policy efforts in this area.

The effect of more general increases in labour force participation rates

As noted in chapter 3, Gruen and Garbutt (2003) raise the prospect of Australia increasing its participation rates to the 80th percentile of those in the OECD. This

---

4 Those new workers aged over 65 years were assumed to have the same employment rate as the average because the assumption of higher unemployment rates for people who could (generally) draw on retirement benefits is unrealistic.

5 This is based on the assumption that the 10 percentage point boost to older male participation rates occurs as a linear trend from 2003-04 to 2044-45. The results are *not* discounted to a present value using a discount rate. Although discounting has the advantage of giving a measure of buying power in today's terms, it has the drawback that generations yet to be born obviously do not have preferences for consumption today. Discounting would tend to underestimate the benefits of higher participation rates.

6 Variations in productivity by age have been ignored in this illustration. Were they included, they would reduce the impact on growth of any scenario that largely draws on increased participation by older workers.

would represent a large shift in participation rates across all age groups except the very young. If achievable, a change to participation rates of this order would have a much more substantial effect on economic growth prospects than rises in participation restricted to older groups alone (table 5.4). Under this scenario, GDP per capita would be around 4.4 per cent higher than otherwise in 2044-45.

Table 5.3 **Impacts on economic growth of varying participation and demographic scenarios[a]**

Scenario	*Per capita labour supply growth to 2044-45*	*Per capita GDP growth to 2044-45*	*Real GDP per capita in 2044-45*	*Average accumulated per person GDP 'dividend' cf base[b]*
	%	%	$	$
Base case	-0.235	1.511	72 708	0
Older male participation rate up 10 pts[c]	-0.187	1.545	73 731	17 500
Participation rises to 80% OECD[d]	-0.097	1.617	75 885	58 344
Older female participation rates converge on males[e]	-0.205	1.541	73 610	15 697
High life expectancy	-0.293	1.451	70 987	-14 282
Low life expectancy	-0.200	1.546	73 761	17 060
High migration	-0.220	1.527	73 178	13 269
Low migration	-0.252	1.493	72 198	-13 779
0.57% fixed migration rate	-0.215	1.531	73 310	14 126
High fertility	-0.268	1.478	71 746	-28 504
Low fertility	-0.204	1.542	73 638	29 382
Most ageing	-0.287	1.458	71 167	-226
Least ageing	-0.221	1.525	73 124	290

a GDP is in 2002-03 prices. The demographic assumptions correspond to the various PC high and low cases described in chapter 2. In the demographic scenarios, participation rates are fixed, so that labour force changes only reflect population changes. Because of this, in the demographic scenarios it is assumed that (age-sex differences aside) any new participants are like existing workers in their characteristics. **b** This is the undiscounted *increment* to GDP from 2003-04 to 2044-45, divided by the average population over this period. Dividing by the population is necessary to avoid misleading comparisons of GDP amounts shared by different numbers of people. **c** It is assumed that increments to base case participation rates are achieved linearly from 2003-04 to 2044-45. It was assumed that, relative to existing workers, new workers had 70 per cent the average productivity levels, 50 per cent of the propensity to work full time, 80 per cent of the average hours and (for those under 65 years) and 90 per cent of the current average employment rate for their age and sex. **d** It is assumed that increments to base case participation rates are achieved linearly from 2003-04 to 2044-45. Because new participants are drawn from a wider group than under the previous scenario, it was assumed they were more like existing workers. It was assumed that, relative to existing workers, new workers had 75 per cent the average productivity levels, 70 per cent of the propensity to work full time, 85 per cent of the average hours and (for those under 65 years) and 90 per cent of the current average employment rate for their age and sex. **e** It is assumed that increments to base case participation rates are achieved linearly from 2003-04 to 2044-45. Additional participants to the labour force were assumed identical to existing workers because this scenario is not a policy simulation (where policies elicit labour market changes), but rather a sensitivity test of the results to different projection outcomes (requiring no policy action).

Source: Commission estimates.

As in the example above, the growth rate in GDP per capita is less than the proportionate increase in the aggregate participation rate because, on average, additional entrants differ from existing workers.[7] The measured output benefits of this thought-experiment may still overstate the actual benefits to Australians. This is because it ignores leisure time and unpaid non-market work, such as child care, that would be relinquished were more people to enter the paid labour force.

Projection errors compared with policy experiments

The above illustrates what might happen were *policy* to increase the participation rates of people who otherwise would not enter the labour force. A separate issue is what would happen if the Commission's projected participation rates were wrong, and, without policy changes, rates were higher or lower than shown. So long as the percentage prediction error is roughly the same across age and sex groups, a rule of thumb is that any 1 per cent (not points) prediction error in the aggregate participation rates, would result in around a 1 per cent prediction error in GDP. This is because such thought experiments do not involve policy attempts to bring 'outsiders' with very different characteristics into the labour market. Since the rule is simple, the Commission has not shown the results of sensitivity testing of this kind.

However, ABARE (sub. DR50) raised one particular case — that of older women — where it considered that the Commission might have underestimated future participation rates. In this instance the rule of thumb does not hold because older women have part-time job and average weekly hour preferences that differ from other labour market participants. Because of this, a scenario in which older female participation rates converge on males is estimated to raise participation rates by around 2 per cent, but GDP per capita in 2044-45 by only 1.2 per cent (table 5.3).

The influence of different demographic futures on economic growth

Australia's age structure is sensitive to developments in mortality, fertility and migration (chapter 2). Since participation rates vary by age, this implies that different demographic futures will also affect economic growth. The effects vary with the demographic shocks.

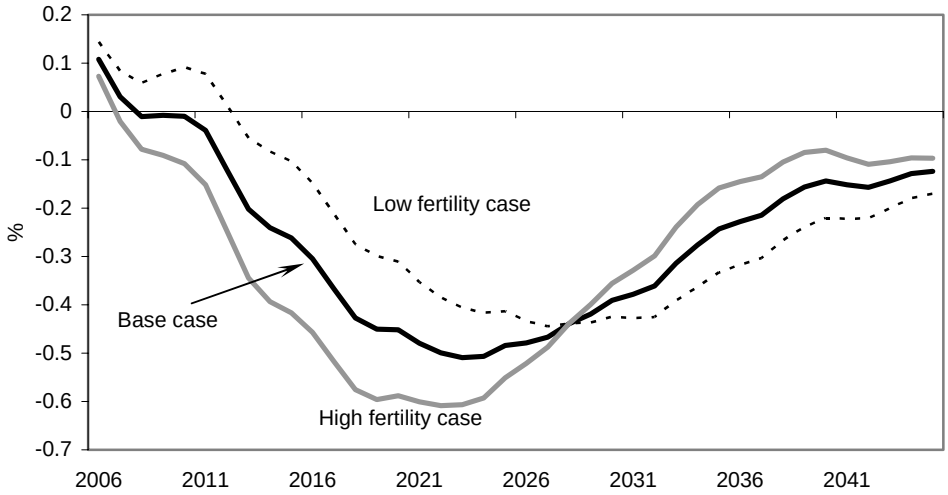
[7] Gruen and Garbutt find a bigger effect on economic growth than here. This reflects the alternative assumption that all other important variables — unemployment rates, average hours worked and productivity — remain fixed at the levels projected in the Intergenerational Report. The authors are aware of the possible limitations of this assumption, at least in relation to productivity. However, they noted that productivity may not be reduced if the reason for increasing participation is greater education of people currently not in the labour force (p. 28).

- If life expectancies were lower than projected, GDP per capita would rise (and indeed by the greatest percentage of any of the demographic experiments). This is because decreased life expectancy mainly reduces the numbers of the old without similar corresponding falls in the labour force. This outcome demonstrates the limitations in using GDP alone as an indicator of the economic impacts of population ageing. In particular, GDP fails to measure the value of leisure or of the non-market services provided by the old.
- High migration increases GDP per capita because it lowers the dependency rate. Its effects on population size are much bigger than on GDP per capita. Thus, in the Commission's high migration scenario, GDP per capita in 2044-45 is only around 1.4 per cent higher than the base case. Average yearly GDP per capita growth from 2044-45 is only around 0.016 percentage points higher than the base. The Intergenerational Report found a similarly negligible impact (p. 61). Migration may have a more important economic role if it targets high skilled people or deals with particular skill and occupational bottlenecks.
- Low fertility rates increase per capita economic growth (slightly) over the projection horizon used in this report because it lowers the youth dependency rate by more than it increases the aged dependency rate. In fact, growth in per capita labour supply (measured in hours) is higher than under the high fertility case until the later 2020s (figure 5.5). This is because additional births make no difference to the labour supply until they are aged 15 years and over, while making a difference to the population size. As shown in chapter 2, in the long run, low fertility does increase the total dependency rate and would lower output per person. In general, the effects of different fertility outcomes on per capita output are very small.
- Demographic scenarios in which ageing is significantly higher or lower than projected by the Commission have small overall impacts on output in 2044-45, and nearly zero impacts on the aggregate stream of GDP per mean population. This reflects the counteracting influences of the demographic factors that lead to greater or lesser ageing. For example, under the 'least ageing' scenario, life expectancy is lower and migration is higher than projected (raising GDP per capita), while fertility is higher (depressing GDP per capita).

The overall implication of the demographic results is that they make small differences to GDP per capita over the time scale concerned. Their fiscal effects are more pronounced (chapter 13).

Figure 5.5 **Growth in labour supply per capita under different fertility scenarios**

2005-06 to 2044-45



Data source: Commission estimates.

The critical importance of productivity

In the absence of any resurgence in Australia's workforce, economic growth over the next four to five decades will overwhelmingly depend on productivity growth. And as noted in section 5.1, in the long run with a stable population, economic growth per capita will depend *entirely* on productivity performance.

To illustrate the significance of productivity, suppose that Australia was able to sustain the so-called 'miracle' productivity performance of the 1990s through further economic reforms, continued gains from information, communication and other technologies, and increasing human capital. With an annual productivity growth rate of 2.05 per cent, Australians would be better off in cumulative GDP terms by around $4 200 *billion* in constant 2002-03 prices by 2044-45 relative to the assumed base-case growth rate of 1.75 per cent (table 5.1). This equates to an average productivity dividend of about $170 000 per person over this period — a good buffer against the spiralling costs of ageing and health spending.[8] This is the

[8] Its effect on government budgetary costs of ageing, however, are less dramatic, since wage costs associated with health and aged care could be expected to increase with productivity — as noted by Gruen and Garbutt (2004). Also, to the extent that the gain is in labour productivity alone and not in multifactor productivity, then it has to be paid for through some investment (eg capital equipment or greater human capital accumulation). So the gain is not a pure welfare benefit.

power of compound interest. As shown above, no other credible change in demography or participation rates has effects of this magnitude.

Table 5.4 **The GDP effects of different productivity growth scenarios**

	2.05% pa after 2003-04	***1.75% pa after 2003-04***	*1.70% pa after 2003-04*	*1.45% pa after 2003-04*
Average growth in GDP per capita	%	**%**	%	%
1990s	2.14	2.14	2.14	2.14
2000s	2.13	1.95	1.92	1.77
2010s	1.76	1.46	1.41	1.16
2020s	1.57	1.27	1.22	0.98
2030s	1.80	1.50	1.45	1.20
2040s	1.91	1.61	1.56	1.31
Real GDP per capita in 2044-45 ($)	82 036	72 708	71 257	64 417
Increase over real GDP per capita in 2003-04 ($)	42 712	33 384	31 933	25 093
Additional real GDP 2004-05 to 2044-45 ($ billion) relative to baseline	4 185	0	-664	-3 847
Additional GDP 2004-05 to 2044-45 per mean population relative to baseline ($)	170 755	0	-27 083	-156 949

a GDP is in 2002-03 prices.

Source: Commission estimates.

Of course, the story is correspondingly worse if Australia were to record lower productivity growth rates:

- If our productivity performance were just 0.05 percentage points worse per year (taking Australia back to the average productivity growth rate that prevailed over the peak to peak years from 1969-70 to 1992-93 — prior to the 'miracle' years) by 2044-45 Australians would be cumulatively worse off relative to the base case by around $660 billion in constant 2002-03 prices.
- A reduction in productivity growth rates of 0.3 percentage points below the base case of 1.75 per cent to 1.45 per cent is symmetric to the 2.05 per cent optimistic case. If the annual productivity growth rate were to fall as low as this then Australians would be cumulatively worse off relative to the base case by around $3 850 billion in constant 2002-03 prices, *adding* to the difficulties in meeting any financing costs associated with ageing or lowering expectations of what services can be provided. This productivity outcome has an historical precedent in the low average productivity rates achieved between 1978-79 to 1992-93. It should also be noted that such a productivity growth rate is just 0.05 percentage points below that which was assumed in a New Zealand projection exercise (Intergenerational Report p. 32). Some of the bleaker scenarios that visualise

demographic pressures on rates of accumulation of physical entrepreneurship and R&D capital could result in productivity growth rates this low.

5.4 Placing these projections in context

Economic growth will slow as a result of population ageing. However, it is important not to dramatise these impacts. Per capita incomes are projected to be much higher than today — indeed nearly double those of 2003-04 by 2044-45 in real terms. The measures of output used in the above analysis will, if anything, tend to understate the true increase in Australian living standards. This is because — following standard National Accounts conventions — the calculations above pre-suppose that there is no productivity gains in sectors where output is hard to measure, such as education.

They also do not take account of the economic benefits from increased volunteering, which is not counted in the usual measures of growth. The Commission used data provided by de Vaus et al. (2003 p. 14) to project the future value of volunteering. These estimates are based on the 1997 ABS time use survey (Cat. no. 4153.0) and measure both formal and informal volunteering. Over the next 40 years, the value of volunteering is expected to rise from 1.8 to around 2.1 per cent of GDP (table E.3 in appendix E), reflecting the growing share of adults in the population. This effect somewhat offsets the reduction in *measured* economic growth rates associated with ageing.

Moreover, in the modelling of ageing adopted above, it should be noted that nothing adverse is happening to the incomes of *individuals* from a lifecycle perspective. Apart from the slowing productivity growth relative to the buoyant 1990s, the *aggregate* slowdown in growth merely reflects the fact that there are more people in retirement or the part-time years of their working lives. It should also be recalled that people value the leisure received in retirement and often choose to retire voluntarily — thus revealing their preferences.

The weakening economic growth prospects of Australia nevertheless have significant revenue (and spending) consequences. These form the focus of the remainder of this study.

6 Health expenditure

Key points

- Government health expenditure has been steadily rising in real terms and is now nearly 6 per cent of GDP. New technology and rising demands have been the main drivers.
- Views differ on the relationship between ageing and health care expenditure. Having reviewed the arguments and evidence, the Commission's assessment is that, in combination with demand and technology, ageing *will* place significant additional pressure on future health expenditure.
- Reflecting higher levels of need, government health expenditure per person is significantly higher for older than younger people.
  - Across OECD countries, expenditure per person over 65 averages four times that of people under 65.
  - In Australia, this pattern of expenditure has existed for some time and shows no sign of changing.
- With the proportion of the population over 65 expected to double by 2044-45 to over 25 per cent, health care costs will inevitably rise.
  - Although people are living longer, and may be healthier, in many cases better health is a result of ongoing (and costly) treatment.
  - Even if health costs are predominantly incurred in the last years of life, there will be pressure on aggregate expenditure as the incidence of deaths rises in an ageing population.
- The Commission projects that government health expenditure (excluding aged care) will rise from 5.7 per cent of GDP in 2002-03 to 10.3 per cent in 2044-45.
  - Projections are sensitive to assumptions about the growth in costs arising from factors other than demography such as technology and demand. (With different assumptions, projected health expenditure in 2044-45 ranges from 9 per cent to just over 11.5 per cent).
  - Nevertheless, in all cases, ageing is projected to account for about half of the increase in health expenditure as a proportion of GDP.

Many of the concerns about the ageing of the population have to do with future health costs. After briefly describing current government health spending (section 6.1), this chapter examines the determinants of future health care expenditure, including the debate about the role of ageing (section 6.2). The analysis in this

section underpins the projections of health care spending by governments presented in section 6.3. The projections are intended to capture the likely development of expenditure pressure over time if current policies and trends continue. As noted in chapter 1, they are not *forecasts* because they make no attempt to incorporate possible responses by governments to unfolding fiscal pressure.

6.1 Government expenditure on health

Total recurrent government health expenditure in Australia (excluding aged care) was around $43 billion, or about 6 per cent of GDP in 2002–03.[1]

Australian Government

The Australian Government currently provides two-thirds of government health expenditure ($29.6 billion in 2002-03), equivalent to 4 per cent of GDP. It funds Medicare and the Pharmaceutical Benefits Scheme (PBS). Medicare provides patient subsidies for medical practitioner services, optometry, diagnostic imaging and pathology. Under the PBS, the Australian Government subsidises a large range of pharmaceutical products to provide patients with timely, reliable and affordable access to prescribed medicines.

In addition, the Australian Government:

- provides specific purpose payments for public hospital services provided by State governments;
- provides a 30 per cent rebate to subsidise the cost of private health insurance; and
- funds a range of other health-related services including medical research, public health and Indigenous services, and health information management.

State governments

State governments spent $13.5 billion on health services, equivalent to 1.8 per cent of GDP in 2002-03. Funding for public hospitals is the major item of State health expenditure — $7.9 billion in recurrent funding or nearly 60 per cent of total State

[1] Values for current health expenditure are from the Australian Institute of Health and Welfare (AIHW) 2004a. Following the format suggested by the World Health Organisation, the AIHW includes high level residential care (RCS 1-4) in health expenditure. For this report, this component has been excluded from health expenditure and included in the aged care projections (chapter 7). Projections of total health expenditure are provided, using a single aggregate model in technical paper 4.

health expenditure. In addition, a substantial proportion of health spending on capital by the States is also for public hospitals. Other State health expenditures include funding for community and public health, ambulance services and dental services.

6.2 Influences on health care expenditure: what role for ageing?

Older people typically need more health services than younger people. As such, the ageing of the population will increase the level of resources devoted to health care.

However, real health expenditures have been rising for other reasons as well — notably growth in of demand, new technologies and growth in prices in the health sector relative to the economy generally.[2] The contribution of ageing relative to these other factors has been a matter of considerable debate. Within the media and among some policy makers, ageing is sometimes presented as a looming crisis for the health system. For example, referring to US pension and health payments, Dr. Greenspan (2004, p. 3) stated:

> This dramatic demographic change is certain to place enormous demands on our nation's resources — demands we almost surely will be unable to meet unless action is taken.

But among many health economists, ageing is often viewed as a relatively minor influence on future health care needs (box 6.1). It is argued that:

- the effect of ageing is swamped by the effects of demand and technology;
- we will be healthier in the future, lessening health costs; and
- most costs are not related to age as such, but merely with the last years of life, so that living longer will not involve significantly higher health costs.

Each of these issues is assessed in this section. The debate about the significance of ageing as a driver of health expenditure is important to the Commission's task in this study. It has implications for the choice of method used to project health expenditure. More broadly, it is also important because it will influence policy makers' responses to increases in health care costs.

[2] This results in higher real expenditure on health for a given level of services. Excess health inflation has been significant over the last 10 years for private health expenditure, but less so for government expenditure. Owing to shortages in some areas of the health workforce (for example, nurses), health costs may rise more quickly than inflation over the short term.

Box 6.1 **Some economists downplay ageing's health impacts?**

A number of prominent economists have suggested that the influence of ageing on future health expenditure is often overstated.

For example Jacobzone (2003) says that:

> The 'doomsday prophecy' which presents ageing as a threat to social and health systems is in fact a naïve fallacy, which results from a lack of understanding of the real impact of ageing. Demography by itself, is a secondary factor in the overall increase of health expenditure. (p. 263)

Zwiefel et al (1999) argues:

> The limited impact of age on HCE [health care expenditure] suggests that population ageing may contribute much less to future growth of the health care sector than claimed by most observers. (p. 485)

Seshamani and Gray (2004) conclude that:

> The widespread belief that ageing populations will automatically generate higher hospital expenditure is therefore over-mechanistic and based on a misapprehension of the association between age and hospital costs. (p. 232)

Reinhardt (cited in sub. DR74) suggests:

> Although in any year per capita health spending for people aged 65 or older tends to average three to five times that for younger Americans, the aging of the population is too gradual a process to rank as a major cost driver in health care. (p. 4)

Similarly, in Australia, Richardson and Robertson (1999) argue that:

> Application of the simple needs model suggests that the impact of future ageing on the need for medical services will be so small that, in the absence of other factors, the size of the health sector would diminish in relation to GDP. … any future problems arising from health sector expenditure will be primarily due to non-demographic factors (p. 348).

Professor Richardson reemphasised this point in his submission to this study:

> The key theme of this submission is that ageing per se will have a minimal quantitative impact and an impact which can easily be absorbed by GDP. Consequently, a relatively minor adjustment to an already small impact factor is of little quantitative significance for the capacity to fund future health expenditures. (sub. 16, p. 7)

Finally, while criticising some aspects of Richardson and Robertson's (1999) analysis Gregory (1999) states that:

> The major issue in health expenditure, … is what determines expenditure within each cohort rather than the impact of the changing age structure on expenditure. This is a very important message which should be repeated and repeated because so many lay people find this message difficult to believe. (p. 394)

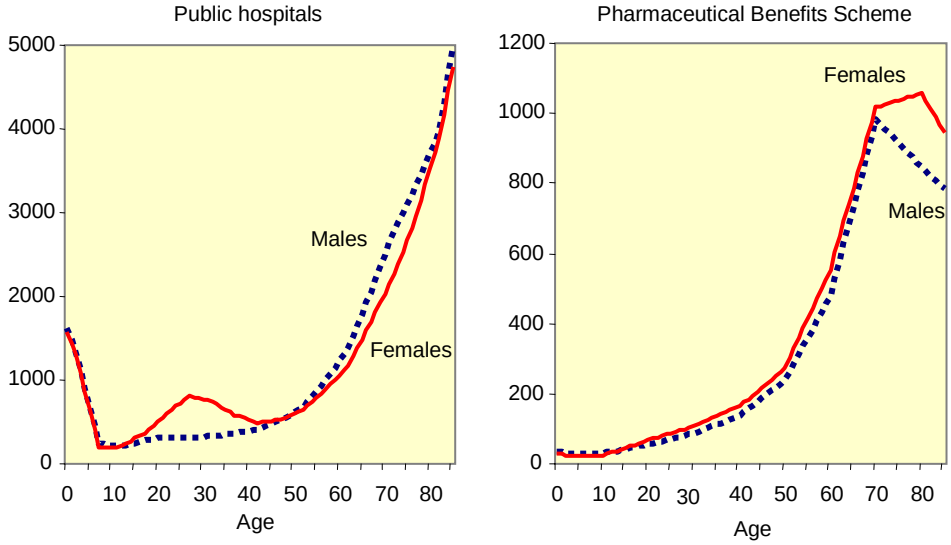
The age profile of health expenditure

The starting point for understanding the likely impact of ageing on health expenditure is that, as noted, health expenditure is significantly higher for older

people than for younger people. For example, costs per person in the PBS are strongly age-related — average costs for a male aged 65-74 years are more than 18 times the average costs for a male aged 15-24 years (figure 6.1). Hospital costs follow a similarly steep profile, while Medicare costs also rise with age, albeit less steeply. Across all health expenditure types, expenditure on those aged over 65 is around four times higher than expenditure on those under 65, and rises to between six to nine times higher for the oldest groups. Similar strong age-related spending patterns are observed across time and in all developed countries (table 6.1).

Figure 6.1 **Costs of hospitals and drugs by age**

Dollars per person



Data source: Hospital profile is based on NSW unit record data provided by NATSEM, Thurecht et al (2003); PBS: Health Insurance Commission, unpublished 2002-03 data.

In combination with rapidly increasing numbers of older people (chapter 2), the upward sloping age profile of health expenditure suggests that, all things being equal, ageing will increase health expenditure significantly.

Table 6.1 **Index of health care expenditure per capita by age for selected countries**[a]

Relative to 25-29 age group (=100)

	Health expenditure on 25–29 year olds	*Health expenditure on 65–69 year olds*	*Health expenditure on 85–89 year olds*
Australia[b]	100	387.6	614.2
Belgium	100	274.5	530.9
Canada[c]	100	351.5	..
Denmark	100	241.9	372.3
Germany	100	303.7	479.7
Spain	100	312.5	455.8
France	100	221.4	479.8
Italy	100	289.3	417.7
Netherlands	100	264.0	383.6
Austria	100	360.7	579.3
Finland	100	326.4	580.0
Sweden	100	276.3	423.7
United States[d]	100	314.9	545.6

[a] For European nations expenditure is as a proportion of GDP per capita and drawn from the year 2000 except: France, 1997; Belgium, Denmark, Spain and United Kingdom, 1998 and Italy, 1999. [b] Categories for Australia are 15-34, 65-74 and 85+. [c] Expenditure per capita for 2000–01. [d] Categories for United States are 6–64, 65–74 and 75+.

Source: Bains (2003); Health Canada (2001) and Meara (2004).

The role of demand and technology

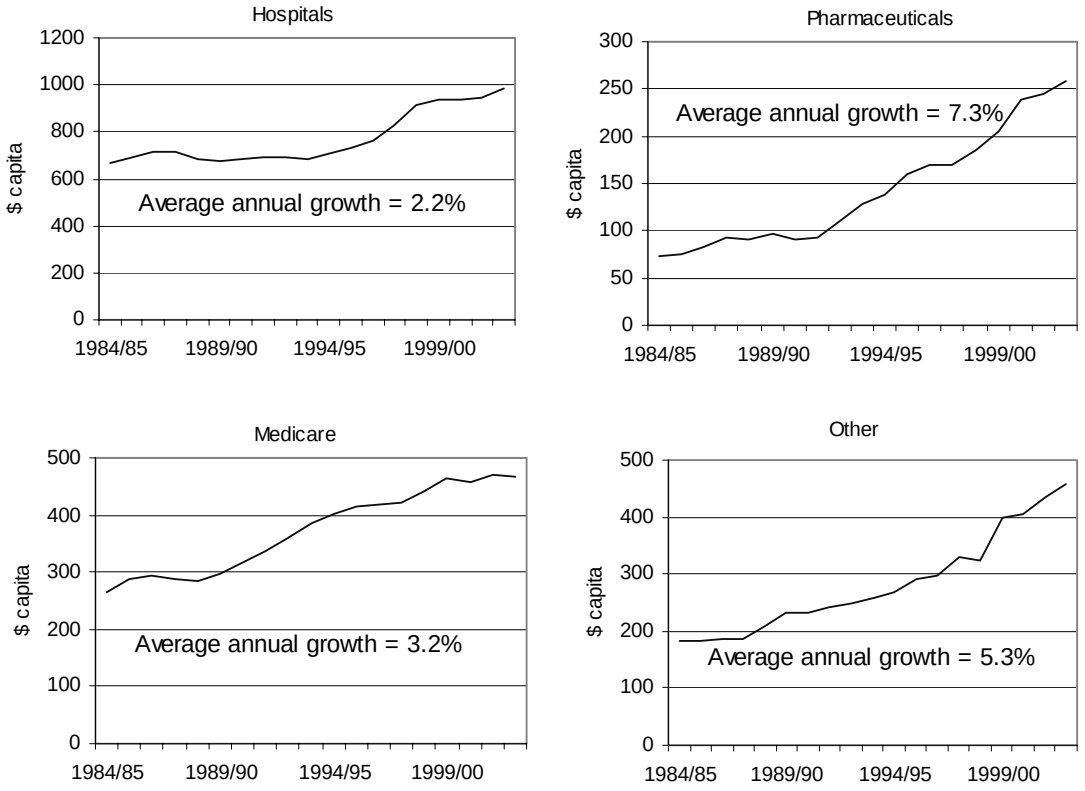
Non–demographic factors, particularly demand and technology, are also critical to future health expenditure. Indeed, over the last 20 years or so, these factors have had a greater impact on health expenditure than ageing. Real per capita spending has been increasing for all major components of Government health expenditure (figure 6.2). Real average growth rates range from a high 7.3 per cent for pharmaceuticals to a more modest annual 2.2 per cent growth in hospital expenditure.

While data are not available to directly estimate the expenditure impacts of past ageing, consistent with other Australian studies (AIHW 1999; Intergenerational Report,), the Commission estimates that ageing has added about 0.5 percentage points a year to the per capita growth rate of health expenditure. Overall, the *age-adjusted* per capita growth in real government health expenditure arising from new technology and greater demand, has ranged between 2 and 3 per cent per annum

over the last 20 years or so.[3] (Growth rates for health expenditure are analysed further in appendix D.) Thus the majority of growth in health expenditure has occurred because of factors other than ageing — notably greater demand for health services, combined with the emergence and diffusion of new medical technologies.

Figure 6.2 **Real per capita increase in Government health care expenditure 1984-85 to 2002-03**

2002-03 dollars



a Average annual growth rate calculated between 1984-85 and 2001-02. Average rates can differ significantly depending on the beginning and end period of the calculation.

Data source: ABS (2003b); AIHW 2004b; Health expenditure data cube (www.aihw.gov.au).

Demand for health care has been shown to be sensitive to income, particularly at the national level (technical paper 5). Wealthy countries not only spend more per person on health care than poorer ones, they also spend a higher proportion of their national income. Many studies have found that variation among countries in GDP per capita explains much of the difference in health costs. Greater national incomes raise the capacity for increased government funding of health care, create expectations of greater care and prompt investments in new health technologies.

3 The Intergenerational Report used growth rates for Australian Government expenditure of 2.5 per cent and 3 per cent in its aggregate model.

Indeed, the introduction of new medical technology is often viewed by health economists and policy makers as *the* major driver of the rapid increase in health expenditure observed in many developed countries. For example, a leading American health economist Fuchs (1998a) cited a survey of 50 other health economists in which 81 per cent agreed with the statement that 'the primary reason for the increase in the health sector's share of GDP over the past 30 years is technological change in medicine'.

However, as Fuchs (1998a) stated, the effect of technological advances on expenditure is rarely simple or immediate. The Commission is currently examining these issues in a research study on the impact of advances in medical technology on healthcare expenditure in Australia. The introduction of new medical technology can have two opposing effects.

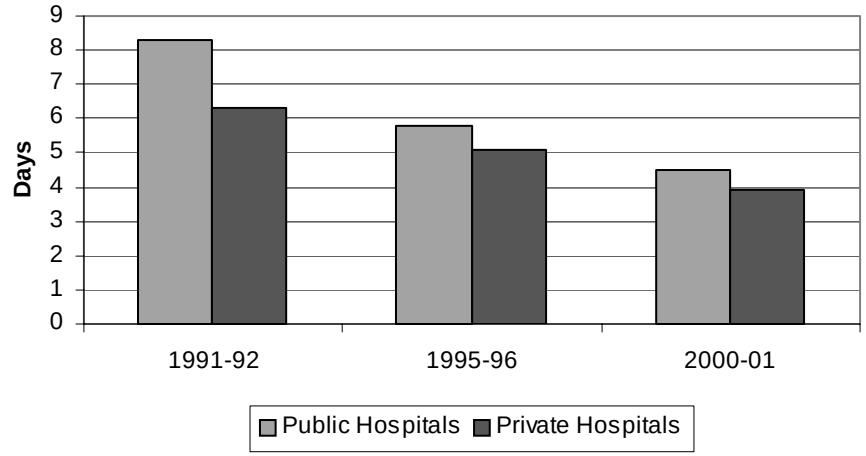
- Like the impact of technology in most other industries, it may make existing treatments cheaper. For example, for people over 65, technology is likely to have been one of the factors contributing to a significant reduction in the average length of stay in public and private hospitals, with concomitant savings for the hospital system in accommodation costs (figure 6.3).[4]
- On the other hand, technology can *increase* the total cost of health care by making treatments more effective, and opening up new avenues for treating serious conditions.

While this second impact may be a cost in expenditure terms, it also yields significant benefits — to a large extent it reflects the success of modern medicine in improving and extending peoples lives. For example, Beller (2001) finds that a large proportion of the decline in coronary heart disease is attributable to improvements in medical therapy. More generally, Thorpe et al (2004) find that, for four of the top five conditions accounting for increased medical expenditure in the US, a rise in the prevalence of treatment, rather than rising treatment costs per case, accounted for most of the spending growth.

In addition, expenditure on health for older people may yield savings in aged care programs. For example a hip replacement may increase a person's mobility and prevent falls, thereby delaying the need for community or residential aged care.

[4] Gray, Yeo and Duckett (2004) note that the falling length of stay has been the main reason why the proportion of beds occupied in hospitals by older people has remained stable in the presence of strongly inreasing separation rates for older people. However, they note that the length of stay trend has reversed in the UK and speculate that further falls are unlikely in Australia.

Figure 6.3 **Average length of stay for people over 65 in hospital**
Length of stay per episode



Data source: DoHA (2003 p.73).

The interaction of ageing with demand and technology

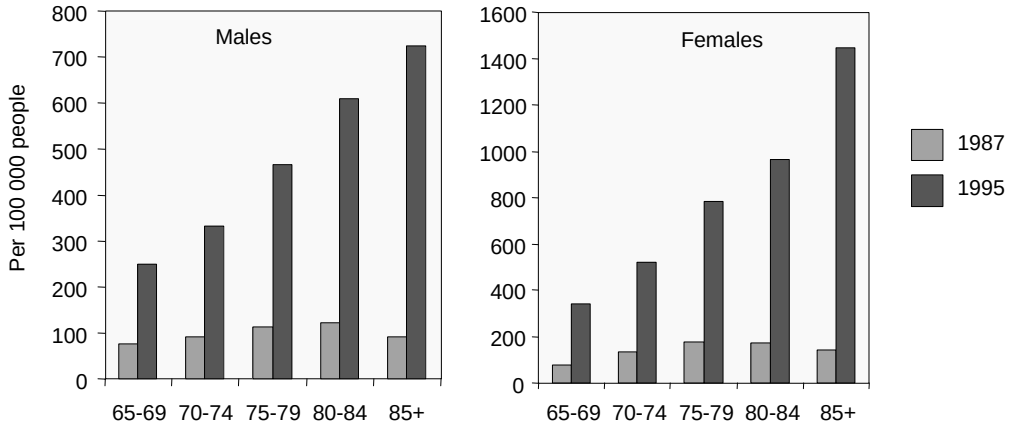
The past dominance of demand and technology on growth in health expenditure does not mean that ageing will be unimportant in the future. As described in chapter 2, the rate of ageing of the Australian population is only now beginning to accelerate (which, as discussed in technical paper 5, is one reason why ageing has not shown up as significant in studies looking at the determinants of past health expenditure). While demand and technology will obviously remain important, how they interact with the future ageing of the population will have a significant influence on future health expenditure.

The increased costs of prostheses provides a vivid example of the interaction of technology and ageing. Fuchs (1998a) finds the incidence of hip replacements has increased substantially for older people over a relatively short period in the US (figure 6.4) reflecting improvements in anaesthesia and prosthetic devices.

In Australia, the number of surgical prostheses (such as hip replacements, pacemakers and cochlear implants) provided under private health insurance increased by one-third between 1997-98 and 2000-01 and has remained stable since then (PHIAC 2004). At the same time, technological improvements in prostheses have meant that the cost of some devices has increased substantially. As a result, between 1997-98 and 2003-04, the benefits paid by private insurers in this area

more than doubled (prompting the Australian Government to allow private insurers to adopt a two tiered approach to the funding of prostheses).[5]

Figure 6.4 **Hip replacement trends among America's aged**



Data source: Fuchs (1998a).

Commenting on the large growth in its claims for prostheses for orthopaedic surgery and for cardio-thoracic procedures, one health insurer said:

> Both these items are predominantly claimed by people in the older age brackets and reflect the higher trend in total claims as the average age of the population increases (HBF 2003).

More generally it commented:

> The baby boomer generation is fast reaching the age where we expect their total claims to jump significantly over time. … This is because of the simple fact that older people tend to require a higher level of health care. Also it reflects the enormous growth in the range and cost of new drugs and medical treatments now available in Australia. (HBF 2003).

Although this example involves prostheses provided under private health insurance, it has implications for government expenditure:

- as noted, the Australian Government subsidises private insurance through the 30 per cent private health insurance rebate; and
- as recognised by the South Australian Department of Health (2005, p. 7), 'once an item is available in the private sector, there is a pressure for it to be adopted into the public system' — insulin pumps representing a recent example.

5 *National Health Act 1953* was amended to require registered health funds to offer a no gap and gap permitted range of prostheses as part of hospital procedures for which a Medicare benefit is payable.

Finally, developments in prostheses technology illustrates that investment in medical technology is often weighted towards treating the conditions faced by older people. This is partly because older age groups have greater needs, and partly because of a higher commercial payoff from investment in conditions with a high prevalence in the community.

One way of capturing the net impact of the interaction between ageing and technology is to consider how technology would affect the age profile of expenditure per capita:

- if demand and technology act to increase per person expenditure equally across all ages, an ageing population — given the rising profile of costs with age — will magnify the increase in costs arising from demand and technology (box 6.2);
- if demand and technology increase per capita expenditure for younger ages at a greater rate than for older groups (implying a 'flattening' of the age-cost profile) then the impact of ageing on health expenditure will be muted; however
- if demand and technology act to increase per capita expenditure more for older age groups, the cost impact of ageing will be exacerbated — there will be an increasing number of people in the age groups where per capita expenditure is growing fastest.

Box 6.2 **The impact of ageing: a stylised example**

If older people use more health services, then ageing, and demand and technology effects interact to produce greater costs. Consider the following example.

Suppose that at a given time, costs for each young person were $100 a year, while costs for each old person were $500 a year, and that over time demand pressures would lead to a trebling of costs for all ages. Assume for simplicity that there is no population growth. In one world, 95 per cent of the population is young and this structure holds true over time, whereas in a parallel world, 95 per cent of the population is young initially, but this proportion falls to 50 per cent over time. Average cost per capita would rise threefold in the world with the static age structure, but by nearly 8 times in the ageing world. Age and demand factors form a potent cocktail.

		Country A - no ageing		Country B - ageing	
		Young	Old	Young	Old
Now	Population	95	5	95	5
	Cost per person	100	500	100	500
	Cost	9 500	2 500	9 500	2 500
	Total Cost		12 000		12 000
Future	Population	95	5	50	50
	Cost per person	300	1 500	300	1 500
	Cost	28 500	7 500	15 000	75 000
	Total Cost		36 000		90 000

Source: Commission estimates.

In the same vein, Professors Sheehan (2002) and Richardson (sub. 16, p. 2) also recognise the necessity of examining movements in the age profile of expenditure over time. As Richardson notes, 'drawing time series conclusions from cross sectional data [in this case, the age profile at a *point* in time] is problematical'.

What is the evidence for changes in the age profile over time?

While there are limitations in the data, it would appear that in Australia and internationally, growth in health care spending is occurring either equally across age groups, or at a greater rate for older than younger people — in other words, the age profile of expenditure is either stable or steepening over time. There is no compelling evidence that expenditure growth is higher among younger groups or of a flattening of the age-cost profile.

Anecdotally, as reported in box 6.3, the community increasingly expects that new technology will be used to treat the aged. This has not always been so. Four factors are likely to underpin such changing expectations:

- greater wealth is resulting in increased demands for better services generally;
- new technology has improved the scope for safely treating the old — as noted, advances in anaesthesia allows some procedures to be performed that would previously have been too risky;
- increasing life expectancy means that there is a greater post-treatment payoff to treating the old in terms of improved health; and
- the greater political influence of the growing share of older people.

Box 6.3 **Changing attitudes to treatment for the aged**

The following comments shed some light on the interaction between community expectations, demand and ageing.

> I think there is, for the very old and frail, a change in community expectations of what medical care is appropriate for those people, and that is responded to. In the past, when pneumonia, the old man's friend, came to visit, that was regarded as quite a good outcome. That is not acceptable to the community anymore. There is a greater tendency to do significant interventions in the really old ... (Evidence of Professor D. Cameron, President, Royal Australasian College of Physicians, SCARCPHF, Committee Hansard, 21 March 2000, p. 379).
>
> People are being offered treatments and operations that were not available 10 years ago. Older people are able to undergo operations and procedures that previously were denied to them. For example, 10 years ago 75-year-old people often were not dialysised if they had chronic renal failure, but this would be a common occurrence now (Evidence of Dr P. Davoren, President, Doctors Reform Society, SCARCPHF, Committee Hansard, 22 March 2000, p. 402).
>
> When I was in an intensive care unit 20 years ago, somebody over 75 would have a tough time getting in. They are now 85 and they are having complicated and major surgery ... I do not see politicians suddenly saying, 'Let's go back and we will not take anybody over 75 into intensive care units'. So the demand is going to increase (Evidence of Ms B. Morieson, Secretary, Victorian Branch, Australian Nursing Federation, SCARCPHF, Committee Hansard, 23 March 2000, p. 533).

Similarly, Vos et al. (2005) comments that there are:

> …changes in the pattern of service delivery, especially in the provision of more services to older people who are starting to receive similar levels of health services as the middle aged with similar diseases.

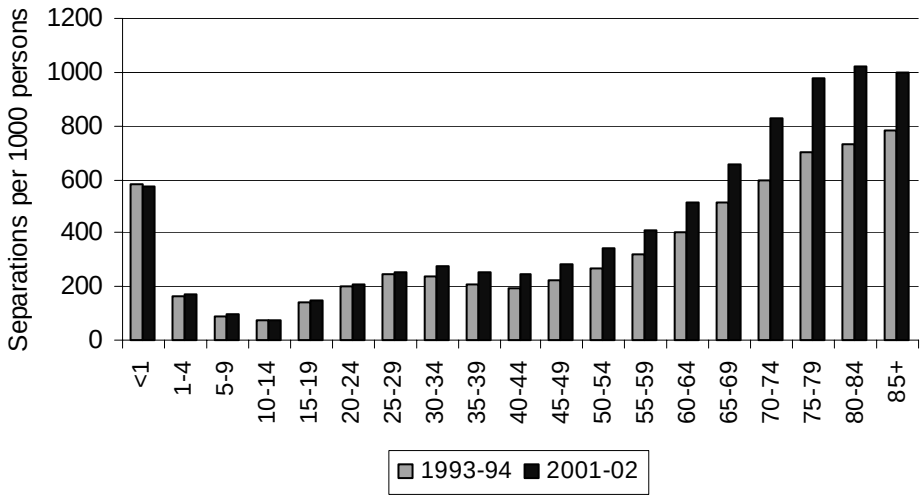
Source: DoHA (2003).

In Australia, this trend appears to be reflected in the use of hospital services (figure 6.5). Over the period 1991-92 to 2000-01, separations for people over 65 increased from 26 per cent to 33 per cent of total separations.

- DoHA (2003) attributes most of this increase to greater use of private hospital services, particularly same day admissions for renal dialysis, cataract-related eye surgery, chemotherapy, lymphoma and non-acute leukaemia, colonoscopies, gastroscopies, and follow-up after completed treatment with endoscopy.
- In public hospitals, separations per capita have also increased at a greater rate among the aged than the young, although not to the same extent as for private hospitals (figure 6.6).

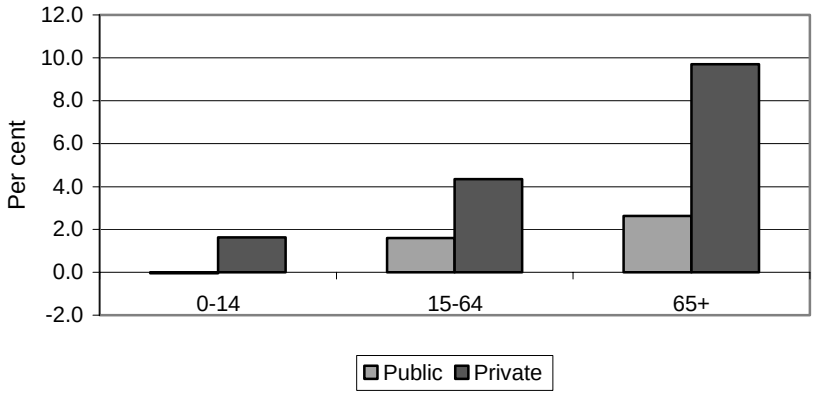
- The shift from public to private treatment for non-elective procedures such as dialysis is revealing in itself, and is likely to be indicative of capacity constraints within the public system.[6]

Figure 6.5 **Hospital separations per 1000 persons, by age, 1993–94 to 2001–02**
Separations from public and private hospitals



Data source: AIHW (national morbidity data base).

Figure 6.6 **Average annual increase in public and private hospital separations by age group, 1991–92 to 2000–01**



Data source: DoHA (2003).

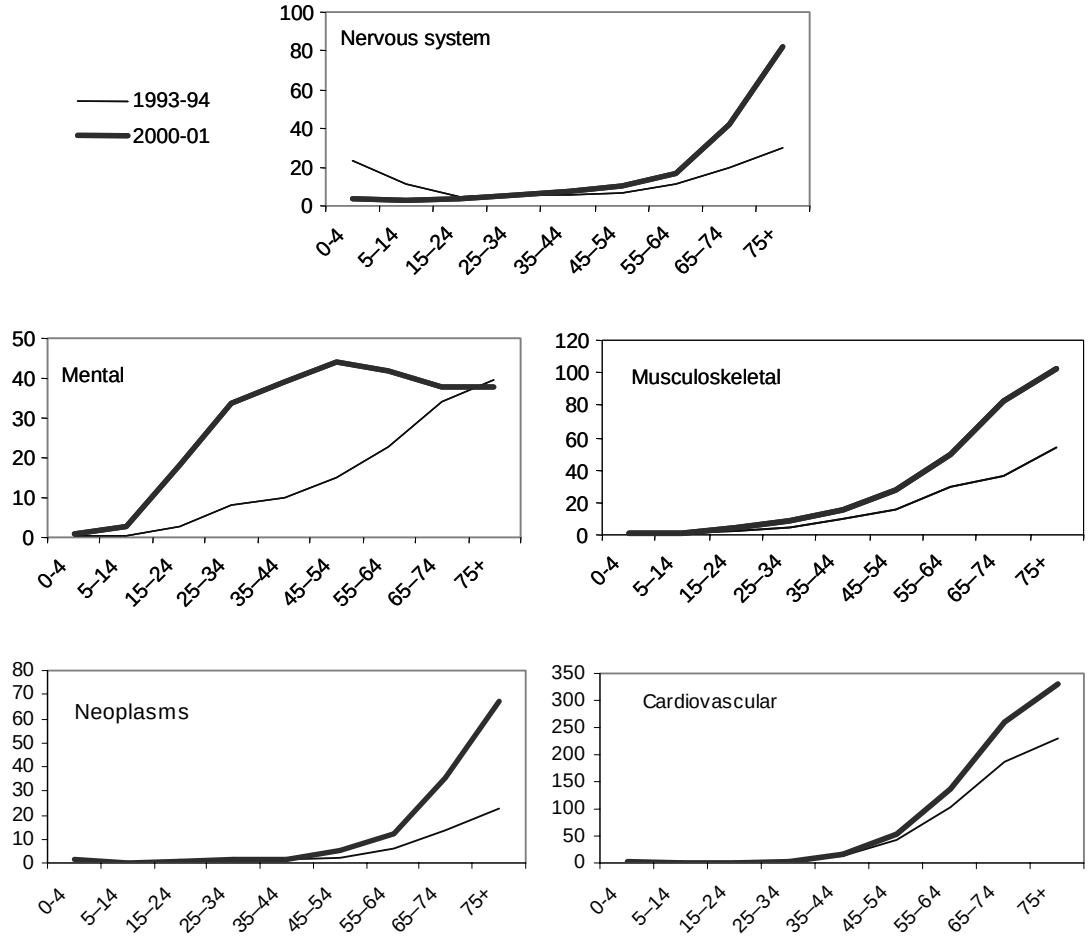
6 In relation to expenditure, the Australian Government funds a portion of private hospital treatment through the 30 per cent rebate for private health insurance: and older people tend to have higher rates of private insurance than younger groups.

Of course, higher *use* of services by older people need not translate to higher *expenditure* growth. For example, declines in the cost of particular procedures, such as cataract surgery, or reduced lengths of stay in hospital, may offset higher use by older people. The evidence on the change in the age profile of expenditure presents a slightly more mixed picture.

- In the US, '[o]ver the period 1963–2000, per person spending grew most rapidly among those age sixty-five and older' (Meara, White and Cutler 2004). However, the pattern is not uniform. From 1987 to 2000, growth among younger populations was slightly greater. In the period 1996 to 2000, hospital growth was once again higher among older people.
- In Canada, where data are available over a 20 year period for public hospital expenditure, the expenditure profile has remained stable (Health Canada 2001).
- In Australia:
  - in relation to Medicare, between 1994-95 and 2002-03, average growth in government spending was higher for older than younger age groups (with the exception of people over 85, for whom expenditure declined (HIC 2004);
  - in relation to pharmaceutical expenditure under the PBS, the AIHW reports that growth has been highest at older age groups (figure 6.7) across a number of disease groups;
  - the Australian Dental Association reports that dental expenditure increases with age. For example, 'in the 65 age group and above, the percentage of such people making a dental visit in the last 12 months increased from 21 per cent in 1979 to 61 per cent in 1999' (sub. 3, p. 3); and
  - AIHW data covering public and private expenditure for admitted patients, medical services and pharmaceuticals combined (figure 6.8) also shows a slight steepening of the age profile between 1993-94 and 2000-01 (these categories are those for which the most reliable breakdown of expenditure by age is available).

In sum, the evidence is that, in Australia, demand and technology are acting to slightly increase — or at least maintain — the current age profile of expenditure across different components of health care. This strongly suggests that the rising share of older people in the future will compound the underlying growth in health expenditure arising from demand and technology.

Figure 6.7 **Per capita cost for prescribed pharmaceuticals by disease group**
2001 dollars



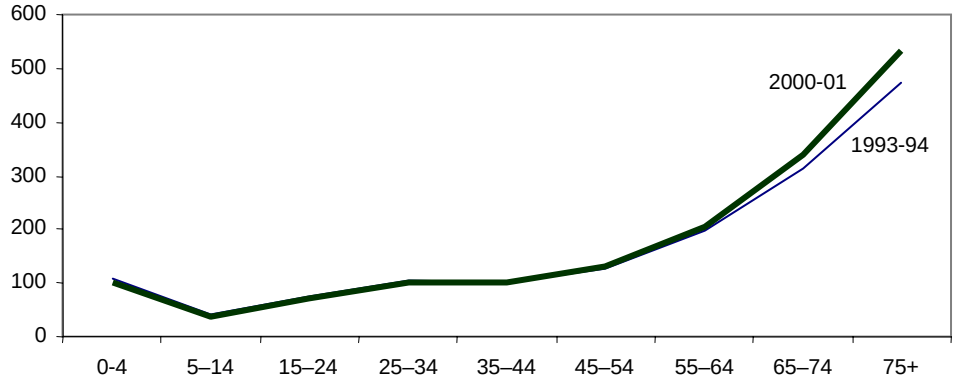
Data source: AIHW (unpublished data).

Would being healthier in the future lessen health costs?

An argument sometimes advanced as to why ageing may not have the impact on expenditure implied by the analysis above is that older people may be significantly healthier in the future (Bryant et al. 2004, Richardson and Robertson 1999, Sheehan 2002). It is argued that a larger but healthier population will not make a significantly greater call on funds than the existing cohort of older people. If this were the case, it would be manifested in the age profile of costs shifting — older people would still cost more than young people, but at progressively older ages.

Figure 6.8 **Index of expenditure, by age, for admitted patients, medical services and prescription pharmaceuticals, 1993-94 and 2000-01**

35-44 age group (= 100)



Data source: AIHW (unpublished data).

As discussed in chapter 2, whether older Australians are becoming more or less 'disabled' over time has been the subject of vigorous debate. Levels of disability are very important to future aged care needs, and for the general wellbeing of older people. However, for health care *expenditure* it is the *prevalence* of chronic conditions, not the level of disability, that is most important.

Higher levels of disability are generally accompanied by more chronic conditions, but the opposite does not necessarily follow. A fall in age-specific disability rates and/or a rise in life expectancy could be accompanied by either an increase or decrease in chronic conditions.

- If lifestyle changes — such as reduced smoking, or better medical treatment — prevent people developing conditions that disable them in some way, then lower disability would be associated with lower expenditure.
- On the other hand, if treatments with increasingly expensive technologies allow people to *manage* their conditions so that they are not disabling, then lower disability could come with a higher medical price tag.

Which scenario will predominate is difficult to determine with certainty. But the weight of evidence appears to support the view that better health among older people is *not* going to reduce health expenditure. For example:

- in the US, Lubitz et al. (2003), found that people over 70 had similar cumulative health care expenditure until death whether or not they were disabled.[7] Significant expenditure was incurred to maintain good health over 70. Lubitz et al. concluded that the results 'raise questions about [the] possibility … that better health among the elderly will moderate expected increases in medical care spending for the elderly';
- the OECD (2004) suggests that for countries reporting a decline in disability among the aged, there is evidence that this decline has not been accompanied by a decline in the prevalence of chronic conditions; and
- in a survey article Jacobzone (2003) also concludes that 'declines in disability may, in fact, be very costly to achieve in terms of health care'.

In Australia, researchers from the School of Population Health at the University of Queensland and the AIHW (Vos et al. 2005), have projected the burden of disease and associated expenditure for eight major disease categories based on epidemiological data (appendix D). The study projects significant decreases in the prevalence of cardiovascular disease and some cancers, but rises in obesity related diseases such as type II diabetes. The age specific rates of Alzheimer's disease are projected to remain stable (however, owing to ageing, the number of cases of Alzheimer's is projected to increase). Overall, the study found that ageing would significantly increase heath expenditure.

Alzheimer's Australia (2005 and sub. DR 55, p. 2) also report projections by Access Economics that, if current trends continue, over 730 000 people will have a diagnosis of dementia by 2050. A treatment for dementia would have a major impact on the burden of this condition. It would also provide major savings in residential aged care expenditure, but could involve higher ongoing medical expenditure.

While the story on disability and morbidity continues to evolve, it seems unlikely that foreseeable trends in disease prevalence and disability will alleviate the fiscal pressure associated with ageing.

What if most costs were associated with the end of life?

Health costs — mainly hospital costs — increase as a person reaches the end of his or her life. There is a significant body of literature that claims that this means that an ageing *population* will not incur significantly increased health costs. Fuchs

[7] As discussed later in the following section, expenditures were not just related to the period before death.

(1984) first suggested that costs at the end of life could explain the slope of the age profile:

> The principal reason why expenditures rise with age in cross-section (among persons aged 65 and over) is that the proportion of persons near death increases with age. (p.152)

Although Fuchs did not claim that there is no effect of ageing on health care other than costs associated with death, he noted that:

> As age-specific death rates fall over time, there will be fewer people in the last year of life, and this will tend to reduce age-specific health expenditures (p. 153).

Zwiefel et al. (1999) and Jacobzone (2003, p. 265) reiterate the point that they expect falling mortality rates to mitigate the impact of the demographic profile. For example, Zwiefel (1999) research for Switzerland:

> …suggests that the terminal phase of life is costly independently of whether it occurs at age 60 or 90. Consequently, per capita health care expenditure is not necessarily affected by the ageing of the population due to an increase in life expectancy.

Most recently, Gray (2004) argues that:

> Taking proximity to death into account, [the] impact of ageing *per se* will be substantially less … 'Traditional' projection methods do not accurately show effects of ageing populations on health expenditures.

This analysis raises two essentially empirical questions:

- Is it true that costs are primarily associated with proximity to death?
- If so, to what extent would this overcome concerns about ageing and health expenditure?

Do medical costs at the end of life explain the age profile?

There is no evidence that the rising age-cost profile is generated solely by costs at the end of life. As would be expected, many studies find that the costs at the end of life are higher than in non-terminal years — often around six to seven times higher. However, such multiples are not high enough for the costs associated with those who die to account for all health costs, even for older groups. For example:

- Menec et al. (2004) in Manitoba found total deaths in all age groups over the previous 12 months represented 1 per cent of the population, yet accounted for 21 per cent of health expenditure in 2000-01. While this is significant, it means that the bulk of expenditure was still accounted for by people who survived;
- Hoover (2002) in the US finds evidence of significantly higher costs associated with the end of life, but also higher ongoing health care costs for the very old;

- similarly, also in the US, Lubitz et al (2003), in one of the few longitudinal studies, found that for people reporting 'excellent' health at age 70 years, 60 per cent of cumulative health expenditure until the end of life would be during the period when they had good, very good or excellent health. Moreover, a significant proportion of the costs incurred while people were in 'poor' health were aged care costs, rather than medical treatment; and
- while Gray (2004) and Seshamani and Gray (2004) suggest that proximity to death overshadows age as a determinant of health expenditure, their study nevertheless finds that age leads to a 30 per cent increase in costs from age 65 to 85.

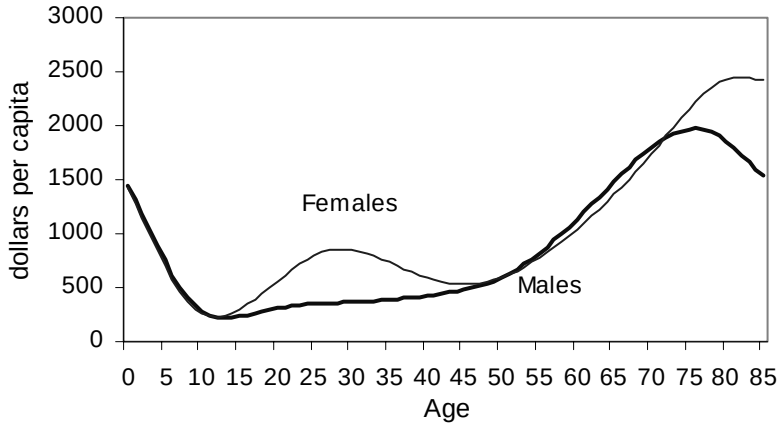
The limited data available in Australia also support the view that costs rise with age rather than arising predominantly at the end of life. For example, the increased use of prostheses is designed to improve the quality and quantity of life rather than manage the period before death. The hospital use statistics cited earlier show most growth to be in private hospitals and mainly for same day procedures. These procedures are typically associated with managing particular conditions rather than treatment or palliative care at the end of life.

Indeed, all these results are consistent with the evidence that medical technology has allowed the management of many chronic conditions leading to less disability (Jacobzone 2003). This phenomenon is incompatible with costs being predominantly at the end of life.[8]

It follows that while observed age-cost profiles may be steeper because more people die in older age groups, they would still be upward sloping even excluding this effect. This is illustrated by Commission modelling of indicative costs incurred in the last year of life. After accounting for the higher costs associated with the period before death, the Commission still finds an upward sloping age profile of ongoing hospital expenditure (figure 6.9)

[8] It is telling that Fuchs, who first raised the cost-of-dying argument, in suggesting that growth in care for older people could plunge the US into a social and economic crisis, appears to no longer considers that costs of death are the main cost associated with age (Fuchs 1998a). Fuchs (1998b, p. 3) 'projected expenditures … by extrapolating trends in age–specific constant dollar expenditures and population projections'.

Figure 6.9 **Ongoing health costs by age after excluding costs associated with death 2002-03** [a]



a Hodrick Prescott filter applied to raw data.

Data source: Commission estimates.

Deaths and the ageing population

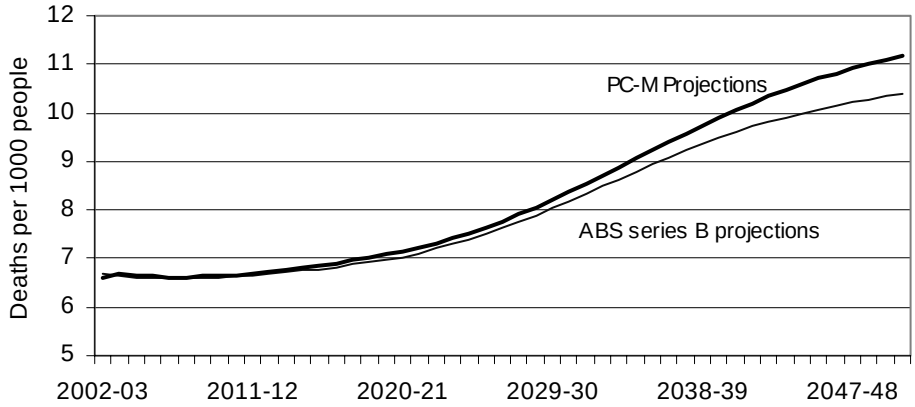
Indeed, the proportion of costs associated with death is not as fundamental to the debate about ageing and health expenditure as is sometimes represented. Even if costs at the end of life did explain most of the upward slope of the age profile of health expenditure, the ageing Australian population would still lead to a major increase in pressure on health expenditure over time.

Ageing will not only mean a higher proportion of the population in older age groups (because of greater longevity), there will also be a higher incidence of deaths. The PC-M series projects the number of deaths in Australia to rise from around 130 000 in 2002-03 to around 283 000 in 2044-45. The crude death rate (number of deaths per 1000 people) also rises by around 50 per cent between now and 2044-45. The ABS B series show an even greater increase in the crude death rate (figure 6.10). Even if *all* costs were related to the period leading up to death, ageing would still lead to substantially higher aggregate expenditure.

In practice, the death rate does not increase substantially until the 2020s, when the baby boomers begin to reach the end of their lives (figure 6.10). If all expenditure were related to death, the main effects of ageing would not be felt until the 2020s. But there would be significant pressure on expenditure after that time. Thus, in Australia at least, the debate about the extent to which health costs are related to death is not about whether ageing will have an effect on aggregate health expenditure, but *when* it will have an effect.

In sum, neither the possibility of a healthier older population in the future, nor evidence that costs are higher at the end of life, undermine the proposition that ageing of the population will place much greater pressure on health expenditure. As discussed in the next section, the Commission's projections for hospital expenditure — showing higher future expenditure — incorporate costs at the end of life as well as ongoing health costs. The Victorian Government (sub. 29, p. 20) also found in its modelling of health expenditure that its optimistic scenario — where health costs were based on proximity to death, or lower levels of service use — had a relatively small impact on the projected fiscal deficit in that State.[9]

Figure 6.10 **Projected deaths per 1000 persons, 2002-03 to 2050-51**



Data sources: PC-M projections and ABS unpublished data.

6.3 Projecting government health expenditure

Underpinning any projections is the assumption that future expenditure will be conditioned by past trends and patterns. In the case of health expenditure, the stability of the positive relationship between age and expenditure, and the persistence of trends in (non-demographic) expenditure growth over a relatively long period of time (appendix D) lend support to this assumption.

Nevertheless, the future contains many unknowns. For example, if effective treatments were to be developed for Alzheimer's disease, these could significantly reduce needs for aged care and health costs for older people. Similarly, gene technology and biotechnology hold the promise of new treatments across a range of areas. On the other hand, not all developments are cause for optimism. Rates of obesity are rising significantly, which is linked with a range of health problems. In

[9] Each assumption reduced the projected fiscal gap of over 6 per cent of GSP by 0.4 percentage points.

addition, resistance to currently available antibiotics may make some conditions harder to treat. Uncertainty about the future does not invalidate projections, but it does indicate the need for sensitivity analysis and a focus on the nature of the result rather than absolute magnitudes.

The Commission's approach is often described as being a 'needs-based' model. As noted in box 6.4, a number of researchers suggest that this approach overestimates the impact of ageing on health expenditure. However, the Commission considers the transparency of the 'needs-based' model is strongly desirable when projecting health expenditure under current government policies.

Method

Government health spending has been projected by broad category of expenditure, and by the level of government funding the service. For the Australian Government, the relevant expenditure categories are hospitals (mainly through grants to the States), medical services (mainly Medicare), pharmaceuticals (the PBS) and other expenditure. For the States, reflecting their differing responsibilities, own-source expenditure is projected for hospitals and other expenditure. The 'other' expenditure category, includes community and public health expenditure, dental services, aids and appliance and research and administration.

Each of the elements influencing health expenditure discussed in section 6.2 has been incorporated in the projection method, namely:

- the projected change in Australia's population based projections undertaken by the ABS for this study (PC-M projections), except for the Northern Territory (owing to the unique circumstances in the Northern Territory, separate projections have been undertaken for the Indigenous and non-Indigenous populations);
- the age profile of expenditure for each component of expenditure; and
- the impact of technology and demand on per capita costs for each component — the non-demographic growth rate.

In addition, the projections of hospital expenditure incorporate data on estimated costs in the last year of life, and projected deaths in the Australian population. Appendix C outlines the methods in more detail, the assumptions used, sensitivity analysis, and the results of alternative projection techniques.

Box 6.4 The needs-based model and the alternatives

Two clear features of the relationship between age and health expenditure in Australia are that:

- higher needs translate to higher health expenditure for older age groups; and
- this relationship has been stable over time (with some evidence that the disparity between expenditure on the old and young is growing).

If follows that an ageing population must create *pressure* for expenditure increases. However, there are two scenarios where that pressure may not result in higher government health expenditure.

First, as pressure from ageing increases, governments may transfer responsibility for funding of some health services to individuals. In this respect, the Victorian Government said:

> It is also possible that community expectations could adapt as the community becomes more affluent. Notably, as incomes rise, individuals may have greater capacity and willingness to make some financial contribution towards the cost of the services they receive. This would allow governments to focus on targeting and improving services for the most disadvantaged in the community. Management may be required to promote such changes in expectations, including communication of the fiscal challenges facing our community, and possible policy options to alleviate it. (sub. 29, p. 24)

Second, governments may restrict growth in health services arising from non-demographic factors — particularly the introduction of new technology — below that which has occurred in the past to absorb, or accommodate, ageing within a given budget. Professor Richardson (2005) argues:

> Health spending across developed countries is determined overwhelmingly by GDP and GDP appears to be the exogenous determinant of health budgets. In all western countries GDP and hence the health budget have grown sufficiently to absorb ageing effects. Hence the lack of relationship between health spending and ageing.

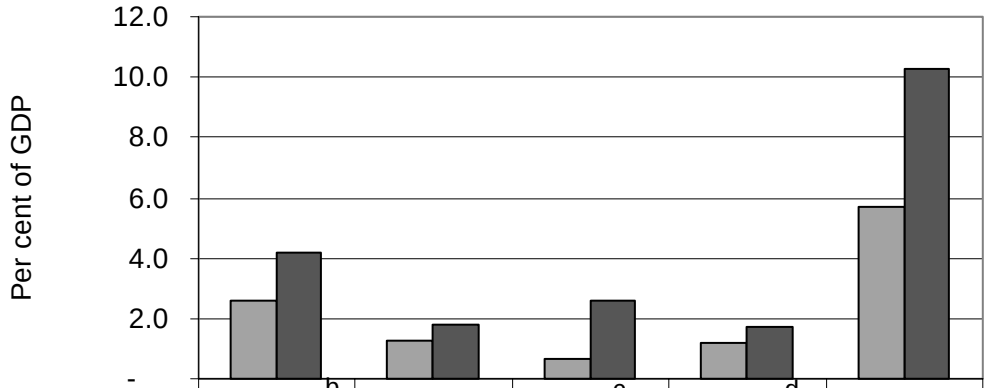
In each of these scenarios, ageing could occur without an increase in government spending as a proportion of GDP. But, in neither of these cases have the needs created by ageing been met costlessly. In the first, private expenditure substitutes for government expenditure. In the second, the rate at which new technology is introduced is slowed (relative to its past trend) to accommodate the pressure arising from ageing. Under this scenario, Australia could move from being a country that takes up new medical technology relatively quickly to one with a slow uptake (such as has been the case in the UK). Over time, this would mean conditions for which effective treatments exist overseas, remaining untreated in Australia.

Thus, in projecting a fiscal deficit, the Commission has been explicit about the needs created by ageing rather than assume they are borne privately or through a technology deficit.

Projected government health expenditure

Total government health expenditure is projected to increase from 5.7 per cent in 2002-03 to around 10.3 per cent of GDP in 2044–45. All components of health expenditure are projected to rise (figure 6.11). Hospital expenditure remains the largest component of expenditure, although its share is projected to fall slightly. Pharmaceutical expenditure is projected to increase by the greatest relative amount, with Medicare and other expenditure maintaining broadly stable shares of expenditure.

Figure 6.11 **Projected government health expenditure as a proportion of GDP 2002-03 to 2044-45** [a]



	Hospital[b]	Medicare	PBS[c]	Other[d]	Total
2002-03	2.6	1.2	0.7	1.2	5.7
2044-45	4.1	1.8	2.6	1.7	10.3

a Projections use a non-demographic growth rate of 0.6 percentage points above the projected growth in GDP per capita. **b** Hospital expenditure includes all capital consumption on health (but excludes capital expenditure. **c** PBS includes expenditure under the Repatriation Pharmaceutical Benefits Scheme. **d** Other expenditure includes other health professionals, aids and appliances, community and public health, dental, ambulance services and research and administration. Unlike the Intergenerational Report, other expenditure excludes the private health insurance rebate, which is allocated, consistent with the approach used by the AIHW, to the activity on which it is spent.

Data source: Commission estimates.

As discussed above, the rise in expenditure as a proportion of GDP reflects the interaction of the age profile of expenditure and the underlying growth in per capita expenditure from non-demographic factors. Hospitals, Medicare and other expenditure are projected using a non-demographic growth rate of 0.6 percentage points above the projected growth in GDP per capita. The differences in the outcomes for these items are explained by the age profile of each. Hospital expenditure is strongly age-related, whereas 'other' expenditure is much less so. Pharmaceutical expenditure increases significantly because it is both strongly age-

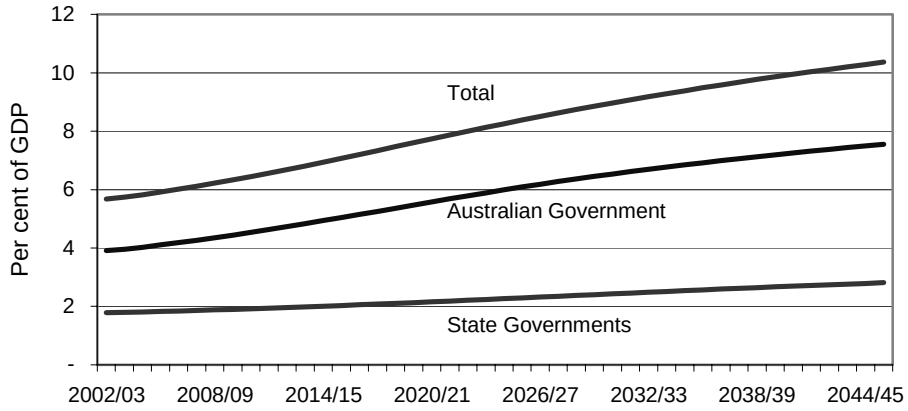
related, and has been projected using a higher non-demographic growth rate (appendix D).

Small variations in the non-demographic growth rate have a significant impact on the results. If health costs per person increased at 0.3 percentage points above the growth in GDP per capita (instead of 0.6 percentage points), total government expenditure is projected to be around 9.0 per cent in 2044-45. On the other hand, at a growth rate of 0.9 per cent above GDP per capita, expenditure is projected to reach over 11.5 per cent of GDP (more details are provided in appendix C and D).

Projections by jurisdiction

Figure 6.12 shows expenditure by jurisdiction. Australian Government expenditure is projected to nearly double, to around 7.5 per cent of GDP. Own-source State Government expenditure is projected to increase by nearly 60 per cent, reaching almost 3 per cent of GDP.

Figure 6.12 **Projected own-source health expenditure as a proportion of GDP 2003-04 to 2044-45**



a Projected using a non-demographic growth rate of 0.6 percentage points above the projected growth in GDP per capita.

Data source: Commission estimates.

At the Australian Government level (table 6.2) the most notable feature is the projected increase in pharmaceutical expenditure, rising from well below hospital and Medicare spending to attain similar levels in 2044–45. The Intergenerational Report also found a rise in PBS expenditure, but more so than in this study. The difference lies in assumptions relating to non-demographic growth of pharmaceutical expenditure. The Report used a constant growth rate, whereas, partly based on developments in pharmaceutical funding since the Report, this study

has used a growth rate that declines over time from an initially high rate (appendix C). More generally, the Commission's results are consistent with those obtained by the Intergenerational Report.[10]

Table 6.2 **Health expenditure as a share of GDP 2002-03 to 2044-45**

	2002-03	*2014-15*	*2024-25*	*2034-35*	*2044-45*
	%	%	%	%	%
Australian Government hospital	1.40	1.58	1.79	2.03	2.25
Medicare	1.23	1.40	1.56	1.69	1.80
PBS	0.68	1.29	1.91	2.34	2.59
Australian Government other	0.60	0.67	0.73	0.80	0.86
Australian Government total	**3.90**	**4.94**	**6.00**	**6.85**	**7.50**
State hospital	1.19	1.35	1.54	1.74	1.92
State other	0.60	0.67	0.74	0.81	0.88
State government total	**1.78**	**2.02**	**2.29**	**2.55**	**2.79**
Total government expenditure	**5.69**	**6.96**	**8.28**	**9.40**	**10.28**

Source: Commission estimates.

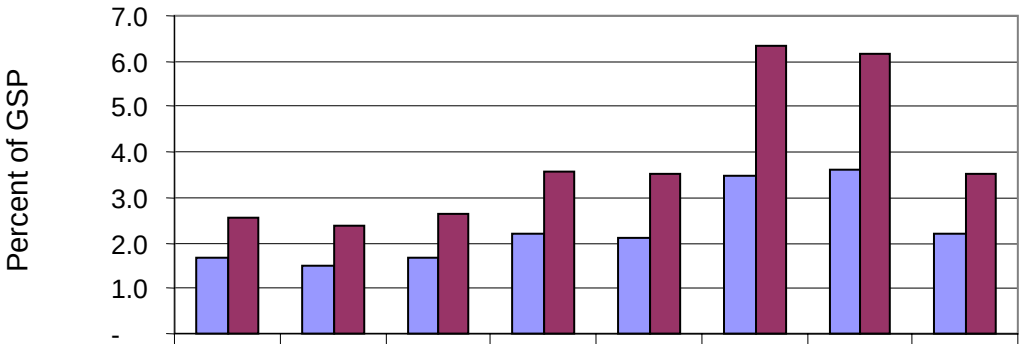
For State governments, hospital expenditure is projected to remain the largest component of own-source expenditure by a substantial margin. Projected own-source government expenditures as a proportion of projected GSP for each State are contained in figure 6.13.

With the exception of the Northern Territory, where separate projections have been made for Indigenous and non-Indigenous people (box 6.5), differences between jurisdictions occur because of:

- different starting points for own-source expenditure as a proportion of GSP;
- different levels of ageing within each; and
- different levels of projected GSP growth (which is also related to ageing).

[10] The Intergenerational Report projected Australian Government health expenditure would be 8.13 per cent of GDP in 2041-42, whereas the Commission projects a slightly lower total of 7.32 per cent for the same year. However, excluding PBS expenditure, the Commission's projections for other categories of health expenditure are very similar to the Report — 4.80 per cent of GDP compared with 4.78 for the Report.

Figure 6.13 **Projected own–source state health expenditure as a proportion of GSP by jurisdiction**



	NSW	Vic	Qld	WA	SA	Tas	NT	ACT
2002-03	1.7	1.5	1.7	2.2	2.1	3.5	3.6	2.2
2044-45	2.6	2.4	2.7	3.6	3.5	6.3	6.2	3.5

Data source: Commission estimates.

For example, Tasmania is projected to have a high degree of ageing and a relatively large increase in expenditure, whereas the population structure in New South Wales is projected to age less with a correspondingly lower impact on expenditure. While Western Australia and the ACT have relatively young populations at present, they are projected to have similar levels of ageing, as measured by the *increase* in the share of the population over 65. This accounts for Western Australia and the ACT having a similar increase in expenditure to South Australia, which has an older population at present.

Two points are important in interpreting the projected increases among States.

First, different levels of expenditure as a proportion of GSP do not indicate the degree of fiscal pressure between jurisdictions. As discussed in chapter 13 (and appendix F) horizontal fiscal equalisation could be expected to largely eliminate differences in fiscal pressure among jurisdictions.

- Second, while hospitals are *funded* by both the Australian and State governments, *delivery* of hospital services is a State responsibility. The Commission's projections assume that hospital funding increases at the same rate as the demand for services, regardless of source. However, several jurisdictions perceive a risk that Australian Government specific purpose payments for hospitals may not keep pace with demand (appendix F). Were this to be the case, it would clearly increase the fiscal pressure on the States.

Box 6.5 **Health projections for the Northern Territory**

Indigenous people comprise 30 per cent of the total population in the Northern Territory. As emphasised by Northern Territory officials, Indigenous people have a much greater need for health care than the non-Indigenous population. Infant mortality rates are over two times higher than for non-Indigenous people, and there are higher age-specific death rates for every age group. Average life expectancy is 50 years for males and 63 years for females — nearly 20 years less than for the non-Indigenous population.

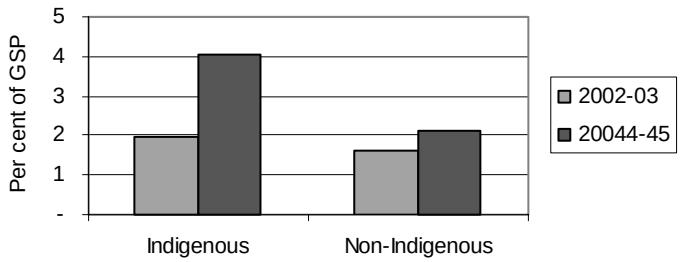
Indigenous people also bear a higher disease burden per head of population than non-Indigenous people for all age groups. This peaks in the 35-54 age groups where Indigenous people have 4.1 times the burden of disease and injury than non-Indigenous people. Cardiovascular disease, acute respiratory infections, diabetes and neonatal disorders are areas of significant difference between Indigenous and non-Indigenous Territorians. Zhao et al. (2004, p. 501) concludes that Indigenous adults 'experience levels of heath comparable to those of non-Aboriginal people 20-30 years older, and that a gap exists in both fatal and non-fatal health outcomes'.

Poor health leads to higher rates of hospital admission and use of community services. Costs per patient are also higher in the Northern Territory because of the costs of providing services in remote communities. As a consequence, expenditure per capita is much higher for Indigenous people and it is concentrated at earlier ages. Average Northern Territory Government health expenditure in 1998-99 was $3208 per Indigenous person compared with $1139 for non-Indigenous people (AIHW 2001).

The Commission has constructed a separate age profile of expenditure for Indigenous people in view of their very different use of services, and projected Indigenous and non-Indigenous health expenditure separately (figure below). It is the policy of all governments to improve Indigenous health outcomes. To reflect this policy over time the Indigenous age-profile becomes like that of the non-Indigenous population.

While costs per capita are higher for Indigenous people, expenditure per disability adjusted life year is almost 20 per cent below the national average, before the impact of remoteness on costs is taken into account. This indicates that potentially greater levels of investment are needed in Indigenous health. To reflect this, the Commission has used a higher non-demographic growth rate for the projections of Indigenous expenditure in the Northern Territory.

Projected NT health expenditure

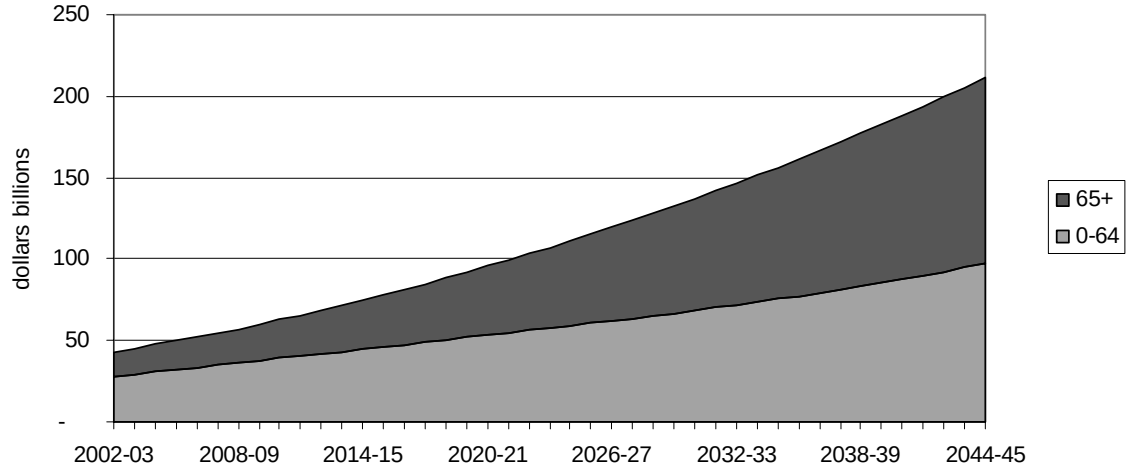


The impact of ageing on health expenditure trends

There are a number of ways of presenting the impact of the ageing of the population on expenditure.

One of the simplest is the proportion of expenditure on those 65 and above compared with the rest of the population. In 2002-03, the Commission estimates that one-third of total government expenditure was accounted for by services to the over 65 group. By 2044-45, this proportion is projected to increase to 57 per cent (figure 6.14).

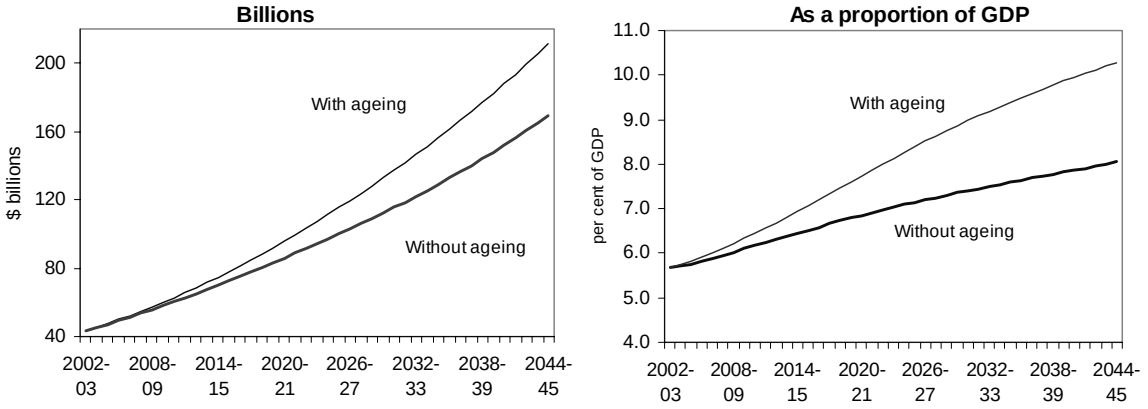
Figure 6.14 **Projected government health expenditure on persons above and below 65, 2002-03 to 2044-45**



Data source: Commission estimates.

Another measure of the impact of ageing is the difference in projected expenditure with and without ageing (figure 6.15). In this case, the without-ageing scenario assumes that population growth and non-demographic growth both occur as projected, but that the age structure of the population (the shares of the population of each age) remains at current levels. If there were no ageing, expenditure is projected to reach $169 billion in 2044-45, whereas with expected demographic change it is projected to be 25 per cent higher at $211 billion. Relative to GDP, ageing also increases expenditure just over 25 per cent (8.1 per cent of GDP without ageing compared with 10.3 per cent with ageing). However, this is more significant than it first appears. Ageing contributes around 2.2 percentage points (or one-half) of the 4.5 percentage points increase in government health expenditure as a proportion of GDP.

Figure 6.15 **Projected government health expenditure with and without ageing, 2002-03 to 2044-45**[a,b]



a To achieve a like with like comparison in the left hand graph, the same non-demographic growth rate has been used for the ageing and non ageing scenario. **b** To express the ageing effect as an increase in *health expenditure as a proportion of GDP*, it is necessary to adjust both the numerator (health expenditure) and denominator (GDP) for the absence of ageing. Without ageing, GDP will be higher (chapter 5). And if the non-demographic growth rate is expressed as a premium over GDP per capita, non-demographic growth will also be higher in the absence of ageing. As shown in the right hand graph, under this scenario, without ageing, health expenditure would reach 8.05 per cent of GDP in 2044-45, compared with projected expenditure of 10.28 per cent of GDP with ageing.

Data source: Commission estimates.

As shown in table 6.3, variation in the degree of ageing among the States is reflected in differences in the increase in expenditure attributable to ageing.

In understanding the ageing effect expressed in this way, it should be emphasised that the percentage increase attributable to ageing is independent of other variables. If demand and technological developments led to higher non-demographic growth, the value of the ageing effect would also be higher, leaving the percentage increase unchanged. For example:

- if non-demographic growth and population growth combined to increase expenditure by $100 billion, the impact of ageing would be to increase total expenditure to $125 billion; whereas
- if non-demographic growth and population growth combined to increase expenditure by $200 billion, the impact of ageing would be to increase total expenditure to $250 billion.

In each case, the increase attributable to ageing is 25 per cent. In this way, ageing can be said to compound any fiscal pressure created by demand and technology-fuelled expenditure growth.

Other ways of calculating the ageing effect are examined in technical paper 6. The clear message that emerges is that, whatever measure is used, ageing is likely to have a significant impact on health expenditure.

Table 6.3 **Percentage increase in expenditure attributable to ageing in 2044-45**[a]

Jurisdiction	*Ageing will increase total expenditure by:*
	%
New South Wales	20
Victoria	21
Queensland	25
Western Australia	28
South Australia	27
Tasmania	29
Northern Territory	24
ACT	28
Australian Government	26
Total government expenditure	25

a State expenditure is own-source expenditure.

Source: Commission estimates.

7 Aged care expenditure and carer payments

Key points

- The proportion of people aged over 80 is projected to treble to nearly one-tenth of the population by 2044-45.
- This group constitutes the main users of aged care services. As a result, the ageing of the population will result in significantly increased demand for aged care.
- Government expenditure on aged care is projected to increase from around 0.86 per cent of GDP to around 2.24 per cent in 2044-45. Residential care remains the largest area of expenditure.
  - These projections assume modest reductions in age-specific disability rates. If there are no reductions in disability, expenditure is projected to be over 2.5 per cent of GDP in 2044-45.
- Government payments to people caring (at home) for people with disabilities are projected to increase slightly from 0.19 per cent of GDP to 0.21 per cent in 2044-45.
  - A small decline in the proportion of payments for carers of people with disabilities under 65 is more than offset by payments for those caring for the over 65s.

The previous chapter demonstrated the potential for ageing-related growth in government health expenditure. Governments also fund a range of aged care services designed specifically to meet the needs of frail older people for care and support. They also provide payments directly to carers.

7.1 Expenditure on aged care

Aged care services funded by governments include:

- residential services, which are generally classified as high care (previously nursing home care) or low care services (previously hostel care);[1] and

[1] High level residential care is included as health expenditure in the Australian Institute of Health and Welfare's classification of health expenditure. However, in this report it is included in aged care expenditure projections and excluded from the health expenditure projections.

- community care services, which include Home and Community Care (HACC) program services, the Community Aged Care Package (CACP) program, the Extended Aged Care at Home (EACH) program and Veterans' Home Care (VHC).

In 2003-04, governments spent over $6.5 billion on aged care services. An ageing population will increase the demand for aged care. This section presents long-term projections of government aged care spending on residential and community aged care services.

Influences on government aged care expenditure

The level of government expenditure on aged care services in the future will primarily be influenced by four factors:

- growth in the number of aged persons;
- disability levels within the aged population;
- any change in the care mix from institutional residential care to care in the community (formal and informal); and
- changes in the average cost of care per person.

Each of these factors has been incorporated into the Commission's projections of aged care expenditure. The method for projecting aged care expenditure is similar to that used to project government health funding. Projections are based on current expenditure per person receiving aged care services (indexed for growth in costs) and the forecast number of older people (box 7.1).

The number of older people

Of particular relevance for aged care expenditure is the number of people over the age of 80, as currently the use of formal aged care services increases rapidly for both males and females beyond this age. The proportion of 80 year olds is expected to nearly treble from 3.3 per cent of the population in 2002-03 to 9.1 per cent in 2044-45.[2] This indicates that ageing will exert substantial pressure on aged care expenditure.

In particular, an increase in the number of older people could lead to a large increase in the number of people with Alzheimer's disease and dementia (unless there is a major breakthrough preventing or treating these conditions). Currently

[2] Based on PC-M projections.

there are over 170 000 people with a diagnosis of dementia. Alzheimer's Australia (2005) project that by 2050 this will rise to 730 000. About half of people with a diagnosis of dementia live in the community and half in residential aged care (Alzheimer's Australia, sub. 24, p. 1). Alzheimer's Australia report that:

> …it is inevitable that direct and indirect costs will escalate because we can be certain that the numbers of people with a diagnosis of dementia will increase and because the duration of care is likely to increase also with the expectation of longer life. (sub. 24, p. 2)

Box 7.1 **Projecting aged care expenditure**

The main steps involved in projecting aged care expenditure are as follows:

- participation rates by age and gender for each aged care program are derived from program data and provide the demographic profile of the use of the program. For example, only 0.5 per cent of females in the 65–69 age group use high care residential facilities. This rises to over 37 per cent for those over 95 years;
  - in contrast to other studies (IGR 2002 and Hogan 2004) the Commission has used participation rates for residential aged care for ages up to the 95 plus group, rather than having a single rate for people over 85.
- in any future year, the number of participants in a program is calculated by multiplying the participation rate by the projected population in that group for that year;
- expenditure for each group is given by multiplying the number of participants in each age group by the average cost per participant (expenditure per person is indexed by the expected growth in costs in the aged care sector); and
- total expenditure is the sum of expenditure on each age group.

While this yields an implicit age profile of expenditure at any point in time, factors influencing the participation rate (such as disability rates, and the availability of partners and children) can be directly modelled, as can factors affecting the average cost. In this way, the age profile of expenditure can change throughout the projection period.

Disability rates

The links between disability levels and use of aged care are not straightforward. There are many more people over the age of 65 with disabilities than require formal aged care services (Madge 2000, p. 26). A better guide to the proportion of the population likely to seek long-term aged care is the number classified as having severe or profound levels of disability. Reductions in rates of severe disability among older people, and the greater use of technology to allow people to live independently, could partially offset greater demand for aged care from increased

numbers of older people. For example, if the average onset of Alzheimer' disease could be delayed by 5 months, Access Economics estimate this would yield a saving of $1.3 billion dollars by 2020 (Alzheimer's Australia, sub. DR55, p. 2).

Measuring trends in the age-specific prevalence of disability remains a controversial subject (OECD 2004a and Gudex and Lafortune 2000). The definitions and thresholds appropriate for gauging the effects of disability on employment, health spending and aged care are different, complicating the assessment of disability trends. The underlying patterns are obscured by data inadequacies, changing definitions, shifting attitudes to disability, new and varying methods of diagnosis, and inexplicable differences in trends across countries with similar living standards.

- For the US, Fogel and Costa (cited in Manton and Gu 2001) find that morbidity and disability rates among male war veterans have declined by 0.6 per cent annually over most of the 20th century. Further, Manton and Gu (2001) find that declines in disability, including for severe categories, have accelerated over recent years.
- Recent research by an international working group to resolve inconsistencies across national surveys also found consistent evidence that, during the 1990s, the proportion of older people receiving assistance with activities of daily living declined. However, their conclusions are sensitive to the specific time period and whether individuals who only use aids or equipment (and do not receive personal assistance) are considered to have a disability with activities of daily living (Freedman, Martin and Schoeni 2004, p. 17 and Freedman et al. 2004).
- The ABS surveys of disability suggest a relatively stable prevalence rate of severe disability in the older population. The age-standardised rates of 'severe or profound' disability in Australia were stable during the 1980s and early 1990s. The increase in the age-standardised rates between 1993 and 1998 are mainly attributable to the changes in the 1998 survey that brought more people with a disability into the scope of the survey. The ABS' 2003 survey maintained the 1998 survey methods so that the results confirm previous pattern of stable age standardised rates (ABS 2003d).

Although the evidence is mixed, particularly for Australia, Hogan (2004) concluded that age-specific rates of severe and profound disability are likely to decline moderately in the future. Based on the international evidence Hogan (2004) incorporated modest reductions in disability into its projections. In the Commission's projections, assumptions about changes in disability levels are reflected in the institutionalisation rate for residential aged care, and the participation rate for CACP and HACC programs. In line with Hogan the Commission has assumed a 0.25 per cent annual decrease in the relevant

participation rates throughout the projection period (and conducted sensitivity testing assuming no change in disability, and higher reductions disability).

The effect of falling disability rates is significant, but only partially offsets the increase in the number of old people. For example, if there were no reductions in disability the number of low and high care residents is projected to rise by over 250 per cent between now and 2044-45. However, with the reduction in disability noted above, the increase in low and high care residents is projected to be around 215 per cent.

Change in the care mix and the role of informal care

It is government policy, and the wish of most older people, to remain and be cared for in the community for as long as possible. CACPs provide an alternative home-based service for older people who are assessed as eligible for care equivalent to low level formal residential care. The number of CACPs has increased significantly since the scheme was introduced in the early 1990s.[3]

Based on current trends and policy it is likely that there will be some change in the balance between low level residential care and community care (both formal and informal) over the next 10 to 15 years. The Commission's projections incorporate a modest change in care mix away from low level residential care to CACPs.[4]

However, there is uncertainty about how formal community care will evolve. The uncertainty arises because there are links between formal care in the community and informal care. Critically, over the longer term, there is likely to be a significant reduction in the proportion of potential informal carers:

- there is an increase in the proportion of single person households. Many older people are currently cared for by their partner. The ABS projects that by 2021, less than half of people over 65 will be living in couple families (AIHW 2004d, p. 31);
- there are fewer children per family, reducing the number of potential carers per family; and

[3] FaCS (sub. DR61, p. 6) also point out that there are a number of people who are cared for without the use of any government services. 'In 1998, 227 400 primary carers reported that they did not receive any assistance and 139 700 primary carers reported they did not receive a government pension or benefit. If these rates change then the overall care mix will vary'.

[4] The Commission has assumed that there will be a trend from low-level residential care to CACPs that will plateau around 2015. Initially it is assumed that there is a decline of 2 per cent in the participation rate for low care and that these people take up CACPs instead. The initial figure then reduces according to a logistic function.

- much greater workforce participation by women, combined with having children later, may somewhat reduce the capacity, or willingness, of women — who traditionally fulfil the caring role — to provide aged care.

AIHW (2003b) concludes that there is unlikely to be a significant shortage in the number of informal carers in the period 2003 to 2013. Among a range of complex factors, population ageing, up to that point, will bring with it a rise in the number of older carers offsetting a small relative decline in the proportion of younger carers. Under its baseline scenario, AIHW finds that the ratio of carers to people with a severe or profound disability is likely to fall only slightly, from 0.43 carers per 100 people with a disability in 2003, to 0.40 in 2013.

However, Australia's population will 'age' significantly after 2013, and the supply of carers may not keep pace with increasing numbers of the elderly.

While the pool of aged carers will increase with ageing, significant care is provided by younger cohorts. The under 65s (mostly women aged 45-64 years) provide over 60 per cent of all caring services to the elderly (figure 7.1 and AIHW 2004d, p. 5).

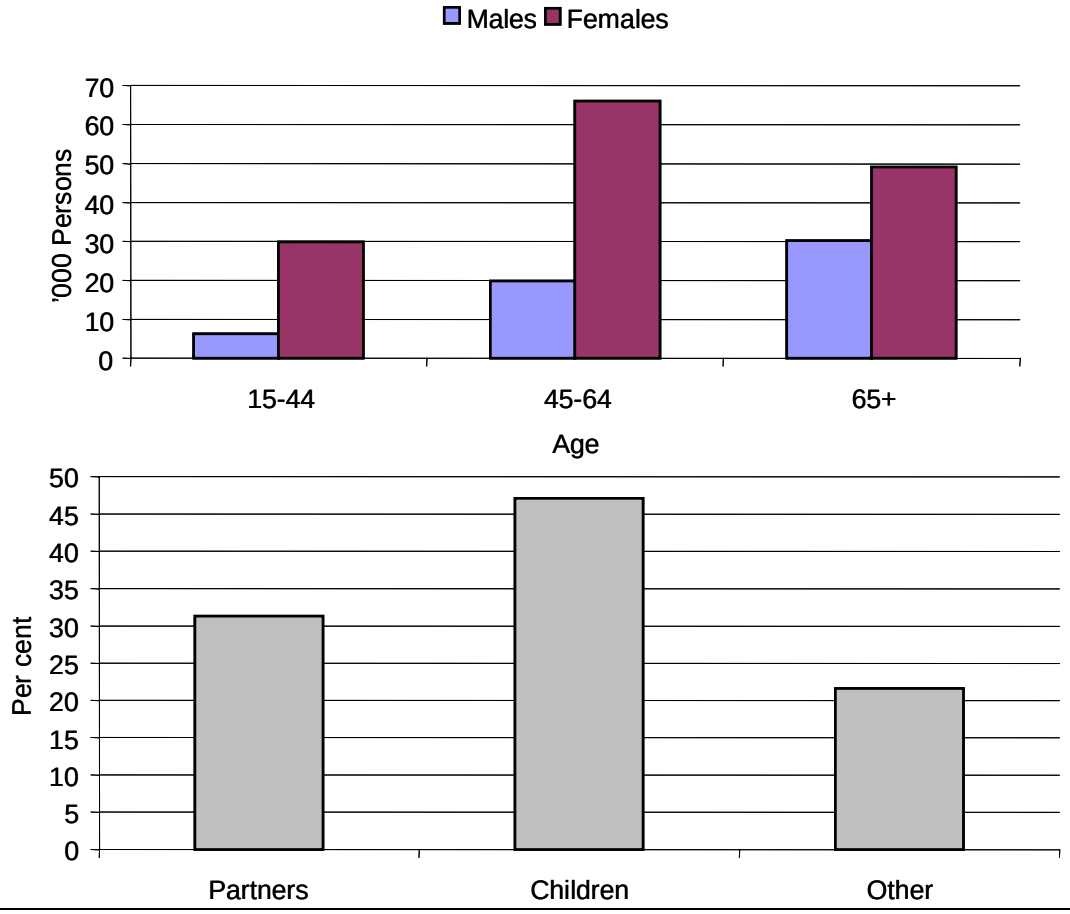
As noted by Hogan (2004, p. 91), over the longer term the pool of potential female carers will decline relative to the number of aged who may need care. Dubbed the 'caretaker ratio' internationally, the ratio of females between 50 and 64 to the population of people over 80 is projected to decline from 2.5 potential carers per person over 80 in 2002-03 to under 1.0 in 2044-45 (figure 7.2).

NATSEM (2004) also find that the potential total number of informal carers will not rise as quickly as those likely to require care. It projects that between 2001 and 2031, the number of older people likely to need assistance because of a severe or profound disability is likely to rise by 160 per cent whereas the number of people likely to provide informal care is likely to increase, but only by 57 per cent.

The relative shortage of informal carers could have two opposing effects on the long-term demand for formal community care. On the one hand, to the extent that formal care is *complementary* to (or 'tops up') informal care, the demand for formal community care could decline (with an increase in the demand for residential care). AIHW (2004d, p. xvi) suggests there may be some complementarity between formal and informal care under current arrangements. The results of its study:

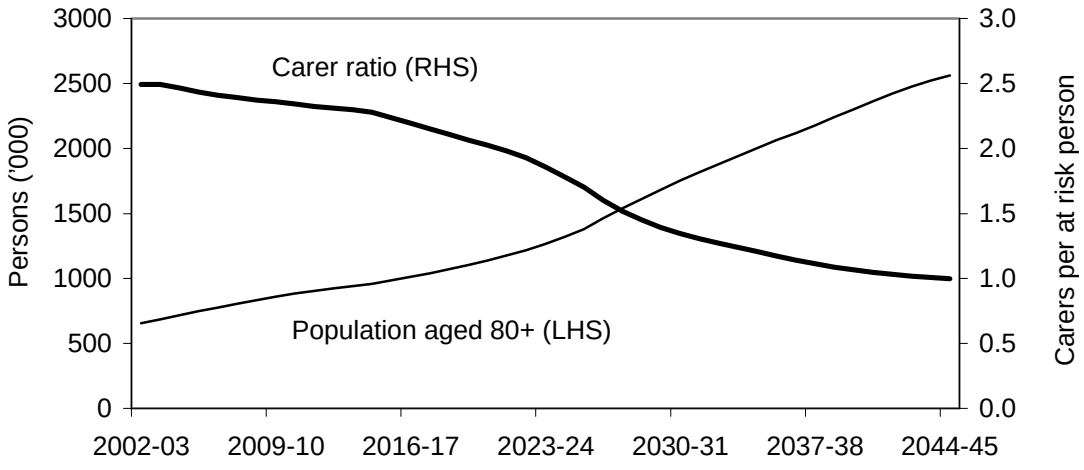
> … supports a finding from the national Aged Care Assessment Program that people with high levels of dependency in core daily activities are more commonly able to remain in their homes if they have a primary carer.

Figure 7.1 **Who provides care to the over 65s?**
1998



Data source: ABS (1999, *Survey of Disability, Ageing and* Carers, Cat. no. 4430.0)

Figure 7.2 **Older female carers relative to the population in need**
Females 50-64 to population over 80



Data source: Calculated from ABS (2003b, *Population Projections Australia*, Cat. no. 3222.0).

On the other hand, to the extent that formal care *substitutes* for informal care, a shortage of informal carers could lead to an increase in demand from the elderly for formal community care. However, in the absence of informal support, formal care in the community could cost about the same as low level residential care. This would tend to reduce the scope for this form of care to expand indefinitely.

In sum, there are constraints on the feasibility of significantly expanding care in the community. The primary reason for this is limits on the availability of informal carers. Consequently, the Commission has projected only a *modest* switch to community care.

Change in the cost of care

The cost of aged care is dominated by labour costs, which represent around three quarters of total residential costs (Hogan 2004), and a slightly higher proportion of the cost of community care services. As such, changes in wage rates of nurses and other aged care workers are likely to primarily influence future costs of care. There is currently a shortage of nurses in general, and of aged care workers in particular. Hogan (2004) found that the aged care workforce would need to increase by 35 per cent over the next decade compared with an 8 per cent increase in the entire Australian workforce. As a result, there is likely to be some increase in aged care workers' wages relative to nurses and to other professions in the short term (over the next five to seven years). To assist age care providers pay more competitive wages to nurses and other staff, in the 2004-05 Budget, the Government announced that it would provide $877.8 million over four years. By 2007-08 this will result in about $2000 extra per resident above the usual indexation of subsidies (Bishop (Minister for Ageing) 2004, p. 28).[5]

In the longer term, however, there are minimal barriers to entry to working in aged care and it is unlikely that wages in the aged care sector will outstrip general wage rises.

While capital costs — primarily nursing home and hostel buildings and infrastructure — currently comprise only around 30 per cent of residential costs, significant changes in these costs would affect the per person cost of care.

[5] The likely increase in wages has been modelled as an increase in per capita unit costs that is 1 per cent greater than the projected increase in real incomes (1.75 per cent per annum) until the year 2011-12. Unit costs are then assumed to increase at the same rate as real income growth. While Hogan (2004) identified scope for productivity gains in the aged care sector, the need for intensive personal care suggests the scope for gains is likely to be less than in the economy generally. Increases in wages are therefore likely to translate to increases in unit costs.

Regulations governing care and consumer expectations influence the infrastructure costs of providers:

- the introduction of accommodation bonds in the 1990s reflected the recognition that more capital was required in the residential care system to meet reasonable standards; and
- based on developments overseas, there may be demands from users and their families for higher standards of accommodation, including reduced numbers in each room.[6]

Over time, such changes are likely to be funded primarily by individuals rather than government expenditure. However, in the 2004-05 Budget the Government announced that one-off funding of $513.3 million ($3500 per resident) would be provided to aged care homes to improve building standards and safety (Bishop (Minister for Ageing) 2004, p. 33). To reflect the periodic nature of such payments, ten per cent of this amount has been included as base funding in the projections.

Projected aged care expenditure

On this basis, total government aged care expenditure is projected to increase from its present level of around 0.86 per cent of GDP to 2.24 per cent in 2044-45. Residential aged care continues to dominate expenditure, increasing from 0.6 per cent of GDP to nearly 1.8 per cent in 2044-45. Table 7.1 presents projections of the number of people in care and expenditure for each component of aged care. The Commission's results are similar to those obtained by other recent studies of aged care in Australia (box 7.2).

Impact of disability and care mix assumptions

The assumption of a moderate change in the care mix from low level residential care to care in the community under the CACP will affect projected numbers in each form of care but have little impact on overall expenditure. This is because the cost of CACP packages is not that much lower than low level residential care.

By contrast, the fall in age-specific disability rates incorporated into the projections does have a significant impact. Table 7.2 contains projections of expenditure under three disability scenarios. Depending on the scenario the increase in total

6 Interestingly, Hogan (2004, p. 19) found that services with less beds per room were more efficient, possibly because facilities with a greater number of beds per room may have been older with poorer layouts and higher maintenance costs.

Government aged care expenditure ranges from 2 per cent to 2.5 per cent of GDP in 2044-45 (the base case lies in the middle of this range).

Table 7.1 **Projected persons receiving care and aged care expenditure, 2002-03 to 2044-45**

	2002–03	*2014–15*	*2024–25*	*2034–35*	*2044–45*
Number of places/persons[a]					
High care residential	97 303	143 477	191 010	265 134	337 652
Low care residential	53 878	60 461	78 507	110 912	140 634
Total residential	151 181	203 938	269 516	376 046	478 286
CACP	27 454	47 618	64 169	88 279	107 383
HACC	661 062	892 093	1 165 873	1 412 131	1 558 666
Expenditure (share of GDP)	%	%	%	%	%
Commonwealth					
Residential	0.57	0.76	0.96	1.29	1.59
CACP	0.04	0.06	0.08	0.10	0.12
HACC	0.09	0.11	0.14	0.16	0.17
Other	0.04	0.05	0.06	0.08	0.09
Total	0.74	0.98	1.24	1.64	1.97
State					
HACC	0.06	0.06	0.08	0.09	0.10
Residential	0.06	0.09	0.11	0.14	0.18
State total	0.12	0.15	0.19	0.24	0.27
Total government	**0.86**	**1.13**	**1.43**	**1.87**	**2.24**

a In order to reflect the impact of ageing on the numbers of people in residential aged care, the Commission has used existing institutionalisation rates by age and sex, rather than the Australian Government's planning rule of 100 residential care places and CACPs per 1000 people over 70. The above results show a higher number of high care places, but a lower number of low care places than implied under current guidelines. Indeed, the Government has allocated more high care places and CACPs than required under its planning guidelines. In addition, the policy of 'ageing in place' allows residents initially in a low care place to progress to a high care place within the same institution, so that a nominally low care place can be used for high care.

Sources: ABS (2003b, *Population Projections Australia*, Cat. no. 3222.0); SCRGSP (2005); Commission estimates.

Box 7.2 **Comparison of results with other studies**

There are a range of recently published projections of future aged care expenditure. Indeed, the Commission has previously published estimates of aged care expenditure in its submission to the Hogan Review (Productivity Commission 2003) and in an earlier study by Madge (2000). The projections in this report:

- lie within the range of projections of residential aged care expenditure contained within the submission to the Hogan review; but
- are somewhat higher than those in Madge (2000) (the difference arises because that study assumed larger reductions in disability than used in this report).

The Intergenerational Report projected that total Australian Government aged care expenditure would increase to 1.77 per cent of GDP by 2041-42 (under the assumption of no change in disability rates), whereas the Commission's projection is 1.89 per cent. The similarity exists despite different demographic projections, disability assumptions and GDP projections underpinning the two exercises.

The Commission's results are also consistent with those of Hogan (2004). Hogan projected that *total* aged care expenditure — including individual contributions to formal aged care — would increase to 2.33 per cent of GDP in 2042–43. The equivalent figure in the Commission's projections is 2.79 per cent — though, the differences are slightly greater at the individual program level.

Overall, the aged care projections are quite robust with respect to minor variations in methodology and assumptions.

Table 7.2 **Aged care expenditure as a proportion of GDP under different assumptions about age-specific disability rates, 2002-03 to 2044-45**

Expenditure as a proportion of GDP	*2002–03*	*2014–15*	*2024–25*	*2034–35*	*2044–45*
	%	%	%	%	%
Zero reduction in disability rates	0.86	1.16	1.50	2.01	2.47
0.25% per annum reduction (base case)	**0.86**	**1.13**	**1.43**	**1.87**	**2.24**
0.5% per annum reduction	0.86	1.10	1.36	1.74	2.04

Source: Commission estimates.

Expenditure by each jurisdiction

Table 7.3 shows projected state aged care expenditure by jurisdiction as a proportion of GSP. In most jurisdictions expenditure is projected to almost double as a proportion of GSP by 2044-45. While there is significant variation in aged care

spending among jurisdictions as a proportion of GSP, this largely reflects different starting points.

Table 7.3 Projected own-state aged care expenditure as a proportion of GSP, 2002-03 to 2044-45

	2002-03	*2014-15*	*2024-25*	*2034-35*	*2044-45*
	%	%	%	%	%
NSW	0.07	0.09	0.11	0.13	0.15
Vic	0.12	0.15	0.18	0.23	0.27
Qld	0.15	0.19	0.23	0.28	0.32
SA	0.16	0.21	0.28	0.38	0.47
WA	0.22	0.28	0.36	0.46	0.55
Tas	0.10	0.12	0.16	0.18	0.19
NT	0.02	0.03	0.04	0.04	0.04
ACT	0.05	0.07	0.09	0.11	0.11

Source: Commission estimates.

7.2 Payments to carers

Australian Government payments to those caring for people with disabilities were nearly $1.9 billion in 2003-04. These comprise two main programs, the Carer Payment and the Carer Allowance.

The *Carer Payment* ($921 million in 2003-04) is an income support payment for people who, because of their caring responsibilities, are unable to work full time. The Carer Payment is paid at the same rate as other social security pensions. In March 2004, around 84 000 people were receiving the payment.

The *Carer Allowance* ($965 million 2003-04) is a payment that is not subject to an income or assets test. It is available to people who provide daily care to a person with a disability. In March 2004 there were 198 000 recipients who cared for adults and just over 96 000 receiving payments who cared for children. The Carer Allowance may be paid in addition to the Carer Payment or other social security payments.

Payments to carers have increased substantially over the last few years, owing to:

- changed eligibility conditions;
- the shift from institutional care to living in the community;
- increases in disability associated with the ageing population;
- closure of payments (for example, the wife pension); and

- increased willingness to identify as a carer.

However, the Budget's estimate of expenditure for 2004-05, on which the Commission's projections are based, shows a slight reduction on the previous year.[7]

Projected carer payments

Future payments to carers depend on the characteristics of those being cared for rather than those providing the care. As such, the ageing of the population will potentially affect carer payments in two ways. Firstly, the lower proportion of children in the population may reduce payments to carers of children with disabilities. Secondly, and in contrast, the greater proportion of older people in the population is likely to lead to a substantial increase in the number of older people requiring care. However, declining age-specific disability rates could lower the level of disability among the young and old, and consequently moderate the level of carer payments.

Consistent with current policy, the Commission has assumed that the eligibility conditions for carer payments remain unchanged throughout the projection period. Thus carer payments are projected using:

- the current cost per recipient of each payment (Carers payment is indexed by the projected growth in real wages while the Carers Allowance is indexed by the CPI);
- an age profile of the people being cared for (adjusted for assumed declines in age–specific disability rates);[8] and
- the projected population of Australia by age and sex.

Under this method, total payments to carers are projected to increase from 0.19 per cent of GDP in 2003-04 to 0.21 per cent in 2044-45.[9] As shown in table 7.4, a small decline in payments to those caring for people with disabilities under 65 is more than offset by payments to carers caring for people 65 and over.

---

7 The lower figure in 2004-05 is partly due to the payment in 2003-04 of the one-off carer bonus of $255 million for the two payments. It is also due to a reduction in the number receiving the carer allowance of 25 000 resulting from a review of carer allowance customers (FaCS, sub. DR61, p. 5).

8 The projections factor in age-specific disability rate declines of 0.25 per cent per annum — the same assumption used in the aged care projections.

9 Increased payments in the Budget between 2002-03 and 2004-05 (estimates) account for part of the increase.

Once again, the assumed decline in disability rates has a material impact on the projections. If disability rates did not decrease, total expenditure is projected to be around 12 per cent higher, at 0.23 per cent of GDP in 2044-45.

In addition, FaCS (sub DR61, p. 5) has pointed to a nexus between the carers payment and the age pension. The two pensions are paid at the same rate. Many older carers receive the age pension rather than the carers payment. In considering this nexus the Commission notes that the age at which females can receive an age pension is being progressively increased to 65 by the year 2014. As this occurs, some female carers — for instance someone aged 62 in 2003-04 — who would previously have been eligible to receive the age pension, will instead receive carer payments (until they reach the new age limit for the age pension). This transitional effect may result in the Commission's projections understating the number of women receiving the carer payment slightly and hence expenditure on carers (the age pension projections are not correspondingly higher because data are available that allow this transitional effect to be been taken into account in those projections).

Finally, implicit in the projections is that it is the demand for care that drives payments with supply adjusting accordingly. For example, if more people require care it is assumed that more people will become available to provide that care and receive carer payments.

Table 7.4 **Projected payments to carers as a proportion of GDP, 2002-03 to 2044-45**

	2002–03	*2014–15*	*2024–25*	*2034–35*	*2044–45*
	%	%	%	%	%
Carer Payment					
Under 65	0.06	0.07	0.07	0.07	0.07
65 and over	0.03	0.05	0.06	0.08	0.09
Total Payment	0.09	0.12	0.13	0.14	0.15
Carer Allowance					
Under 65	0.07	0.05	0.04	0.04	0.03
65 and over	0.03	0.03	0.03	0.03	0.03
Total Allowance	0.10	0.08	0.07	0.07	0.06
Expenditure on carers					
Under 65	0.13	0.12	0.11	0.10	0.09
65 and over	0.06	0.08	0.09	0.11	0.12
Total expenditure	0.19	0.20	0.20	0.21	0.21

Source: Commission estimates.

This is likely to be the case for those being cared for who are under 65. However, as noted in previous sections, for demographic and social reasons, there may be a growing shortage of carers for older people. If there is a shortage in the supply of

carers then payments to carers may not be as high as projected. But this would not represent an overall saving to government expenditure. With demand for care undiminished, any reduction in carer payments because of a lack of carers is likely to be offset by an increase in expenditure on other aged care programs such as residential care or formal community care. Therefore, the Commission does not consider that its projections of carer payments overestimate the net impact on Australian Government finances of current policy.

8 Personal benefit payments

Key points

- The main personal benefit payments — Age and Service Pensions, Family Tax Benefit, Disability Support Pension, unemployment allowances and Parenting Payment Single — cost the Government $54 billion in 2003-04 and represented 6.7 per cent of GDP.
- Personal benefit payments are often age-dependent. An ageing population will affect the share of people who can access payments and therefore has implications for Government budgets.
- Over the next 40 years the main personal benefit payments are projected to rise from 6.7 per cent of GDP in 2003-04 to 7.7 per cent in 2044-45.
  - Spending on Age and Service Pensions is expected to increase the most — from 2.9 per cent of GDP in 2003-04 to 4.6 per cent in 2044-45.
  - There is also a projected increase in spending on the Disability Support Pension and Parenting Payment Single.
  - Spending on unemployment allowances and Family Tax Benefit is likely to decline by around one percentage point of GDP, reflecting proportionately fewer children and young unemployed as the population ages.

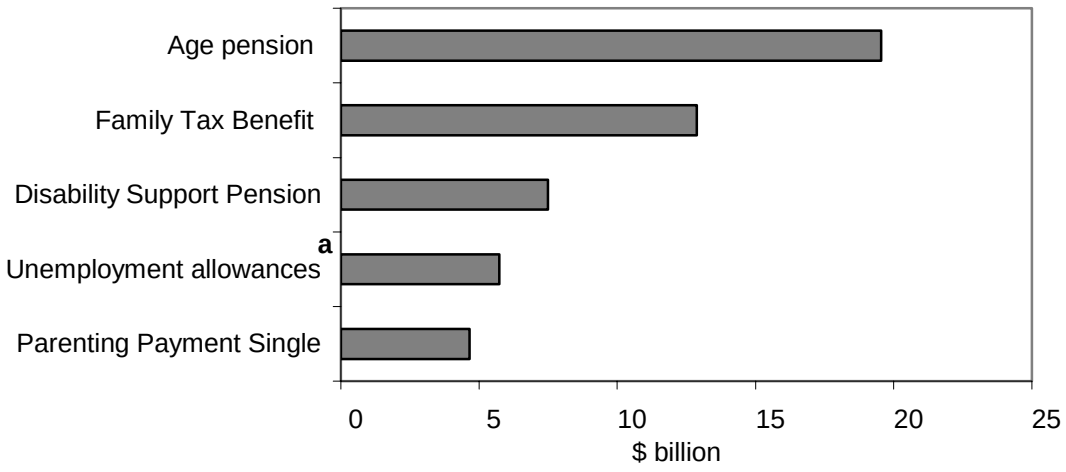
The Australian Government provides income transfers to individuals and families to help address their needs. These include, Age Pensions, unemployment allowances and a range of family support benefits. The application of these benefits is often age-dependent. For example, family benefits are typically accessed by younger people, whereas the Age Pension is obviously limited to the old. As a consequence, a shift to an older population structure will affect the share of people who can access benefits, with implications for the Government's budget.

This chapter examines the likely trajectory of expenditure on the Australian Government's major personal benefit payments. These are Age and Service Pensions, Family Tax Benefit, Disability Support Pension, unemployment allowances, and Parenting Payment Single. It considers the nature and magnitude of the payments (section 8.1) and the extent to which payments are age-related (section 8.2). It then develops methodologies for projecting payments over the next forty years (section 8.3) and produces estimates of future Government budget pressures in these areas (section 8.4).

8.1 Nature and magnitude of payments

The Department of Family and Community Services (FaCS) administers over 30 individual income-support and family assistance payments. In 2003-04, personal benefits administered by the department amounted to $61 billion. The largest payment is the Age Pension. Other significant payments are Family Tax Benefit, unemployment allowances, Disability Support Pension and Parenting Payment Single (figure 8.1 and box 8.1). Together, these payments (some $50 billion in 2003-04) form 82 per cent of total personal benefit payments. Other payments to individuals such as Child Care Allowance, Sickness Allowance, Maternity Payment, Widow Allowance, Special Benefit and Partner Allowance account for only a small proportion of government expenditure and have not been examined. Estimates of Carers Allowance are presented in chapter 6.

Figure 8.1 **Expenditure on selected personal benefit payments 2003-04**
$ billion



a Include Newstart Allowance, Youth Allowance other and Mature Age Allowance.

Data source: FaCS (2004a).

In addition to personal benefits administered by FaCS the Department of Veteran's Affairs provides Service Pensions to eligible veterans, their partners and widows. Eligibility is dependent on age, qualifying service, residency, and meeting the income and assets tests. In 2003-04, Service Pension and War Widows Pension payments to those aged 60 and over amounted to over $3.8 billion, representing 0.5 per cent of GDP.

Collectively, Service Pensions and the major FaCS personal benefit payments amounted to $54 billion in 2003-04 or 6.7 per cent of GDP — representing the bulk

of personal benefits paid by the Australian Government. It is these main spending areas that are modelled by the Commission.

Box 8.1 Personal benefit payments: a brief description

Age Pension is intended as a safety net for individuals who have limited opportunity or capacity to save for retirement. The age of qualification is 65 years for males and for females it is being increased gradually to 65 years (between 1995 and 2014). Qualification is also subject to the income and assets tests. In 2003-04, Age Pension outlays were $19.5 billion, representing 32 per cent of Australian Government income support payments or 2.4 per cent of GDP. Currently, there are over 1.8 million recipients of the Age Pension.

Family Tax Benefit has two components, Part A and Part B.

Family Tax Benefit Part A is paid to low and middle income families with dependent children up to the age of 21, and/or older children between the ages of 21 and 24 years who are studying full-time and not receiving Youth Allowance or any other Commonwealth payments.

Family Tax Benefit Part B provides extra assistance (over part A) for families with only one main income earner, particularly those with children under five years. It is paid to families with dependent children up to the age of 16, and dependent children aged between 16 and 18 years who are studying full-time.

In 2003-04, Family Tax Benefit outlays were $12.9 billion — 21 per cent of personal benefit payments or 1.6 per cent of GDP. Over 1.8 million families (or 3.5 million children) receive the benefit.

Disability Support Pension is available to individuals less than Age Pension age who have a physical, intellectual or psychiatric impairment that results in a continuing inability to work. It is subject to income and assets tests. In 2003-04, Disability Support Pension outlays amounted to $7.5 billion, representing 12 per cent of personal benefit payments or 0.9 per cent of GDP. There are about 690 000 recipients of the Disability Support Pension.

Unemployment allowances are difficult to measure because of the range of labour market assistance available. The main payments are Newstart Allowance, Youth Allowance, and Mature Age Allowance.

- Newstart Allowance is available to people aged between 21 years and Age Pension age who are unemployed and satisfy the activity and income and assets tests.
- Youth Allowance is available to students aged 16 to 25 years and unemployed 16 to 21 year olds who satisfy the income and assets tests. Of relevance to unemployment payments is Youth Allowance Other, which excludes full time students.
- Mature Age Allowance recognises the labour market difficulties faced by older unemployed Australians. Qualification is over 60 years and less than Age Pension age, no recent workforce experience (13 weeks) and previously in receipt of a payment such as Newstart Allowance, Parenting Payment or Widow Allowance. It is subject to the income and assets tests, but is not activity tested.

In 2003-04, outlays on Newstart Allowance, Youth Allowance Other and Mature Age Allowance amounted to $5.7 billion representing 9 per cent of personal benefit payments or 0.7 per cent of GDP. There are over 600 000 recipients of these allowances.

Parenting Payment Single is available to sole parents who are the primary carers of children aged under 16 years. In 2003-04, Parenting Payment Single outlays amounted to $4.6 billion, representing 8 per cent of personal benefit payments or 0.6 per cent of GDP. There are about 450 000 recipients of Parenting Payment Single.

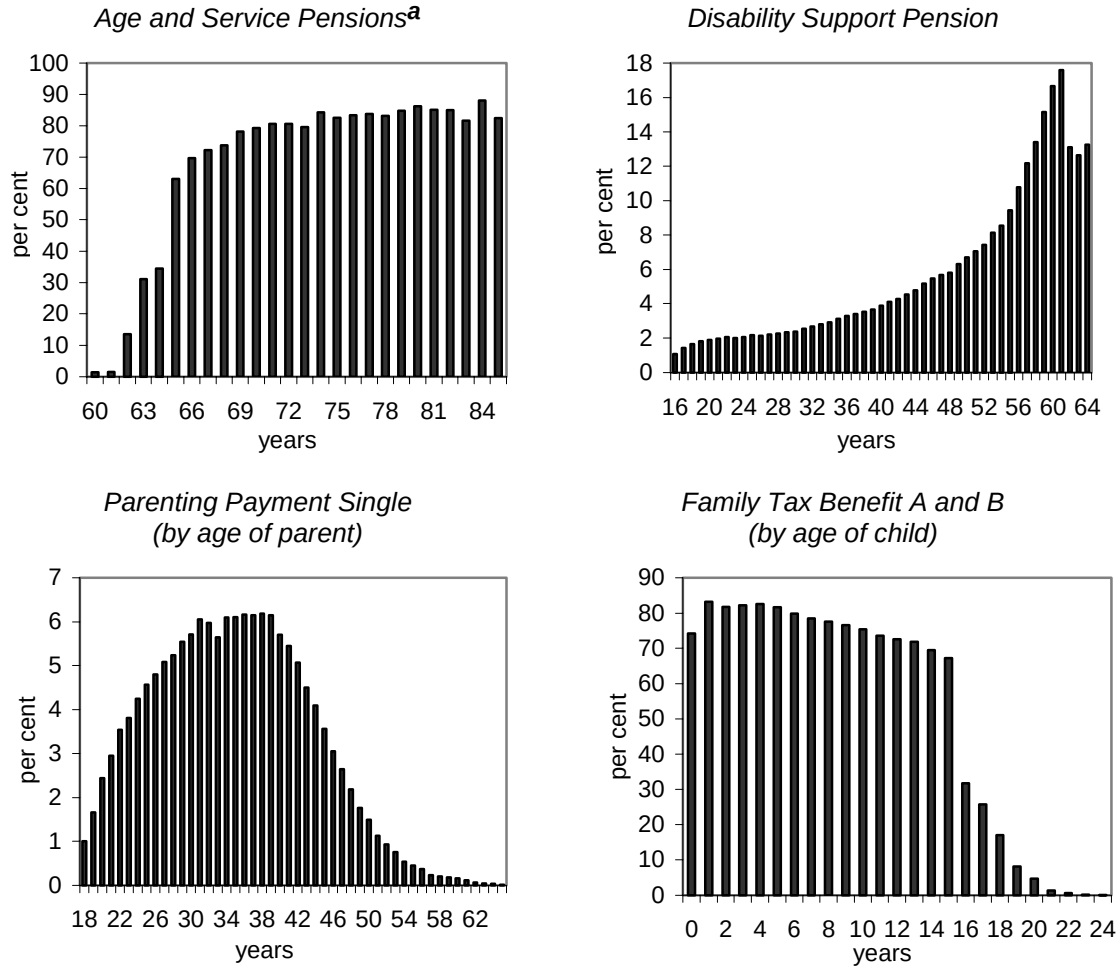
Sources: FaCS 2003 and unpublished data from FaCS and Centrelink.

8.2 Benefits are strongly age-related

Government expenditure on payments to individuals and families is largely determined by the population of various age groups.

- About 80 per cent of the population aged over 65 years receive an Age or Service Pension.
- As age increases (up to Age Pension age when qualification for the Disability Support Pension ceases) the number of people receiving a Disability Support Pension increases.
- Associated with the age-related nature of raising children, the majority of Parenting Payment Single recipients are aged between 30 and 45 years.
- The majority of children aged between 0 and 15 years are covered by Family Tax Benefit (figure 8.2).

Figure 8.2 **Benefit coverage rate by age**



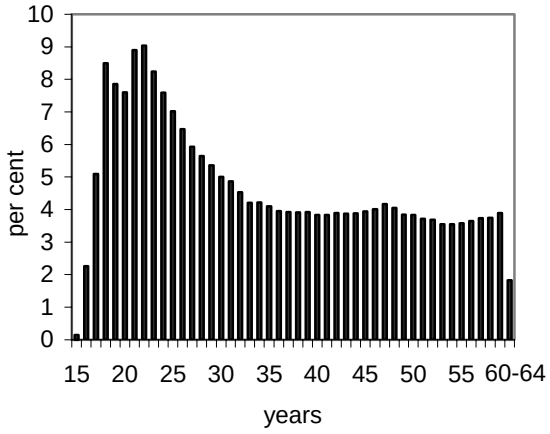
a Includes Age Pension, Service Pension and War Widows Pension; last observation is 85 years and over.

Data sources: Age and Service Pension latest available data provided by Centrelink and the Department of Veteran's Affairs. Other data provided by FaCS.

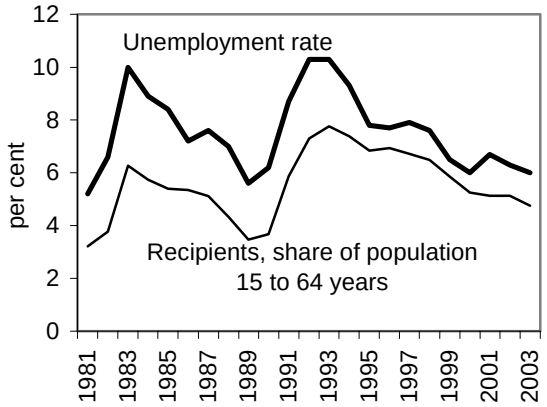
- The most important age-related aspect of unemployment benefits is that they are not accessed after Age Pension age. The coverage rate for unemployment payments is highest for people aged between 17 years and 25 years. However, total expenditure on unemployment allowances is not driven primarily by the age structure of the labour force. Unemployment occurs at all ages under 65 years and is influenced by regulatory arrangements and the stage of the economic cycle (figure 8.3).

Figure 8.3 **Recipients of unemployment allowances**[a]

Coverage rate of recipients by age



Unemployment rate and recipients as a share of the population, 1981 to 2003, June values



a Unemployment allowances are measured by FaCS as the number of customers on Newstart Allowance and Youth Allowance Other. It does not include Mature Age Allowance for 60–65 year olds, which is taken into account in the Commission's projections.

Data sources: Recipient numbers FaCS (2001); FaCS (2004b) and unpublished data from Centrelink; unemployment rate from ABS dx database, table LMUR-909, June values.

As the population ages, all else being equal, expenditure on Age and Disability Support Pensions (as a percentage of GDP) will increase and expenditure on Family Tax Benefit and Parenting Payment Single (as a percentage of GDP) will fall. However, in addition to demographic factors, there are a number of other factors that influence the number of recipients and government expenditure on personal benefit payments over time. These include changes in the policy framework and administration, labour market conditions and socioeconomic factors such as fertility rates, labour force participation and changes in living patterns. All need to be considered when making projections. The key drivers differ for each payment — box 8.2 looks at the key past drivers of Disability Support Pension as an example.

Box 8.2 The key drivers of the Disability Support Pension

The percentage of the population receiving the Disability Support Pension over the last two decades has doubled. This is despite ABS statistics on age-specific disability rates indicating no significant trend in the prevalence of disability within the community (ABS Cat. no. 4430.0). There are a number of factors contributing to the increasing numbers of recipients. These are discussed below.

Demographic factors

Older people are far more likely than younger people to have a disability and to have developed a degenerative condition as a consequence of ageing. Currently there are about 690 000 recipients of the Disability Support Pension. Of these, 75 per cent are between 40 years and age pension age (when qualification for Disability Support Pension ceases). As the population ages, all else being equal, there will be an increase in the proportion of people with a disability.

Policy framework and administration of income support payments

In recent times, changes in the way Disability Support Pension and other substitute payments have been administered have had a significant effect on the number of recipients and coverage rates. In particular, changes embodied in the Disability Reform Package of 1991 represented an easing of the disability eligibility criteria, producing an increase in the number of disability support recipients and an increase in the proportion of the population receiving the payment. In 1992-93, a year after the introduction of the reform package, coverage rates grew 13 per cent compared with an annual average of 2 per cent over the previous 5 years.

Loss of access to other forms of support, such as Veterans' Affairs Service Pension, Widow B and Wife Pension, and the gradual lifting of the minimum age for qualification for the age pension for women (from 60 to 65 years by 2014) has also increased and will continue to increase the number of Disability Support Pension recipients in the future.

Labour market conditions

Some studies have linked the growth in disability pensions to economic cycles whereby economic downturns and recessions reduce the capacity for people with disabilities to retain or find work. For example, one factor behind the steady rise in Disability Support Pension recipients during the 1970s and 1980s was the overall increase in unemployment during that period and its selective impact on particular groups.

Changes in living patterns

Finally, changes in living patterns have also played a role. The increase in numbers of Disability Support Pension recipients since 1980 has been influenced by the higher number of people living alone either by choice or as a result of separation and divorce. Since the Disability Support Pension requires that an applicant meet both the assets and income tests, a single person who lives alone is more likely to be eligible for a pension than someone living with a partner who may be earning income.

8.3 Method for projections

The Commission adopted a method similar to that of the Intergenerational Report in making projections for age-related benefit payments, but was able to use more up-to-date data and new demographic projections:

- historical data were typically collected on the *coverage rate* — the number of recipients of a payment expressed as a proportion of the relevant age-sex group (data availability determined the number of age-sex groups estimated for each payment);
- a model of future trends in coverage rates was developed. In most cases a logistic function was chosen to provide a tapering of growth in coverage rates over time;
- estimates of future expenditure on personal benefit payments per beneficiary were estimated using current indexation arrangements; and
- projections of total spending on any given benefit category were made by combining projected coverage rates with demographic projections and assumed changes in real benefits per beneficiary.

The exception to this approach are projections for Age and Service Pensions. Here, the Commission's estimates were based on coverage and benefit rates produced by the Australian Treasury, which had already developed a detailed model of expenditure in this area (box 8.3).

Age and Service pensions

Treasury projections of coverage rates and average pension payments and PC-M demographic projections were applied to 2003-04 estimates of recipient numbers and expenditure on Age and Service Pensions to project expenditure for six age groups for both males and females. Service Pension estimates include the Age Service Pension, War Widows Pension and the Income Support Supplement for War Widowers.

Box 8.3 **Treasury modelling of Age and Service Pensions**

Treasury has developed a comprehensive policy model (RIMGROUP) to project future expenditure on Age and Service Pensions. RIMGROUP combines population and labour force projections with models of the accumulation of superannuation and non superannuation assets. It calculates pension payments (including part payments), taking into account the complex rules for eligibility (such as asset and income tests). RIMGROUP models over 4300 cohorts, covering each birth year, gender, and career earnings decile in the Australian population. Each cohort is tracked through its lifecycle (between age 18 and 100+ depending on birth year) with superannuation and assets modelled through all working life and retirement.

The model is consistent with current policy and includes known policy changes such as increasing the age pension entitlement age for women, increasing the superannuation preservation age, and the continuing evolution of the superannuation system. The model calculates the number of pension recipients and levels of payments over time. It projects that dependency on the Age Pension will decline as the superannuation system matures and as people accumulate other assets.

The Commission used Treasury projections of the number of recipients as a percentage of population and the average value of the Age and Service Pension by age group (based on the RIMGROUP model used for the Intergenerational Report) to project future expenditure on Age and Service Pensions. The Commission combined these coverage and benefit rates with the PC-M population projections to derive estimates of the Age Pension payments over time. This approach gives a base case result that is consistent with the underlying method of RIMGROUP, but allows more up-to-date population and expenditure estimates to be used. It is also possible to use this method to examine likely Age Pension payments if population ageing was more or less than the base case.

However, unlike the RIMGROUP model, the Commission's approach cannot accurately estimate the effects on payments of alternative scenarios for the key economic parameters that affect pension eligibility (such as the effects of asset price growth, greater productivity or higher labour participation rates). For example, higher productivity rates than under the base case will decrease dependency rates on the Age Pension since the relevant thresholds for eligibility climb only with the CPI, while they will increase payments to eligible beneficiaries since actual benefits rise with average weekly earnings. The question of likely fiscal impacts under different scenarios is discussed further in chapter 13.

Sources: Intergenerational Report 2002, p. 83 and http://www.rim.treasury.gov.au/content/models.asp.

Family Tax Benefit A and B

The Commission's projections for Family Tax Benefit A and B did not utilise historical data. Although the Australian Government has provided assistance to families since 1941, the nature of assistance has changed markedly over the period.

On 1 July 2000, a new system of financial assistance to families with children was introduced. The family tax system was again changed in the 2004-05 Australian Government Budget. Given the substantial nature of recent changes made to family assistance, historical data are of limited relevance in considering future outlays. Rather, it was assumed that the key driver for projections of coverage is the prospective number of children.

Expenditure on Family Tax Benefit is the budget responsibility of both FaCS and the Australian Taxation Office (ATO). However, the Commission has limited its estimates to expenditure on Family Tax Benefit by FaCS. ATO expenditure on Family Tax Benefit represents a small component of overall expenditure and its inclusion would not significantly change the results.

Outlays for Family Tax Benefits A and B were projected separately.

Family Tax Benefit A

Coverage rates were derived for each child age, up to the age of 24 years for 2002-03. These rates were assumed constant and multiplied by PC-M population projections to estimate future recipient numbers.

Total expenditure was calculated by multiplying the total projected number of children covered by Family Tax Benefit A by the estimated average annual payment per child in 2003-04. Expenditure estimates were then adjusted in line with changes announced in the 2004-05 budget.

It was not possible to project expenditure for each child age or age group, as information on average Family Tax Benefit A expenditure by child age or age group is not available. Further, FaCS advised that any attempt to estimate average expenditure by child age or age group would be fraught with difficulties.

All Family Tax Benefits are indexed in line with the CPI. However, Family Tax Benefit A for children aged under 16 years is also linked, via legislation, to average weekly earnings. While the benefit has not been adjusted to average weekly earnings in the past the Commission estimates that by 2007-08 an alignment with average weekly earnings will be made. The Commission assumed 1.75 per cent growth in average weekly earnings per annum (for children under 16 years in receipt of Family Tax Benefit A) after 2007-08. (Reflecting the productivity assumption throughout this report.)

Family Tax Benefit B

Coverage rates for 2002-03 were derived for each age up to the age of 18 years. These rates were assumed constant and multiplied by the relevant population base (using PC-M demographic projections) to project future recipient numbers.

Expenditure data are collected according to the average rate of payment per family rather than child. To project expenditure, child recipient numbers were converted to 'family units' based on the current average rate of 1.9 children per family. Expenditure was then calculated (for the under 5 years and 5 to 15 years age groups) by multiplying the total projected number of children covered by Family Tax B by the average rate of payment as at June 2003. Expenditure estimates were then adjusted in line with changes announced in the 2004-05 budget. Family Tax Benefit B is indexed to the CPI.

Disability Support Pension

Coverage rates were derived for six age groups (16 to 19 years, 20 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years and 60 to 64 years) for both males and females using a coverage trend model. As discussed in box 8.2, the Disability Reform Package of 1991 had a substantial impact on coverage rates, consequently trends were based on historical time series data extending from 1991-92 to 2003-04. The primary approach was to allow a tapering of growth based on logistic curves. Exceptions are the rates for 50 to 59 and 60 to 64 year olds. Based on recent trends, the following was considered appropriate:

- for males aged 50-59 years and 60-64 years a slight, gradual decline in coverage rates;
- for females aged 50-59 years a constant coverage rate; and
- for females aged 60-64 years an increase in coverage rates reflecting the phased increase in Age Pension eligibility age until 2014 and then constant thereafter.

Future recipient numbers were calculated for each age group by multiplying the estimated coverage rate by the relevant population base (using PC-M demographic projections). Full rate and part rate recipient numbers by age were then calculated using current data on the percentage of full rate and part rate recipients at each age in each age group. For example, in June 2003, 19 year old, full rate female recipients accounted for 27 per cent of female recipients in the 16 to 19 age group and 58 year old, part rate male recipients accounted for 2 per cent of male recipients in the 50 to 59 age group. These shares were applied to data for all years.

Expenditure on the Disability Support Pension (for full rate and part rate recipients by age) was calculated by multiplying the number of full and part rate recipients by the average annual expenditure of full and part rate recipients, at each age. In 2003-04, age-specific average annual expenditures were calculated by applying the percentage of average expenditure accounted for by each age in June 2003 to annual expenditure for 2003-04. For all other years, average expenditure by age was increased in line with average weekly earnings (assumed 1.75 per cent per annum). Total expenditure on the Disability Support Pension was calculated as the sum of expenditure on full and part rate recipients at each age.

Unemployment allowances

Coverage rates for unemployment allowances in 2003-04 were calculated as the number of recipients of Newstart Allowance, Youth Allowance Other (which excludes full time students) and Mature Age Allowance divided by population. They were derived for ten age groups, for both males and females. Coverage rates between 2004-05 and 2044-45 were estimated based on the projected unemployment rate (chapter 3). Future recipients of unemployment allowances were then calculated using PC-M demographic projections.

Expenditure estimates were calculated by multiplying the projected number of recipients by average annual expenditure for males and females in each age group. Average expenditure by age was estimated by applying expenditure by age in March 2004 to annual expenditure for 2003-04. Unemployment allowances are indexed to the CPI.

Parenting Payment Single

Coverage rates were derived for six age groups (16 to 19 years, 20 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years and over 60 years) for both men and women using a coverage trend model based on logistic curves. Trends in the logistic functions were based on historical time series data extending from 1988-89 to 2003-04.

Future recipient numbers and expenditure were calculated using the same approach as for Disability Support Pension.

8.4 The projected growth in payments

Government spending on personal benefit payments, as a percentage of GDP, is expected to increase over the next forty years. The principal payments (Age and Service Pensions, Family Tax Benefit, Disability Support Pension, unemployment allowances and Parenting Payment Single) are projected to increase from 6.7 per cent of GDP in 2003-04 to 7.7 per cent in 2044-45 (table 8.1).

Expenditure on Age and Service Pensions account for the majority of this increase. By 2044-45, the proportion of the population reaching Age and Service Pension age will double. And expenditure on Age and Service Pensions are projected to increase from 2.9 per cent of GDP in 2003-04 to 4.6 per cent in 2044-45. This takes into account an increase in the number of people drawing on superannuation benefits.

Also associated with an ageing population is an increasing proportion of the population receiving the Disability Support Pension. Expenditure on Disability Support Pension is projected to increase from 0.9 per cent of GDP in 2003-04 to 1.1 per cent in 2044-45.

Expenditure on Parenting Payment Single is also projected to increase over the period. This is the result of the increasing numbers of one parent families within the community rather than ageing.

These increases in expenditure will be partly offset by decreasing expenditure on unemployment allowances and Family Tax Benefit.

- Unemployment allowances are projected to fall from 0.7 per cent of GDP in 2003-04 to 0.3 per cent in 2044-45. This primarily reflects the indexing of unemployment benefits to the CPI which grows at a slower rate than GDP. The indexation of unemployment benefits is discussed in the following section.
- Spending on Family Tax Benefit A and B is projected to fall over the forecast period — from 1.6 per cent in 2003-04 to 1.1 per cent in 2044-45. This principally reflects lower proportions of the population in the relevant age groups (essentially under 15 years) and the policy of indexing some components of family payments to the CPI, which grows at a slower rate than GDP.

In summary, on the basis of the current policy environment, spending on Age and Service Pensions is projected to increase significantly over the next 40 years. There is also a projected increase in spending on Disability Support Pension and Parenting Payment Single. However, spending on unemployment allowances and Family Tax Benefit are projected to decline, partly offsetting the overall increase in personal benefit outlays associated with an ageing population.

Table 8.1 **Projections of payments to individuals, per cent of GDP**

	2003-04	*2008-09*	*2014-15*	*2024-25*	*2034-35*	*2044-45*
Age and Service Pension	2.88	3.01	3.34	4.01	4.48	4.59
Family Tax Benefit A and B	1.58	1.46	1.34	1.27	1.19	1.11
Disability Support Pension	0.92	0.99	1.04	1.06	1.05	1.06
Unemployment allowances[a]	0.70	0.55	0.47	0.39	0.33	0.28
Parenting Payment Single	0.57	0.60	0.63	0.67	0.69	0.70
Total	**6.65**	**6.61**	**6.82**	**7.39**	**7.74**	**7.74**

[a] Assumes CPI indexing with no adjustment to align with MTAWE-indexed Age Pension.

Source: Commission estimates.

Some qualifications

These projections are sensitive to changes in Government policy. For example, the long-standing policy of indexing unemployment allowances to the CPI, in comparison with the Age Pension which is indexed to male total average weekly earnings (MTAWE), will mean that over time the value of unemployment allowances will fall relative to the value of the Age Pension.

Although there have not been any non-CPI related increases to unemployment allowances since the Age Pension has been indexed to MTAWE (except for July 2000 when unemployment allowances were increased as part of a package of measures to compensate for the impact of the GST) such an approach is not likely to be sustainable in the long-term. For example, under current indexation arrangements, in 2044-45 the maximum value of Newstart Allowance (for a single) will be less than half the maximum value of the Age Pension (for a single), compared with over 80 per cent currently. Were this pattern to persist, then by 2100, the maximum Age Pension could be over six times higher than the maximum Newstart Allowance (assuming 1.75 per cent real wage growth in line with productivity growth).

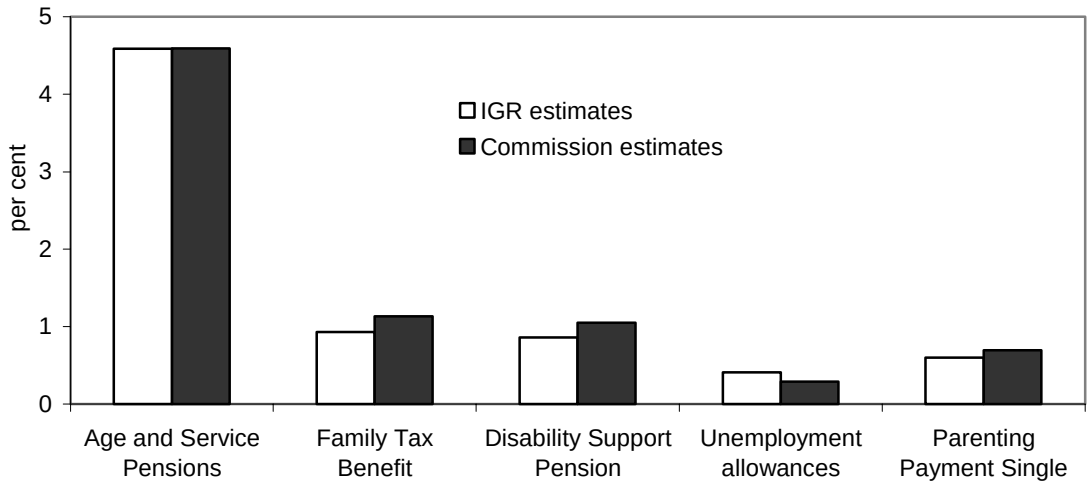
It is therefore likely that, on the assumption that MTAWE-indexation is maintained for the Age Pension, the Government would need to make periodic adjustments to unemployment allowances over periods of this length in order to maintain some degree of parity between the two payment rates.

Therefore, projections on the basis of CPI indexing (as above), while consistent with stated Government policy, are likely to underestimate the long run value of unemployment allowances. For example, if at the extreme, parity was achieved so that unemployment allowances increased in line with MTAWE (consistent with the Age Pension), the Commission projects that total expenditure on unemployment

allowances would reach 0.6 per cent of GDP in 2044-45, about double that under the current indexation policy. This gives an upper bound to the fiscal pressures from this source.

The Commission's projections differ somewhat from those in the Intergenerational Report. The Commission projects that in 2041-42 payments to individuals will increase to about 7.8 per cent of GDP. This compares with an estimate of 7.4 per cent in the Intergenerational Report. The most significant discrepancies are projections for Family Tax Benefit and Disability Support Pension (figure 8.4).

Figure 8.4 **Comparison of personal benefit payment projections 2041-42**
Commission and Intergeneration Report estimates, per cent of GDP



Data source: Commission estimates and *Intergenerational Report* (2002).

These differences arise because the Commission has used more recent expenditure data and new demographic projections. In addition, there have been two relevant policy changes since the release of the Intergenerational Report.

- Expenditure on the Family Tax Benefit was increased significantly in the recent budget.
- Changes to Disability Support Pension announced in the 2002-03 budget to tighten the eligibility criteria for the payment were blocked in the Senate and were therefore omitted from the Commission's analysis.

Over the next 40 years there will undoubtedly be a number of changes in government policy relating to payments to individuals. However, consistent with its approach for other expenditure items the Commission's projections are made on the basis of current indexation arrangements and policy settings (chapter 1).

9 Education expenditure and ageing

Key points

- Integral to an ageing population is proportionally fewer young people. The share of 5 to 24 year olds in the population is projected to decline from around 27 per cent in 2002-03 to just over 22 per cent by 2044-45.
- While the share of young people will decline, in absolute terms the number of school age individuals is projected to increase by around 13 per cent, resulting in a commensurate increase in primary and secondary school students.
- Participation rates for university and vocational education and training are likely to increase, contributing to a rise of around 22 per cent in the number of students aged 16-24 years.
- While government expenditure on education is projected to increase in real terms, there is likely to be a decline in education expenditure as a share of GDP. Expenditure is projected to fall from its 2002-03 level of 5.2 per cent to around 4.7 per cent by 2044-45:
  - The effects are greatest at the State level, reflecting their pre-eminent role in funding school education.
  - Declines in education expenditure as a share of GSP are projected for all jurisdictions, ranging from around 5 per cent in Tasmania to around 16 per cent in Western Australia and the ACT.
  - Australian Government education expenditure is also likely to decline slightly from 1.9 per cent of GDP in 2002-03 to 1.8 per cent in 2044-45.

The young account for most government spending on education. Accordingly, population ageing could be expected to reduce pressure on education expenditures, partially offsetting other budget areas where ageing will exert upward pressures. This chapter examines the factors that influence education spending, with a focus on the likely impact of ageing on aggregate education expenditures over the next 40 years.

9.1 Structure of education and funding

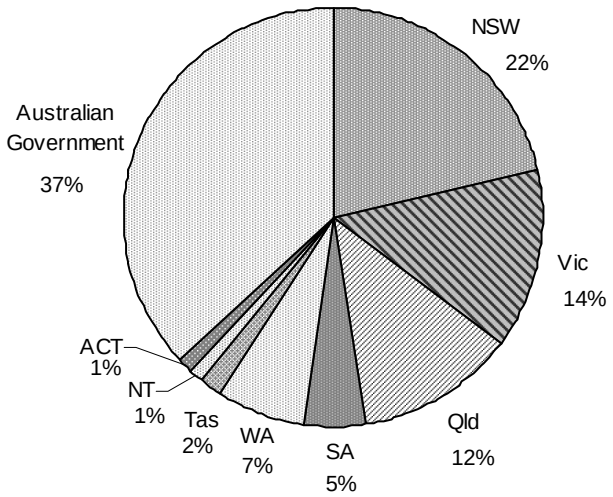
Education comprises three broad sectors: schools (both government and non-government); vocational education and training (VET); and universities. The Australian Government also provides income support payments for students.

Total government expenditure on education amounted to $39 billion in 2002-03, around 14.3 per cent of the combined expenditure of all governments and 5.2 per cent of GDP.

- The majority of education expenditure is by the States — accounting for 63 per cent of the total (figure 9.1).
- However, the Australian Government provides the bulk of government funding for universities and non-government schools (table 9.1).

Funds for education are also provided by private and other sources. For example, fees are charged for non-government schools and for university and VET courses undertaken by domestic and foreign students. Universities also receive revenues from interest on investments as well as for contract research and advice.

Figure 9.1 **Education expenditures by governments**
2002-03



Data sources: ABS 2004f; DEST (2003, 2004a); NCVER (2003a, 2004a); and SCRGSP (2004, 2005).

Table 9.1 **Where does the money come from?**

Shares of total government education funding, 2002-03

	Funding			*Share of total government education funding*		
	States	*Aust. Govt.*	*Total*	*States*	*Aust. Govt.*	*Total*
	$m	*$m*	*$m*	*%*	*%*	*%*
Schools	19 743	5887	25 630	50.1	14.9	65.0
Government	*18 245*	*2128*	*20 373*	*46.3*	*5.4*	*51.7*
Non-government	*1499*	*3759*	*5257*	*3.8*	*9.5*	*13.3*
VET	2681	1238	3919	6.8	3.1	9.9
University [a]	205	5625	5831	0.5	14.3	14.8
HECS repayments	-	-847	-847	-	-2.1	-2.1
Income assistance	-	2001	2001	-	5.1	5.1
Other education	2240	648	2888	5.7	1.6	7.3
Total	**24 870**	**14 552**	**39 422**	**63.1**	**36.9**	**100.0**

[a] The total university figure reported in the ABS *Government Finance Statistics, 2002-03* (Cat. No. 5512.0) is much larger since it records total public university expenditures, while only government funding is shown in table 9.1.

Sources: ABS 2004f; DEST (2003, 2004a); NCVER (2003a, 2004a); and SCRGSP (2004, 2005).

9.2 Method for projecting government expenditure

The effects of ageing on education expenditures can be calculated from:

- the changing age structure of the population;
- participation rates in education by different age groups for each sector; and
- changes in average costs per student in each sector (box 9.1).

Different jurisdictions have varying responsibilities for funding education, and the participation trends within jurisdictions can also differ. Therefore, the Commission has projected funding by jurisdiction and by source for each of these three areas.

Changing age structure of the population

Corresponding to the rising shares of older people in the population are falling shares of younger people. The falling proportion of the young is particularly important for future education expenditure. For example, the share of 5 to 24 year olds in the population — the group with by far the highest participation in education — is projected to decline from around 27 per cent to 22 per cent in 2044-45.

Box 9.1 **Projection method**

Education funding projections were calculated using projections of the population, education participation and per student costs of education services. Population projections (Pop) were multiplied by participation rates (P) to arrive at student numbers which were then multiplied by average costs (AC)[1] to arrive at a total funding figure.

$F = \Sigma^{i}(Pop_{it} \times P_{it} \times AC_{t})$

The population projections employed were the Commission's 'PC-M' series for all States except the Northern Territory, where Commission projections of Indigenous and non-Indigenous populations were used (chapter 2).

Participation rates for schools were calculated in the base year (2002-03) by dividing student numbers by population estimates for each year of age. In the case of the Northern Territory, participation rates were calculated for Indigenous and non-Indigenous students. School participation rates were held constant over the projection period.

University and VET participation rates were based on full-time equivalent (FTE) student numbers to take account of the greater propensity of these students to study on a part-time basis.[2] In the case of universities, projected participation rates were based on historical data, with a tapering of growth based on logistic curves. VET participation rates were increased by 15 per cent over the projection period. Rates for intermediate years were then calculated using a logistic formula.

In the main, average costs were assumed to grow at 1.75 per cent per annum. This reflects the expectation that wages and average costs in this sector will follow real wage growth in the economy as a whole. Economy wide wages are determined by the projected labour productivity growth rate.

Current funding trends and future funding commitments in the school and university sectors respectively suggest a short-term growth rate above 1.75 per cent. To reflect this, a growth premium has been applied in the short run.[3]

The effects of ageing were found by subtracting an age-adjusted projection from the base case projection (described above). The age-adjusted projection was based on a simulated population projection, which retained the 2002-03 age structure for all years.

The assumptions described above are broadly similar to those used in the Intergenerational Report. The Intergenerational Report also assumed that real funding per student increases at the same rate as real wages, school participation rates would remain constant and VET and university participation rates would rise.

---

1 Average costs are expressed as dollars of funding per student. Average costs were calculated for government primary and high school students, non-government school students, and university and VET FTE students.

2 VET participation data expressed in annual curriculum hours was converted to FTE student numbers by dividing by 540.

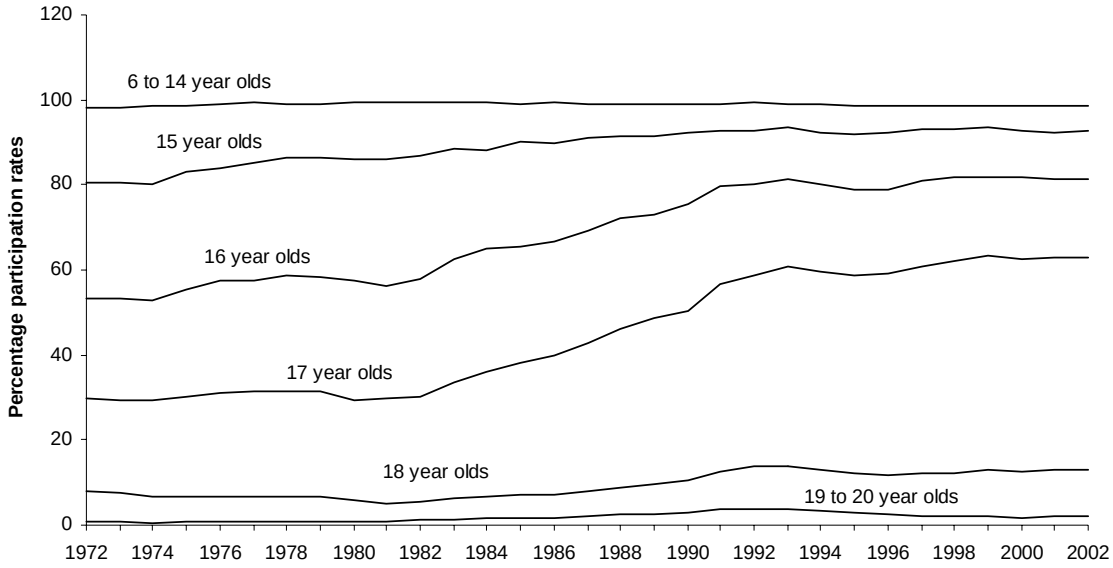
3 Growth in average costs was projected to fall to 1.75 per cent per annum after ten years for schools and five years for universities.

Trends in participation

Schools

Participation rates for the voluntary years of schooling grew strongly over the 1980s, but levelled off during the early 1990s (figure 9.2). Based on these trends, overall school participation rates, in all jurisdictions except the Northern Territory, were assumed to remain constant in the base case projections.

Figure 9.2 **Trends in school participation rates vary by age group**
1972 to 2002



Data sources: ABS 2004 (*School Student Numbers By Age*, special request consistent with ABS Schools publication Cat. no. 4221.0); ABS 2003 (*Population by Age and Sex, Australian States and Territories*, Cat. no. 3201.0).

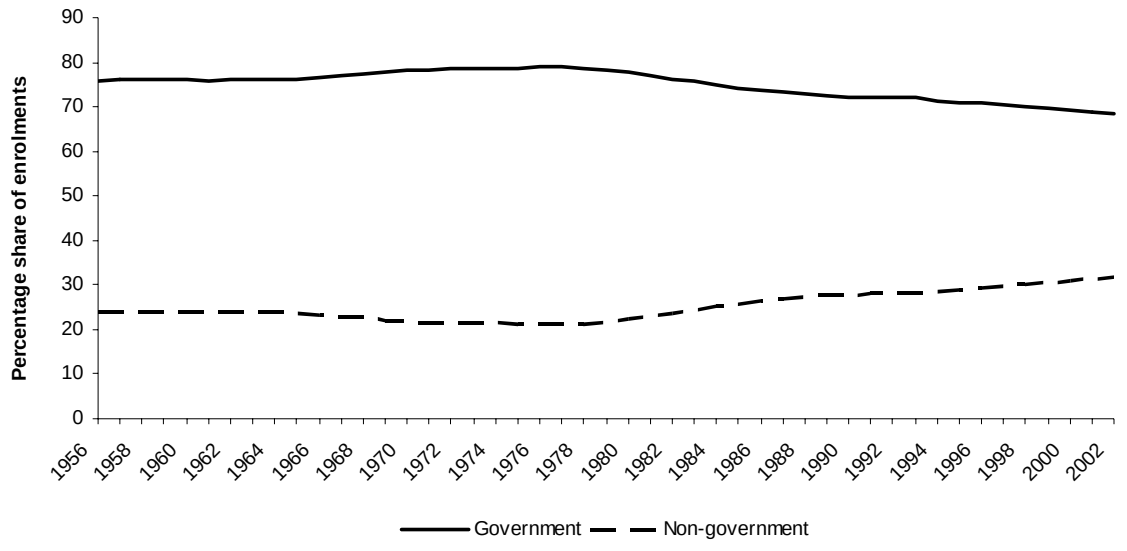
School participation rates for the Indigenous population in the Northern Territory have historically been significantly lower than for other Australians, although have improved in recent years. They were projected to gradually increase until they matched those for the non-Indigenous population.

Shift in enrolments from government to non-government schools

An important trend in the schools sector is the shift in enrolments from government to non-government schools. Between 1980 and 2004, the non-government schools' share of total enrolments rose from approximately 22 per cent to 33 per cent (figure

9.3). Over the last five years, the rate of shift between the sectors averaged 0.24 percentage points per year.

Figure 9.3 **The shift from government to non-government schools**
1972 to 2004



Data source: ABS (*School Student Numbers By Age, 1956 to 2003*, special request consistent with ABS Schools publication Cat. no. 4221.0).

Were this recent trend to continue, it would result in a substantial reduction in government schooling. Further, there would be a shift in the balance of funding from State governments (which provide the bulk of the funding for government schools) to the Australian Government (which provides most of the government funding for non-government schools). However, the policy commitments of State governments to maintaining a strong government school sector would suggest that such an outcome is unlikely. Indeed, the rate of shift to private schooling has declined to its present rate from a peak in the early eighties of 0.7 percentage points per year.

Hence, in the Commission's projections, the shift in enrolments from government to non-government schools was assumed to slowly abate in each jurisdiction, gradually reducing from the levels observed over the last five years, to reach a steady state by 2044-45.[4] Under these assumptions, the overall share of students in government schools falls by around five percentage points over the projection period. By 2044-45, the proportion of students in government schools is projected

[4] A different method was employed for the Northern Territory, which relied on the assumption that participation rates for Indigenous students in government and non-government schools would gradually increase until they were the same as those for non-Indigenous students.

to range from around 52 per cent in the ACT to 73 per cent in the Northern Territory (table 9.2).

Table 9.2 **The projected distribution of enrolments in government and non-government schools**

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Australia*
Proportion of students in government schools									
2002-03	68.0	65.4	70.8	67.9	69.3	74.5	76.9	61.2	68.2
2044-45 (projected)	61.6	63.5	67.6	59.4	61.6	71.4	72.6	51.6	63.3
Average annual percentage point shift									
1999 to 2004	0.313	0.094	0.154	0.413	0.378	0.149	0.107	0.468	0.238

Sources: ABS (*Schools, Australia, 2004*, Cat. no. 4221.0); ABS (*School Student Numbers By Age, 1956 to 2003*, special request consistent with ABS Schools publication Cat. no. 4221.0); Commission estimates.

University and VET participation

There has been modest growth in university participation rates over the last decade and a half, with rates increasing from 2.0 per cent in 1989-90 to 2.5 per cent in 2002-03.[5] Increases in participation were more pronounced for some ages. For example, participation rates for 20 and 21 year olds increased by 8.8 and 8.1 percentage points respectively over the period. In contrast, there was a slight decline in participation by 17 year olds, with rates falling by 0.2 percentage points.

As comparable FTE student data were not available for the VET sector, analysis of participation rates was restricted to the period 1996-97 to 2002-03. Available data suggests that growth in VET participation has exceeded that in the university sector, increasing from 2.8 to 3.4 per cent over the period (the equivalent increase for the university sector was 2.4 to 2.5 per cent). As with university participation, growth in participation rates was more pronounced for some ages, specifically, 18-20 years (table 9.3).

The Commission has modelled university and VET participation rates for each of the educationally relevant years. University participation rates are projected to initially increase in line with current trend rates, with a subsequent tapering of growth (based on logistic curves). Participation rates for VET were assumed to increase by 15 per cent over the projection period.

[5] Participation rates are measured in terms of FTE students for both university and VET.

Table 9.3 **Recent growth in university and VET participation rates**

FTE students for educationally relevant years[a]

	Universities			*VET* [b]		
Age of student	*Student participation rates*	*Student participation rates*	*Percentage point change*	*Student participation rates*	*Student participation rates*	*Percentage point change*
	1996-97	*2002-03*		*1996-97*	*2002-03*	
years	%	%		%	%	
17	13.8	12.1	-1.6	12.4	14.2	1.9
18	25.0	24.2	-0.8	22.9	25.3	2.4
19	24.3	26.0	1.7	19.5	23.2	3.7
20	20.4	23.1	2.8	14.4	16.7	2.3
21	14.5	17.0	2.5	10.5	12.1	1.6
22	9.6	11.1	1.5	7.9	9.1	1.2
23	6.7	7.9	1.2	6.6	7.6	1.1
24	5.1	6.1	1.0	5.6	6.7	1.1
25-29	3.1	3.8	0.7	4.1	5.2	1.0
Total	**2.4**	**2.5**	**0.1**	**2.8**	**3.4**	**0.6**

a FTE students per person in the age group population x 100. **b** VET data expressed in annual curriculum hours was converted to FTE students by dividing by 540.

Sources: ABS 2003 (*Population by Age and Sex, Australian States and Territories*, Cat. no. 3201.0); DEST (2004b); and NCVER (2004b).

Trends in costs per student

Schools

Real government spending per student outpaced real GDP per capita from the early 1970s through to the early 1980s. This is consistent with the substantial reduction in student teacher ratios experienced over the period. The ratio of full-time students to teachers in government primary schools fell from 25.1 in 1973 to 20.0 in 1981, while the student teacher ratio in government secondary schools fell from 16.2 to 12.3 (ABS 2002c).

However, since the early 1980s, real per student government expenditure has roughly maintained parity with increases in real GDP per capita (figure 9.4).[6]

6 The trend in the ratio of per student government expenditure to GDP per capita from 1982-83 to 1997-98 is statistically insignificant.

Figure 9.4 **Percentage of real school funding per student to per capita GDP [a]**

1970-71 to 2002-03

a There is a break in the series between 1997-98 and 1998-99, which overstates growth between those years. The data up to 1997-98 are based upon cash accounting expenditures, while the data from 1998-99 are based upon accrual accounting expenditures.

Data sources: ABS (*School Student Numbers By Age, 1956 to 2003*, special request consistent with ABS Schools publication Cat. no. 4221.0); ABS 2003 (*Government Finance Statistics, Expenditures on Education*, special request consistent with ABS Cat. no. 5512.0).

A further increase in the ratio of per student government expenditure to real GDP per capita has been evident since the late 1990s.[7] However, this increase can only be partially explained by reductions in student teacher ratios (which fell only slightly over the period).[8] As Bourke (2003, p. 25) observed: 'In recent years, expenditure relating to computing may have absorbed a larger part of both government school and non-government school expenditures'.

Another contributor has been increases in teachers' wages. Over the four years to 2002, teachers wages increased by around 15.5 per cent, exceeding increases in per capita GDP over the same period of 7.5 per cent. This reflects a period of 'catch-up' following a period of below average wage growth from the mid 1980s to mid 1990s.

7 Data pre and post 1997-98 (which saw the introduction of accrual accounting) have been assessed separately.

8 From 1997 to 2002 the ratio of full-time students to teaching staff fell by 5.1 per cent in primary schools and 2.4 per cent in secondary schools.

A non-demographic, average cost growth rate, while not evident over most of the 1980s and 1990s, has been incorporated into the Commission's intermediate projections of government schools expenditure. This is designed to capture further likely catch-up growth in teachers' wages and, to a lesser extent, reductions in student teacher ratios.

It is assumed that real school expenditures per student initially grow at the rate of 3.2 per cent per annum.[9] This rate is gradually reduced over a ten year period (based on a logistic function) until it reaches 1.75 per cent, the average labour productivity growth rate and, therefore, the major determinant of real wage growth in the economy over the longer term. Average growth in per student costs is maintained at 1.75 per cent per annum for the rest of the projection period.

University costs per student

University funding is derived from the Australian and State governments, student contributions and from university-generated revenues.

In the case of universities, student contributions can be paid to the institution at the time of study, or deferred and progressively repaid when the individual reaches a certain level of income under the Higher Education Contribution Scheme (HECS). Where a student elects to defer their whole HECS liability, the university receives the full amount from the Australian Government.

Hence, in any given period, the *net* Australian Government contribution to universities comprises:

- direct payments to institutions in the form of Australian Government Grants; *plus*
- HECS payments made to institutions on behalf of students who elect to defer payment of their contribution; *less*
- revenue received through HECS repayments (table 9.4).

Projections for each of these components, along with the funding contributions of the State governments, form part of the Commission's model of future university education expenditure.

[9] As observed by a number of jurisdictions, non-demographic factors are a source of cost pressure in the education sector. For example, the New South Wales Treasury has estimated non-demographic, average cost growth rates in education of 0.7 percentage points per year (technical paper 8, table 8.5). Necessarily, judgments about which rates to apply in projections remain partially subjective. The Commission has applied an initial growth rate in education of 3.2 per cent per annum (comprising the current rate of growth in GDP per capita of 2.5 per cent plus a non-demographic growth rate of 0.7 percentage points).

Table 9.4 **Sources of government university funding to domestic students**

Funding source (2002-03)	
	$m
Australian Government grants (1)	4066.52
Commonwealth HECS payments (2)	1558.86
Private HECS repayments (3)	-847.00
Revenue from Australian Government (1+2-3)	4778.37
Revenue from State governments (4)	205.37
Revenue from government (1+2-3+4)	4983.75
	$
Total government expenditure per FTE domestic student	**9510**

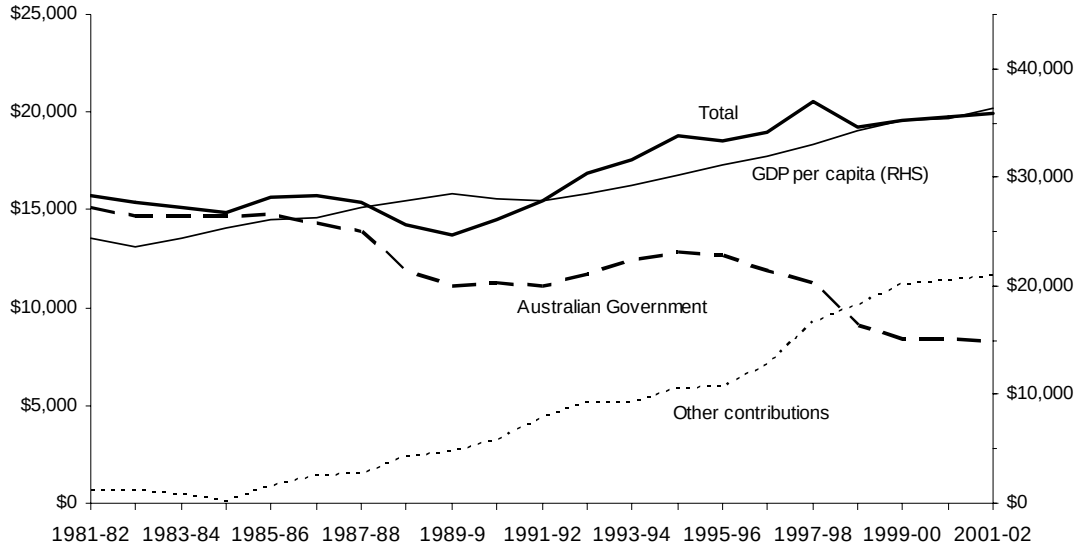
Sources: DEST (2003, 2004a).

Trends in Australian Government university funding

The introduction of HECS in 1989 has meant that, while total university funding per domestic student has increased as a proportion of GDP, net public funding per student has declined (figure 9.5).

Figure 9.5 **Growth in real university funding per domestic student and per capita GDP [a]**

1981-82 to 2001-02 (Base year: 2001-02)



a Other contributions (derived as total expenditure less Australian Government funding) refer to university generated revenues, contributions made by individuals plus a small amount of State funding.

Data source: ABS 2003 (*Government Finance Statistics, Expenditures on Education*, special request consistent with ABS Cat. no. 5512.0) and DEST (2004b).

However, the '*Backing Australia's Future*' initiative will see an increase in Australian Government per student funding through to 2007-08. This additional funding was reflected in the Commission's projections of Australian Government expenditure on universities. From 2007-08, it was assumed that both Australian and State government real funding per student would grow at the rate of increase in real incomes of 1.75 per cent.[10]

HECS payments

In order to determine the Australian Government's net contribution to higher education over the projection period, a simple model of student HECS liabilities, based on the following assumptions, was employed.

- Student up-front HECS payments and private HECS repayments increase at the rate of 1.75 per cent per annum, such that real increases in the costs of providing higher education services over time are met equally by government and individuals.[11]
- The ratio of up-front to deferred payments remains fixed at base year (2002-03) levels over the projection period.[12]
- Past HECS liabilities, amounting to $9094 million as at 30 June 2003, are amortised over the period 2003-04 to 2013-14.[13]
- Students commence repaying their HECS liabilities immediately after leaving university with total payments spread equally over a ten year period.
- Total repayments are discounted to take account of non-payment — it was assumed that only around 76 per cent of outstanding HECS liabilities would be repaid.[14]

[10] In the 2001-02 budget, while the major source of funding increase was the Backing Australia's Future package, increases also came from a cost adjustment factor calculation. The cost adjustment factor took into account movements in salaries and inflation in non-salary costs.

[11] The exception being a one off increase of 25 per cent in 2005 to reflect a likely fee increase.

[12] The likely fee increase in 2005 may see an increase in the proportion of students who choose to defer their payments.

[13] This amount was discounted by 76 per cent to account for non-payment of liability. Footnote 10.

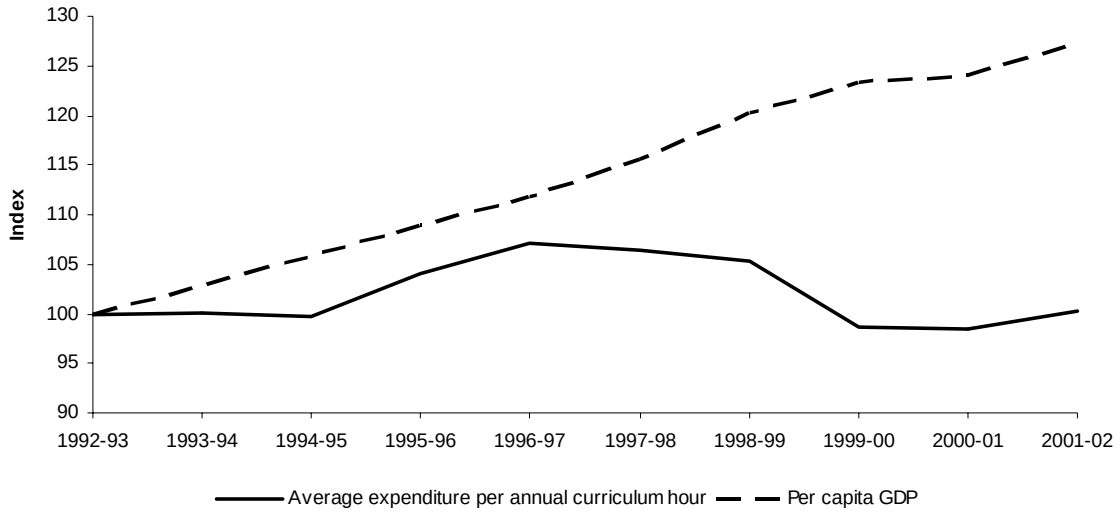
[14] Based on 2001-02 to 2002-03 estimates, around 76 per cent of HECS debts are expected to be repaid (DEST Annual report 2002-03, 2003-04, tables 21 and 4.15, respectively).

VET costs per student

Average VET costs (real expenditure per annual curriculum hour) have been relatively stable over the 1990s (figure 9.6). The Commission has modelled VET costs per student as increasing in line with rises in real incomes.

Figure 9.6 **Growth in real VET funding per student has been lower than per capita GDP**

1992-93 to 2001-02 (Base year: 1992)



Data sources: ABS 2003 (*Government Finance Statistics, Expenditures on Education*, special request consistent with ABS Cat. no. 5512.0) and NCVER (2004b).

Costs may not respond immediately to falling student numbers

Many education costs do not change significantly as student numbers vary in the short term. For example, the costs of providing assets such as buildings and grounds, library facilities and executive functions are not reduced if student numbers fall.

Although student numbers are projected to increase in aggregate, it is likely that there will be reduced enrolments in many institutions; that is, the demand for and supply of student places is likely to be more mismatched in institutions where growth in student numbers is slow.

This suggests that fixed costs per student might initially rise as a result of demographic pressures and then fall away in the long run as non-viable (small) institutions close. Hence, the effects on fixed costs of falling student numbers is

likely to be of low importance by the end of the projection horizon used in this study.

Other areas of government education expenditure

The focus of this section thus far has been to identify trends in participation and average costs in the three main education sectors — schools, universities, and VET. Two remaining areas of government expenditure are dealt with here. These are student assistance and a residual category, 'other education', which encompasses pre-schools, special schools, adult non-vocational courses offered by non-TAFE providers, migrant education programs and school transport.

The Commission did not explicitly project government expenditure on child care given it is a very small proportion of GDP. Around $2.3 billion was expended in 2002-03 by Australian and State governments on children's services (largely comprising childcare services including preschool services in childcare centres) (SCRGSP 2004, p. 14.5); or around 0.3 per cent of GDP in that year.[15] Therefore, child care expenditure would appear with other residual items of expenditure in the Commission projections. As a group, expenditure on residual items as a share of GDP was projected to grow only slightly (chapter 13).

Student assistance

The Australian Government provides financial assistance to students through a variety of measures, including Youth Allowance, Austudy, Abstudy, Fares Assistance, Assistance for Isolated Children and Rent Assistance.

The Commission has projected expenditure for three of the primary payments — Youth Allowance, Austudy and Fares Allowance. (Rent Assistance projections are outlined in chapter 10.) Average assistance expenditure per student was calculated by dividing total expenditure in the base year by the relevant student population (16-24 year old students in the case of Youth Allowance, 25+ year old students for Austudy and the total student population in the case of Fares Allowance).

Average assistance expenditure per student was fixed over the projection period, as the current regulatory framework only provides for indexation of these payments to the CPI. Projections of total expenditure were derived by multiplying average assistance expenditure per student by the relevant projected student population.

[15] Government expenditure on children's services as a share of GDP was slightly less in 2003-04. Expenditure accounted for $2.4 billion in that year (SCRGSP 2005, p. 14.6).

Other education

Other education expenditure was estimated for preschools, special schools, adult non-vocational courses offered by non-TAFE providers, migrant education programs and school transport.

Average other education expenditure was derived by dividing expenditure in each jurisdiction (sourced from the ABS' General Finance Statistics) by the population of 0 to 30 year olds. Other expenditure for NSW, Victoria and Tasmania was supplemented with estimates of preschool expenditure since this component was not reported (or was under reported) in the General Finance Statistics.[16] Results for these jurisdictions should be treated with caution.

It was assumed that average real other education expenditures would grow by 1.75 per cent per annum, an assumption employed elsewhere in the Commission's education projections. Average expenditure was multiplied by the relevant population projections in order to derive total expenditure.

9.3 Projected education expenditures

Based on the above assumptions, government expenditure is projected to decline from 5.2 per cent to 4.7 per cent of GDP in 2044-45, or by 0.5 percentage points (table 9.5). This occurs despite increases in projected participation rates in higher education. It is largely due to a decline in the State component of government school expenditure.

Australian Government expenditure is projected to decline by around 0.1 percentage points as a share of GDP. (The Intergenerational Report projected a slightly higher fall of 0.25 percentage points in 2041-42). The reduction in student assistance payments as a share of GDP is the major contributor to this decline. Were such payments to grow in line with increases in average weekly earnings, total Australian Government education expenditure would be likely to remain constant as a share of GDP. Notably, the decline in Australian Government expenditure occurs despite a slight increase in *net* university expenditure of 0.06 percentage points due to an increase in university participation rates and real per student expenditure.

[16] An additional $80.87 million, $84.98 million and $19.72 million were added to the 2002-03 General Financial Statistics data for other expenditure in New South Wales, Victoria and Tasmania. The reporting of preschool and 'other' education expenditure in the 2002-03 General Finance Statistics is outlined in more detail in SCRGSP (2005).

Table 9.5 **Projected government education funding as a share of GDP**
By level of government and education sector

	2002-03			*2044-45*		
	States and Territories	*Aust. Govt.*	*Total*	*States and Territories.*	*Aust.Govt.*	*Total*
	%	*%*	*%*	*%*	*%*	*%*
Schools	2.60	0.78	3.38	2.24	0.76	2.99
Government	*2.41*	*0.28*	*2.69*	*2.03*	*0.24*	*2.27*
Non-government	*0.20*	*0.50*	*0.69*	*0.21*	*0.52*	*0.73*
VET	0.35	0.16	0.52	0.36	0.16	0.52
University	0.03	0.74	0.77	0.03	0.87	0.89
HECS repayments	-	-0.11	-0.11	-	-0.17	-0.17
Income assistance	-	0.26	0.26	-	0.12	0.12
Other education	0.30	0.09	0.38	0.27	0.08	0.34
Total	**3.28**	**1.92**	**5.20**	**2.89**	**1.81**	**4.69**

Sources: ABS 2004f; DEST (2003, 2004a); NCVER (2003a, 2004a); SCRGSP (2004, 2005); and Commission estimates.

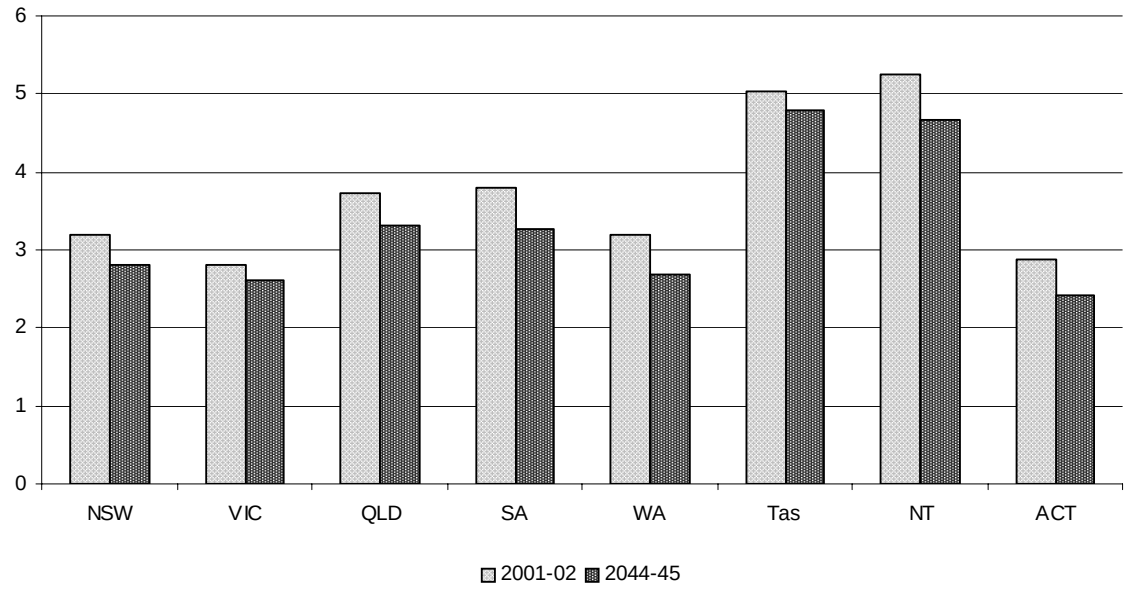
For the States and Territories, the decline in expenditure as a share of GDP is 0.39 percentage points, due largely to a decline in expenditure on government schools. This is despite a slight increase in VET funding of 0.01 percentage points.

The projected decreases in State education expenditure as a proportion of GSP range from 5 per cent in Tasmania to 16 per cent in Western Australia and the ACT (figure 9.7).

The impact of ageing

In table 9.6, the impact of demographic change is isolated from non-demographic factors such as projected changes in participation rates and unit costs. It shows that the impact of ageing is significant. Total government education expenditure is projected to be nearly $24 billion, or 20 per cent, lower than if the age structure remained as it is today.

Figure 9.7 **Projected government education expenditures as a proportion of GSP, 2002-03 and 2044-45**



Data sources: ABS 2004f; DEST (2003, 2004a); NCVER (2003a, 2004a); SCRGSP (2004, 2005); and Commission estimates.

Table 9.6 **Impact of population ageing on government education expenditures in 2044-45**

Sector	*Expenditure with projected ageing*	*Expenditure if there were no ageing*	*Reduction due to ageing*
	$ billion	$ billion	%
Schools	61 475	77 762	20.9
Government	46 540	58 886	21.0
Non-government	14 935	18 876	20.9
VET	10 624	13 380	20.6
University	18 344	22 113	17.0
HECS repayments	-3 553	-4 237	16.1
Student assistance	2 480	3 065	19.1
Other	7 025	8 525	17.6
Total	**96 394**	**120 608**	**20.1**

Sources: ABS 2004f; DEST (2003, 2004a); NCVER (2003a, 2004a); SCRGSP (2004, 2005); and Commission estimates.

10 Other expenditure

Key points

- The ageing of the population may affect government expenditure in a range of areas beyond those canvassed in previous chapters. However, these are not likely to be major sources of fiscal pressure or relief.
- Older people have higher than average levels of home ownership than the general population.
  - Nevertheless, ageing is likely to create pressure for greater housing assistance to older people who do not own their own homes, and who, typically, have low incomes.
- There will be increased growth in demand for community and disabled transport. That said:
  - public transport concessions to pensioners and other older people are unlikely to result in a large revenue drain; and
  - the private car will become an even more important means of transport for older people.
- A reduction in the proportion of younger people should tend to reduce overall crime rates in the future, thereby reducing expenditure on law and order.
  - However, this takes place against a background of rising community expectations in relation to safety, so there may be few net savings.
- Ageing is likely to increase the number of people entitled to State government concessions. Nevertheless, the fiscal pressure on overall concessions spending and revenue foregone is unlikely to be very large.
- Total superannuation expenditure of governments as a proportion of GDP is expected to decline by 2044-45, providing a small amount of fiscal relief.

Governments identified a number of areas of government expenditure where fiscal pressures (or relief) may arise, even though they are not the main drivers of expenditure. The four most important of these are housing, transport, law and order, and unfunded government superannuation liabilities. The emphasis of this chapter is on the broad direction and scale of the impact of ageing on budgets in these areas, rather than seeking to provide projections of expenditure.

10.1 Housing assistance trends

Older people have high levels of home ownership. Nevertheless, ageing is likely to exert some fiscal pressure on the two major sources of government expenditure on housing — Commonwealth Rent Assistance (CRA) and State public housing.

Tenure type and housing cost by age

People aged over 65 have higher levels of home ownership than younger groups. For the community as a whole, just over 70 per cent of households own their homes in full or in part. In the over 65 age group, the ownership rate reaches over 84 per cent (table 10.1).

Table 10.1 **Housing tenure by age[a]**
Per cent of households[b]

Tenure and landlord type	*15-24 years*	*25-34 years*	*35-44 years*	*45-54 years*	*55-64 years*	*65 and over*	*All households*
Owner without a mortgage	2	7.2	17.1	38.8	63.9	80.7	38.2
Owner with a mortgage	14	43.6	52	40.5	19.7	3.6	32.1
Total renters[c]:	78.4	47	29.4	19	14.7	12.5	27.4
State housing authority	5.1	4.5	5.4	4.2	4.5	6	5
Private landlord	70.4	40.7	23	13.9	8.6	5.1	21

a The reference person is the husband or wife who responded to the survey in a couple or the respondent in a lone person household. These figures relate only to people residing in private dwellings, excluding those located in non-private dwellings, such as hospitals, nursing homes, public hostels, prisons or emergency shelter. **b** Figures do not add up to 100 per cent because of missing responses. **c** Excludes people living in non-private accommodation such as nursing homes or hostels. Total renters includes boarders.

Source: ABS (*Housing Occupancy and Costs, Australia, 2000-01,* Cat. no. 4130.0.55.001).

The high level of home ownership among the elderly is a reflection of life-cycle patterns. Young singles tend to be renters, while young couples are usually at an early stage of buying a home through mortgage. Over time, most of the mortgage is paid back, so that for the group aged over 65 years, more than 80 per cent of households own their homes outright and only 3.6 per cent continue to pay some mortgage. More detailed analysis of the life-cycle pattern of home ownership is presented in Kendig and Gardner (1997), Kendig and Neutze (1999) and Yates (1997).

Given that the majority of those aged over 65 years own their homes outright, they face on average, lower housing costs than younger households (table 10.2). This suggests that a lack of access to affordable housing is not a major problem in this age group as a whole, and that recourse to government housing assistance measures will be limited.

However, while this may be true in broad terms, those over 65 who do not own a home can face serious financial difficulties in renting accommodation in the private market. Due to below average income levels, renters, particularly from private landlords, tend to spend a larger proportion of their income on housing than younger cohorts (table 10.2).

Table 10.2 **Housing costs vary by age and tenure[a]**

Median housing cost as per cent of income

Tenure and landlord type	*25-34 years*	*35-44 years*	*45-54 years*	*55-64 years*	*65 and over*	*All households*
Owner without a mortgage	3	2	2	3	4	3
Owner with a mortgage	21	19	14	13	8	18
Total renters[b]	20	22	21	23	23	21
State housing authority	21	19	21	21	21	20
Private landlord	20	22	22	28	30	22

a The reference person is the husband or wife who responded to the survey in a couple or the respondent in a lone person household. These figures relate only to people residing in private dwellings, excluding those located in non-private dwellings, such as hospitals, nursing homes, public hostels, prisons or emergency shelter. **b** Excludes people living in non-private accommodation such as nursing homes or hostels. Total renters includes boarders.

Source: ABS (*Housing Occupancy and Costs, Australia, 2000-01,* Cat. no. 4130.0).

Trends in housing assistance

Commonwealth Rent Assistance

Assistance to private renters is provided mainly by the Australian Government through the Commonwealth Rent Assistance (CRA) scheme.[1] Rent assistance is a non-taxable income supplement paid to individuals and families in recognition of the housing costs they incur in the private rental market. All pensioners, allowances (recipients of allowances such as Newstart Allowance), beneficiaries and people receiving more than the base rate of Family Tax Benefit Part A, may be eligible for this assistance. It is paid at the rate of 75 cents per dollar of rent paid above a designated rent threshold,[2] subject to maximum rates depending on household composition.

1 Paid mainly by the Department of Family and Community Services (FaCS), although some payments are made through the Department of Veteran Affairs and the Department of Education, Science and Training.

2 The threshold is set dependent on the circumstances of each customer.

The Australian Government provided over $1.95 billion in CRA to around 928 000 income units in 2003-04.[3] As at 6 March 2004, the average payment across Australia was $77 per fortnight. On a capital/rest of State or Territory basis, Sydney had the highest average rent assistance ($80 per fortnight). The lowest ($73 per fortnight) was in non-capital South Australia (SCRGSP 2005). Average payment also varies by primary benefit type (table 10.3).

The distribution of CRA recipients among those receiving Department of Family and Community Services (FaCS) payments is presented in table 10.3. The mix of clients by payment type reflects the fact that the proportion of social security recipients receiving CRA varies by age. Older clients (income units) tend to be less likely to receive CRA, consistent with their relatively low usage of private rental accommodation and higher levels of home ownership. As at November 2002, among FaCS clients, 43 per cent of all income units with a head aged 25 years received CRA. This proportion decreased to 39 per cent for those with a head aged 30 years, and 30 and 26 per cent for those aged 40 and 50 years respectively. People over 65 recorded the lowest levels of receipt of CRA (14 per cent) (SCRGSP 2004).

Table 10.3 **Income support and Commonwealth Rent Assistance scheme, June 2004** [a]

Primary benefit type	*Income units*	*Proportion of CRA recipients*	*Average fortnightly payment*
	persons	per cent	$
Age Pension	162 602	17.1	71
Disability Support Pension	173 825	18.3	78
Newstart	182 984	19.3	73
Parenting Payment (single)	200 460	21.1	90
Parenting Payment (partnered)[b]	27 492	2.9	101
Youth Allowance	87 940	9.3	62
Family Tax Benefit[c]	77 469	8.2	76
Other Qualifying Benefits	36 926	3.9	77
Total [d]	**949 698**	**100**	**77**

[a] Data are for CRA recipients who were clients of FaCS only. Data excludes those paid Rent Assistance by, or on behalf of, DVA or DEST. [b] Income units classified as Parenting Payment (partnered) only if partner does not receive an income support payment. [c] Income units classified as Family Tax Benefit only if neither the person nor partner receives an income support payment. [d] Components may not sum to 100 per cent as a result of rounding.

Sources: SCRGSP (2005); ABS 2005 (*Year Book Australia*: Housing Assistance Table 8.21).

[3] Income units are analogous to family units except that non-dependent children and other adults are treated as separate income units.

Public housing

Public housing comprises dwellings owned (or leased) and managed by State housing authorities. The Commonwealth State Housing Agreement (CSHA) provides the funding for public housing. Public and community housing accounted for most of the $1.3 billion provided in housing assistance under CSHA in 2003-04.[4]

A total of 336 000 public housing dwellings were occupied at June 2004. The public housing stock is augmented by houses leased from private owners by State and local government housing authorities. As indicated in table 10.1, around 5 per cent of Australian households live in public housing. Community housing, which is managed by not-for-profit organisations and local governments, adds another 7.2 per cent to the public housing stock. The total market value of public housing owned by housing authorities in 2002-03 is estimated at around $54 billion (SCRGSP 2005, p. 16.6).

Expenditure on CSHA declined by approximately 30.9 per cent in real terms between 1993-94 and 2003-04 (SCRGSP 2005), while expenditure on CRA increased by approximately 9.2 per cent over the same period (figure 10.1).

Public housing rents are generally set at market levels and rebates are granted to low income earners in order to provide affordable housing to people on low incomes. The rebates are determined so that tenants should pay no more than 25 per cent of their assessable income in rent. In most cases this is a higher subsidy than the CRA provides to those renting in the private market.[5]

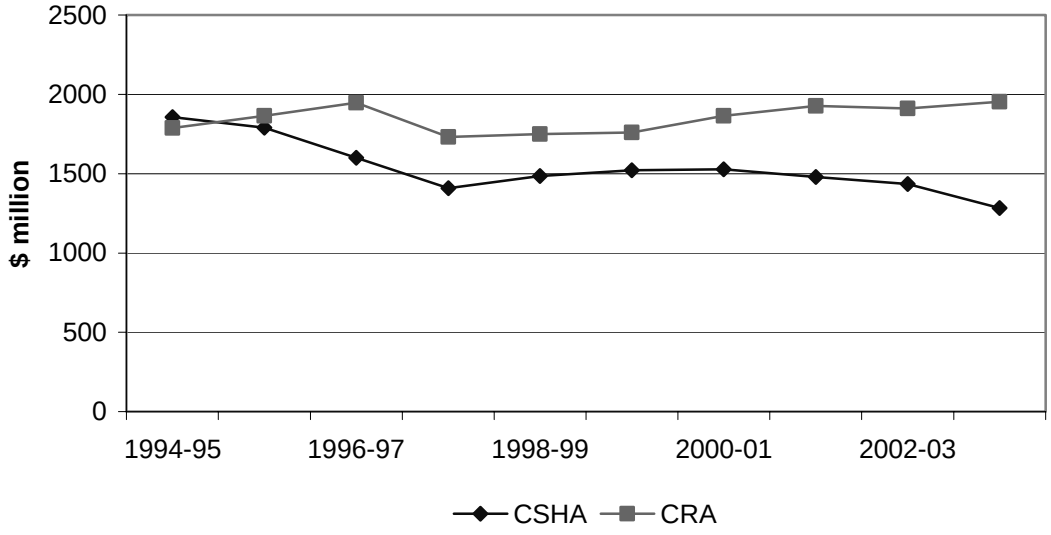
Public housing is available to people on low incomes and those with special needs. Around 40 per cent of new households allocated public housing in 2001-02 reported a household member with a disability (AIHW 2003c). According to the ABS, approximately 80 per cent of households who rented from a State or Territory housing authority in 2000-01 relied on pensions and allowances as their principal source of income. Priority rankings across States and Territories are not uniform, but generally a high priority for public housing is given to those who have low incomes and health and/or disability problems. This criterion tends to favour older people. Other priority criteria favour younger demographic groups, such as single mothers.

---

[4] Other CSHA outlays are related to the Aboriginal Rental program, crisis accommodation, specific types of rent subsidies, assistance in home purchasing, bond loans and relocation expenses.

[5] While rent rebate in public housing is dependent on household income, CRA is not linked to household income but to the amount of rent paid and household size and composition.

Figure 10.1 **Real government expenditure on housing assistance**
2003–04 dollars



Source: SCRGSP (2005).

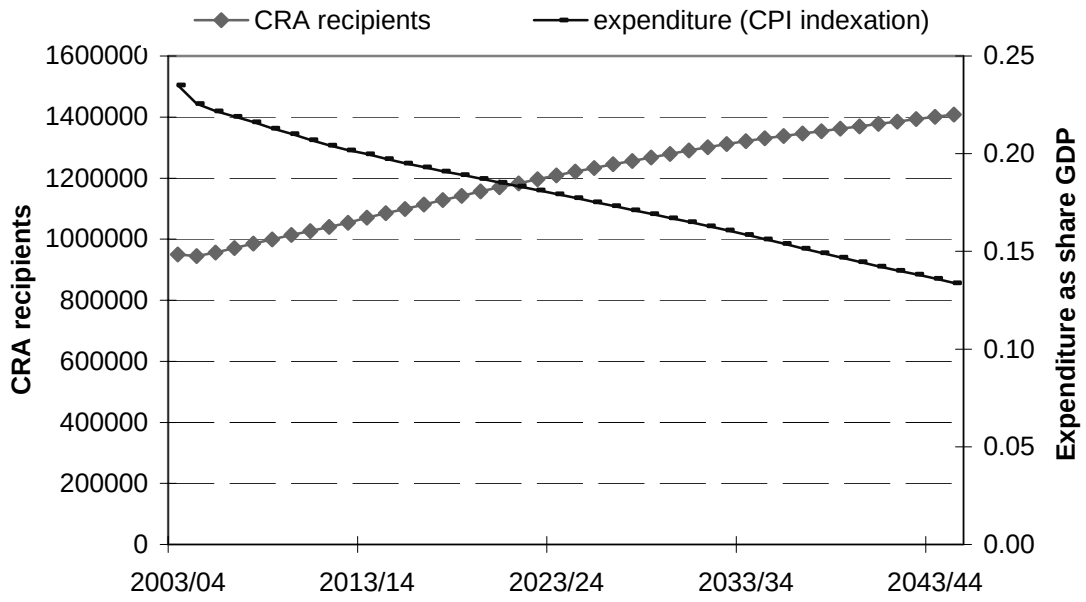
The fact that priority criteria tend to favour elderly low income people with disabilities is also reflected in the age distribution of public housing tenants. Among households with a reference person aged over 65 years, 6 per cent are living in public housing, whereas among all age groups just under 5 per cent rely on this type of accommodation (table 10.1).

Future government expenditure on housing

Rent Assistance

The number of CRA recipients over the period 2003-04 to 2044-45 is expected to increase in line with increases in the number of income support recipients (figure 10.2). However, expenditure on CRA is projected to fall from its 2003-04 level of 0.24 per cent of GDP, to 0.13 per cent in 2044-45 (figure 10.2). The decline in CRA expenditure occurs because average real payments are held constant over the projection period. Indexation of CRA payments to Average Weekly Earnings would see expenditure rise over the projection period (box 10.1).

Figure 10.2 **Projected CRA expenditure and recipient numbers**



Data source: Commission estimates.

Public housing

The higher propensity to use public housing by those over 65 years, combined with growth in the number of 65+ households, is likely to result in an increase in the demand for (the available stock) of public housing. Figure 10.3 shows the projected numbers of people in public housing, were supply to accommodate increased demand. In turn, were the additional demand for public housing to be met, it is likely that expenditure would increase as a share of GDP over the projection period.

A further likely source of fiscal pressure are the costs associated with adapting the current stock of public housing to the needs of an ageing population:

> [The] Current dwelling stock is diverse in terms of type and condition of housing and much of it was built to respond to the needs of families rather than smaller aged households. (New South Wales Government, sub. DR45, p. 37)
>
> A significant issue for state housing services is a misalignment of the stock of housing to the profile of clients. Much of the existing public housing stock was designed for families requiring mostly three-bedroom houses. (Tasmanian Government sub. DR69, p. 13)

Box 10.1 **Method for projecting demand for rent assistance and public housing**

For *Commonwealth Rent Assistance (CRA)*, estimates of income support recipients (chapter 8), in conjunction with information on the distribution of CRA recipients among FaCS clients in 2003 (table 10.3), can be used to derive estimates of the number of CRA recipients over time. This approach takes the number of CRA recipients as at 30 June 2003, for a given primary benefit (such as Age Pension), and applies an annual growth rate from present to 2044-45. The growth rate is equal to the projected growth rate in the number of recipients of the primary benefit. This approach assumes that the share of CRA recipients for any given primary benefit remains constant over time. The Commission has not projected recipient numbers for all of the primary benefits presented in table 10.3. Where this is the case, an average, weighted growth rate has been applied. Finally, the Commission has only projected the number of recipients of Youth Allowance. 'Other' (essentially non-students), growth in this benefit has been used as a proxy for growth in all Youth Allowance recipients.

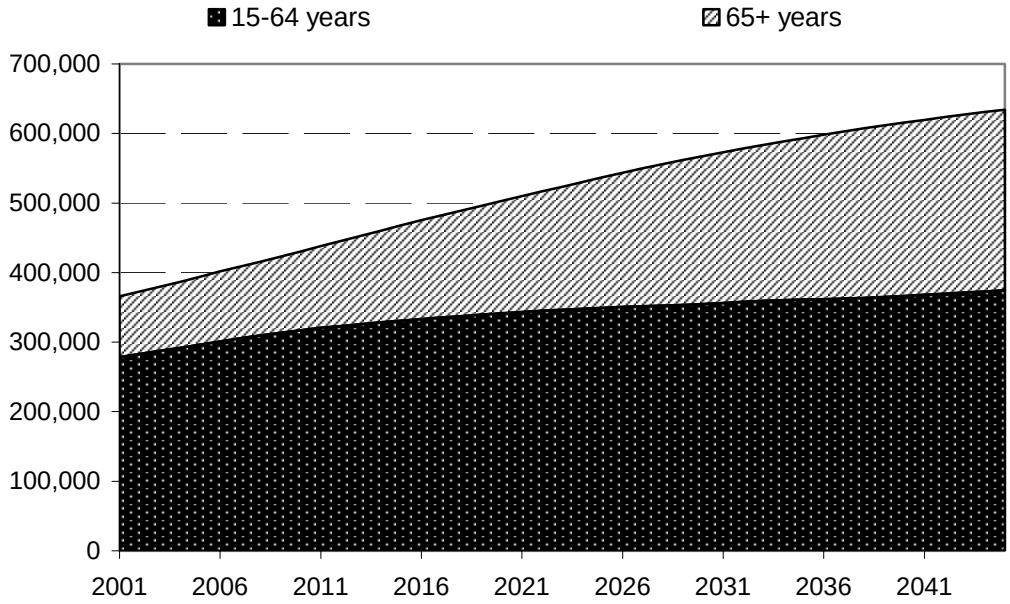
Expenditure estimates were calculated by multiplying the projected number of recipients (by primary benefit type) by average annual expenditure (table 10.3). Although CRA is indexed to CPI, other payments such as pensions, are indexed to average weekly earnings. It is likely that over the long run, the government will make ad hoc adjustments to CRA payments in order to maintain some parity between it and other forms of welfare payments. Hence, projections on the basis of CPI indexing alone, while consistent with stated Government policy, are likely to underestimate the long-run value of CRA expenditure. For example, were CRA payments increased in line with average weekly earnings, total expenditure on CRA is projected to reach 0.27 per cent of GDP in 2044-45, compared with 0.13 per cent under the current indexation policy.

For public housing, the number of households occupying public housing expressed as a share of all households for a given age group (table 10.1), combined with Commission projections of household numbers (chapter 11), can be used to derive projections of the demand for public housing over time. This approach assumes that the intensity of use of public housing for a given age group remains constant over the projection period. Hence, growth in the demand for public housing for a given age group is analogous to growth in the number of projected households for that age group. One limitation of this approach is that projections of future demand are based on current levels of use, thereby excluding those on waiting lists. Accordingly, these projections should be treated as lower bound estimates.

However, provision of housing assistance is an evolving area of government policy, and there appears to be a move away from public housing towards other forms of housing assistance (evident in expenditure trends in figure 10.1 above). In this case, increased demand for housing assistance created by the ageing of the population is likely to be manifested in other forms of assistance, and possibly in increases in rent assistance beyond that projected above. Given this uncertainty, projected

expenditure on CRA has not been included in the Commission's projections of fiscal pressure.

Figure 10.3 **Projected demand for public housing**
By age of household reference person.



Data source: Commission estimates.

10.2 Spending on transport services

In 2002-03, Australian governments spent over $11 billion on transport services (table 10.4). States and Territories are the main provider of funding, with transport representing 12 per cent of total State expenditure (or about 1.1 per cent of GDP). Funding for roads is the biggest component, comprising two thirds of total transport expenditure.

Table 10.4 **Government transport expenditure, 2002-03**

	Aust. Govt	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Total*
	$m	$m	$m	$m	$m	$m	$m	$m	$m	$m
Road	1 257	2 046	1 546	1 149	404	575	185	51	105	7 318
Water	203	62	15	88	39	3	10	1	0	421
Rail	31	1 178	1 015	670	56	270	0	5	0	3 225
Air	153	0	0	2	0	0	0	1	0	156
Total	1 644	3 286	2 576	1 909	499	848	195	58	105	11 120

Source: ABS (*Government Finance Statistics, 2002-03,* Cat. no. 5512.0).

It is likely that ageing alone will have only a limited adverse impact on total transport spending and, thus, government fiscal positions. The majority of expenditure is for transport infrastructure, and ageing will not fundamentally affect the requirements for road and rail networks, or their configuration. Even were ageing to increase transport expenditure by 10 per cent above its counterfactual levels, this would lead to added pressure of only about 0.1 percentage points of GDP in 2044-45.

However, the New South Wales Government considered that both demographic and non-demographic factors could add to spending pressures in transport:

> Increased spending could be expected on: pedestrian facilities; safer roads, bypasses and interchanges; clearer road signage; transport assistance relating to the use of motor vehicles by the elderly, as well as public transport concessions; accessibility of public transport for less mobile passengers; changing demands for service routes to access more leisure activities, services and health needs; and changing demands on the times transport services operate and their frequency. (sub. DR45, p. 29)

Extending past expenditure trends,[6] the New South Wales Government (sub. DR45, p. 24) estimated that growth in transport and communication expenditure might lead to a fiscal gap of about 1 percentage points of GSP by 2041-42. It also noted (pp. 38-40) that, as the projections took into account only public bus transport concessions, they understated transport spending pressures.

However, the New South Wales Government also observed that the projected fiscal pressures from this spending category appeared to be unique to New South Wales

6 The projections are based on the observation that, between 1978-79 and 1997-98, transport (and communication) expenditure had grown by an average of 1.9 percentage points faster each year than GSP. Communication spending plays a minor role in the emerging spending pressures as it is a small share of spending in this portfolio area. The New South Wales Treasury projections underpinning these findings, as well as the role of non-demographic factors more generally, are discussed in chapter 13 and technical paper 8.

and did not apply for combined Australian governments.[7] Although the Australia-wide impact of ageing on transport spending is likely to be limited, there may well be implications in a number of transport areas, including subsidies for public transport, transport of the disabled and access to services generally by older Australians.

Subsidies for public transport

Net government expenditure on passenger public transport was around $2.8 billion in 2001-02 (table 10.5). Fare concessions are offered on most services to pensioners and older people. Notwithstanding a greater proportion of older people in the future, it is unlikely that fare concessions will be a significant revenue drain on transport budgets. From the available data, it appears that older people are not particularly intensive users of public transport. For example:

- For urban rail and bus transport, the share of use by older people is less than their share in the population.
- For regional rail and bus travel, the share of use is also lower than other groups, but does exceed the share of older people in the population (figure 10.4).

The reasons for this situation are likely to be many, ranging from older people being concerned about personal safety on public transport to having strong preferences for more personal forms of transport that cater better to their needs and attributes (such as a disability). For example, the Tasmanian Government reported data collected by AC Neilson on behalf of Australian police services that indicate that older people are much less likely than other persons to feel safe in settings outside their homes, such as public transport (sub. DR69, p. 14). The Municipal Association of Victoria noted that where public transport is available, it often does not meet the needs of older people due to timetabling and route constraints (sub. DR43, pp. 5-6). COTA National Seniors Partnership considered that seniors would be higher users, if transport services were more appropriate to their needs (sub. DR57, p. 11):

> … State transport authorities do not design public transport with the needs of seniors in mind, despite the fact that they are an important user group, and one that is very reliant on this transport. Systems are designed with the needs of the paid workforce and school children in mind. This is compounded by the variability in local government provision for older citizens..

[7] The New South Wales Government noted that for both the combined States and the Australian Government, spending on transport and communication as a share of GSP/GDP was projected to *decline* by 0.1 percentage points to 2041-42. As noted in chapter 13, the Commission has modelled non-demographic factors for a residual category of spending, which includes, transport and communication, rather than modelling each component separately.

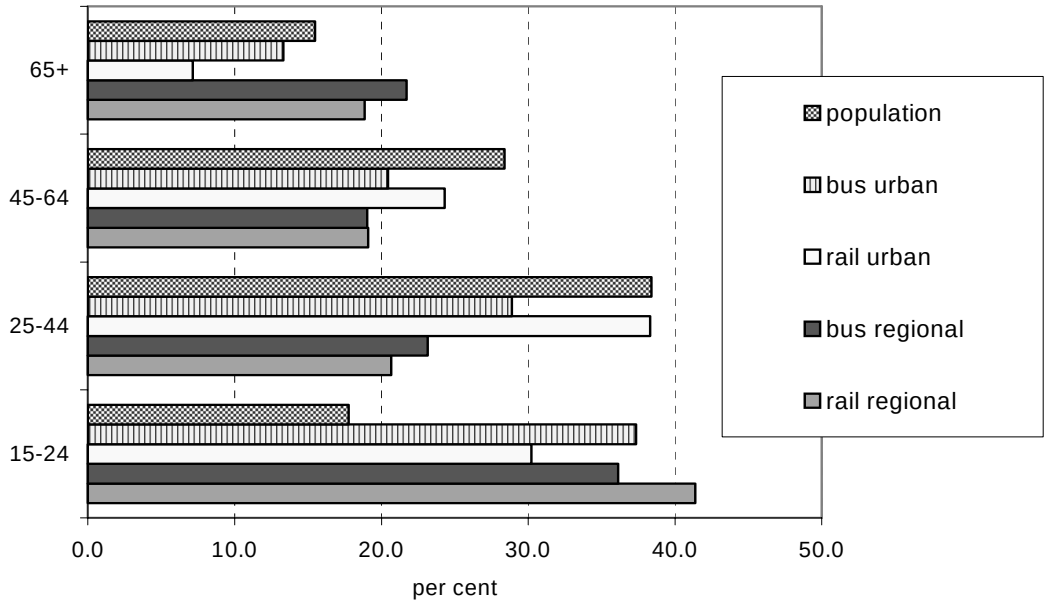
Table 10.5 **Net government expenditure on passenger public transport in 2001-02**

	Buses, trams and ferries[a]	*Passenger trains*	*Total*
	$m	$m	$m
New South Wales	606	696	1 302
Victoria	459	351	810
Queensland	174	4	178
South Australia	161	1	162
Western Australia	213	79	292
Tasmania	19	0	19
Northern Territory	6	0	6
Australian Capital Territory	29	0	29
Total net expenses	**1 667**	**1 131**	**2 798**
Total as a percentage of GDP	**0.23**	**0.15**	**0.38**

[a] The data on buses, trams and ferries are included in the ABS statistics under categories 3219 and 3281, and also include road expenditure items not classified elsewhere. The figures presented in the table are based on estimates of net government expenditure on buses, trams and ferries obtained from transport authorities.

Source: ABS unpublished data.

Figure 10.4 **Use of public transport by age**



Data sources: BTRE (2002); Steer, Davies, and Gleave (2001); TransportNSW (2002) and unpublished data from the transport authorities in Adelaide, Perth and Queensland Rail.

Ageing may well lead to a change in the current pattern of demand for public transport, which some see as affecting infrastructure needs and revenues. Engineers Australia, considered that public transport and other amenities will come under

pressure as ageing, along with a reduction in average household size, add to housing demands and urban expansion. (sub. DR44, p. 1)

The New South Wales Government noted that for public transport, spending pressures would include:

> … accessibility of buses, trains and ferries for less mobile passengers; safety and security of public transport for older persons; changing demands for service routes to access more leisure activities, services and health needs; and changing demands on the times transport services operate and their frequency (sub. DR45, p. 40).

Another jurisdiction considered changes in infrastructure would be required to accommodate the changing safety, access and lifestyle needs of an older population. For example, for older people to consider walking as an alternative to public transport, accessible infrastructure and public amenities will need to be provided. Such modifications are likely to create costs for public transport operators and local governments that would not be incurred to meet the needs of other groups. However, there are already substantial numbers of old people in the Australian community, and in many cases adaptations have already been made (for example, ramps and disabled access), with the prospect that these will be better utilised. Ageing may create further pressures to change the standard of public transport services, but it is unclear whether the incremental costs of these changes will be substantial.

Older people are more likely to use public transport outside peak times. Indeed, this is frequently the purpose of fare concessions. As the New South Wales Government said:

> For public transport the implication of an ageing population is that the pattern of the demand is likely to change. There will be less journey-to-work trips and more trips related to community activities, shopping and health-related journeys. There will be a shift from peak hour travel to more off- or inter-peak period trips as less people will travel to and from work. (sub. DR45, p. 39)

That said, a greater number of older people using public transport networks during off-peak periods is unlikely to lead to a need to augment infrastructure beyond that required to service peak demand. Disparities between peak load and off-peak demands are often a major source of cost in infrastructure provision. If ageing leads to a lower disparity as a result of greater proportionate increases in off-peak demand, then this may produce savings in infrastructure costs.

The projected decline in the proportion of school-age children may also contribute to reduced transport costs:

- school age children are among the heaviest users of services (figure 10.4 under represents their use because surveys typically interview people over the age of 15);
- school children travel during the morning peak, adding to any congestion on public transport; and
- most jurisdictions provide some form of subsidised school travel, which often includes dedicated school bus services.

Although the Tasmanian Government accepted that population ageing is likely to reduce the number of students requiring transport to and from school it said that:

> It is unclear whether this will result in substantial cost savings, at least in the short to medium term. As fixed costs make up a high proportion of total costs, unless student numbers fall sufficiently to enable bus sizes to be reduced or some services to cease, a decline in student numbers may not significantly reduce student transport expenditure. (sub. DR69, p. 15)

However, in the long term — certainly over the period considered in this report — a decline in the number of school age children will inevitably reduce loads from this source of demand on the general public transport system during peak times and the need for dedicated services.

The Commission's overall assessment is that there is unlikely to be a need to significantly alter transport infrastructure requirements as a result of ageing.

Transport assistance to the disabled

Australian governments also spend on special purpose programs designed to improve the access of disabled people to medical facilities, shopping centres and public transport. The majority of severely disabled people are over 65.

There are three types of programs that provide transport access to the disabled:

- general 'community transport' provides free or subsidised transport services from the home to shops, medical practitioners and transport stations;
- the more specialised 'patient travel scheme' is designed to assist disabled people living in remote areas (usually more than 100 km from the service provider) to access medical specialists; and
- the taxi subsidy scheme, which subsidises the taxi fares of permanently and severely disabled people.

Community transport encompasses a wide range of services and is provided by a variety of organisations (including local government — chapter 12). There is a heavy involvement by volunteer drivers who often provide assistance free of charge and are reimbursed for motor vehicle running expenses. Other services are provided by paid drivers with the necessary skills to work with special needs passengers. The vehicles used range from ordinary cars to mini-buses and vehicles fitted to accommodate wheelchairs. Community transport is carried out mainly in the cities, as most elderly people live in urban areas. However, more expensive access services are also provided to people living in rural and remote areas.

The Municipal Association of Victoria noted a relationship between community transport and other transport choices such as private car and public transport (sub. DR43, pp. 5-6). It considered that older people particularly looked to community transport options, as there might be a number of age-related conditions that impinged upon their ability to drive. Indeed, it considered that the demand for community transport is likely to increase with the introduction of regular testing of older drivers by the Victorian Government. Further, the Association noted that, although public transport is an option for older persons in some geographic locations, not all communities have access to public transport. Even where public transport is available, it often does not meet the needs of older persons due to timetabling and route constraints.

Given the wide range of organisations involved in community transport, it is difficult to provide a precise estimate of the net cost to government. From the information obtained from discussions with State Government agencies involved in this area, it appears that total government expenditure in 2002-03 around Australia was between $55 and $65 million. A significant portion of funding comes from the Home and Community Care (HACC) program (chapter 7). Additional funds for community transport come from other program areas under the health or transport portfolios.[8]

In terms of government expenditure, the patient travel scheme is probably larger than the community transport program. In 2002-03, between $70 and $75 million was devoted to this program nationwide. Direct funding comes from State health departments. The program is more costly on a per capita basis in States where a significant share of the population live in remote regions, such as Queensland, Western Australia and the Northern Territory. Occasionally, the patient travel scheme also covers travel to medical specialists in another State. Modes of transport range from taxis to planes.

[8] In New South Wales, Queensland and South Australia, community transport is coordinated mainly by the State Department of Transport whereas in Victoria, Western Australia and Northern Territory it is coordinated mainly by the State Department of Health.

The taxi subsidy scheme covers up to 50 per cent of the taxi fares of permanently and severely disabled people. Eligibility is conditional on medical certificates. In 2002-03, between $80 and $90 million was spent on this scheme nationwide. Taxi subsidies are administered by State transport departments.

Population ageing generally will increase demand for specialised transport services to assist frail and disabled people who live in the community. In addition, transport assistance to the disabled may become more important in an ageing society where governments support a policy of assisting the frail and disabled to live in the community rather than in residential homes. The New South Wales Government supported this view saying that it is reasonable to assume that there will be upward pressure on the cost of schemes such as its Community Transport Program and Taxi Subsidy Scheme (sub. DR45, p. 40).

Access to services by older people

Many participants highlighted the importance of access to transport services by older people. The New South Wales Government noted that:

> Seniors need access to transportation that allows them to move freely around their communities. There is a need for transportation options that preserve dignity, maximise independence, and provide access to the full range of activities that contribute to quality of life.
>
> - Limited transport choices can lead to isolation of older persons and a consequent deterioration in both physical and mental health. Research for the NSW Greater Metropolitan Region shows that 49 per cent of those aged over 65 without a drivers licence did not make a trip on an average day in 2002. (sub. DR43, p. 38)

It also noted that age per se did not limit access, but rather the extent of mobility and disability (sub. DR43, p. 38).

Several participants emphasised the important role played by specialised or personal forms of transport for older people in achieving access and drew attention to the increasing demand for community transport. The New South Wales Government noted that this may provide a solution for larger numbers living in low density areas and provide assisted trips for shopping, community lunches, library visits and day outings for the housebound and for the active aged (sub. DR45, p. 39).

Aside from the special needs of those with disabilities, public transport plays a key role in facilitating continued access by older people to shops, medical services and the community generally. As the Victorian Government noted, 'access to an integrated transport network is essential to the economic and social participation of Victorians of all ages (sub. 29, p. 60)'. The Victorian Government suggested that as

a result of ageing, public transport may shift towards local transit (relative to commuter transport). Troy (1999, p. 464) also supports this proposition:

> Given that the aged proportion of the population is increasing we may need to pay more attention to the development of local area transport services, such as mini-bus services, to enable the aged to participate, to make better use of social infrastructure and to avail themselves of the services available in the city.

Such public transport initiatives are likely to become more important in the future.

However, the need for further public transport infrastructure should not be overstated. The primary means of access to services by older Australians will continue to be the private car. At present even for those over 65, the private car is the dominant mode of transport. In addition, travelling by car as a passenger is also an important means of transport for the elderly. Between 1994 and 1996 in Victoria, over 30 per cent of all trips by females over 65 were as a car passenger (compared with under 10 per cent by males) (Steer, Davies and Gleave 2001). While many of the trips as a passenger for females are likely to be accompanying a partner, travel by car with offspring, other immediate family or friends is also likely to be an important means of accessing services for both males and females who do not drive.

As the Victorian Government noted, the number of older drivers is likely to increase substantially (sub. 29, p. 60). This is not just because there will be more older people, but because a greater proportion of older people will have driver's licences. Steer, Davies and Gleave (2001) predict that, in Victoria, the percentage of over 65s holding a drivers licence will increase, for males, from 84 per cent in 1996 to 99 per cent in 2031, and for females, from 44 per cent to 94 per cent. The rapid increase in the proportion of older female drivers partly underpins their conclusion that there will be greater reliance on the car by older people.

Similar trends were reported by the New South Wales Government. It observed that, over time, older persons have remained the most likely to make walking trips. However, their rate of private vehicle use has grown at the expense of both public transport and walking. Between 1991 and 2001, the proportion of public transport trips taken by those over 60 years has fallen. This reflects the increasing proportion of older women who hold a driver's license, the growth in car ownership and the increased wealth and mobility of older age groups.

- The most significant growth in the number of trips taken by private car between 1999 and 2002 has been in the 50 – 60 year age group, primarily related to an increase in private vehicle transport.
- Across the board license holding has grown along with car ownership, especially for young women. As this group approaches old age, they are likely to have higher mobility rates than previous generations of older Australians. (sub. DR45, p. 38)

In all, this trend to the private car will be positive for mobility and access to services by older people. However, their use of the existing road infrastructure could involve some extra age-related costs for State governments including:

- the costs of licensing older people who require regular assessments of their fitness to drive (Tasmanian Government, sub. DR69, p. 15);
- the foregone revenue from concessions given for motor vehicle licence and registrations — for example, in New South Wales, there is subsidisation of licences, registration, weight tax and, to a limited extent, charges for heavy vehicles (sub. DR45, pp. 39-40). The New South Government noted that the elderly do not pay these license fees and charges:
  - in 2003-04, about 20 per cent of licence holders and 21 per cent of vehicle registrations were receiving concessions. About 50 per cent of those receiving concessions were aged 65 years and over and the amount of their concessions constituted 52 per cent of total rebates and refunds;
  - total motor vehicle concessions reached $153.2 million in 2003-04, of which 52 per cent (or $79.3 million) were granted to age pensioners; and
- the costs of traffic accidents — Steer, Davies and Gleave (2001) sound a note of caution that the ageing population may raise some safety concerns as crash rates tend to rise with age after the age of 25.

The New South Wales Government (sub. DR45, p. 38) considered that the greater presence of older drivers on the roads may lead to demands for more older-person friendly driving conditions such as lower speed zones as well as other infrastructure improvements. It said that for road systems there will be a need for: improved or higher level of service for road corridors and networks; safer roads, bypasses and interchanges; clearer road signage; and lower speed limits in highly urbanized and residential zones (sub. DR45, p 39).

However, many of these improvements stem from broader public needs, not just those of the aged. The Commission considers that although ageing may see more older people on the roads and, thus, generate certain costs associated with road use, the impact on road infrastructure spending is unlikely to deviate significantly from past trends.

10.3 Law and Order

In 2002-03, expenditure by the combined States on Public Order and Safety accounted for 1.4 per cent of gross output.[9] There is little difference in state shares. State law and order portfolios fund and administer three broad facets of the judicial system: crime prevention and law enforcement; the detention and rehabilitation of convicted offenders; and the provision and maintenance of a legal infrastructure.[10]

State governments generally considered that a change in the age structure of the population will have only a relatively minor impact on law and order expenditure. For example, the South Australian Government (sub. 62) projected that, in the absence of other influences, the share of such expenditures in GDP by the combined States in 2041-42, would be 0.1 percentage points lower, based on current age profiles of victims of crime, defendants and imprisonment.

However, governments were strongly of the view that non-demographic factors may give rise to fiscal pressure. Over the last 25 years, Public Order and Safety expenditure by the combined States is estimated to have grown faster than output — by between 1.2 and 1.7 per cent per year between 1978-79 and 1997-98 (table 8.4. in technical paper 8) and much faster (about 3.0 per cent) since.[11] The States saw little likelihood of a quick abatement in these trends, citing community-wide expectations for increased safety and meeting new challenges such as the complexity of e-based crime and terrorism. The Western Australian Government (sub. 39, p.25) estimated that if historical expenditure trends continued, it would face a fiscal gap of 0.6 per cent of GSP by 2044-45 for law and order. Similarly, the New South Wales Government projected a fiscal gap of 0.8 percentage points of GSP for the combined States.[12]

Broadly, there are two drivers of spending on law and order: the propensity to commit crime; and community feelings of security and expectations of safety. An ageing population may cause these two drivers to work against each other, with the net effect unclear. Crime is more prevalent among younger people, but it is often

---

9 Under the General Finance Statistics Purpose classification.

10 In 1997-98, Police Services accounted for 44 per cent of total expenditure (GFS basis) on Public Order and Safety. Other major items were Law Courts and Legal services (19 per cent), Prisons and Other Corrective services (15 per cent), and Fire Protection services (12 per cent). More recent GFS data at this level of disaggregation has not been published by the ABS.

11 These growth rates include any effects of ageing, which are generally agreed to be small relative to non-demographic effects — for example, the New South Wales Treasury estimated that the growth rate would have been about 0.3 per cent per year higher in the absence of past ageing.

12 The Queensland and Tasmanian governments also included non-demographic growth rates for law and order in some of their analysis.

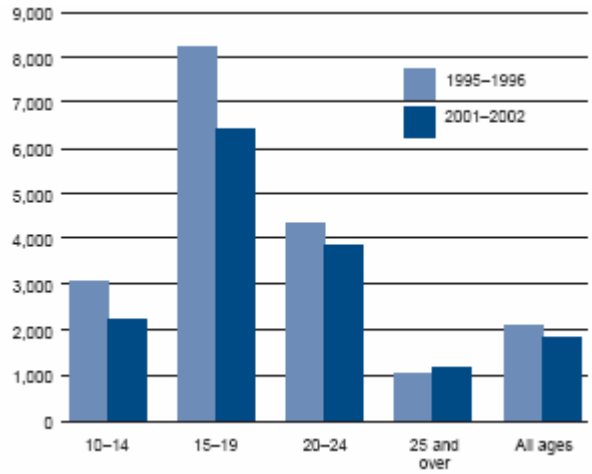
argued that older people tend to feel less safe and desire governments to invest accordingly. These age-related effects are examined in turn. Following this, there is a consideration of (the more dominant) non-demographic cost pressures suggested by governments.

Historically, most offenders and victims of crime have been young

The Australian Institute of Criminology (2003) reports data on offenders provided by the Victorian, Queensland and South Australian police departments. The majority of offenders are aged less than 25, with crime highest among those aged 15-19 (figure 10.5). The age profile of crime rates for specific offences such as assault, sexual assault and robbery repeat this profile.

Figure 10.5 **Offenders by age**

Rate per 100,000 persons



Data source: AIC (2003).

Assuming such past crime profiles continue, population ageing will cause the principal offending population (youths) to decline as a share of the population, except for the Northern Territory.[13] Consequently, less resources will be required (per capita) to police and protect the community, to a given standard, as total crime rates fall.

[13] The Northern Territory Treasury (sub. 58) noted that, in the Territory, criminal activity is disproportionately associated with young adult Indigenous people. It estimated, using two independent methods, that prison costs were split about 80:20 between Indigenous and non-Indigenous people and that Indigenous 20 to 39 year olds accounted for over 60 per cent of total costs. The Treasury stated 'this demographic group will represent an increasing proportion of the Territory's future population and lead to a range of increased costs across the full range of law and justice activities.'

Not only are perpetrators typically younger, but so are their victims. Some 35 000 persons aged 25-34 were either assaulted, robbed or murdered in 2003 — more than seven times the number of these crimes committed against the over 65s. By far the most common offence is assault, with nearly 160 000 incidences reported across all ages in 2003. Most commonly, males aged 15-44 are the victims of assault, followed by women aged 25-44. Sexual assault and robbery come a distant second, with around 18 000 and 17 000 respective incidences that year. Figure 10.6 shows the rates of assault, sexual assault and robbery per 100 000 persons by victim age. Each offence shows the same distinct age profile that peaks well before the middle aged.

Policing for the aged

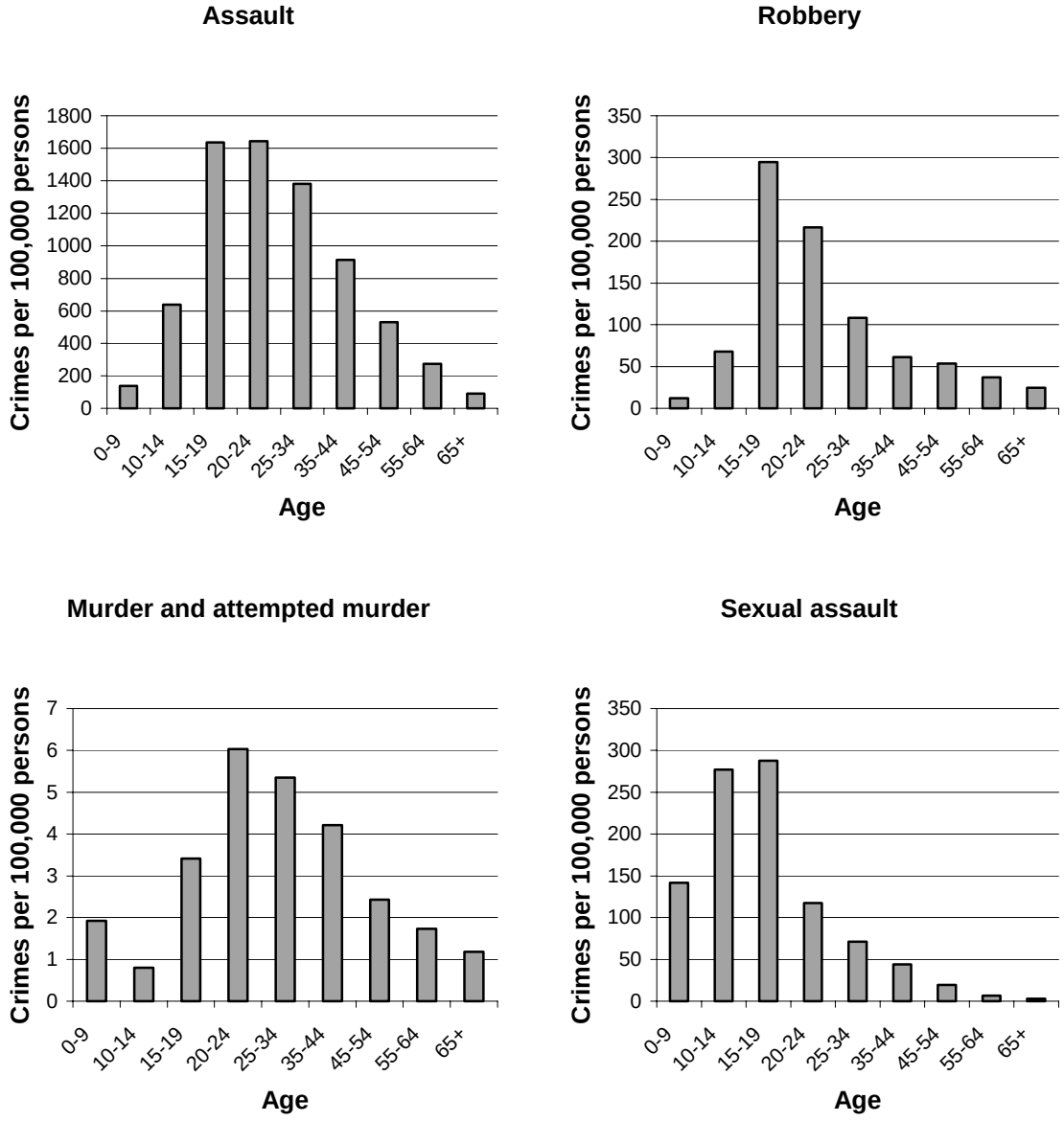
The Tasmanian Government (sub. 69) suggested that data on crimes *against the person* may not provide an entirely accurate picture of the incidence of crime by age. The Tasmanian Police has advised the Government that elderly persons are more susceptible to crimes such as home invasion and fraud. An issue then is whether a change in the mix of crimes such as from less assaults of young people to more fraud of older people increases or decreases the average costs of law and order, holding the crime rate constant. Further, some have suggested that the incidence of crimes against the elderly may increase, such as financial fraud (both internet and non internet based).

Non-crime, law and order costs may also increase because of an ageing population:

- The South Australian Government (sub. 23, p.30) noted that police officers will continue to have contact with an increasing number of older people with mental health problems, requiring appropriate training.
- The NSW Government (sub. 45, p.42) commented that estimates of small (favourable) ageing impacts on law and order expenditure may be overstated because such estimates are based on the age profile of crimes and incarceration. It excludes police resources used for community support (calls for assistance for both crime and non-crime) and events/emergencies management. The aged are considered to be high users of these services.
- The Victorian Government (sub. 29, p.32) stated that 'the ageing of Australia's population will result in a growing number of older, more vulnerable people requiring civil law protection and advocacy from government and their agencies. This will create the need for more and different forms of court system protection, consumer protection and other advocacy mechanisms.' The vulnerability relates to mental illness and frailty.

Figure 10.6 **Victims of crime**

Crime rates per 100,000 persons, 2003



Data source: ABS 2004 (*Recorded Crime, 2003*, Cat. 4510.0).

Older people may feel less safe

The Queensland Government noted that (sub. 17, p. 41):

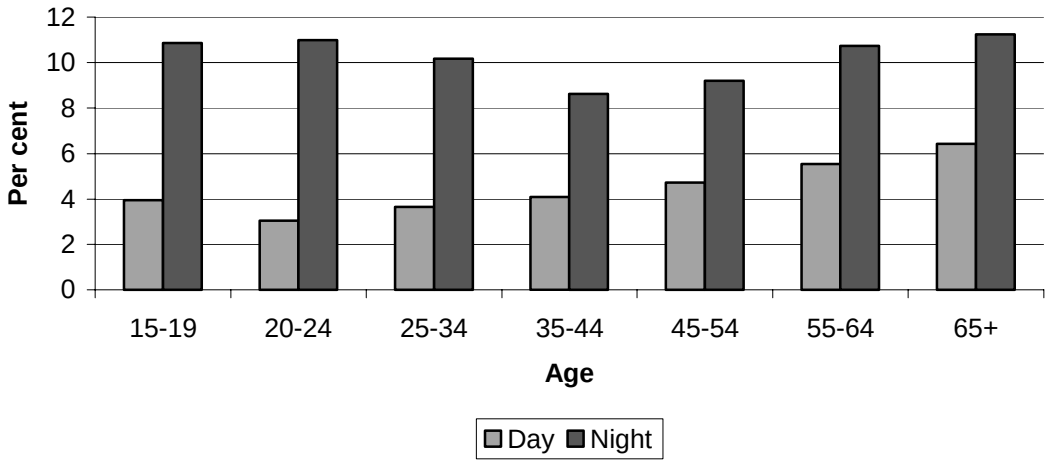
> Although less likely to be a victim of crime, older people have higher levels of fear of crime than the general community for a number of reasons, including lack of physical strength, lower income (and thus a theft is likely to have more of an economic impact), a feeling of social isolation, and a reliance upon the media for information about crime.

It is argued that the elderly do not require more resources to *keep* them safe, but (demand through voting) more resources to make them *feel* safe.

However, these concerns are not uniformly supported by surveys on this issue. For example, there seems to be little indication in the ABS survey of Crime and Safety that the elderly were significantly more likely to feel *unsafe* or *very unsafe* than the younger cohorts (figure 10.7). The elderly are more likely to feel unsafe during the day, but only by a small margin.[14] The elderly are in fact less likely to perceive crime as a problem in their neighbourhood than younger cohorts. McCoy (1996) has previously argued that even where the elderly indicate they are more fearful of crime, the extent of this heightened fear is still quite low.

In the report, *Fear of Crime*, Tulloch et al (1998) found conflicting opinions in the literature. It noted that the excess fear reported by the elderly was dependent on the phrasing of the question. Similarly, La Grange and Ferraro (1987) claim that poor methodological issues have led to an exaggeration of the fear of crime by the elderly. They suggest that while the *impact* of crime on the elderly may be significantly greater, they are not likely to be more fearful than other groups in the community.

Figure 10.7 **Feeling unsafe?**



Data source: ABS 2003 (*Crime and Safety, Australia, 2002*, Cat. 4509.0).

[14] The Tasmanian Government (sub. 69, p. 14) noted that AC Neilson collect data more frequently and from a larger sample than the ABS survey. While not directly comparable with the ABS data, the data indicate that older people felt less safe in their home than younger people, but not by a large margin and also relatively less safe outside their home (such as public transport).

Rather than being strictly age related, growing demands for public safety are more likely part of a community-wide phenomenon.

Overall impact of ageing

To sum up, a change in the age structure may affect law and order expenditure in five ways:

- it may lower the overall crime rate, as the majority of offenders and victims are currently young people;
- it may change the overall mix of crimes, which may change the average cost per crime;
- it may stimulate an increase in the incidence of crimes against the elderly (such as financial fraud);
- additional police and related resources may be required to deal with non-crime services to the elderly (such as emergency assistance and civil law protection); and
- the aged may demand (through voting pressure) more resources to make them feel safe.

The general view is that the first effect will dominate, but that population ageing, by itself, is not likely to significantly reduce government spending on law and order. As noted by the Tasmania Government (sub. 69) the pattern of crime by age is likely to be only a small factor in explaining overall crime trends. For example, in Tasmania between 1998 and 2002 crimes against the person rose 51 per cent while crimes against property fell 27 per cent — such significant changes over such a short period are likely to have been driven by non-demographic factors.

Non-demographic pressures on law and order expenditure

As noted above, public order and safety expenditure has, on average, grown faster than GDP since 1978-79.[15] Governments' expectations about future expenditure are

[15] The Queensland Government (sub. 66) estimated that public order and safety expenditure of the combined States had grown at an average of 1.6 per cent faster than GDP since 1977-78 and 3.0 per cent faster since 1989-90, and noted that it appears to be related to steadily increasing crime rates since the early 1960s. The South Australian Government (sub. 62) estimated that public order and safety expenditure of the States had grown at an average of 1.8 per cent faster than GDP between 1992-93 and 2002-03 — it noted concerns by the ABS about data prior to 1992-93. The Tasmanian government (sub. 40, p.43) noted that it had made some preliminary

strongly conditioned by this past trend. The general view is that it would be reasonable to plan for the possibility that there will be some degree of 'excess' growth in expenditure, at least in the short to medium term. Such growth rates, however, may not be sustainable over the long term. The Queensland Government (sub. 66) commented 'it is perhaps unlikely that the trend towards higher growth rates in public order and safety expenditure will continue for the next forty years, particularly if crime rates remain lower for older age cohorts.'

The reasons for the past growth are not well understood and it is difficult to know whether the same underlying drivers will be evident in the future. It has been suggested that community-wide expectations about safety may generally rise with income levels. Governments also offered some specific examples of what may give rise to continued public order and safety expenditure pressures. For example:

- In response to the belief that community expectations in relation to law, order and safety are rising, the South Australian Government intends to recruit and train an additional 200 police officers over and above normal recruitment strategies designed to replace officers leaving the force (sub. 62, p. 6). The additional police are directed at a number of objectives, including additional patrols, and more staff to investigate organised crime, serious sexual offences and e-crime. In addition to increased police numbers the Government intends to build two new police stations in metropolitan Adelaide, upgrade security around critical infrastructure and increase resources for emergency management planning and legal services.
- The Western Department of Treasury and Finance (sub. 70) noted that its law and order practitioners expect expenditure pressures to increase for a range of reasons, including increased crime complexity relating to technology, the need to improve law and order services in remote (Indigenous) communities, increased threats from terrorism, and increased manufacture of illicit drugs.
- The Tasmania Government (sub. 69) suggested that key future drivers include a trend towards increased reporting of crimes such as sexual assault, child abuse and domestic violence — partly a reflection of legislative changes and focussed campaigns — and new crimes, such as those using the internet.

Notwithstanding identification of potential new challenges, future law and order expenditure growth remains highly uncertain. Crime rates may plunge unexpectedly as they did in the US in the early and mid-1990s, precisely at a time when the experts were forecasting a crime explosion (Levitt 2004).

estimates of historical excess expenditure growth but that the results were sensitive to assumptions about the measure of real per capita income and the time period.

The Commission's overall view

The Commission considers that ageing *per se* is unlikely to give rise to fiscal pressure from law and order budgets — and may in fact provide some minor relief. However, the Commission has not quantified the expected minor reductions.

Against this, there is an expectation by governments that law and order expenditure may grow faster than GDP for non-age related reasons (such as increasing community-wide expectations about safety and new types of crime). The Commission considered the option of assuming a specific non-demographic expenditure growth rate for law and order. However, as explained in chapter 13 and technical paper 8), rather than project non-demographic expenditure growth rates for each portfolio area separately, the Commission has only done so for the most important expenditure categories. For all other (residual) expenditure, including law and order, the Commission assessed likely future trends in aggregate residual expenditure. While there may be fiscal pressures arising from trends in law and order spending, they appear to be moderated by reductions in other residual areas.

10.4 State and Territory government concessions

All levels of government offer a range of concessions to improve the affordability of goods and services to people on low income. The concessions involve direct subsidies or discounts on government charges. Some States expressed the view that their concessions are exposed to population ageing (Victorian Government, sub. 29, p. 34; South Australian Government, sub. DR62, p. 7; and Western Australian Government, sub. DR70, p. 4). Accordingly, this section considers briefly the main State government concessions available to older people.

Each State or Territory offers a varying range of concessions for government services. Some of these concessions are covered elsewhere in the report (public transport — section 10.2; motor vehicle registration and drivers' licence — section 10.2; and municipal rates — chapter 12). But there are a broad range of others available, including water and sewerage; gas and electricity; housing; optical, dental and hearing services; ambulance, emergency services or fire services; and recreational services (such as, public zoos, art galleries and national parks).

Eligibility for concessions can vary, but in many cases is determined primarily by the recipient's eligibility for an Australian Government concession card.[16] Eligibility for the State concessions is thus generally linked to entitlement to

[16] These include the Pensioner Concession Card, the Commonwealth Health Care Card, the Commonwealth Seniors Health Card or a Department of Veterans' Gold Card.

personal benefit payments from the Australian Government, or to some type of income and assets test.

Concessions may also be available to persons holding a State concession card, such as a Seniors Card.[17] Entitlement to a Seniors Card is based on age (typically 60 years) and maximum hours worked in a week (usually 20 hours). It is not contingent on income or assets (Department of Health and Ageing 2005).

The Australian Government has in place a funding arrangement with the States and Territories that is intended to ensure that all holders of the Pensioner Concession Card receive certain core concessions (on council, water and sewerage charges, electricity charges, motor vehicle registration and public transport) (FaCS 2004c). This is done through an annual Specific Purpose Payment to all State and Territory Governments. The agreement does not specify the level of concession that must be offered; State governments determine these matters (South Australian Government, sub. DR62, p. 7).

The net cost to State Governments of concessions as a proportion of GSP is generally relatively small. The South Australian Government estimated that, in 2004-05, the total expenditure/revenue foregone in relation to its principal concessions was over $120 million, or approximately 0.23 per cent of GSP. The Specific Purpose Payment reduced this further to around 0.19 per cent of GSP (sub. DR62, p.7). The Western Australian Government noted that, in 2002-03, it provided concessions with an estimated value of around $387 million or around 0.5 per cent of GSP (sub. DR70, p. 4). This estimate is likely to overstate Western Australian spending and revenue foregone on concessions as it does not include the Specific Purpose Payment.

Impact of ageing on government concessions

The impact of ageing on State and Territory government expenditure or revenue foregone on concessions depends on:

- the number of concession card holders, including the proportion of holders who are older people, which are subject to eligibility rules determined primarily by the Australian Government; and
- the value of the concession, which depends on the person's demand for the service and the concession rate determined primarily by the State Government.

[17] As well as government services, Senior Card holders might also obtain concessions for commercial activities.

As noted, eligibility for many State concessions is governed by the recipient's eligibility for certain concession cards issued by the Australian Government. There are around 270 000 Australian defence force veterans and widows holding Gold Cards (DVA 2004, p. 252). That, with other concession card holders (table 10.6), reveals that the current Australian Government cardholding population eligible for State and Territory concessions is at least 5 million people.

Table 10.6 **Australian Government concession cards[a]**

Benefit type	*Pensioner Concession Card*	*Commonwealth Health Care Card*	*Commonwealth Seniors Health Care Card*	*Total*
	number.	number.	number.	number.
Age Pension	1 809 344	-	-	1 809 344
Disability Support Pension	690 649	-	-	690 649
Newstart Allowance	15 000	521 700	-	536 700
Parenting Payment Single	456 138	2 212	-	458 350
Seniors Health Card	-	-	291 043	291 043
Low Income Card	-	283 439	-	283 439
Family Tax Benefit	-	177 725	-	177 725
Parenting Payment Partnered	374	176 568	-	176 942
Carer Allowance	-	120 950	-	120 950
Other[b]	211 301	204 395	-	415 696
Total	**3 182 806**	**1 486 989**	**291 043**	**4 960 838**

a As at 18 February 2005. **b** Encompasses Bereavement Allowance, Carer Payment, Exceptional Circumstances Relief Payment, Farm Family Restart, Foster Child, Mobility Allowance, NSS Mature Age Allowance, Partner Allowance, Sickness Allowance, Special Benefit, Widow Allowance, Widow B Pension, Wife Pension Age, Wife Pension Disability Support Pension, and Youth Allowance.

Source: FaCS (2005) (unpublished data).

Of this population, the Commission estimates that around 45 per cent, or around 2.4 million, are older people — namely, age pensioners holding the Pensioner Concession Card, Commonwealth Senior Health Care Card holders and Gold card holders — who are entitled to State concessions.

The Commission has not projected the number of older people holding Australian Government concessions cards and, thus, those entitled to State concessions. However, in projecting expenditure on Australian Government personal benefit payments in chapter 8, the Commission also projected the number of recipients, including age and service pensioners. It found that the number of age and service pensioners would increase between 2002-03 and 2044-45 by over 130 per cent to 5.1 million.

Although these projections suggest that demographic change may lead to a substantial increase in concession card holders who are older people, it is not at all

clear that there would be an accompanying increase in expenditure or revenue foregone on concessions or, if there were, that it would be significant. As noted, much depends on the extent of take up of particular concessions as well as the concession rate, which can vary significantly between concessions, as well as between the States.

That said, there is some evidence to suggest that the impact of ageing on concession expenditure or revenue foregone is unlikely to be very large. This may be partly due to existing caps and maximum limits on the concessions:

- The South Australian Government (sub. DR62, p. 7) projected the expenditure and revenue foregone on concessions to increase from its current level of 0.19 per cent of GSP (net of the Specific Purpose Payment) to between 0.28 and 0.37 per cent of GSP in 40 years time; an increase of between 0.1 and 0.2 per cent of GSP.[18]
- Piper and Siemon (2003) modelled the likely impacts of ageing on a group of Victorian Government concessions — electricity, gas, water and municipal rates — as well as the likely impacts of changes in prices or concession entitlements from 2003 to 2050. Their results suggest that, other things being equal, ageing will lead to a *decrease* in total spending in real terms on the four concessions of around 35 per cent. The decrease in total spending is made up of a decrease in spending on water and municipal rates concessions of around 70 per cent and 65 per cent, respectively; and an increase in spending on electricity and gas concessions of around 20 per cent for each. Reasons suggested for these results is to be found in the unindexed caps on water and rates concessions.

Accordingly, the fiscal pressures on States attributable to ageing impacts on concessions spending and revenue foregone are likely to be very small.

10.5 Superannuation expenditure

All Australian governments have superannuation obligations for their employees. Since some of these obligations are unfunded, they entail future budget costs as pension income and lump sum entitlements become due.

[18] The projection of 0.28 per cent of GSP assumed 0.75 per cent per annum real growth in the average values of the concessions. The projection of 0.37 per cent of GSP assumed that average concession values rose in line with nominal GSP growth (sub. DR62, p. 7).

Accurately assessing future combined State expenses is difficult

Several factors limit accurate assessments of future superannuation expenses by Australian governments:

- Consistent long-run annual projections of superannuation expenditure for all Australian governments are not identified in published government budget papers. There are further difficulties in consistently comparing different State Government projections that are available due to different actuarial assumptions, the complications associated with sporadic capital injections and different terminology for superannuation accounting.
- Over long horizons, projected expenses are also subject to demographic and other uncertainties. For example, changes in mortality, morbidity, investment returns, workforce advancement and salary growth, retirement and resignation rates, and decisions about preservation and lump sum preferences affect the timing and magnitude of future expenses. Comparisons of various projections of superannuation expenses reveal significant revisions as a result of changes in assumptions about such factors (DoFA 2003).

Superannuation will provide fiscal relief in the longer run

Despite the difficulties in projecting expenses, it is likely that, over the long term, governments' superannuation expenses will decline as a share of GDP.

At present, there are around $130 billion in net unfunded superannuation liabilities held by Australian governments, representing around 15 per cent of GDP (table 10.7).[19] There are significant variations between jurisdictions in their obligations, varying from around 4 to 15 per cent of GSP or GDP. But in all jurisdictions, changes to superannuation funding arrangements for government employees means that superannuation expenses can be expected to generally fall over the next 40 years (with some jurisdictions experiencing initial rises before this fall).

[19] This stock represents the net present value of the future stream of superannuation entitlements, less the value of fund assets, less the current balance of any 'reserve' funds established by governments separate from the superannuation fund (as is the case for New South Wales, Tasmania and the ACT).

Table 10.7 **Unfunded superannuation liabilities, Australian governments, 2004-05**

General Government Sector

	Australian	*NSW*	*Vic*	*Qld*[a]	*WA*	*SA*	*Tas*	*ACT*	*NT*
	$m	$m	$m	$m	$m	$m	$m	$m	$m
Net unfunded liabilities	89 007	12 757	12 877	0	5 381	5 837	1 340	906	1 513
Net unfunded liabilities as % GSP or GDP[b]	10.4	4.2	5.9	9.2	5.7	10.9	9.7	5.3	14.7
Anticipated full funding date (year)[c]	unknown	2030	2035	2005	2013	2034	2018	2040	2060

a Queensland consolidates the superannuation assets and liabilities into its balance sheet, whereas for all other governments only the net unfunded liability of the (separate) superannuation funds are identified. The Queensland General Government Sector holds financial assets that are greater than total liabilities, and in that context, superannuation is considered to be fully funded. **b** There may be slight differences to government estimates because the Commission has used gross product estimates calculated for this study, as well as the same price deflator for all jurisdictions. **c** The target for the ACT is 90 per cent asset coverage rather than full funding.

Source: various Budget Papers.

Most governments intend to extinguish most or all of their unfunded liabilities by 2044-45 (box 10.2), based on two broad strategies:[20]

- closure of the main unfunded defined benefit schemes to new members, with new government employees, in a few cases, entering accumulation funds (as for private employees); and
- past (and proposed) capital injections from consolidated revenue either into a specific reserve fund or more directly into the superannuation fund.

The closure of defined benefit schemes will have a significant impact on superannuation expenses, though it will be slow to take effect, as many fund members will remain in active service for some time. For example, while the Commonwealth Superannuation Scheme was closed from 1 July 1990, there were still around 40 000 contributors at 30 June 2002. Several defined benefit schemes remain open, but these tend to be small and governments are providing capital injections to control the build up of net liabilities.[21] Despite these still intact defined

[20] Once the unfunded past service liabilities are extinguished, there will still be annual superannuation expenditure in respect of the compulsory 9 per cent superannuation guarantee and any employer productivity contributions under wage agreements. However, such expenditure will move largely in line with public sector salaries and public sector employment, which is unlikely to significantly exceed gross product growth.

[21] For example, without capital injections, the unfunded liability of the only open scheme in Western Australia was estimated to increase from $0.5 billion in 1997 to $2.3 billion by 2007 and

benefit schemes, it appears that a significant share of the outstanding liabilities for superannuation will be extinguished by 2044-45.

In this context, projected spending on superannuation expenses provide a modest source of fiscal relief for Australian Governments. Some idea of the size of the relief can be gauged from Australian Government superannuation expenses, which still account for the lion's share of total unfunded liabilities. The 2002 actuarial reports on the Australian Government's schemes project that annual superannuation expenses of the Australian Government will fall gradually from 0.58 per cent of GDP in 2003-04 to 0.40 by 2044-45 (figure 10.8).[22] The annual expenses are meeting benefits as they become payable and do not represent capital injections, that would otherwise confuse the picture. In this case, the simple 'difference measure' — 0.18 percentage points of GDP — is a reasonable indicator of fiscal relief for this level of government.

Given past advance funding by State governments and the closure of most defined benefit schemes, it can be expected that their combined superannuation expenses will also fall over the next 40 years. Future capital injections are also planned, which will further reduce their future superannuation liabilities. Such injections represent upfront fiscal costs that provide long run fiscal savings. In this instance, the fiscal savings apparent at a given year, such as 2044-45, do not reveal fiscal costs incurred in earlier years. In these cases, the simple 'difference measure' can be misinterpreted. For example, where governments had provided large capital injections early in the projection period, this would result in no or small expenditure requirements for superannuation expenses by 2044-45. This would suggest a bigger reduction in the fiscal pressure than that which took into account the necessity for early budgetary outlays to achieve this outcome. (A present (or future) value measure of fiscal pressure would overcome this problem).

In that context, a better, if rough, indicator of the fiscal relief in superannuation expenses likely for combined State Governments would abstract from future capital injections. A simple way of doing this is to consider the present size of superannuation liabilities of combined State Governments relative to the Australian Government. As State unfunded liabilities combined are around half that of the

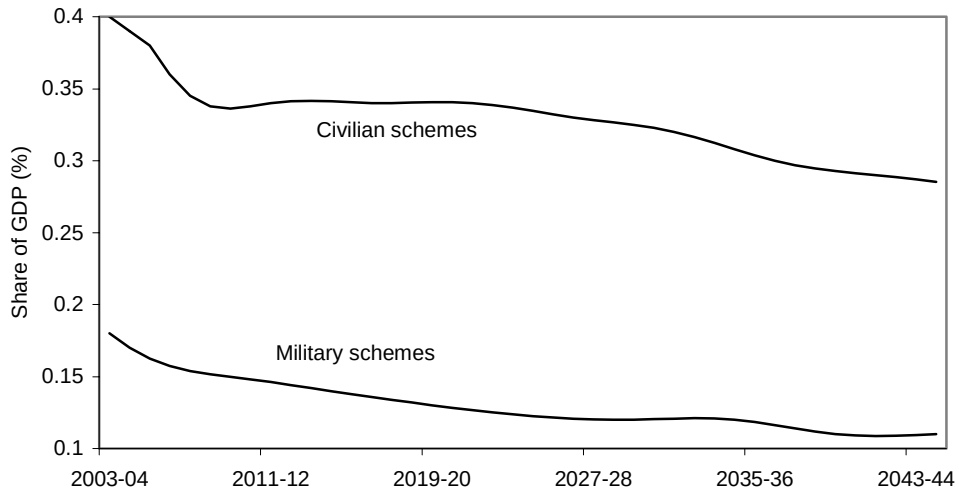
---

$15.8 billion by 2026 (1998-99 Budget Papers). However, as a consequence of budgeted injections of about $520 million announced in the 1997-98 and 1998-99 Budgets, the unfunded liability of that scheme was estimated to be effectively capped at around the then current level and be extinguished by around 2013. The unfunded liability of the other two schemes, totalling about $4 billion at the time was forecast to be kept in check by virtue of them being closed.

22 The Intergenerational Report found similarly small changes over a different projection period. They estimated Australian Government superannuation expenses would fall from 0.56 per cent of GDP in 2001-02 to 0.32 per cent by 2041-42. The differences in magnitudes reflects revisions in the assumptions used to generate expenses (such as different GDP growth assumptions).

Australian Government, a rough measure of fiscal relief is also around half that of the Australian Government — or about 0.1 percentage points.

Figure 10.8 **Australian Government superannuation expenses[a]**
As a share of GDP



a Data on projected Commonwealth employer costs to GDP are only published for selective years into the future. For example, Mercer Human Resource Consulting (2003) published estimates for 11 years from 2003-04 to 2041-42. The remaining years were interpolated and extrapolated by using a cubic spline fitted to the data. It should be noted that the actuaries used different GDP and real wage assumptions to the Commission, mainly reflecting different assumptions of real wage growth (1.5 per cent rather than 1.75 per cent per annum). These assumptions affect the projected expenditure stream and GDP by around the same amount, so that the ratio should still be a reasonably valid measure of pressure. Both the numerator and the denominator of the 5 per cent per annum in computing the actual expenses, while the Commission anticipates higher real wage growth. However, by expressing the expenses as a share of GDP, these differences in assumptions should make no difference, since a higher real wage growth figure would inflate both expenses and GDP by the same proportionate amount.

Data sources: Australian Government Actuary (2003) and DoFA (2003).

Of course, the figure could be higher or lower than this, depending on the exact time profile of expenses. The profile of payments needed to meet unfunded current lump sum and pension demands by retired government employees varies by jurisdiction For example, some defined benefits schemes for State and Territory employees are still open and others have closed only recently. Nonetheless, fiscal relief associated with declining superannuation expenses as a share of GDP is likely for combined State and Territory Governments, but will be small in magnitude.

Box 10.2 **Full funding targets and capital injections**

The New South Wales Government expects its superannuation entitlements to be fully funded by 30 June 2030, fifteen years earlier than anticipated when the funding plan was introduced in 1993. New South Wales began making capital injections into the General Government Liability Management Fund in 2002-03.

The Victorian Government aims for 100 per cent funding of superannuation liabilities by 2035 and expects to comfortably achieve this. The unfunded prior service cost is being funded by annual payments direct to the State Superannuation Fund. Over the past five years, the Government has made payments of about $1.8 billion more than originally budgeted.

The financial assets of the Queensland Government currently exceed the net present value of superannuation entitlements and, on that basis, superannuation liabilities are reported as already fully funded.

The unfunded liability of the open scheme in Western Australia was forecast in 1998-99 to be extinguished by around 2013. The unfunded liability of the two closed schemes is forecast to decline slowly without any additional funding.

The South Australian Government closed the principal defined benefit schemes in 1994 and commenced a program of cash payments to fully fund liabilities, which is currently expected to be achieved by 2034.

The Tasmanian Government's Fiscal Strategy set a target date of 30 June 2018 to eliminate the net unfunded liability for past service. A Superannuation Provision Account was established in 1994, to which the government makes annual payments, most recently of around $130 million.

The ACT Government's goal is for the assets of its Superannuation Provision Account, established in 1991, to be 90 per cent of the superannuation liabilities by 2040. Use of this account is legislatively limited to superannuation purposes only. The 90 per cent target recognises the potential movements in both assets and liabilities over this time frame. Annual budget injections are calculated on the basis of maintaining a constant level of real funding, which the Government says provides a measure of inter-generational equity.

The Northern Territory Government forecasts extinguishment of its unfunded superannuation liabilities by 2060. In 2002-03, there was a commitment to catch-up funding of $10 million each year, but this has been suspended while the Government reviews the impact of recent poor equity returns and significant change in other jurisdiction's treatment of liabilities.

The unfunded superannuation liabilities for the four main Australian Government schemes was estimated in 2002 to decline from about 12 per cent of GDP to around 8 per cent by the mid 2040s, in the absence of additional funding. This reflects closure of the two oldest and more costly schemes more than a decade ago. As part of the 2004 Federal Election, it was announced that a re-elected Coalition Government would establish a Future Fund out of future budget surpluses 'to increase national savings, offset unfunded superannuation liabilities and maximise the Government's net worth'.

Source: various Budget papers

11 Revenue

Key points

- Government revenues, as a share of GDP, are not as sensitive to ageing as expenditure.
  - This is because those factors that drive GDP are also the prime determinants of taxation revenue — keeping the two roughly in balance.
- Over the next 40 years, the ratios of Australian Government income taxes to GDP and of State payroll taxes to GDP are projected to stay the same.
- States' gambling taxes should also remain roughly constant as a share of GDP over this period, because while older people spend less than young adults, there will be proportionately more adults than at present, offsetting the ageing effect.
- The other major age-related State tax — conveyancing duties — is also subject to opposing effects. Older people move less often, reducing the number of transactions for a given stock of dwellings. But population ageing will also swell the total number of households, as average household sizes fall. Together with continuing real house price growth, that may result in conveyancing duties rising by between 0.05 and 0.46 percentage points of State GSP, depending on the jurisdiction.
- The States' GST revenues may decline as a share of GDP because tax-exempt consumption — particularly on private health care goods and services — is expected to grow. But the effect is modest, with a projected reduction in the ratio of GST revenues to GDP of around 0.3 percentage points.
- Total tax revenues for both the Australian and State governments are projected to remain roughly constant as a share of GDP.
- Overall, it is the expenditure consequences of population ageing, not its revenue implications, that are the fundamental source of the fiscal pressures associated with ageing.

Population ageing, together with other influences, will affect government taxation revenues as well as expenditure requirements. Both sides of government activity — revenue and spending — determine the net fiscal pressure experienced by different jurisdictions. Were the tax revenue to GDP ratio to rise sufficiently, this would offset the impacts of the increasing social expenditures associated with ageing, and concerns about the fiscal impacts of ageing would largely be misplaced. Conversely, were the revenue to GDP ratio to fall, then fiscal pressures would be accentuated. This chapter briefly considers the likely outcomes for ageing-related Australian and State government taxation revenue over the next forty years.

11.1 Relevant features of the tax system

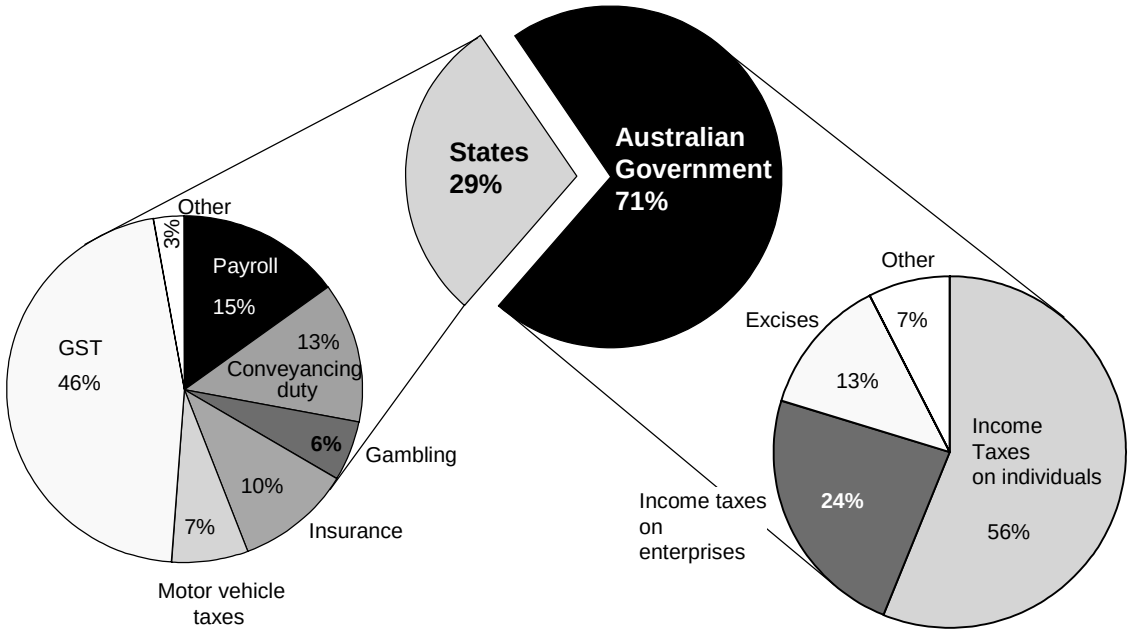
The Australian Government collects the bulk of taxation revenue in Australia. This is true even if the Goods and Service Tax (GST) is deemed a State tax (figure 11.1). Over the very long run, both the Australian and State governments have increased their taxation revenues as a share of GDP (figure 11.2). However, since 1971-72, the rate of growth of Australian Government tax revenue to GDP has increased only slowly (0.2 per cent per year to 2003-04). In contrast, and from a lower base, tax revenues to GDP have continued to rise steeply for States and local government, at around 2.3 per cent per year to 2003-04 (and by 1.7 per cent per year to 1999-00, the year before GST revenues were available to the States).

That said, probably the best overall perspective of taxation is the combined tax revenues from all levels of governments. This recognises that:

- Australian and State government finances are linked because of the importance of grants made by the Australian Government to the States (appendix F); and
- that responsibilities for various spending activities have shifted between different levels of government.

Such combined tax revenue has climbed at around 0.6 per cent per year over the last 30 years, but growth rates appear to be abating (figure 11.2).

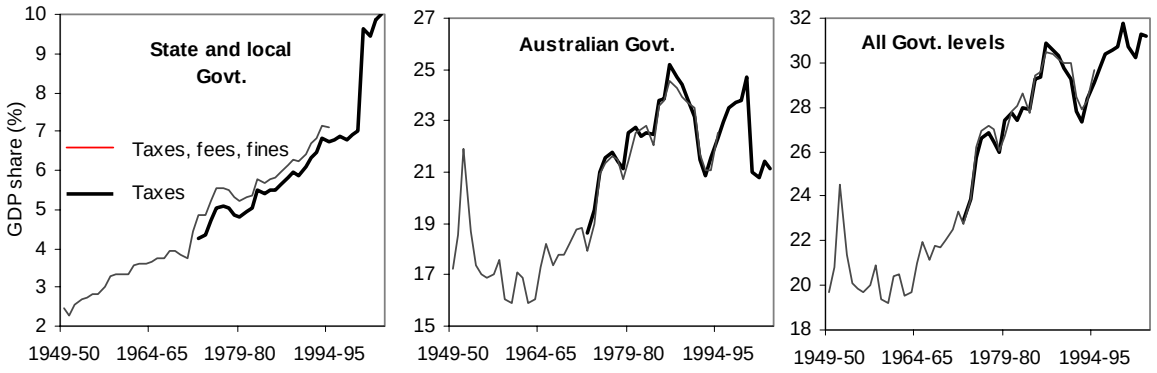
Figure 11.1 **Taxation revenue for the Australian and State Governments, 2002-03[a]**



a This excludes local government, which collected around $7 billion of property taxes in 2002-03. GST has been shown as a State tax. The Australian Government collects this tax, but fully passes it on to the States.

Data source: ABS (2004, *Taxation Revenue, Australia*, Cat. no. 5506.0, April).

Figure 11.2 **Taxes have risen relative to GDP over the long run, 1949-50 to 2003-04**



a The most recent data are primary and secondary taxes collected by each tier of government. The older series (from the Reserve Bank of Australia database and Foster and Stewart, 1991) are on a different basis, but is likely to illustrate tax rate trends over the long term. GST revenue has been treated as a State tax, which is why the ratio climbs abruptly in 2000-01 for State and local governments (and why correspondingly, the tax rate falls for the Australian Government). The State and local government data include property taxes collected by local governments.

Data sources: ABS (*National Accounts*, Cat. no. 5206.0); Foster and Stewart (1991); Reserve Bank of Australia database from Econdata.

11.2 Whither Australian Government taxes?

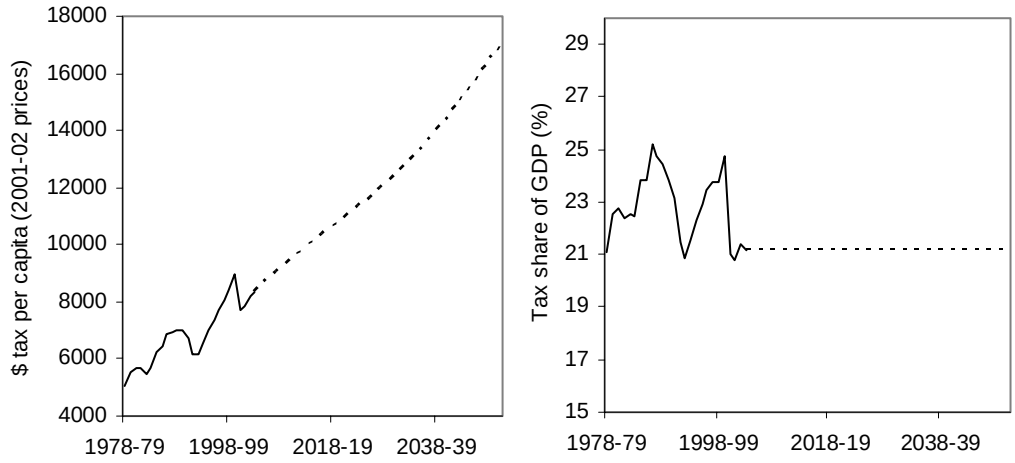
As noted by the Intergenerational Report (p. 53), it is common to project taxation revenue as a constant share of GDP. This approach has been adopted by the US Congressional Budget Office, the UK Treasury, the NZ Treasury and the Intergenerational Report itself. This method has the advantage of simplicity, but also reflects the fact that the same factors that determine GDP (labour supply, productivity and profits) also determine the revenue base that is the source of much taxation.

The Commission has adopted a similar approach for Australian Government taxation revenue. In the case of corporate income taxes, the underlying assumption is that tax rates remain unchanged — consistent with the 'no policy change' basis for this study. However, individual income taxes are more complex because of progressive tax scales. Unless the Government were to alter tax thresholds, inflation and real wage growth would place more personal income in higher tax brackets. Since real per capita incomes are projected to double by 2044-45, and nominal per capita incomes to increase by nearly fivefold over the same period,[1] no change in income tax thresholds would result in large increases in income tax as a share of GDP. Virtually all full time working taxpayers would be taxed at the highest marginal rate. This is not consistent with the Government's declared policy of maintaining taxes roughly constant as a proportion of GDP. Consequently, the underlying assumption that has been adopted for individual income taxes is that tax thresholds are indexed so that, overall, revenue does not rise as a share of GDP. It is assumed that excise and other Australian Government taxes also rise in line with GDP.

Consequently, the picture for trends in Australian Government tax revenue (figure 11.3) is identical to that of GDP, with the same (proportionate) ageing effects as described in chapter 5.

[1] Based on an assumption of 1.75 per cent productivity growth and 2.125 per cent long-run inflation rates (in line with Budget forward estimates).

Figure 11.3 **Australian Government tax revenue projections**



Data source: Commission estimates.

11.3 What about State taxation revenues?

With the exception of payroll taxes, the situation for State tax revenues is less straightforward. This is because population ageing may affect several revenue sources through mechanisms that are distinct from those influencing GDP. For example:

- spending on gambling is partly determined by age, so that gambling tax revenues may be affected as the age structure changes;
- certain expenditure classes — most notably health care — are exempt from the GST. As the population ages and demand for health-related goods and services rises as a share of total spending, GST revenues, as a share of GDP, may fall; and
- conveyancing taxes are a function of household formation, house price movements and the propensity to move — all of which are influenced by ageing.

It is less clear that other areas of State revenue (such as taxes on insurance, land taxes on commercial properties and motor vehicle taxes) are affected by ageing — and these are not analysed.

Payroll taxes

The structure of payroll taxes is complex, with a progressive rate structure based on payroll size, and exemptions for (small) businesses with total payrolls below a threshold (CGC 2003a). General government employees are excluded from assessment, as are defence personnel. Thresholds are periodically revised as inflation and real growth raise average payrolls.

Despite the complex nature of the tax arrangements, the ratio of payroll tax to total wages and salaries has been remarkably stable in aggregate for the States as a group (figure 11.4). It has been less stable for individual States. For example, there was a significant drop in the implicit tax rate in the Northern Territory after the late 1990s. However, there are no obvious long-term trends in implicit payroll taxes, suggesting that the best estimate of the future tax rate is the present one.

The underlying premises for using a fixed implicit rate for payroll tax revenue projections are:

- *no significant changes in the payroll size distribution of firms over the long run.* A shift away from small business to big business, for example, would tend to increase payroll tax revenues as the share of exempt payrolls declined. Historically, there has been an economy-wide shift towards smaller businesses.[2] Much of this past growth reflects structural changes in the private sector that have increased the importance of the (historically small-business dominated) service sector compared with goods-producing industries. However, it appears that the small business share of employment of the economy may fall in the future — against past trends. This reflects the fact that those industries with the greatest employment growth are now increasingly being dominated by bigger businesses.[3] Nevertheless, it is likely that any future changes in the size distribution of firms will have only second-order effects on payroll tax revenues, just as past shifts in favour of small business failed to erode payroll revenues;
- *no change in the relative importance of general government or defence personnel over time*. This is a reasonable assumption for all jurisdictions, except

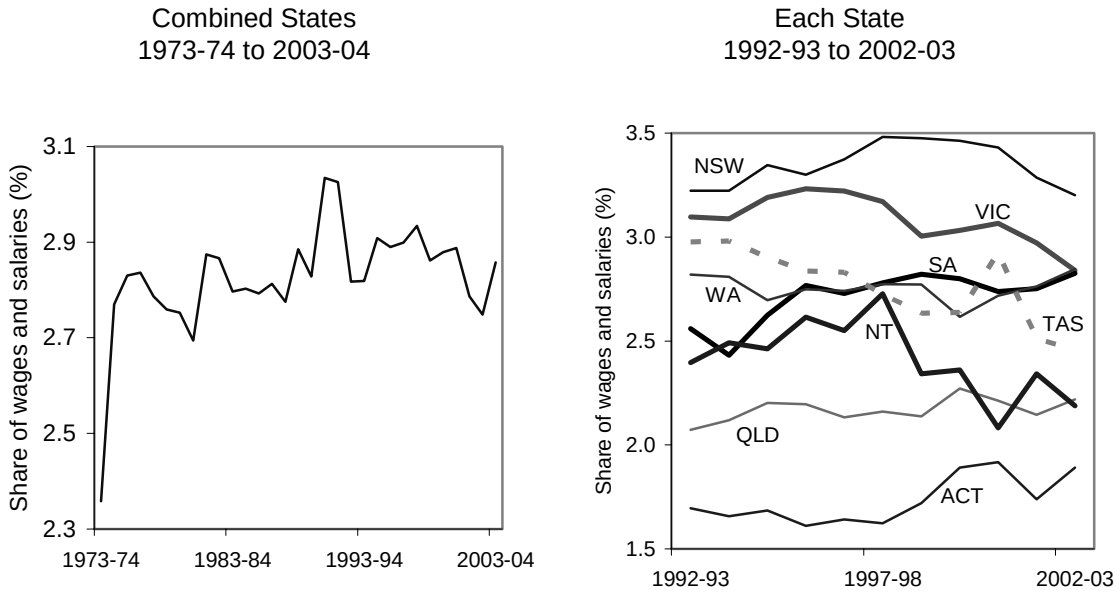
[2] So from 1983-84 to 2000-01, the share of employees in small business increased from 45.1 to 47.2 per cent (ABS 2002, *Small Business in Australia 2001*, Cat. no. 1321.0, p. 18).

[3] For example, the small business employment share of goods-producing industries has increased from 32.4 per cent in 1983-84 to 48.9 per cent in 2000-01, but the economy-wide employment share of these industries has fallen from 33 to 23 per cent over the same period. In contrast, the small business employment share of services producing industries has decreased from 51.4 per cent in 1983-84 to 46.7 per cent in 2000-01, but the economy-wide employment share of these industries has increased from 67 to 77 per cent over the same period (ABS 2002, *Small Business in Australia 2001*, Cat. no. 1321.0, p. 18).

perhaps, the Northern Territory and the ACT, where there is more risk that these shares will alter;

- *continued periodic indexation of thresholds for nominal growth in wages;* and
- *no change in average tax rates.*

Figure 11.4 **Implicit payroll tax rates**[a]



a Average (implicit) payroll tax rates were calculated by dividing payroll taxes by total wages and salaries.

Data sources: ABS (*National Accounts, National Income Expenditure and Product*, Cat. no. 5206.0; *Taxation Revenue Australia*, Cat. no. 5506.0).

Assuming a fixed ratio of revenue to wages and salaries, average payroll tax revenue can be projected for each jurisdiction and the combined States by:

- estimating (constant price) average wages and salaries for each jurisdiction to 2044-45, based on the labour supply estimates from chapter 3 and the assumption that average real wages grow at the underlying productivity rate of 1.75 per cent per year;[4] and
- applying the implicit payroll tax (from figure 11.4) for each jurisdiction for 2002-03 to projected wage and salaries.

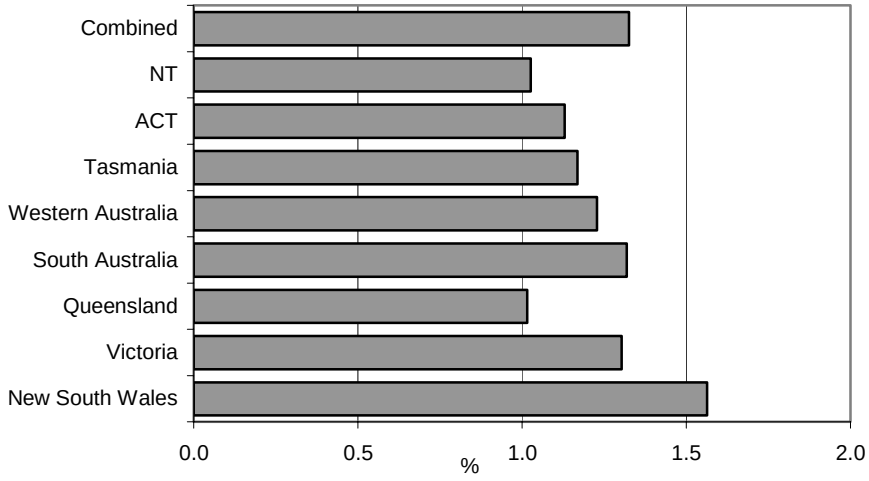
This is equivalent to assuming that payroll taxes stay fixed at their 2002-03 share of Gross State Product (GSP) for the period to 2044-45 (figure 11.5).[5] Since GSP

4 With the exception of the Northern Territory, where payroll taxes for Indigenous and non-Indigenous people are estimated separately and employ different assumptions about productivity growth.

5 Reflecting the method used to construct GSP.

grows at different rates across States, the combined States' payroll revenue to GDP ratio is not constant over the projection horizon. But the change is a small one, with the ratio falling by only 0.02 percentage points to 2044-45 (representing a fall in payroll tax revenue per dollar of GDP of under 2 per cent).

Figure 11.5 **Payroll tax revenue to GSP ratio, 2004-05 to 2044-45**



Data source: Commission estimates.

Goods and Services Tax

The Goods and Services Tax (GST) is now the single most important source of taxation revenue for States (figure 11.1). Various submissions by State governments highlighted the risks to this important source of revenue posed by the disproportionate growth of consumption items that are exempt from the GST.[6] There are several ways in which aggregate GST revenues may be affected by ageing.

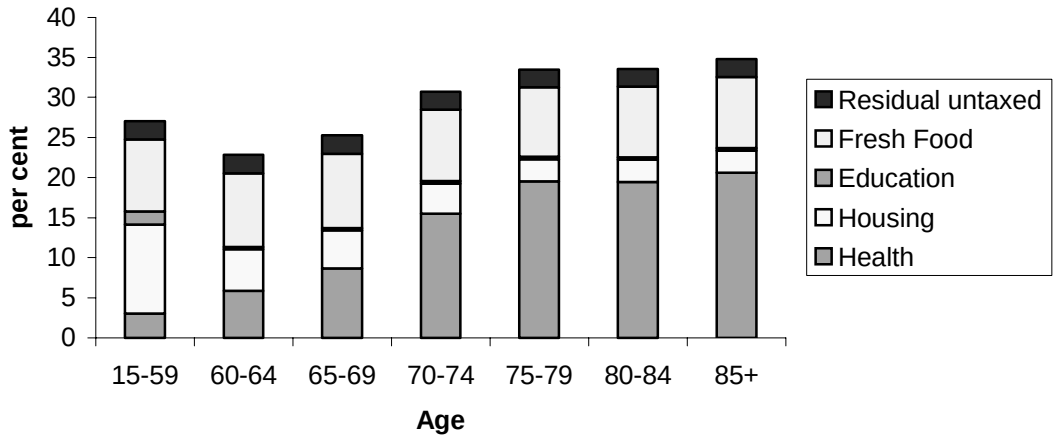
The importance of tax-exempt items

Some consumption items, such as health care, fresh foods and many educational goods and services, are exempt from taxation (Western Australian Government, sub. 39, p. 17). Indeed, GST-free items accounted for over 30 per cent of household consumption and nearly 20 per cent of GDP in 2003-04. Older people spend proportionately more on these exempt items than other groups (figure 11.6). For

6 For example, the Victorian Government (sub. 29, p. 36ff) and Queensland Government (sub. 17, p. 44).

example, about 28 per cent of consumption by people aged under 60 years is untaxed — most of this is expenditure on mortgages, housing rents and fresh food. In contrast, around 35 per cent of the consumption of those aged over 75 years is untaxed, mainly reflecting untaxed health expenditure.

Figure 11.6 **How important are GST-exempt items in people's spending?**
2003-04

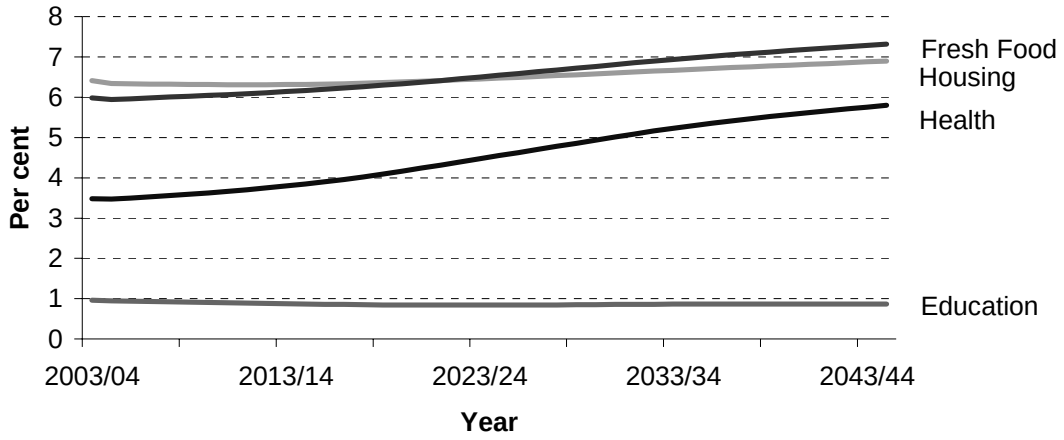


Data sources: ABS (*Household Expenditure Survey*, Cat. no. 6535.0); AIHW (2004); Commission estimates.

This pattern of expenditure by age, combined with the expected increase in the importance of health care spending, suggests that tax-exempt spending will rise significantly. The Commission estimates that tax-exempt spending will rise from 18.7 per cent of GDP in 2003-04 to 21.4 per cent of GDP by 2044-45 (technical paper 11). The main source of this change is increased private expenditure on health services, which will increase by about 2 percentage points as a share of GDP. The surge in private health expenditures, however, is partly offset by a reduction in tax-exempt consumption in education and housing. This reflects relatively fewer children in education and an increase in homeownership that reduces tax-exempt rents (figure 11.7).

The relative increase in tax-exempt private consumption implies (for a given savings rate) a decrease in the ratio of *taxable* consumption to GDP from 41.1 per cent of GDP in 2003-04 to 38.4 per cent by 2044-45. This would reduce total GST revenue from 4.11 per cent of GDP in 2003-04 to 3.84 per cent by 2044-45. This in turn represents a reduction in GST revenues of 0.27 percentage points of GDP or 6 per cent, much of which can be attributed to ageing. These results are similar to those suggested by jurisdictions. For example, the Victorian Government assessed a decrease in GST of 0.35 percentage points of GSP for that State (sub. 29, p. 36).

Figure 11.7 **Expenditure on tax-exempt items**



Data sources: Technical paper 11 and Commission estimates.

Will changes in saving rates affect GST revenues?

There is evidence that people tend to save more in the years leading up to retirement and then subsequently (partly) run down assets. Accordingly, savings rates may increase over the next few decades as more people shift into the pre-retirement years,[7] but then eventually fall as a greater proportion of the population reaches retirement age. This would imply a *long-run* increase in household consumption to GDP ratios associated with population ageing, with implications for GST revenue.

However, it is very difficult to measure precisely the extent of this effect.[8] Consistent national accounts data on consumption and GDP, collected since 1959-60,[9] fail to show strong evidence of lifecycle effects. For example, the average consumption to GDP ratio in the first seven years of the series was 0.598 (when younger people represented a much more significant share than older people). In the last seven years of the data to 2002-03 — when considerable ageing had occurred — the average consumption to income ratio was almost identical at 0.596. At times between 1959-60 and 2002-03, the private consumption ratio has

7 Fitzgerald (2004, p. 99), for example, projected increased savings associated with the demographic shift to more mature aged people, who have higher savings propensities.

8 While the literature on savings and consumption behaviour is voluminous, no consensus exists about long-run likely savings behaviour. The household data that are used to analyse the issue are often also flawed — such as standard ABS National Accounts' measures of household savings — because they ignore capital gains (or losses) in stocks of wealth as changes in household income (Australian Government Treasury 1999).

9 ABS (*National Accounts*, Cat. no. 5204.0).

dipped to as low as 0.55, but much of this probably represents savings in bad times, rather than life cycle effects.

That said, there is the *potential* for a significant change in consumption ratios in the future because the assets that will be available to older people are likely to be relatively very large. As noted by the Victorian Government (sub. 29, p. 38), on the basis of estimates by Kelly (2003), the future old will be asset rich. Around 50 per cent of the nation's family wealth is projected to be held by people aged 65 years or more by 2031, whereas currently this group only holds around 22 per cent of aggregate wealth. Much of this wealth is in owner-occupied housing and superannuation assets. Were a proportion of this to be liquidated to finance consumption (and clearly, at least superannuation assets will be run down), then, all other things being equal, the ratio of total private consumption to GDP would rise.

For every percentage point increase in the ratio of household consumption to GDP, around 64 per cent of this additional consumption would be on taxable goods and services.[10] Since 10 per cent of the amount is GST revenue, there would be a 0.064 per cent increase in the GST to GDP ratio.

However, a 1 percentage point increase in the household consumption to GDP ratio is relatively large, especially considering that present consumption to GDP ratios (and associated spending to household disposable incomes) are historically high. The maximum household consumption ratio in the past 50 years has been just 1.1 percentage points higher than the present ratio.[11]

It should also be noted that the dissaving observed among older people is less than is predicted in conventional lifecycle models. This is because many older people do not run down their assets significantly because:

- they wish to leave bequests; or
- they are uncertain about how long they have to live (encouraging prudence when liquidating wealth to fund present consumption); and
- have a significant share of their wealth locked into assets that are not (currently) fungible or that they are reluctant to borrow against — primarily owner-occupied dwellings.[12]

---

[10] Estimated by noting that under the base scenario, the ratio of taxable consumption to total consumption will be 38.6/(38.6+21.3) = 64.4 per cent in 2044-45.

[11] Based on data from the ABS (*National Accounts*, Cat. no. 5206.0).

[12] Cross-sectional data sets on wealth holdings show lower wealth among older people (for example, results from HILDA — Headey, Marks and Wooden 2004), but this is likely to represent the history of lower average lifetime wages for older people relative to younger groups, than evidence of dissaving per se. The NATSEM model of wealth among the future aged (Kelly

Some studies even show that older people can actually be net savers (for example, Börsch-Supan and Essig 2003 for Germany).

Overall, the degree of dissavings associated with ageing and the consequent positive effects on GST revenues, are probably not as large as sometimes conjectured. They have been ignored in the Commission's base case.

However, it is possible that the behaviour of the future old will be different from that of older people in the past. For example, new financial instruments and attitudes to their use may make it more favourable to sell equity in the owner-occupied home, and changing patterns of intergenerational altruism may reduce bequests.

The effects of these changes on aggregate consumption would not be as great as might initially be expected because the savings behaviour of older people and other generations are linked. For example, were old people to leave less bequests, the effects on aggregate consumption would partly be offset by greater saving (less consumption) by the young, in anticipation of less wealth from bequests in middle age. Nevertheless, the aggregate consumption ratio could be expected to rise. To take an extreme scenario, were the household consumption to GDP ratio to rise by 5 percentage points by 2044-45 (which would represent considerable liquidation of assets by older people to finance consumption), then the GST to GDP ratio would be 4.16 per cent — virtually unchanged from its present rate.

So the shift towards consumption of tax-exempt items that accompanies ageing is most likely to reduce long-run GST revenues slightly as a share of GDP. But if the savings behaviour of older people changes so that they consume more out of their income, such reductions are likely to be smaller or even possibly fully offset.

The effects on individual jurisdictions

Judgments about the future GST revenue to GSP ratios of individual States is complicated by horizontal fiscal equalisation (HFE) (appendix F) and South Australian Government, sub. 23, pp. 18–20). The actual GST tax revenues distributed to a jurisdiction are not determined by the amount of tax collected in that jurisdiction or by distributing equal GST revenue amounts on a per capita basis. Rather, the Commonwealth Grants Commission recommends distribution of GST revenue based on States' differential revenue raising capacities, service utilisation rates and costs. The socio-demographic characteristics of a State, including the

2003), shows greater wealth holdings among the very old (75+) than either 55–64 year olds and 65–74 year olds by 2031 (though this will depend on the underlying assumptions of that model about consumption behaviour among older people).

share of the population in older age groups, are important to these calculations. For example, the Northern Territory would generate around $412 per person in GST revenue in 2004-05, on an equal per capita basis, but under HFE, it will receive $1760 per person.[13]

Were the existing GST relativities — the weight given to each person in a State for the purpose of distributing the GST — to be fixed over time,[14] there would be quite marked changes in GST to GSP ratios for individual jurisdictions. For example, the Commission estimates that the GST to GSP ratio would decrease by around 0.8 percentage points for South Australia. However, as noted by the South Australian Government, the purpose of HFE is to take account of relative disadvantages of the States. Given ageing, the South Australian Government has forecast that its GST relativity will increase from around 1.2 in 2004-05 to about 1.35 by around 2040-41 (sub. 23, p. 21). This ameliorates the fiscal burden it would otherwise experience. All other things being equal, States that are more exposed to future fiscal pressures associated with ageing will receive greater distributions of the national GST revenue.

This facet of HFE means that there is little point in calculating the future distribution of GST among jurisdictions for the purpose of estimating ageing pressures at the State level. The ultimate distribution of the GST is effectively derived as a residual, with the objective that no State faces a greater degree of fiscal pressure from factors like ageing.[15]

Gambling taxes

Gambling taxes have played an increasingly important role as a revenue source for States, reflecting the strong growth of commercial gambling, particularly gaming machines, in many jurisdictions (technical paper 10). Unfortunately, there are limitations in available survey evidence on gambling expenditure by age. For example, the ABS Household Survey, the best survey of overall spending patterns by households, is not suited to estimation of this particular spending category. It

[13] Largely reflecting the budgetary disadvantages to that State arising from a substantial Indigenous population (Australian Government Treasury 2004, p. 11).

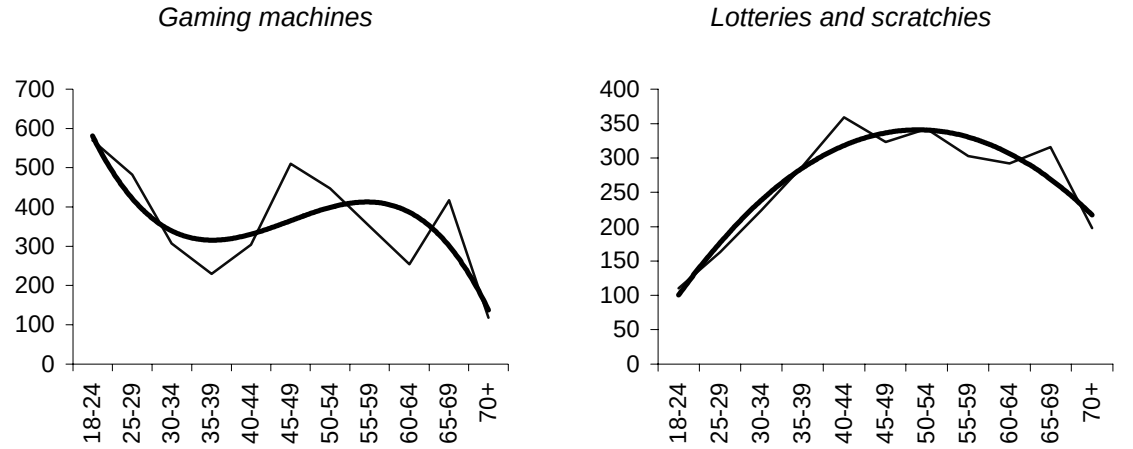
[14] And were States' shares of health care grants from the Australian Government also constant over time.

[15] The Tasmanian Government (sub. DR69, p. 5) noted that HFE was an imperfect process and that the objective of equalisation might not be fully met. This is a source of additional fiscal risk for individual jurisdictions. These risks cannot readily be enumerated given the complexity of the models used by the Commonwealth Grants Commission and the fact that they are adapted over time.

severely underestimates total gambling, and is not a reliable basis for examining the relationship between age and gambling expenditure.

However, more reliable data are available. As part of its 1999-2000 inquiry into gambling, the Commission conducted a special-purpose survey of gambling alone, geared to collecting detailed gambling expenditure data, as well as other aspects of gambling behaviour. This data revealed that, overall, gambling spending is highest for the young, is fairly flat until retirement and then falls significantly for subsequent ages (technical paper 10). However, the story for individual gambling forms varies. Gaming machine spending follows that of aggregate spending, but that on lotteries, for example, suggests more spending by the middle-aged than any other age group (figure 11.8).

Figure 11.8 **Different games have different age appeal**



Data source: Technical paper 10 and Commission estimates based on its Survey of Gambling (PC 1999a).

Two offsetting demographic factors influence spending on gambling in the future.

- Firstly, there are statutory bars on gambling by minors, so that the relevant age group for gambling expenditure is (predominantly) adults. The adult share of the population is expected to increase over the next 40 years for all jurisdictions. This will increase the proportion of the population that gamble and (all else equal) result in an increase in gambling expenditure to GDP.
- Secondly, the share of population in older age groups, is projected to increase. This will offset increasing gambling expenditure to the extent that older age groups continue to have a lower propensity to gamble.

In most jurisdictions, the ageing effect outweighs the 'adulthood' effect, so that gambling expenditure and revenue is projected to fall over time as a share of GSP — albeit by very modest amounts (table 11.1). In contrast, in the Northern Territory the adulthood effect outweighs the ageing effect, explaining the (small) rise in

spending to GSP. In Western Australia, the two effects effectively cancel each other out and there is a slight increase in gambling revenue to GSP. However, the underlying mechanism is somewhat different from other jurisdictions. This State has a stronger reliance on revenue from lottery gambling, in which older gamblers spend more than the young.

The Victorian Government found a greater responsiveness of gambling revenue to ageing than these results — though still small in an absolute sense. They projected an increase in gambling revenue to GSP of around 0.11 percentage points for Victoria (sub. 29, p. 37), in comparison with a decline of 0.02 percentage points identified by the Commission. However, the basis for the Victorian Government's result is different since the consumption data on which their projections are built show an increasing propensity to gamble with age.

Table 11.1 **State revenue from gambling, projections**
Per cent of GSP

Jurisdiction	*2002-03*	*2044-45*	*Change*
	%	%	Points
New South Wales	0.48	0.47	-0.01
Victoria	0.68	0.67	-0.02
Queensland	0.49	0.48	-0.01
South Australia	0.70	0.68	-0.03
Western Australia	0.28	0.28	0.00
Tasmania	0.58	0.55	-0.03
Northern Territory	0.39	0.41	0.02
ACT	0.32	0.31	-0.01
All jurisdictions	**0.52**	**0.50**	**-0.03**

Source: Technical paper 10.

Conveyancing revenue

Conveyancing revenue is raised through stamp duties imposed on the value of property purchased. It is a transactions-based tax — duty is payable when a transfer of ownership occurs. Arrangements between the States are similar, with each jurisdiction operating a tiered rate structure, with increasing marginal rates (technical paper 9). As in the case of payroll taxes, the revenue collected would rise as a share of each State's GSP, were the various thresholds to be left at their present levels. Such a setting would be untenable over the long term. Accordingly, the Commission's projections assume indexation of the thresholds, so that the average stamp duty tax rate is fixed over time.

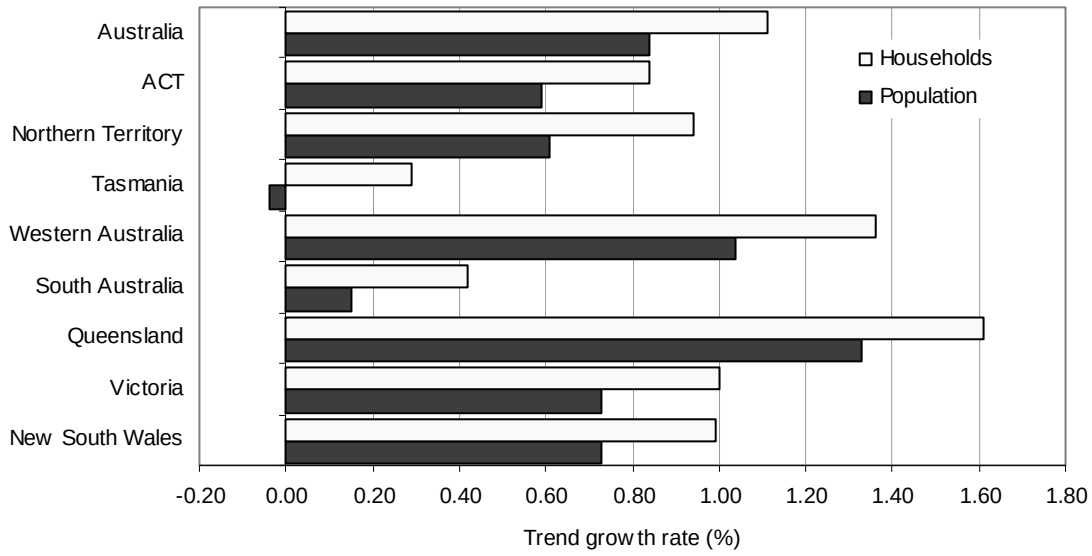
Ageing has several, offsetting, impacts on conveyancing revenue. Demographic change directly affects the number of dwellings and potentially their prices, while the lower mobility of older people affects the volume of transactions. It is the combination of these three factors — dwelling numbers, price and transaction rates — that, with the assumption of a fixed stamp duty rate, determines overall conveyancing revenues.

Dwelling numbers

Demographic change affects average household size and, through that, the number of dwellings in Australia. The Commission developed projections of future household numbers for every jurisdiction to 2044-45, based on the propensity of people of different ages and genders to belong to 15 different living arrangement types (such as a child in couple family, a female lone person, and a group household member). The projections incorporate slow changes in living arrangement propensities over time, as past ABS Census data reveal that some living arrangements are becoming more common (for example, as a result of family breakdown). These propensities were combined with changing population numbers and age structures to give detailed estimates of total household numbers. These showed that household numbers would rise faster than population numbers (figure 11.9), a process accentuated by ageing (technical paper 9).[16]

16 The trend rate of growth of households is projected to be around 1.1 per cent per annum for Australia from 2003-04 to 2044-45. In the absence of population ageing, this would be reduced to around 0.67 per cent per anum.

Figure 11.9 **Household growth will outpace population change**
Trend growth rates, 2003-04 to 2044-45



Data source: Technical paper 9.

Ageing tends to increase household formation for a given population because aged households are much more likely to be either a couple or a lone person household (and particularly a lone woman). For example, lone person households are projected to double over the 40 year projection period.

Dwelling prices

A forty year projection of house prices is clearly speculative. It is not appropriate to use recent historical trends, since these are too influenced by short-run factors that will not persist. Over the long run, factors such as household income, household formation and supply constraints are likely to be the main determinants of prices (assuming no policy changes in taxation or general urban regulations).

- On the basis of other projections in this study, per capita GDP growth is likely to be somewhat lower than in the past — reflecting slower labour supply growth. This suggests less buoyant household income trends.
- Household formation will also slow. This does not contradict the findings about the effect of ageing on household numbers — ageing increases household formation for a *given* population. But future population growth will be much slower than in the past. Using the PC-M population projections, the Australian population will be growing at less than half its present rate by the mid 21st century and by less than one fifth of its present rate by 2101.

- But Australia's biggest cities — particularly Sydney and Melbourne — will still come under population pressure because populations and households will still grow. Since people often wish to live centrally within cities, these population pressures, combined with obstacles to higher density housing and re-zoning, suggests increasing supply constraints that will influence the prices of established homes.

The future of house prices is the product of this cocktail of influences, some pushing prices below the long-run average rate of increase, and some above it. In the absence of a reliable model of house prices, the Commission has been guided by the Australia-wide long-run real price trend. Since 1970, real prices for detached houses in Australia have grown at around 2.3 per cent per annum (PC 2004a) — and this is the figure generally used in the projections that follow. This trend rate is more likely to pick up the fundamental drivers of house prices than recent trends.

The national growth rate has been employed in projections for all jurisdictions, with the exception of Tasmania and South Australia. In these jurisdictions the long-run historical data reveal persistently lower rates of real price growth than those experienced in other jurisdictions. These jurisdictions are also projected to experience lower growth rates in household formation than other States. Indeed, household numbers actually decline after 2034 (Tasmania) and 2040 (South Australia). This suggests a lower rate of house price growth for these States. The Commission has used 1.2 per cent growth for non-capital city areas and 1.8 per cent growth in the capital cities, though these are clearly speculative estimates.

Transactions

While population and household growth remain the most important determinants of total transactions, some household types are much less likely to move than others. The Commission modelled the likelihood of moving for each of 13 age groups, for each jurisdiction, and by type of purchase (with altogether 273 purchase-rate likelihoods being estimated). In particular, older people move significantly less often than others (figure 11.10) — a factor considered by several State governments (Queensland Government sub. 17, p. 43 and Victorian Government sub. 29, p. 37) as likely to reduce overall dwelling transactions.

Indeed, it was this factor that was seen by the Victorian Government (sub. 29, p. 37) as central to its finding that stamp duty would fall by 0.19 per cent of GSP:[17]

[17] Part of the reduction in stamp duties shown in the Victorian Government submission reflect the abolition of financial institutions' transactions taxes by 2005 (as part of the Inter-Governmental Agreement). Accordingly, the housing stamp duty revenue decline is less than 0.19 percentage points.

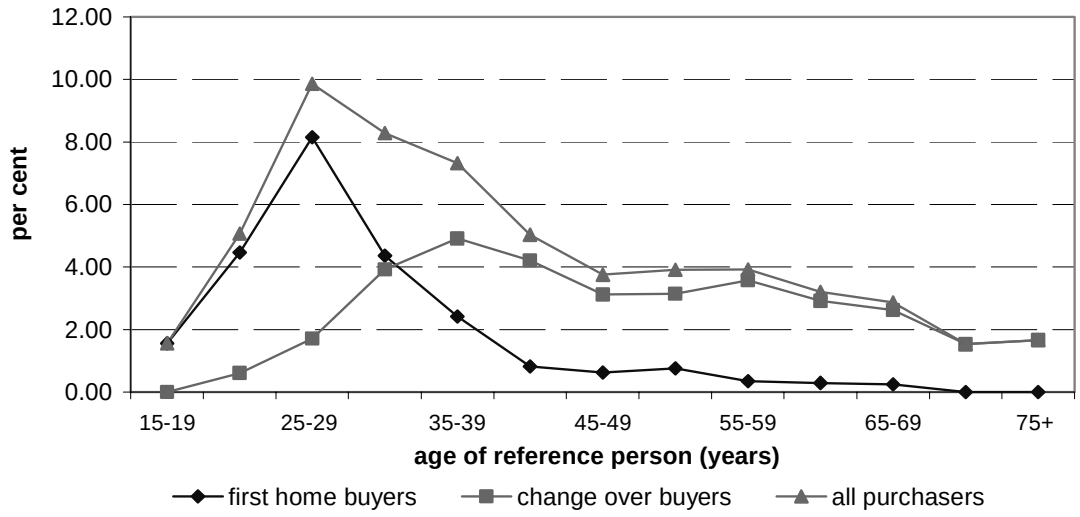
> The projected decline in revenue … arises because population ageing is expected to reduce both the rate of housing turnover and dwelling investment over the next few decades. This arises as retirees are less likely to move house and there is a smaller share of young families in the population buying houses. These effects are expected to more than offset falling average household size.

The net impacts on conveyancing revenue

Ageing increases household formation (for a given population), but decreases the number of transactions for a given number of dwellings. These patterns, combined with the assumed growth in real long-run property prices over the next four decades, results in small overall increases in conveyancing duty as a share of GSP by 2044-45 — even for the most ageing States, South Australia and Tasmania (figure 11.11). The most important underlying reason for this outcome is the assumption that house prices will continue on average to rise at rates higher than real per capita GSP (as they have done over the long run). Were house prices to rise by around 1.6 per cent per annum — then conveyancing duty would be roughly fixed as a share of GSP for most jurisdictions. Lower growth rates would result in a contraction of the conveyancing revenue to GSP ratio.

Figure 11.10 **Who are the buyers, 1999 to 2001?**

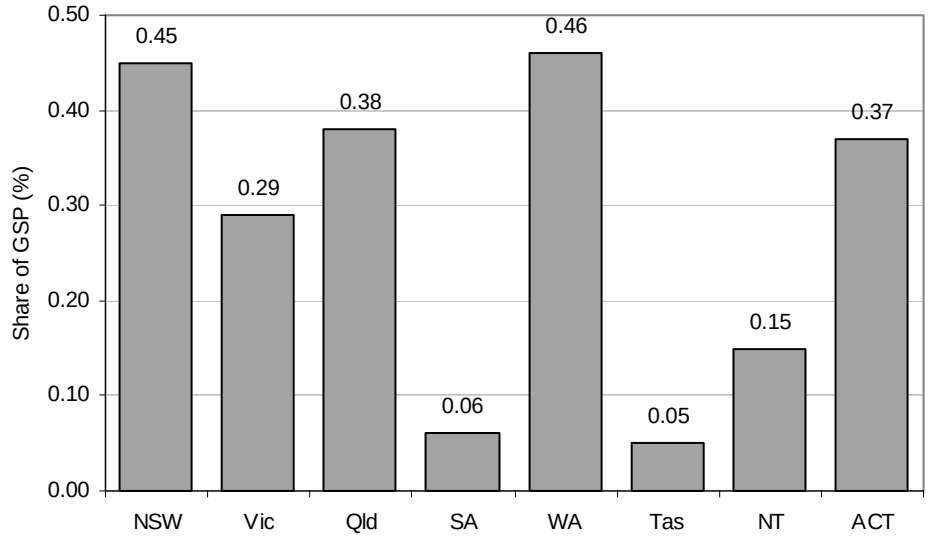
Proportion of households who purchased a home by age of reference person (average within a year)



Data sources: ABS (unpublished data from the Surveys of Income and Housing Costs 2001); Commission estimates.

Figure 11.11 **Conveyancing revenue rises modestly as a share of States' gross product, 2002-03 to 2044-45[a]**

Change in revenue to GSP



a The results for the Northern Territory are regarded as more unreliable than other jurisdictions (Technical paper 9).

Data source: Technical paper 9.

11.4 Summing up

As a share of GDP, government revenues are not as sensitive to an ageing population structure as expenditure. This is because those factors that drive GDP are also the prime determinants of revenue — keeping the two roughly in balance. Some State government taxes may decline as a share of GDP — such as GST revenue — but the effect is not large, and is offset by a projected increase in conveyancing revenue. Overall, it is therefore the expenditure consequences of population ageing, not its revenue implications, that are the fundamental source of the fiscal pressures associated with ageing.

12 Local government and regional impacts

Key points

- There is wide variation in demographic change at the regional level.
  - Coastal areas, in particular, already have higher concentrations of older people and are projected to 'age' rapidly.
- Although local government is not the main provider of health and aged care services, provision of human services comprises around half of local government expenditure.
  - Ageing of the population will place increasing pressure on expenditure.
- Municipal revenue is unlikely to increase at a greater rate than the growth in GDP.
- Accordingly, in common with other levels of government, there is likely to be an emerging fiscal deficit at the local government level under current policy settings.
- Labour shortages in certain professions in rural and remote areas are likely to be exacerbated by ageing.
  - This reflects entry barriers and insufficiently attractive wages and conditions.

There is significant variation in the extent of population ageing among States. The disparities are even wider at the local government and regional levels. This chapter provides a perspective on ageing at the regional level and considers the economic implications of demographic change for local government and regions.

12.1 Demographic change at the regional level

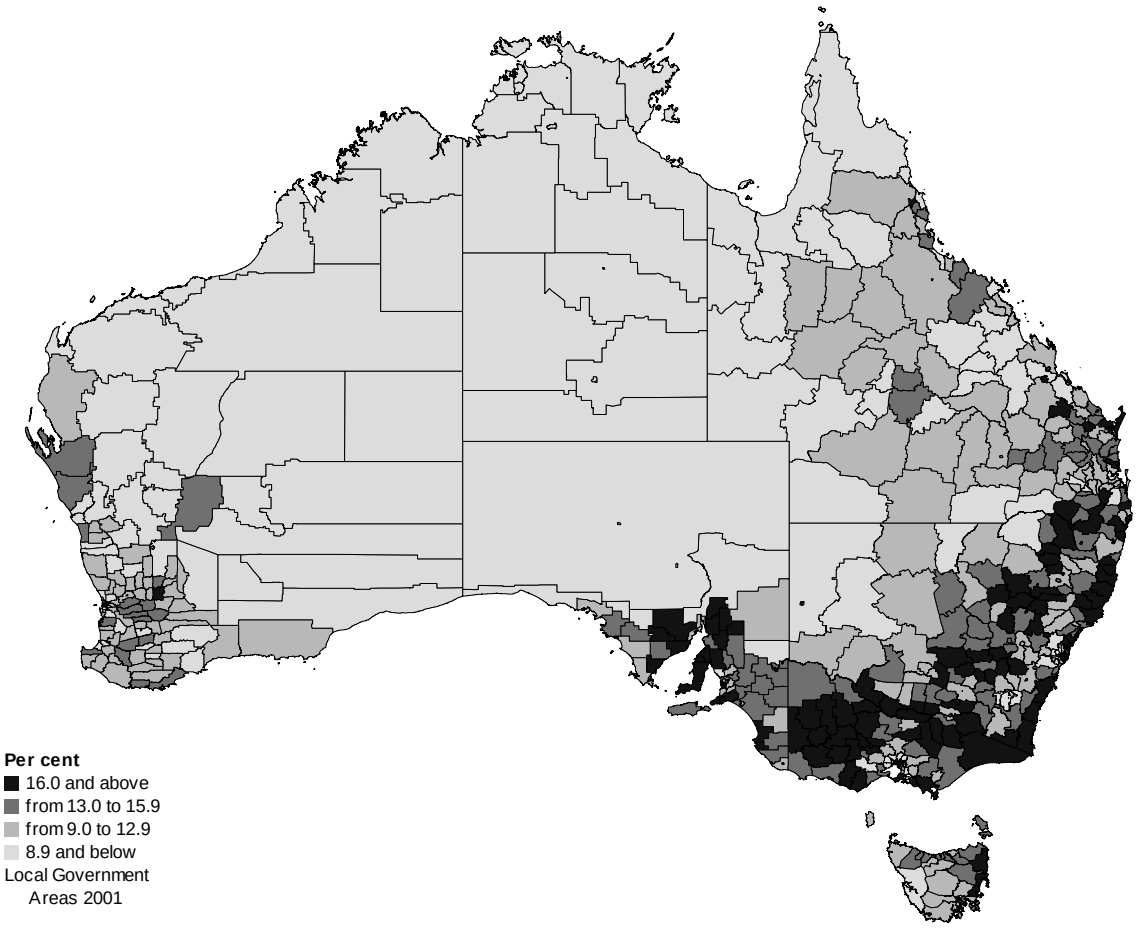
The Commission analysed demographic change at the regional level using ABS Census data from 1981 and 2001.

The dispersion of the population share of over 65 year olds across statistical local areas is wide. It ranges from 30.9 per cent in Victor Harbour (a coastal town near Adelaide) to below two per cent in a number of statistical local areas in the Northern Territory and the Pilbarra region in Western Australia. There is a

relatively high concentration of the elderly along eastern Australia stretching from southern Queensland into South Australia (figure 12.1).

To better understand broad trends in regional ageing, regions have been divided into eight broad categories, ranging from inner-metropolitan to non-urban remote (box 12.1).

Figure 12.1 **Proportion aged 65 and over in 2001**



Data source: ABS (unpublished data from Census 2001, local government areas).

Box 12.1 **Regional categories**

The 1251 statistical local areas in Australia have been grouped into the following categories:

- metropolitan cities — inner suburbs;
- metropolitan cities — outer suburbs;
- urban coastal cities;
- non-urban coastal areas;
- inland cities;
- inland rural areas;
- cities in remote regions; and
- non-urban settlements in remote regions.

Metropolitan cities cover Sydney, Melbourne, Brisbane, Adelaide, Perth and Canberra. About half the population living in these cities were allocated to 'inner' suburbs and the rest to 'outer' suburbs, depending on distance from the CBD.

Urban areas cover only cities with a population above 20 000. Smaller towns are classified as non-urban areas. The non-urban inland areas correspond to what is commonly referred to as the wheat-sheep pastoral zone.

Remote regions cover the Northern Territory, the desert and semi-desert areas in western New South Wales, western Queensland, northern South Australia, eastern Western Australia, as well as coastal areas north-west of Cairns in Queensland and north of Geraldton in Western Australia. These remote areas are characterised by sparse population and the importance of mining and grazing. Cities in remote regions include Darwin, Alice Springs, Broken Hill, Mount Isa, Kalgoorlie and Roebourne.

Categorisation of statistical local areas is not always clear cut. For example, areas such as Redcliff, Caboolture and the Gold Coast could be classified as outer suburbs of Brisbane or as coastal urban regions.

Table 12.1 shows the proportion of over 65 year olds in each category and the share of these regional categories in the national population. The share of people aged over 65 increased substantially in all regional categories between 1981 and 2001. The heaviest concentration of the elderly in 2001 occurred in coastal regions (both urban and non-urban), followed by metropolitan inner suburbs and then by inland regions (rural and urban). Ageing was less pronounced in metropolitan outer suburbs and remote regions. A similar pattern already existed in 1981, but the disparities between regional categories have widened as the overall share of the aged population increased.

Table 12.1 **The population share of over 65 year olds across regions, 1981 and 2001**

	Share of over 65 year olds in 1981[a]	*Share of over 65 year olds in 2001*[a]	*Share of over 65 year olds – change between 1981 and 2001*[a]	*Category share in national population 2001*
	%	%	%	%
Metropolitan inner suburbs	11.6	14.1	2.4	30.3
Metropolitan outer suburbs	6.2	9.9	3.7	30.6
Coastal non-urban	11.1	15.4	4.4	6.8
Coastal urban	10.9	14.5	3.6	15.9
Inland rural	9.6	13.9	4.3	9.7
Inland urban	10.0	13.3	3.3	4.4
Remote other	5.3	6.7	1.4	1.4
Remote urban	5.0	6.2	1.1	1.0
Total	**9.4**	**12.7**	**3.3**	**100.0**

a Weighted average according to statistical local area population in 2001.

Source: ABS (unpublished data from Census 1981 and 2001, statistical local areas).

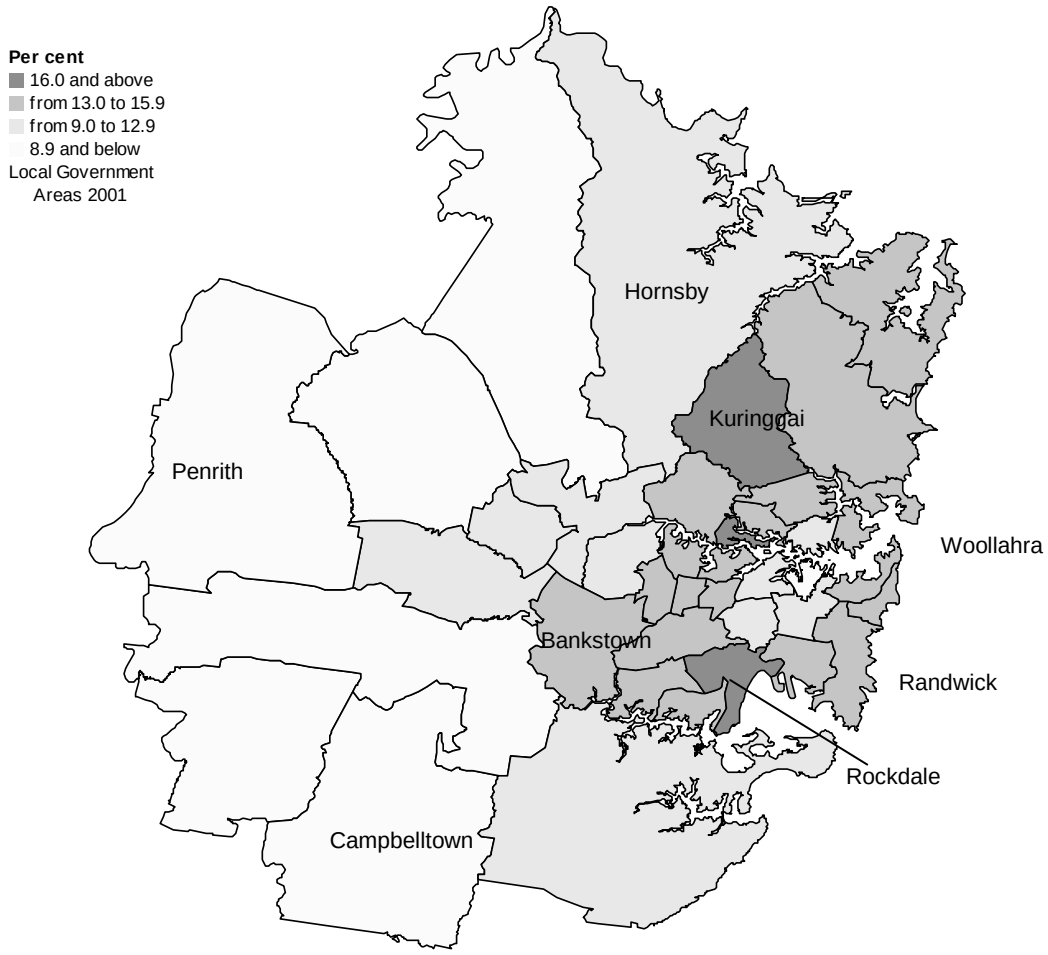
In metropolitan inner suburbs close to the CBD, the proportion of the elderly tends to be relatively low. But it becomes considerably higher in the outer ring of inner suburbs, usually located more than 5 km from the CBD. Figure 12.2 — based on 2001 Census data — illustrates this phenomenon in the suburbs of Sydney, as well as the systematic differences in the concentration of the elderly between inner and outer suburbs. The reason why many elderly prefer not to live close to the CBD is a matter for conjecture — it might be related to high real estate prices, traffic congestion and other urban pressures.

The relatively low proportion of aged people in metropolitan outer suburbs could reflect their 'mortgage belt' status, being heavily populated by recent homebuyers, such as young families and recent immigrants of working age.[1]

The share of elderly is also low in remote regions. In remote regions, life expectancy is below the national average, reflecting the larger proportion of Indigenous people. Moreover, mining and grazing industries in these regions tend to attract younger people and older people tend to leave these regions upon retirement, often seeking better medical and other facilities.

1 Some coastal areas, which are categorised as metropolitan outer suburbs, such as the Mornington Peninsula near Melbourne and Victor Harbour near Adelaide, have exceptionally high concentrations of over 65 year olds.

Figure 12.2 **Proportion aged over 65 in Sydney statistical local areas in 2001**



Data source: ABS (unpublished data from Census 2001, local government areas).

The effect of internal migration and natural growth

The Australian Local Government Association (ALGA, sub. 18, p. 15) noted that internal migration has a significant impact on the age structure of regions. Defying national trends, some regions are becoming younger, either because they are gaining relatively more young people or losing relatively more older people. The opposite is also the case; some regions are ageing through gaining relatively more older people or losing relatively more younger people (table 12.2).

Table 12.2 **Effects of internal migration on population ageing, 1996 to 2001**

Becoming younger	
Gaining young and working age, losing seniors	Brisbane City, Sydney Outer North, Darwin, Melbourne West
Gaining young, losing working age and seniors	Melbourne Inner, Adelaide Central, Perth Central, Global Sydney, ACT, Melbourne North, Melbourne South, Melbourne East, Sydney Inner West, Adelaide Plains, Qld North
Losing young and working age, losing seniors more	WA Pilbarra-Kimberley, NT Lingiari, Sydney Mid West, Qld North West, Sydney South
Balanced	
Balanced gains	Perth Outer North, Perth Outer South, Qld Gold Coast
Balanced losses	Sydney Outer West
Becoming older	
Gaining young and working age and seniors more	NSW Central Coast, Brisbane North, Qld Sunshine Coast, WA Peel-South West, NSW Illawarra, NSW Hunter
Losing young, gaining workforce age and seniors	Adelaide Outer, Vic Loddon, Melbourne Westernport, Vic Central Highlands, Vic Barwon, Vic Goulburn, Vic Ovens-Hume, NSW South-East, NSW Mid North Coast, NSW Richmond-Tweed, Sydney Outer South West, Qld Wide Bay-Burnett
Losing young and workforce age, gaining seniors	Tas North, Tas Hobart-South, Vic Gippsland
Losing young and middle aged, losing seniors less	WA Gascoyne-Goldfields, WA Wheatbelt-Great Southern, SA Eyre and Yorke, SA Murraylands, SA South East, Vic Mallee-Wimmera, Vic West, Tas North West, NSW Murray, NSW Murrumbidgee, NSW Central West, NSW Far and North West, NSW North, Qld Pastoral, Qld Far North, Qld Mackay, Qld Fitzroy, Qld West Moreton

Source: ALGA (sub. 18, p. 15).

The Commission analysed inter-regional migration using Census data. Although information on movements of the elderly between regions is not directly available, the Census data for 1981 and 2001 can be decomposed into 'natural' growth and net migration flow for each statistical local area.

The starting point for the natural growth calculation is the age profile of each statistical local area in 1981. By applying the national average death rate corresponding to each age bracket and the national average birth rate of each female age bracket over the 20 years from 1981 to 2001, the theoretical size of each statistical local area population and its age profile that would have occurred in 2001

if there was no migration into or out of the region can be calculated. The projected changes can then be compared with actual changes; the difference representing the effect of regional migration. This is made up of internal migration plus net immigration from abroad; but, there is, insufficient information in the data to identify separately these two components. The estimated overall effect of migration on regional population growth and changes in the age profile is shown in table 12.3.

Table 12.3 **Regional demographic change between 1981 and 2001**

	Total population growth[a]	*Net migration (total population growth less natural growth)*[b]	*Share of over 65 year olds — difference between actual and expected*[b]	*Main reason for migration-induced change in share*
	%	%	%	
Metropolitan inner suburbs	8.0	-1.7	-1.5	Old out
Metropolitan outer suburbs	51.6	32.1	-1.1	Young in
Coastal non-urban	39.6	28.9	0.6	Old in
Coastal urban	46.5	34.8	0.2	Old in
Inland rural	10.9	-1.7	0.4	Young out
Inland urban	24.2	9.9	0.5	Old in
Remote other	7.5	-13.2	-3.7	Old out
Remote urban	8.0	-14.6	-3.9	Old out
Total national	**27.6**	**14.1**	**-0.8**	**Young in**

a All ages. **b** Weighted average according to statistical local area population in 2001.

Source: ABS (unpublished data from Census 1981 and 2001, statistical local areas).

The second column in table 12.3, net migration, shows estimated total population growth that can be attributed to migration in the eight regional categories. It is calculated by taking away from total population growth the estimated increase due to natural growth. The third column shows the difference between the actual proportion of over 65 year olds in 2001 and the expected proportion based on natural changes (birth and death) alone. This difference reflects the effect of migration on the age profile, specifically its impact on the share of over 65 year olds.

Based on the relationships between net migration and the share of over 65 year olds in the population (box 12.2), the main reasons for the migration-induced effect on the age structure are as follows.

- **Inland rural areas** recorded a migration-induced increase in the share of over 65 year olds, accompanied by net emigration, indicating that most older people tended to stay while many younger people left.

Box 12.2 **Interpreting the relationship between expected and actual migration between regions and the ageing of regions**

Internal migration can cause a region to age in two ways.

- If the region receives a large influx of older people then the share of over 65 year olds will tend to rise.
- If more younger people tend to leave the region than older ones, the effect will be also to increase the share of over 65 year olds.

While available data do not directly provide information on the size and age distribution of regional migration, the main reason for the migration-induced change can be inferred by combining information on estimated total net migration with the estimated change in the share of the elderly caused by migration.

- In a region with an above expected level of net migration, a below expected increase in the share of the elderly indicates that the net migration is mainly attributable to the inflow of younger people. Conversely, if that region had an above average increase in the share of the elderly it would be attributed to a disproportionately strong inflow of older people.
- In a region which experienced negative or below average migrant inflow, an above average increase in the share of the elderly can be attributed mainly to the emigration of younger people. Conversely, a below average increase in the share of the elderly indicates in this case a disproportionately strong emigration of older people from the region.

The third column (which represents the migration-induced change) in table 12.3 shows that migration had a positive effect on the share of over 65 year olds in the two coastal and the two inland regions but had a negative effect in the two metropolitan and two remote area regions.

- **In metropolitan inner suburbs**, there was also lower than expected population increase (emigration), but the share of over 65 year olds is significantly lower than would be expected on the basis of natural growth. This finding suggests that older people tended to leave inner suburbs during the 1981–2001 period. Detailed examination of the statistical local area data indicates that the emigration of older people from inner suburbs was usually strongest for suburbs close to the CBD.
- In **outer metropolitan suburbs**, there was also a negative variation between the actual and expected share of over 65 year olds. Given the above average population flow into outer suburbs, it appears that the below expected increase in the share of the elderly was caused mainly by an influx of younger people into

these suburbs from other areas and overseas migrants (a group with a low average share of over 65 year olds).[2]

- **Inland urban regions** recorded population growth only slightly below the national average, but the change in the share of over 65 year olds was well above the theoretically expected. This indicates that these cities received some immigration of older people during the study period, possibly in order to benefit from better developed facilities (for those from rural areas) or in order to benefit from lower cost of living (particularly housing) for those from metropolitan areas.
- **Remote regions** recorded significantly lower growth than expected on the basis of natural increase, indicating a negative net migration effect accompanied by a lower than expected increase in the over 65 year olds. This is consistent with the observed strong tendency for the old to move out of these areas.
- By contrast**, coastal areas** (both urban and non-urban) appear to have been the major recipients of elderly migrant inflow during the study period.

The drift to the coast

The migration of older people to the coastal 'sun belt' stretching between northern New South Wales and southern Queensland has been well publicised. For example, Salt (2004) said that:

> … not only are Australians shifting to the Gold Coast, but pretty much every other township along the eastern seaboard. Indeed, where are old, cold, superannuated southern baby boomers going to retire? … The [Gold] Coast and places like it, are the logical destination for a whole generation of retirees. (p. 128)

However, from the Census data, it appears that the migration of the elderly to non-metropolitan coastal areas is actually more widespread and covers also the coastal regions of Victoria, South Australia and Western Australia.

As indicated in table 12.1, the share of the old along the coast is similar to their share in metropolitan inner suburbs and in inland regions. Two distinguishing features of the coastal experience are that:

[2] According to ABS (*Migration 1999–2001*, Cat. no. 3412.0), the share of over 65 year olds in total permanent arrivals to Australia was 2 per cent. Their share in the total population at that time stood at around 12.5 per cent. The low share of elderly among overseas immigrants explains why at the national level the actual proportion of over 65 year olds is 0.8 percentage points below the level expected on the basis of natural growth alone. Immigration from abroad also explains the relatively low proportion of over 65 year olds in Sydney, a major port of call for immigrants.

- older people actually move to coastal areas, which is much less common for inner suburbs and inland regions (table 12.3); and
- the distribution is not even, with pockets of very high concentrations along the coast — ABS (2002b) analysis of the regional distribution of the aged gives considerable emphasis to the concentration of the elderly in non-metropolitan areas along the eastern seaboard and South Australian coast. The top concentration ratios are located between Hervey Bay in Queensland and the Eyre Peninsula in South Australia.

A more comprehensive understanding of the mobility of the old requires a closer examination of net movements for all regions. The drift to the coast could lead to increasing differences in the demographic profile of coastal regions compared with both metropolitan and inland settlements.

To examine this further, the Commission pooled the Australian population into three broad regions (box 12.3) — broadly corresponding with the eight regional groups in box 12.1 — and estimated the net migration between each of them.

Box 12.3 **Metropolitan, coastal and inland regions**

ABS-defined statistical divisions (a grouping of local government areas) were pooled based on population and geography to derive three broad regions — metropolitan, coastal and inland.

The metropolitan region consists of all statistical divisions containing the state capital and the Illawarra (New South Wales) statistical division due to its large urban population.

Coastal regions are those statistical divisions with coastline and without large inland expanses. Since, for this exercise, the coastal region represents those divisions where aged people are thought to migrate, only those divisions with a heavily populated coastline and without a large number of inland settlements to skew the migration distribution where included in this category.

The inland region consists of the remaining statistical divisions, covering the majority of inland Australia.

Internal net migration by age group for each region was estimated using a sample of Census data on movements into and out of three statistical divisions from each region between 1996 and 2001 (table 12.4). More recent data than that in table 12.3 was used as the net migration estimates were to be incorporated in the Commission's projections of ageing in the three regions (later). (For projection purposes, an estimate of net migration based over a more recent (and shorter) period is likely to be a more effective predictor of future trends than an estimate based over

a longer period.) As the net migration estimates for each age group across the three regional groups do not sum to zero (for example, because the estimates are picking up migration within a regional group), the estimates of the percentage of population gains (or losses) due to migration may be slightly overstated (understated). Nonetheless, the estimates are useful for comparing the movement of people to and from the three regions.

Table 12.4 **Internal net migration by age between 1996 and 2001**

Region and age grouping	*Net migration per year*[a]	*Total population*	*Percentage of population gained or lost*
			%
Metropolitan			
0-19	-15 000	3 359 205	-0.4
20-44	-41 151	4 672 748	-0.9
45-64	-16 529	2 770 712	-0.6
65-84	312	1 299 408	0.0
85 and over	654	170396	0.4
Coastal			
0-19	7 775	477 630	1.6
20-44	7 141	576 507	1.2
45-64	11 995	425 459	2.8
65-84	4 095	249 661	1.6
85 and over	861	34 909	2.5
Inland			
0-19	-10 451	893 099	-1.2
20-44	-4 809	1 022 049	-0.5
45-64	647	704 399	0.1
65-84	1 664	335 131	0.5
85 and over	452	39 763	1.1

a The net migration for each age cohort across the three regional groups do not sum to zero for several reasons. First, net migration is estimated from a limited sample of statistical divisions and so sampling error is likely. Second, the estimates may be picking up migration within a region group, which may overstate the importance of net migration to that regional group. For example, it is likely that there is migration within the metropolitan region group (that is, between or within capital cities). Third, as the net migration estimates are based on data over a five year period, they may be picking up the movement of people across the different age cohorts.

Source: ABS (unpublished data from Census 1996 and 2001).

The estimates show that coastal areas have been net recipients of people for all age groups. These areas have had particularly large influxes of middle-aged and older people (45 years and over) relative to the host populations. It is also clear, though, that the net migration of the old (65 years and over) from metropolitan areas is very small relative to their host populations. The bulk of older Australians age in place. Thus, the disproportionate importance to coastal populations of the inward drift of the old is a reflection, not just of the movement of the aged from urban centres, but of the big difference in the populations of metropolitan and coastal regions.

Projected demographic change from internal migration

Using the net migration estimates in table 12.4, as well as net migration from abroad estimates, the Commission projected the population of coastal, inland and metropolitan regions by age to 2045. Table 12.5 presents the projected increase in those aged 65 and over. These results show growth of over 200 per cent in the number of 65s and over in the coastal areas. While smaller growth is experienced in the inland and metropolitan regions, it is still significant with numbers more than doubling. In the coastal areas, the large migration of older people in proportion to the population appear to be counteracted by the inflow of younger age groups. This results in the coastal areas having the smallest share of 65s and over by 2045. In contrast, the metropolitan and inland regions exhibit larger increases in the proportion of their population 65 and over despite lower overall growth in this age group.

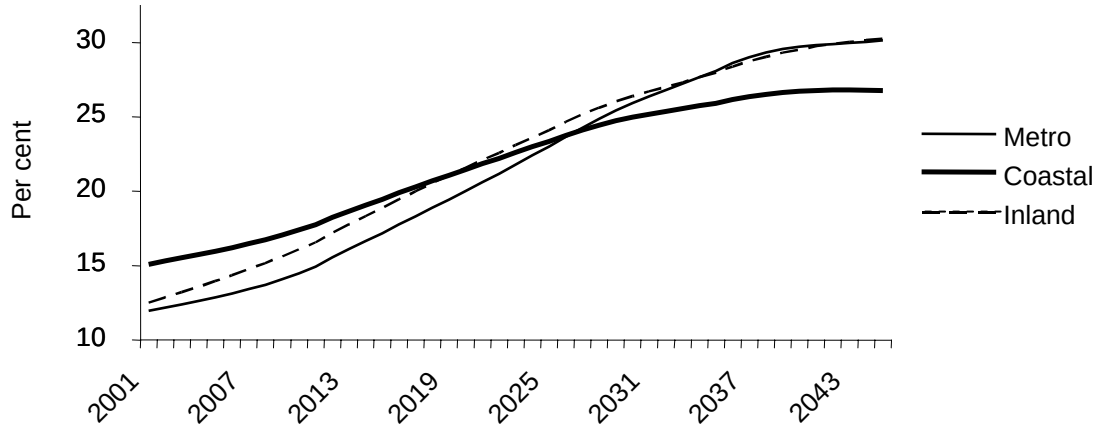
Table 12.5 **Projected ageing by region, 2001 to 2045**

Region	*Share of 65 and over in 2001*	*Share of 65 and over in 2045*	*Change between 2001 and 2045*	*Growth in 65 and over 2001 to 2045*
	%	%	%	%
Metropolitan	12.0	30.1	18.5	129.3
Coastal	15.1	26.8	11.7	210.8
Inland	12.5	30.2	18.1	179.7

Source: ABS (unpublished data from Census 1996 and 2001); Commission estimates.

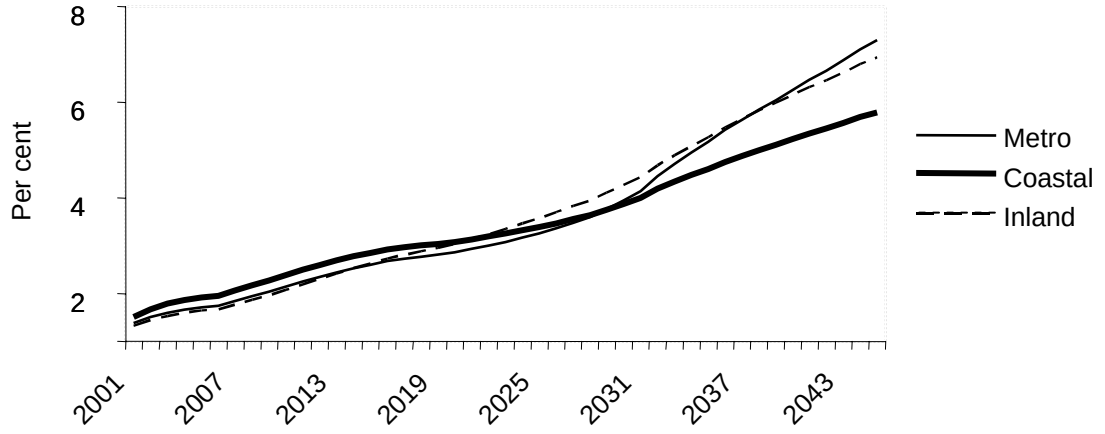
These results suggest that coastal areas will experience a steadier increase in the proportion of people aged 65 and over than metropolitan and inland localities, as can be seen in figure 12.3. For the 85 and over age bracket (figure 12.4), coastal and inland regions experience a more smoothed growth path compared with metropolitan regions. This could be explained by better access to health care facilities in metropolitan regions, encouraging the movement of the aged to these regions. While there will be a widening gap between the proportions of old and young in all regions, the difference is likely to be the smallest in coastal areas, given the inflow of young.

Figure 12.3 **Proportion aged 65 years and over by region, 2001 to 2045**



Data source: ABS (unpublished data from Census 1996 and 2001); Commission estimates.

Figure 12.4 **Proportion aged 85 years and over by region, 2001 to 2045**



Data source: ABS (unpublished data from Census 1996 and 2001); Commission estimates.

Regional population projections have been made by others.

The State of the Regions reports, prepared for the ALGA by National Economics, contain various projections by age group at a regional level (involving a grouping of local government areas). For example, the most recent report (ALGA 2004) contains short-term projections by age group for six broadly-defined regions[3]. The projections show that, among the six regions, the lifestyle region (which encompasses the Gold and Sunshine Coasts in Queensland, and the New South

[3] The regions are rural, core metropolitan, resource-based, dispersed metropolitan, production zone and lifestyle. They are derived from 64 regional groups, which are in turn derived from a combination of local government areas.

Wales Mid North Coast) shows a relatively high percentage point change between 1996 and 2006.

The Queensland Government (sub. 17, p. xi) has projected demographic change at the statistical division level (table 12.6). Each of the projections confirm that the variations present in the existing profiles are likely to continue into the future, and in some cases may be exacerbated. For example, in Queensland, the increase in the number of people aged over 65 years by 2026 is likely to vary from 37 per cent in the Central West to 200 per cent in Moreton.

Table 12.6 **Projected number of persons aged 65 and over, Queensland statistical divisions, 2001 and 2026**

Statistical division	*2001*	*2026*	*Growth between 2001 and 2026*	
	Number	Number	Number	%
Brisbane	177 850	411 567	233 717	131.4
Moreton	103 620	311 151	207 531	200.3
South East Queensland	281 470	722 718	441 248	156.8
Wide Bay-Burnett	36 677	99 085	62 408	170.2
Darling Downs	27 245	56 119	28 874	106.0
South West	2 749	4 159	1 410	51.3
Fitzroy	18 467	39 292	20 825	112.8
Central West	1 331	1 825	494	37.1
Mackay	12 958	35 756	22 798	175.9
Northern	18 254	39 706	21 452	117.5
Far North	21 143	54 609	33 466	158.3
North West	1 935	4 700	2 765	142.9
Queensland	**422 232**	**1 057 967**	**635 735**	**150.6**

Source: Queensland Government (sub. 17, p. xi).

The Victorian Government identified the trend for the non-metropolitan regions to age more than metropolitan regions. It noted that Melbourne will be less affected by ageing than will regional Victoria (sub. 29, p. 10).

12.2 Economic implications of ageing for local government

As for other levels of government, ageing of the population is likely to cause some fiscal pressure for local governments through an imbalance between expenditure and revenue growth. Given the disparity in ageing across regions, some areas are also likely to face significant pressure on infrastructure planning and provision.

Local government expenditure

Traditionally, local governments were mainly responsible for roads, utilities and other property-related services. Over recent decades, they have increasingly been drawn into providing a range of human services, often in collaboration with other levels of government and non-government agencies. Indeed, education, health, welfare, housing and community amenities and recreation and culture represented 49 per cent of local government expenditure in 2002-03 (table 12.7). The ALGA noted that the provision of such services has been recognised by the Commonwealth Grants Commission:

> … the composition of services provided by local government has changed markedly over the last 30-35 years and local government is increasingly providing human services (social welfare type services) at the expense of traditional property based services (particularly roads). (sub. 18, p. 9)

Table 12.7 **Local government expenditure by purpose, 2002-03**[a]
Proportion of total expenditure, and total expenditure

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*Total*
	%	%	%	%	%	%	%	%
General public services	15	12	20	17	10	14	38	15
Education, health, welfare and public safety	11	21	3	7	11	6	5	11
Housing and community amenities	26	18	30	19	15	36	27	24
Recreation and culture	11	17	11	17	23	12	7	14
Services to industry[a]	2	1	2	3	1	-	1	1
Transport and communication	29	22	28	25	33	23	14	27
Other	7	8	7	12	8	8	8	8
	$m	$m	$m	$m	$m	$m	$m	$m
Total	**5 663**	**3 970**	**4 492**	**1 074**	**1 596**	**512**	**284**	**17 591**

[a] The ACT does not have local government. [b] Industry includes agriculture forestry and fishing, mining manufacturing and construction, and fuel and energy.

Source: ABS (*Government Finance Statistics,* Cat. no. 5512.0).

The use of a number of human services is significantly age-related, including:

- health and aged care;
- home support services;
- subsidy of medical services;
- financial support to aged care facilities;
- local community transport; and

- a range of cultural and recreation services.

Examples of these services include:

- subsidy of medical services — rural and remote councils are providing housing, salary top-ups or subsidised travel to attract doctors, nurses and dentists. For example, the Shire of Laverton in Western Australia provides incentives of $170 000 a year to retain a doctor and around $48 000 to nurses who complete at least six months service at the local hospital (HRSCEFPA 2003, p. 33);
- services provided under the Home and Community Care (HACC) program[4] — In Victoria, HACC services are increasingly being funded by local government. In the City of Whitehorse, HACC services consume over 10 per cent of the council's recurrent expenditure. In the last four years, council's contribution to the provision of HACC services increased from 22 per cent to 30 per cent (ALGA, sub. 18, p. 10). A recent report by the Victorian Auditor General noted that, in 2002-03, local government contributed $48 million of revenue from rates and charges to HACC services, an increase of about 23 per cent compared with 2000–01 (Municipal Association of Victoria, sub. DR43, p. 4). With ageing, these services are projected to increase significantly in the future (chapter 7);
- 'healthy ageing' services — the City of Salisbury (sub. DR52, p. 2) noted that the high cost of ageing that used to be associated with the few years prior to death will be extended significantly over a long period as older people require long-term health, recreation, travel, home and social supports. Many of these early intervention 'health ageing' approaches fall outside health or HACC funding and have become the realm of local government;
- community transport — in Victoria, the demand for these services has grown significantly in the last ten years. The types of trips have expanded from a predominantly social focus to the provision of essential day-to-day trips to medical, therapy, rehabilitation and other such services. Specialist vehicles are increasingly being used to accommodate older persons with varying levels of mobility (Municipal Association of Victoria, sub. DR43, p. 5 and section 10.2);

[4] According to the Australian Government Department of Health and Ageing (DoHA 2004), the HACC program is funded jointly by the Australian and State governments. The program enables the provision of community care services to frail aged people, younger people with disabilities, and their carers in their own homes. Specific HACC services include nursing care; allied health care; meals and other food services; domestic assistance; personal care; home modification and maintenance; transport; respite care; counselling, support, information and advocacy; and assessment. As at December 2003, there were about 3000 HACC-funded providers of services including local government and non-government organisations. Some 700 000 people a year receive the services.

- housing services — although not a prima facie responsibility of local government, councils in Victoria are playing an increasing role in advocating and facilitating the provision of housing for older people (Municipal Association of Victoria, sub. DR43, p. 7); and
- volunteer management — the increasing demand for volunteers to assist and support older people as well as to recruit and support older people as volunteers equates to increased costs for local government of volunteer management (City of Salisbury, sub. DR52, p. 2).

Thus, while local government is not the *primary* provider of key aged-related services such as health or aged care, the ageing of the population is likely to result in increasing demands on the resources of local government. These increasing demands are likely to be more pronounced in rural and remote areas and areas of social and economic disadvantage:

- for rural and remote councils, where local communities are dispersed, there are relatively high costs of service provision because of, for example, substantial transportation costs (Municipal Association of Victoria, sub. DR43, p. 4); and
- in areas of social and economic disadvantage, councils are faced with providing services to high need but asset poor clients. The City of Salisbury highlighted the complexities of ageing in economically disadvantaged areas. The factors identified by the City as relevant to it include: a population ageing at a faster rate than the Australian average; a culturally diverse population; the ageing population being previously primarily semi-skilled, relatively low-paid production line workers; a high proportion of older people on disability support and age pensions; a great majority of the population relying on the pension for their income; relatively high numbers of older people in South Australian Housing Trust accommodation; low house values in comparison with State averages; and higher than average levels of unemployment (sub. DR52, p. 1).

Local government revenue

The degree of fiscal pressure that demographic change will place upon local government depends on the extent to which these increasing expenditure demands are matched by revenue growth.

Local government has three major revenue sources (table 12.8):

- taxes on property (municipal rates), which comprise 38 per cent of revenue;
- grants from the Australian and State governments (averaging 12 per cent of council revenue), although for some rural and remote councils, grants can account for more than 50 per cent of revenue (ALGA, sub. 18, p. 12); and

- fees and charges, which have been increasing as a proportion of total revenue and now comprise 32 per cent of revenue on average.

A theme raised by local government representatives is that, in comparison with expenditure growth, revenue growth would be constrained because of community resistance to increasing rates and charges, increasing eligibility for rate rebates as well as the practice of indexing growth in Australian and State government grants to the CPI (Municipal Association of Victoria, sub. DR43, pp. 1, 3, 10).

Table 12.8 **Local government revenue, 2002-03**

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*Total*
	%	%	%	%	%	%	%	%
Taxation revenue	36	46	28	59	46	35	26	38
Current grants and subsidies	12	13	9	14	11	14	24	12
Sales of goods and services	34	20	45	19	21	41	35	32
Interest and other	19	21	18	8	22	10	15	19
	$m	$m	$m	$m	$m	$m	$m	$m
Total	**6 586**	**3 977**	**5 151**	**1 069**	**1 648**	**507**	**188**	**19 126**

Source: ABS (*Government Finance Statistics*, Cat. no. 5512.0).

Municipal rates

In the longer term, property prices in most areas are likely to increase at least in line with the real growth in GDP per capita (chapter 11). All things being equal, taxes on property are likely to grow at the same rate.

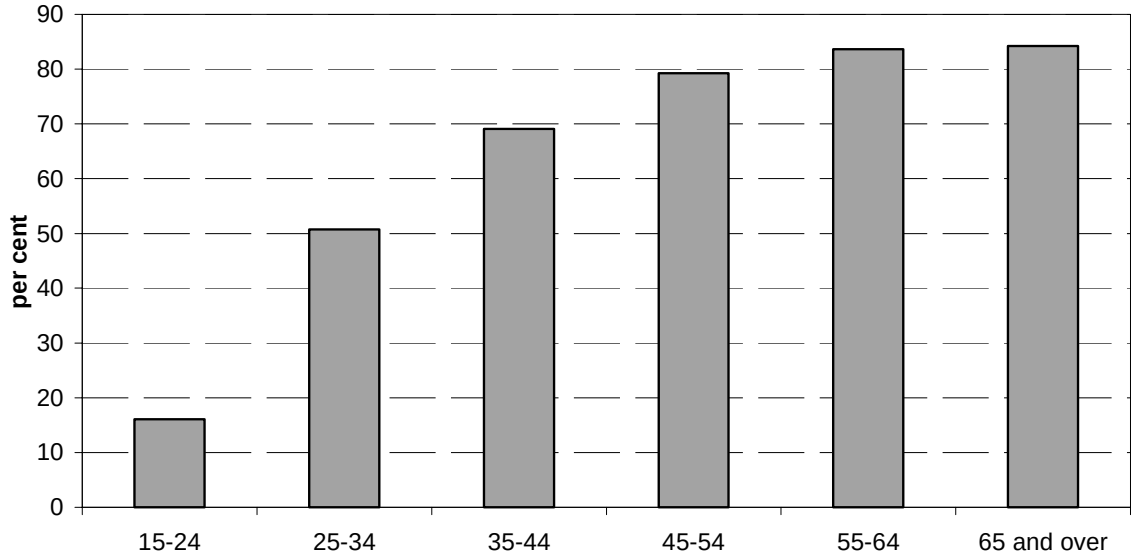
However, there is likely to be an increase in the proportion of ratepayers eligible for pensioner concessions on municipal rates.[5] At present, just under half of all councils provide pensioner rate concessions (table 12.9). Such concessions are generally provided to holders of Pensioner Concession Cards issued by the Australian Government (chapter 10). The number of pensioners, particularly age pensioners, is projected to increase significantly (chapter 8) resulting in a lower rate base and an increase number of concession card holders.

The extent to which councils with ageing populations are affected by eligibility for pensioner rate concessions depends on the proportion of pensioners who are rate

[5] In some jurisdictions like New South Wales, there is provision for the postponement of rates in certain circumstances (that is, for pensioners). The New South Wales Government said an increased uptake in this option may create a cash flow problem for some councils in the short term. However, in the longer term, once the property is sold, these councils would receive the full amount of rates in arrears and interest payable (sub. DR45, p. 27).

payers (property owners). If current trends of relatively high levels of home ownership among those aged 55 years and over continue (figure 12.5), municipal rate receipts are likely to come under increasing pressure.

Figure 12.5 **Home ownership by age of reference person**



Data source: ABS (*Housing Occupancy and Costs, Australia, 2000-01*, Cat no. 4130.0).

The impact of increasing pensioner concession rate eligibility is likely to vary significantly by local government area for a number of reasons:

- as noted, the demographic profile of residents varies considerably among municipalities;
- the proportion of councils who offer pensioner rate concessions also varies considerably among States. The impact of such concessions in South Australia, where they are offered by less than three per cent of councils will obviously be considerably less than in New South Wales[6] where all councils are required to provide pensioner rate concessions (table 12.9). Indeed, the New South Wales Government (sub. DR45, p. 27) was of the view that a major impact of an ageing population on both local and State government finances will be an increase in the pensioner rate subsidy; and
- the size of pensioner rate concessions varies from $10 to $400 per annum. This is, in turn, reflected in large variations in the total cost to local government of providing pensioner rate concessions (table 12.9). In Queensland alone, the cost

6 The Nambucca Shire Council (sub. 1) reported that pensioner rate subsidies already equate to some 10 per cent of its rate revenue and it only has a population of 19 000.

to councils of pensioner rate concessions varied from $580 to approximately $21 million (Hough 2004).

Table 12.9 **Local government pensioner municipal rate concessions, 2002-03**

Jurisdiction	*Proportion of councils providing pensioner rate concessions*	*Cost to local government*
	%	$'000s
NSW	100.0[a]	67 771
Vic	12.7	3 008
Qld	75.2	46 030
SA	2.9	131
WA	4.2	176
Tas	24.1	652
NT	16.7	19
ACT	na	na
Total	**46.8[b]**	**117 786**

a All NSW councils provide a pensioner rate concession as part of a joint NSW, local government scheme. The cost to the local government sector of the scheme in 2002-03 was $60 million. In addition to this around 16 per cent of NSW councils provided a further concession amounting to $7.7 million. **b** Excluding the joint NSW council scheme, the total proportion of councils providing concessions was around 24 per cent.

Source: Hough (2004, table 1).

Collectively, pensioner rate concessions provided by councils amounted to $118 million in 2002-03 (table 12.9). A further $264 million in pensioner rate concessions were provided by State governments (table 12.10). The concessions provided by State governments offer greater coverage (since they are available to all eligible pensioners irrespective of where they reside) and are often of higher value. Hence, while it is likely that local government taxation revenues will come under pressure from increasing proportions of pensioner households, such pressures are likely to be ameliorated by the presence of state-based schemes.

Table 12.10 **State government pensioner rate concessions, 2002-03**

	Pensioner rate concession provided[a]	*Number of recipients*	*Cost to State Government*
			$m
NSW	$250 or 50 per cent	413 200	74.0[b]
Vic	$135 or 50 per cent[c]	398 600	57.5
Qld	$180 or 20 per cent	247 500	41.7
SA	$190 or 50 per cent	143 000	28.5
WA	50 per cent	156 000	38.4
Tas	$318 or 30 per cent	42 956	13.1
NT	$300	17 000	7.2
ACT	$250 or 50 per cent	15 000	3.9
Total		**1 433 256**	**264.3**

[a] The lower value concession applies. [b] This is 55 per cent of the total mandatory pensioner concessions provided. The other 45 per cent, around $60 million is funded by the local government sector in NSW. [c] Scheduled to increase to $160 in 2004-05.

Source: Hough (2004, table 1).

Financial Assistance Grants

The Australian Government makes Financial Assistance Grants (FAGs) to local government through Special Purpose Payments (SPPs) such as for the HACC program. The New South Wales Government suggested that another area of potential impact relates to whether SPPs to local government will grow in line with growing demand as the population ages (sub. DR45, p. 27). It said that to the extent SPPs reflect this additional demand, the fiscal pressure will be borne by the Australian Government, rather than local government. On the other hand, the ALGA (2003) argued that there is a risk that ageing-related fiscal pressure on the Australian Government may be transmitted to local government through reduced grants.

Under current government policy, per capita FAGs are indexed by the CPI. FAGs will, therefore, increase in line with population growth and inflation. However, under this indexation arrangement, they are likely to decrease as a proportion of GDP. Even though the current indexation arrangements were only introduced in 2000, FAGs to local government have been decreasing over the last decade — from 0.25 per cent of GDP in 1991-92 to 0.19 per cent of GDP in 2003-04 (Webb 2003; Commission estimate). FAGs are therefore unlikely to represent a source of revenue growth that would offset any increased spending associated with ageing.

Fees and charges

Fees and charges are applied to a wide range of local government activities and include water charges, waste disposal fees, child care fees, fees for planning applications and for a range of licensing and regulatory activities. Fees and charges have risen from 17 per cent of local government revenue in the 1970s to 32 per cent today (ALGA, sub. 18, p.11).

Fees and charges are levied for specific services and do not represent a revenue source to fund general programs. The ALGA suggested that further increases in revenue from fees and charges is unsustainable. Although it is difficult to assess the scope for increases in such a diverse revenue source, it does seem unlikely that future growth will match past trends. Over the last 15 years or so, user charges have been applied to many services that were once provided free of charge. The scope to bring further activities into the net may be limited, in which case future increases may rely more on increasing existing charges.

Local government infrastructure planning and provision

The ALGA (sub. 18) suggested that local government will face increasing pressures to upgrade or modify infrastructure, which may not have been built with consideration of ageing populations. Planning processes for development of age-related infrastructure may also come under pressure. This was echoed by the Municipal Association of Victoria, which gave the following specific example:

> In conjunction with the inadequacy of public transport, safety and accessibility of the physical environment can be significant in restricting independence for older communities. The maintenance of street lighting, footpaths, kerbs, and sanitation services are important infrastructure considerations for older people's health and well being. In the future, it is likely that local government will face increasing community expectations of high standard amenities, such as, for example, car parking, public seating, and public toilets. (sub. DR43, p. 7)

As discussed, there is a relatively strong trend of migration to coastal areas among older people, resulting in a sizeable proportion of the population in some areas being over 65. At present, this cohort largely comprises the 'young old' who are for the most part healthy and independent. However, as these people age, their use of services such as aged care and health is likely to rise significantly. With the number of people aged over 65 projected to more than double in all regions (metropolitan, coastal and inland), planning processes are likely to come under significant pressure as a consequence. This will be especially evident in coastal regions, with the number of people aged over 65 projected to more than triple.

In the case of aged care, the Commission estimates that, nationally, the number of people in high and low care residential aged care is likely to increase by 78 per cent by 2024-25 and over 200 per cent by 2044-45. On the assumption that people will want aged care in the region where they currently live, for regions with a higher concentration of older people and/or positive net migration of older age groups, the increases may be much larger. This could pose challenges for such councils in designating sufficient land for new developments in a timely fashion and ensuring that new facilities are integrated with existing service delivery. Although COTA National Seniors argued that 'it should not be too difficult for local governments to fairly accurately estimate future demand for residential care and to plan now, and make provision for future need' (sub. DR57, p. 10).

The increasing pressures on local government to provide suitable infrastructure and planning brought about by an ageing population will still need to be balanced against the needs of younger people in the area. The City of Salisbury noted that the allocation of land for residential and other accommodation for older people to age in their preferred locality may not be possible due to limited availability and competing local demands such as trying to attract younger families into an area to boost economic growth (sub. DR52, p. 2).

Fiscal pressure on local government from an ageing population

Owing to the wide range and variation in services provided by local government the Commission has not attempted to project local government expenditure or revenue.

However, the picture that emerges from this brief discussion is that local government will not be immune from the fiscal pressure that the ageing of the population is likely to create for other levels of government.

- Local government is increasingly involved in the provision of human services, which are more likely to face expenditure pressure from ageing than traditional activities such as provision of roads and utilities. In areas with a high concentration of elderly people there may also be pressure on local government planning processes to provide sufficient land and infrastructure for aged care.
- At the same time, local government revenue is unlikely to increase at a greater rate than the growth in GDP, and some components such as FAGs will grow at slower rates. Indeed, there is likely to be an increase in the eligibility for rate relief as well as community expectations that services are provided without increases in rates and charges.

The impending fiscal pressure on local government due to ageing is likely to be exacerbated in particular areas, such as those experiencing social and economic

disadvantage. As the population ages, this will have repercussions for future local government revenue (such as rate rebates) as well as for spending on services that assist low income people (including the elderly).

Internal migration patterns can also have fiscal repercussions for councils. The New South Wales Government said that the Local Government Grants Commission has observed a population shift from the western parts of New South Wales towards either Sydney or the coast (sub. DR45, p. 27). This would adversely affect the revenue base for some local governments, while boosting that of others. In addition, it suggested that some councils may need to seek assistance for infrastructure needs to cater for shifts in the population. While this trend is not solely related to the ageing of the population, it is nevertheless likely to add to fiscal pressures on some local governments.

Overall, therefore, with current policy settings, many councils are likely to face an emerging fiscal deficit as Australia's population ages.

12.3 Other regional impacts

In addition to affecting the fiscal position of local governments, an ageing population can have broader regional impacts. Some of the key ones are described briefly.

Regional labour shortages

Concerns have been expressed that, as the population ages, labour shortages in particular occupations such as the health care professions are likely to be more pronounced in certain regions as well as for the smaller States. The National Healthcare Alliance noted that while there are currently 'generalised shortages of health professionals, rural and remote areas will always be most seriously affected' (sub. DR42, p. 17 and box 12.4). The Tasmanian Government observed that shortages in the health care professions in small jurisdictions such as Tasmania are likely to be more acute because of number of factors including the 'perceived isolation of the state and the rural nature of many positions' (sub. DR69, p. 9).

The Municipal Association of Victoria drew attention to the age profile of the workforce within local government and suggested that a large number of staff will be retiring in the next decade. It expected special difficulties in recruiting and retaining community care and infrastructure maintenance workers (sub. DR43, pp. 7–8).

Box 12.4 **Attracting and keeping health care professionals in rural and remote areas is difficult**

The National Healthcare Alliance (sub. DR42) cited the results of a survey by the Australian Medical Association (AMA 2002) to explain why current shortages in the health workforce are most pronounced in rural and remote areas.

> A professional workforce may once have been attracted to the country lifestyle and the opportunity for a close relationship with a community, but with declining work conditions and declining social conditions, this appeal is diminishing. It will not be repaired without major investment.
>
> Work intensity — The [Australian Medical Association] Survey revealed that GPs [general practitioners] frequently perceive huge disadvantages in country practice, many from the point of view of hindsight. They view the long hours, especially after hours, on call hours and lack of holidays without lack of locums or relief — 'never off duty' — as a fundamental difficulty, causing stress and burnout. Greater work intensity is also due to the greater diversity and skills challenges of rural work, with emergency and hospital work particularly stressful. There is limited hospital, specialist technological and allied health back up, generating problems of professional and personal isolation, which increase with remoteness. Many GPs view rural or remote work as underpaid relative to the responsibility, with a 120% loading on top of the current rural remuneration rate required to attract the average urban GP to the bush.
>
> Family conflicts and costs — Partner's career, children's schooling and lack of family support are big issues, markedly so for single mothers. As children grow older, there is a substantial problem with education, in terms of the cost of boarding school (around $15,000 p.a.) and university accommodation ('running two houses') as well as family separation. At this stage, many GPs move back to the city. Discontentment of partners is also often seen as unsustainable necessitating a move back to the city. Separation from extended family and friends can be a problem for young or single people. These issues were mentioned in two thirds of responses to the survey and were non-negotiable — 'wouldn't go for any money'.
>
> Business difficulties — Small business administration (often without IT or other support), difficulty getting partners or selling a business, higher practice costs in many cases, lack of capital appreciation and red tape [for example, Trade Practices Act] are also barriers to rural GP supply. Medical indemnity insurance premiums (and associated anxieties) are increasingly prohibitive, especially for obstetric and rural procedural work. Maintaining the required variety of skills is difficult given the cost of travelling (and lack of access) to continuing medical education … and other training.
>
> Lifestyle and other factors — Many GPs perceive the rural lifestyle to be lacking in social choices, amenities and peer interaction — isolated, parochial (the small town mentality) yet lacking anonymity (the gold fish bowl syndrome). This is particularly true for minorities. (pp. 19–20)

Concerns have also been expressed about declining volunteer numbers in rural and remote areas as the population ages. The Municipal Association of Victoria noted that rural and regional communities are particularly reliant on volunteers for the provision of fire and other emergency services (sub. DR43, p. 9).

As noted in chapter 3, although an ageing population may create enduring shortages in some professions, these reflect entry barriers and insufficiently attractive wages and conditions. The same is true where the shortages are felt in particular regions. That said, these shortages do not affect the labour market as a whole.

State provision of services and community leadership

Some State governments observed that ageing would have impacts on their provision of services to certain regions, particularly remote areas as well as other more diffuse impacts on local communities.

The Northern Territory Treasury (sub. DR58, p. 3) observed that there are relatively high 'special costs' in more 'rural jurisdictions' — such as the costs of providing transport to hospitals, aged-care services to dispersed and small remote communities and infrastructure in 'such settings' — which could be increased by an ageing population. Further, it noted that housing costs could be a very substantial additional burden on government finances for remote parts of the Northern Territory:

> Remote [I]ndigenous communities have very high average household sizes, mainly due to large family sizes. As ageing occurs and as fertility rates decline family sizes will also decline somewhat, resulting in small household sizes in the future. This will have a disproportionate impact on the demand for new housing, thus if average household size drops to 3-4 in remote areas over the next 40 years from the current levels or 6-8 or even higher, then, even without any increase in the size of the population this will produce a doubling in the demand for housing (all of which is funded through government dollars in one way or another). (sub. DR58, p. 3).

Another jurisdiction observed that an ageing population in regional areas would have other impacts that would raise policy and community challenges. These impacts include the lack of community leadership as regional areas lose younger people, and the increasing costs of providing utility services to rural communities that experience a population decline.

These trends may well be occurring independently of ageing. For example, drought and the closure of businesses frequently cause declines in local populations as people leave to seek employment elsewhere. Such events may well exaggerate the proportion of older people who remain.

13 Implications of population ageing

Key points

- By 2044-45, governments are projected to have a combined ageing-related fiscal gap of around 6.4 per cent of GDP relative to 2003-04. Cumulatively, the value of the fiscal pressure from 2003-04 to 2044-45 adds up to around $2150 billion in 2002-03 dollars.
- Assessing the fiscal pressures at different levels of government is complicated by grants between the various tiers. Different assumptions about the future size of those grants can significantly affect where the fiscal pressures are borne. This means that the best single measure of fiscal pressure is for all Governments combined.
- On past trends, much of the fiscal pressure will fall on the Australian Government, reflecting its particularly large responsibilities for health care. However, this is dependent on the assumption that the Australian Government's special purpose grants to the States keep up with service needs.
- There are many other uncertainties in the Commission's projections. The most important implication for public policy is the risk that the fiscal impacts of ageing could be significantly greater than the Commission has projected.
- While the potential fiscal and economic consequences are great, population ageing does not currently represent a crisis:
  - Productivity growth will ensure that Australians are much richer in the future, and better able to afford the costs associated with ageing.
  - It is also important to recognise that older people contribute to the economy and society in ways that are not reflected in GDP.
  - Australia does not face a pension crisis, in contrast to a number of other countries.
  - The rising government expenditures related to ageing will improve community wellbeing.
  - The impacts of population ageing will be felt gradually and are therefore amenable to timely policy action.
- Ageing nevertheless raises major policy challenges, predominantly because of the large emerging fiscal gap that would need financing in the absence of any mitigating measures.
- Population policies are important in their own right, but could not feasibly stem the effects of ageing.
- Higher economy-wide productivity and participation rates are the keys to future economic growth and society's capacity to 'pay' for the costs of ageing. Both are amenable to policy, although the longer term payoffs would be greatest for improvements in productivity growth.
- The effect of higher economic growth on fiscal pressure is muted because service demands and costs also rise with productivity. However, if fiscal pressures were to be partly financed through income taxes, faster economic growth reduces the degree of fiscal pressure for any given set of (inflation-indexed) marginal tax rates.
- Improvements in the efficiency, effectiveness and productivity of Australia's health system would ameliorate the major source of fiscal pressure at its origin.

13.1 Introduction

This chapter draws together the various threads of this study. First, it matches the revenue and expenditure projections from previous chapters to determine overall fiscal pressures for different governments (section 13.2).

Second, it places the various projections in context, by noting some of the key uncertainties and how these could affect the potential outcomes (section 13.3).

Third, population ageing is sometimes perceived as an adverse social trend. Is this valid and if so how? Section 13.4 explores these issues.

Finally, population ageing has obvious policy implications because Government is largely responsible for the financing and provision of ageing-related services. A variety of policy options are potentially available. The Commission has not been asked to make recommendations, but its research findings can be useful in pinpointing those policy areas that are more likely to be fruitful than others (section 13.5).

13.2 Ageing and fiscal pressures

What is meant by 'fiscal pressure'?

Fiscal pressure refers to the extent to which increases in government spending outpace revenue growth (see below). This study places most emphasis on those revenue and spending areas where a significant proportion of spending is age-related. The Commission has not, for example, developed detailed scenarios for defence spending, because it will not plausibly depend on population ageing. The Intergenerational Report and State Government submissions also emphasised 'demographically-driven' fiscal pressures.

Nevertheless, the fiscal position could be exacerbated (or relieved) by non-demographic trends in spending areas where ageing plays a minor or no role. Consequently, the Commission has assessed the extent to which such trends either ameliorate or aggravate fiscal pressures (technical paper 8).

It should be stressed that while the projections of major sources of fiscal pressure in this chapter are related to ageing, they are not attributable solely to it. For example, technological change in health care is likely to increase overall costs, and this will occur to a significant degree regardless of population ageing. Where factors other

than ageing are important — as they are in health care — the Commission has explored their relative importance.

There are many possible measures of the fiscal impacts of population ageing and trend growth in expenditures. This study uses two measures:

- the difference between the fiscal position of governments in 2044-45 as a share of GDP and that in a base year (2003-04).[1] In this study, this headline measure is referred to interchangeably as either 'fiscal pressure' or the 'fiscal gap'.[2] Fiscal pressure is not necessarily equal to the actual fiscal position in any given year, though it would be projected to be similar since current fiscal balances are close to zero as a share of GDP.
- the additional debt-to-GDP ratio that would apply in 2044-45, were Governments to finance the fiscal gaps through borrowing.[3] This represents a picture of the future value of the accumulated liabilities associated with fiscal pressure, taking into account the costs of financing the gaps. There is no presumption that Governments will in fact finance the fiscal gap this way (indeed, such an approach would be unsustainable).[4] The advantage of this measure is that it distils differences in the patterns of deficits over time between different levels of Government or between alternative projection scenarios. It is possible, for example, to have the same fiscal gap in 2044-45 for two different projection scenarios, but for the debt-to-GDP ratio at this time to diverge as a result of differences in the past levels and sequences of deficits.

Fiscal impacts for different levels of government

The incidence of fiscal pressure is complicated by the financial dependence of the States and Territories ('States') on the Australian Government (appendix F). Changes in the payments made by the Australian Government to the States as a

[1] As in the Australian Treasury's *Intergenerational Report*, projections of spending and revenue used to derive the fiscal gap do not include all sources of revenue or all types of expenditure. The underlying assumption is that all residual income sources stay fixed as a share of GDP, as do all residual spending items (the latter is tested in technical paper 8).

[2] Some other studies, such as the Intergenerational Report and that by the NSW Treasury, refer to the *actual* fiscal position as fiscal pressure and the difference in positions as the fiscal gap. This should be noted when comparing their results with those of the Commission.

[3] An alternative approach is that of Gruen and Garbutt (2004), who compute the fixed yearly cash addition to GDP ratio that would leave the Government debt to GDP ratio at the end of the projection horizon equal to its value at the start.

[4] As shown below, under the base case, the debt to GDP ratio would be around two by 2044-45 (with a real interest rate of 5 per cent per annum) compared with 0.035 in 2003-04 for all Australian Governments.

result of ageing pressures can shift budgetary pressures between the different tiers of government. The implication of this is that *aggregate* fiscal pressure borne by governments collectively is the best single measure of the fiscal consequences of ageing, because it is not sensitive to assumptions that affect incidence. In other words, fiscal pressure is like water in a maze of tunnels: pumping it from one tunnel to another does not diminish the amount, but merely re-distributes it.

As noted in chapter 11, negligible changes in the tax revenue shares of GDP are projected because the various age-related and other factors offset each other. For the Governments as a group, tax revenue is projected to rise by a negligible 0.06 percentage points from 2003-04 to 2044-45.

The more striking story is on the expenditure side. Here, across all levels of Government, spending is projected to rise by around 6.5 percentage points of GDP over the same period, of which most is health and aged care (table 13.1).[5] The Age Pension also rises significantly by 1.7 percentage points of GDP — but this is much less than that projected for many OECD countries. Australia has been successful in avoiding large future liabilities associated with age pensions because government funded age pensions are not earnings-related and have been partly replaced by privately funded superannuation as a result of earlier reforms. Moreover, *overall* safety net payments by government grow by only 1.1 percentage points because the Age Pension is partly offset by the decline in payments that favour younger age groups, such as family payments and unemployment benefits. However, as shown later, the pressures may be higher than this (over the long term) if the Australian Government periodically increases allowances, such as unemployment benefits, so that they maintain relativities with pensions. The Commission's projections of fiscal pressure are therefore likely to be conservative.

[5] It should be noted that had 2002-03 been used as the base year (as in the draft report), spending would have risen by 6.8 percentage points. This underlines the fact that differences in base years can alter the story significantly. The Commission has used 2003-04 as the base year in the final report because it is the last completed fiscal year.

Table 13.1 **Spending pressure for all Governments combined**

Age-related government spending to GDP ratios, Base case

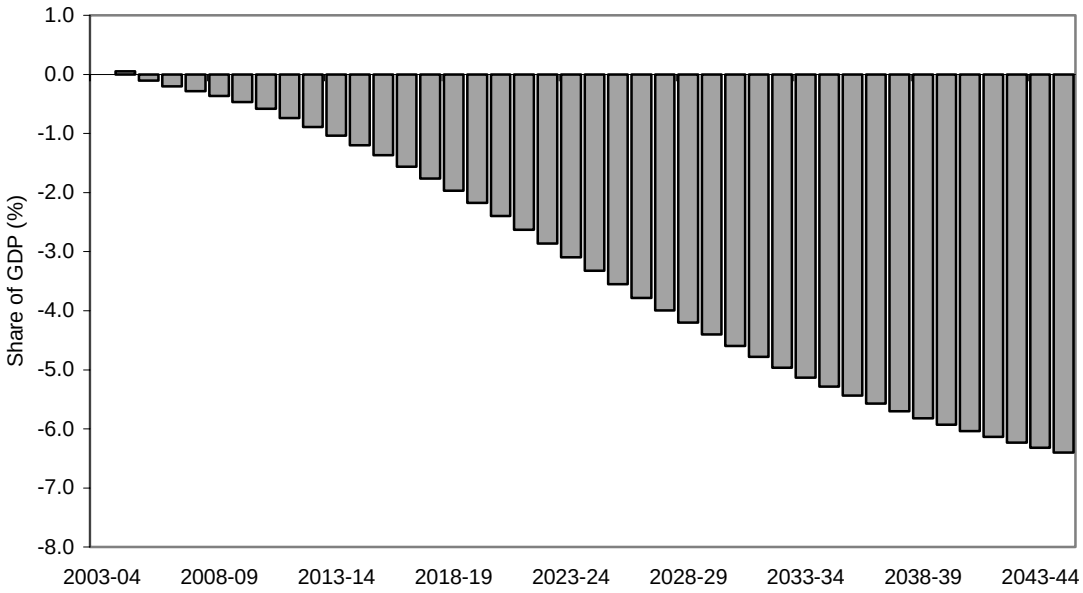
Spending category	*2003-04*	*2044-45*	*Difference (fiscal pressure)*
	%	%	Percentage points
Health care	5.7	10.3	4.5
Aged care & carers	1.1	2.4	1.4
Age pensions	2.9	4.6	1.7
Other social safety net	3.8	3.1	-0.6
Education	5.2	4.7	-0.5
Total	**18.7**	**25.2**	**6.5**

Source: Commission estimates.

Fiscal pressure rises smoothly over time for combined Governments (figures 13.1), reflecting the fact that population ageing is a gradual and continuous process, as are non-demographic trends.

Figure 13.1 **The fiscal pressure builds gradually**

Relative to 2003-04



a The graph shows the difference in the net fiscal position of combined State and Australian Governments relative to the position in 2003-04, or N_t-$N_{2003-04}$, where N_t (net fiscal position in year t) is defined as R_t - E_t, where R_t and E_t are age-related revenue to GDP and expenditure to GDP respectively. The graph does not show the actual fiscal deficit, since that would also depend on what happens to non-age related spending and revenue to GDP ratios. State Government general government spending was close to revenue in the base year (2003-04), while the Australian Government was running a fiscal balance of around 0.4 per cent of GDP in this year (Budget Paper no. 1, 2004-05). Accordingly, if non-ageing expenditures and revenues were to stay fixed as a share of GDP, then the actual fiscal balance would be close to that shown above.

Data source: Commission estimates.

In the Commission's base case, the spending pressures on the Australian Government are projected to be greater than for State Governments (table 13.2), and indeed a little higher than found by the Intergenerational Report.[6] If the fiscal impacts are measured in terms of the net debt-to-GDP ratios that they cumulatively imply, the differences between the levels of government are larger. The net debt-to-GDP ratio for the Australian Government would be about 1.9 by 2044-45, while the comparable figure for the combined States would be about 0.1. This reflects the different time profiles of fiscal pressure.

Table 13.2 **Spending pressures by area by Government: the base case**
Age-related government spending to GDP ratios by level of Government

	2003-04	*2044-45*	*Difference (fiscal pressure)*
Australian Government summary	%	%	Percentage points
Health care	4.0	7.5	3.5
Aged care & carers	1.0	2.2	1.2
Age pensions	2.9	4.6	1.7
Other social safety net	3.8	3.1	-0.6
Education	2.0	1.8	-0.1
Total	**13.5**	**19.2**	**5.7**
Combined States summary			
Health care	1.8	2.8	1.0
Aged care & carers	0.1	0.3	0.1
Education	3.3	2.9	-0.4
Total	**5.2**	**5.9**	**0.8**

Source: Commission estimates.

The relatively modest pressure on the States in the Commission's 'base' projections reflects:

- the assumption that special purpose payments (SPPs) from the Australian Government to the States rise with service needs, rather than say being fixed in real per capita terms (appendix F);
- their relatively minor role in age-related social welfare; and
- the significant role played by the States in education funding (table 13.3). Two forces are at work here. First, population ageing results in a lower share of

[6] The Intergenerational Report projected an increase in fiscal pressure for the Australian Government of 5.3 percentage points of GDP between 2001-02 and 2041-42 compared with the Commission's 5.7 percentage points from 2003-04 to 2044-45. There are several contributing factors to this divergence: different base year data (which can make an appreciable difference), the use by Treasury of the forward estimates for budget surpluses in the first few years, GDP variations, different population projections and revised pension data, among other factors.

Australians of school age (the area of education for which the States have the greatest responsibility). Second, the Australian Government is a major funder of private schools, which have been growing relatively rapidly, displacing students from State-funded public schools.

Of these factors, the first is the more important over the longer term. While the assumption about SPPs is consistent with the function of these payments, the Commission acknowledges that there are other possibilities, especially over the shorter term (appendix F). Different assumptions about the growth rate of Special Purpose Payments by the Australian Government to the States make a substantial difference to the distribution of fiscal pressures between jurisdictions. For example:

- were SPPs to grow only with inflation and population, then the spending pressure on the States would treble by 2044-45, while that of the Australian Government would fall by around 30 per cent (table 13.3); and
- if the relative fiscal impacts are measured by the implied net debt-to-GDP ratio in 2044-45, the effects of different SPP assumptions are even greater. Were SPPs to grow only with inflation and population, then the net debt-to-GDP ratio in 2044-45 for the combined States would increase nearly sixfold compared with the base case (table 13.3).

Different assumptions about SPPs also change significantly the profile of fiscal pressure felt by different jurisdictions (figure 13.2). These alternative scenarios may not be likely outcomes, but they highlight some of the fiscal risks faced by the States.

The Victorian Government (sub. 29, pp. 16-17) obtains roughly similar results to the Commission's case A and C scenarios:

- under its low fiscal impact scenario, there is only a slightly widening fiscal gap (less than 0.5 percentage points) from the decade prior to 2011-12 to the decade 2031-32 to 2041-42; whereas
- under the high fiscal impact scenario, the fiscal gap widens by around 2.5 percentage points between the two periods. [7]

The Queensland Government (sub. 17, attachment 4) and the Tasmanian Government (sub. 40, p. 50) have also emphasised the importance of the

[7] The low fiscal impact scenario incorporates the assumption that Commonwealth health funding to Victoria is maintained as a share of hospital costs, in line with the costs of providing health services. It also uses case mix adjusted separations data and adjusts health costs for 'proximity' to death. The high fiscal impact is based on the Commonwealth only maintaining health SPPs in real per capita terms, uses bed days as the hospital utilisation measure and does not adjust for proximity to death.

assumptions about SPPs in determining the extent of pressure experienced by State Governments. For example, the Tasmanian Government projects that if SPPs remained constant in real per capita terms (rather than as a constant share of GSP), then the fiscal gap for that State would be widened by an *additional* 2.5 percentage points of GSP.

Before allowing for the distribution of GST revenues, the States facing the greatest demographic transition encounter the greatest spending pressures (such as Tasmania, table 13.4). However, the Commission has not calculated an overall fiscal pressure measure for each State. This is because, as noted in chapter 11, horizontal fiscal equalisation can be expected to allocate the GST revenue in a way that will largely eliminate such apparent variations in fiscal pressure across the States. However, in appendix F, the Commission has indicated the extent to which the GST may have to be re-distributed so that the fiscal pressures between jurisdictions would be equalised (figure F.6).

Table 13.3 **The distribution of spending pressure under different SPP assumptions**

Age-related government spending to GDP ratios by level of Government

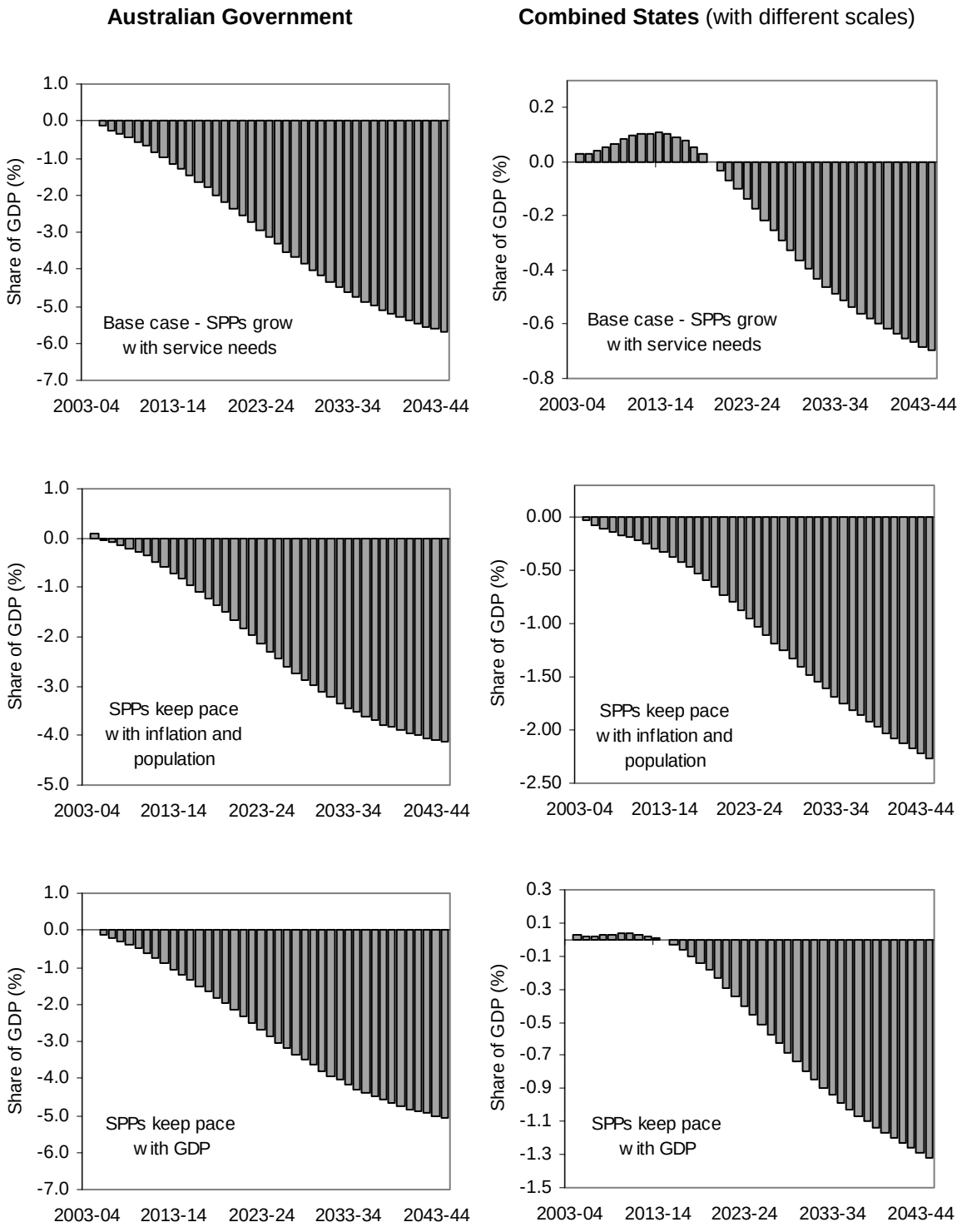
Alternative scenarios for Intergovernmental relations	*Australian Government*	*Combined States*
SPPs grow with inflation and population (Case A)		
2003-04 (%)	13.5	5.2
2044-45 (%)	17.7	7.5
Difference (fiscal pressure) (percentage points) [a]	**4.1**	**2.3**
Net debt-to-GDP ratio of cumulative gaps, 2044-45	1.36	0.67
SPPs grow with GDP (Case B)		
2003-04 (%)	13.5	5.2
2044-45 (%)	18.6	6.6
Difference (fiscal pressure) (percentage points)	**5.1**	**1.4**
Net debt-to-GDP ratio of cumulative gaps 2044-45,	1.73	0.30
SPPs grow with service needs (Case C - the base case)		
2003-04 (%)	13.5	5.2
2044-45 (%)	19.2	5.9
Difference (fiscal pressure) (percentage points)	**5.7**	**0.8**
Net debt-to-GDP ratio of cumulative gaps, 2044-45	1.91	0.12

[a] The total pressure does not add up to 6.5 per cent due to rounding errors.

Data source: Commission estimates and appendix F.

Figure 13.2 **The time profile of fiscal pressure also varies with SPP assumptions**

Relative to 2003-04



a See note **a** in figure 13.1.

Data source: Commission estimates.

Overall, as emphasised earlier, the best measure of fiscal pressure is that which falls on governments collectively — it is only this measure that is free from the need to make assumptions about inter-government fiscal relations.

Table 13.4 **Notional spending pressures at the State and Territory level**
Age-related government spending to GDP ratios[a]

Individual States (spending)	*2003-04*	*2044-45*	*Difference*
	%	%	Percentage points
NSW	5.0	5.5	0.5
VIC	4.4	5.2	0.8
QLD	5.5	6.3	0.8
WA	5.4	6.8	1.4
SA	6.0	7.3	1.2
TAS	8.6	11.3	2.7
NT	9.1	10.9	1.8
ACT	5.3	5.7	0.4
Total combined States	5.2	5.9	0.8

[a] The pressures are only notional because differences in the extent of pressure are moderated by compensating payments made by the Grants Commission under horizontal fiscal equalisation (appendix F).

Source: Commission estimates.

Residual sources of fiscal pressure (or relief)

It is possible that trends in other areas of spending by government that are largely unaffected by ageing might increase or alleviate fiscal pressures, with implications for the challenges posed by an ageing Australia.

Over various periods from 1962-63, the Commission examined trends in the GDP shares for the Australian Government and combined State Governments of residual spending items that have little or no relationship to ageing.[8] The perspective on the growth of other spending categories is dependent on the data period selected and on the method adopted for assessing trends (technical paper 8). Some results suggest additional fiscal pressures and others fiscal relief. The most plausible results suggest that residual spending categories will grow in approximate parity with GDP.

Overall, there is no compelling evidence that non-demographic factors outside the main spending areas considered by the Commission in this study will either exacerbate or ease future fiscal pressures. To that extent, the fiscal pressures

[8] For the combined States, this expenditure excluded health and education spending, while for the Australian Government it excluded education, health and welfare spending.

estimated by the Commission provide a reasonable approximation to the aggregate fiscal pressures facing future governments.

The impact of indexation of allowances

The Australian Government indexes a variety of transfer payments (such as Disability Support Pension and the Age Pension) to average weekly earnings (AWE), while other allowances are indexed to the consumer price index (CPI). The latter include unemployment benefits, carer allowances, youth allowance for students, AusStudy and some Family Tax Benefits. Reflecting that this differential treatment is currently Government policy, the Commission has maintained the indexation arrangements in its base case projections (chapter 8). The same approach was taken by the Intergenerational Report and Gruen and Garbutt (2004).

However, over an extended period, the relativities between payments indexed to CPI and AWE would grow large and, as noted by the Institute of Actuaries of Australia (2003), are 'likely to prove unsustainable'. Such a widening gap could conflict with wider Government policies (such as equity goals) and may also have unintended impacts on the behaviour of welfare recipients. For example, by 2044-45, a full rate Disability Support pension would be more than double that of unemployment benefits. The incentive to transfer from unemployment benefits to DSP, which is already strong, would be significantly increased. This would undermine the goal of encouraging greater labour participation of those with disabilities.

On the assumption that AWE-indexation is maintained for pensions, it is therefore likely that the Government would need to make periodic adjustments to unemployment and other allowances over the next 40 years to maintain some degree of parity between these various social welfare benefits. In the extreme, were benefits currently indexed to the CPI to be indexed to AWE, the fiscal gap would widen by a further 0.6 percentage points by 2044-45 (table 13.5). The actual outcome is likely to be somewhat lower than this.

The only alternative resolution of the widening relativity between various benefits would be to shift towards more uniform adoption of CPI-indexation rather than AWE indexation for social welfare benefits. This is consistent with the treatment of some superannuation annuities and has been considered in some other countries, such as Norway, as a means of reducing the fiscal pressures associated with growing pensions (Fredriksen and Stølen 2003). For the primary payments (age and disability support pensions), a full shift to CPI-indexation would cut the overall fiscal pressure from 6.5 to about 3.6 per cent of GDP. However, this would

represent a marked departure from current policy, and would profoundly widen the disparity in living standards between working people and pensioners.

Table 13.5 **Impact of fully indexing Australian Government allowances to Average Weekly Earnings compared with the CPI**

Aggregate spending pressure as a share of GDP in 2044-45

Spending area	*Spending pressure (AWE indexation)*	*Spending pressure (base case)*
	Percentage points	Percentage points
Health care	4.54	4.54
Aged care & carers	1.42	1.37
Age pensions	1.72	1.72
Other social safety net	-0.19	-0.63
Education	-0.40	-0.52
Total	7.09	6.46

Source: Commission estimates.

How important is ageing?

Understanding the effects of ageing on future government spending depends on the measure of spending adopted, whether this be nominal, real, per capita or as a share of GDP (technical appendix 6). Some measures are much more useful for policy purposes and others less so. For example, it is possible to calculate how much of the increase in government spending in *nominal* terms could be ascribed to ageing compared with prices, population growth, and other factors. Ageing would show up as a small contributor to the increase in nominal spending, giving the misleading impression that it did not matter. Such an experiment, however, is not useful for policymakers because Governments would not be concerned by rises in their commitments arising from bigger populations, inflation or rising GDP, so long as their commitment did not outpace their revenue share of GDP (projected to be roughly fixed). Accordingly, a simple and more appropriate way of testing the significance of ageing is to assess government spending to GDP with and without ageing.

When expressed as a share of GDP, fiscal pressures can be overwhelmingly attributed to ageing. In the absence of ageing, the fiscal gap on the spending side is projected to be only around 0.9 per cent of GDP. In such a scenario:

- education, aged care and Disability Support Pension costs would stay roughly stable as a share of GDP because unit costs rise with the productivity rate (the main determinant of future GDP growth), while demographic pressures or relief would be absent;

- health care expenditure would still rise by around 2.2 percentage points because of the assumption that health care costs rise as a premium above GDP (reflecting technology and service expectations), but this is around half that which occurs with ageing;
- age and service Pensions would *decline* as a share of GDP by around 0.8 percentage points. This reflects reductions in eligibility rates for the pension and that average pension payments do not keep pace with GDP growth because the share of pensioners on part-payments rises; while
- a range of other allowances that are indexed to the CPI would decline as a share of GDP, including unemployment benefits and some family tax benefits. For example, unemployment benefits and family tax benefits combined would fall by around 1 percentage points of GDP.

As total spending pressures are 6.5 per cent of GDP in 2044-45 in the presence of ageing, this implies that nearly 90 per cent of the fiscal gap associated with spending can be attributed to ageing alone. This pre-eminent role reflects the fact that ageing increases spending shares, while reducing the growth rate of the economy.

13.3 Uncertainties surrounding the projections

History is littered with faulty prognostication by experts over even quite short-term horizons. There are some famous examples:

- In 1909 *Scientific American*, asserted:

  That the automobile has reached the limit of its development is suggested by the fact that during the past year no improvements of a radical nature have been introduced.

- Ernst Rutherford, the famous physicist proclaimed in 1933 (following a similar view put forward by Albert Einstein a year earlier) that:

  The energy produced by the atom is a very poor kind of thing. Anyone who expects a source of power from the transformation of these atoms is talking moonshine.

- In 1929, two weeks before the stock market crashed and the start of the Great Depression, Irving Fisher, a prestigious Yale University Professor of Economics, claimed:

  Stock prices have reached what looks like a permanently high plateau. [9]

As emphasised in the introduction to this study, there are many uncertainties about how and to what extent population ageing may affect Australia's economic

[9] See http://www.permanent.com/quotes.htm.

prospects over the next forty years. The Commission has made some informed judgments about these, but there are obviously many things that could plausibly occur to change the story. Moreover, while the projections have been based on a continuation of existing policies, governments will almost certainly develop new policies aimed at reducing the fiscal impacts of the demographic transition.

Projecting demography faces many uncertainties

Demographic uncertainty is clearly important. Were fertility to be much lower than projected and longevity somewhat greater (scenario P2 in chapter 2), Australia could end up with a 60 per cent greater share of people aged 85 or more years than under the base case by 2044-45, and more than double the base case share by 2100-01. This would have clear impacts on health and aged care costs.

Different *non-demographic* trends in health costs are very influential given the importance of health care costs in shaping fiscal pressures. Even small variations in outcomes in this area can make a large difference. To take some examples:

- the costs of health services may rise by more or less than projected. As noted in appendix D, the power of compound interest means that small errors in judging trends in prices or usage make a large difference to health care costs and fiscal pressures. (Something rising by 1 per cent per annum increases by under 50 per cent in 40 years; adding just a ½ percentage point per annum to this makes the increase over 80 per cent);
- new health risks may emerge, such as new viruses, a greater prevalence of antibiotic resistant bacteria or larger than realised problems associated with rising obesity; or
- on the other hand, new technologies and better public health approaches may lower morbidity rates and increase health productivity — for example, treatments for Alzheimer's disease, better arthritis drugs, new antibacterials, a 'cure' for diabetes, or the use of robots in surgery and as aids.

At the jurisdictional level, the results for the Northern Territory are particularly vulnerable to error. The Northern Territory Government is committed to reducing Indigenous disadvantage by increasing workforce participation rates, educational attainment and improving health and life spans. The Commission's baseline estimates for the Northern Territory have reflected these aspirations. However, achieving these objectives represents a major challenge — even over the long horizon of the projections in this report. For example, improvements in life expectancy among non-infant Indigenous Northern Territorians over the past few decades have been slow (Condon et al. 2004b and Technical paper 1). There has

also been a decrease in their involvement in mainstream employment. The Commission has included the population module relating to the Northern Territory on the CD attached to this report. This allows sensitivity testing of its assumptions — particularly those relating to mortality and fertility — for Indigenous populations in the Northern Territory. Ongoing monitoring of developments in this and other States will be needed to assess whether the existing projections remain adequate.

Other uncertainties

Increases in productivity and labour supply may also decrease fiscal gaps, although the improvement is partly offset by feedback effects from wage rates and economic growth (a point examined further below).

Global developments matter too. Australia has become an open economy sensitive to the state of world markets. Population ageing is a global phenomenon that could affect world growth, investment and migration flows, asset prices, innovation and entrepreneurship. Adverse or favourable developments in any of these areas may affect Australia's economic and productivity performance — and our capacity for financing the services that will expand with ageing. For example, citing results of complex overlapping generation models, Kotlikoff and Burns (2004, pp. 95ff) see risks of global capital shortages for ageing economies. All things being equal, these risk lowering average labour productivity, wages, and therefore the tax revenues, to meet ageing fiscal costs. (This at least reduces the prospect of an asset price 'meltdown', as diagnosed by other commentators.)

The Commission has used the Treasury's projections for age pensions in this study — and these are clearly sensitive to assumptions about the performance of private superannuation funds. Were these funds to perform badly because of poor global economic and corporate growth, then more people would be eligible for part age pensions, adding to the fiscal gap.

Modelling some key uncertainties

Given their potential significance, the Commission explored some of these uncertainties (and policy possibilities) more formally (table 13.6 and box 13.1). The overall finding is that different scenarios can have quite large impacts on taxpayers' accumulated liabilities (relative to GDP), but no credible scenario can *avoid* significant fiscal pressures.

The results for labour participation and productivity may seem paradoxical given that these scenarios are associated with substantially higher economic growth, and

therefore a greater capacity to pay for Government services. Why is this not reflected in larger reductions in fiscal pressure?

Table 13.6 **Impacts on spending pressures of alternative scenarios**
Difference to base case in 2044-45[a]

	More ageing	*High fertility*	*High migration*	*Less ageing*	*Higher across-the-board labour participation*	*Older male participation*	*Higher productivity*
Change in Fiscal pressures (percentage points)							
Health care	0.54	-0.24	-0.13	-0.53	0.00	0.00	0.00
Aged care & carers	0.98	-0.10	-0.09	-0.40	-0.10	-0.03	-0.01
Age pensions	1.13	-0.19	-0.15	-0.66	-0.19	-0.06	-0.04
Other social safety net	-0.15	0.13	0.01	0.14	-0.23	-0.19	-0.07
Education	-0.58	0.46	-0.21	0.38	-0.20	-0.07	-0.12
Total	1.92	0.06	-0.57	-1.06	-0.72	-0.35	-0.24
Change in debt-to-GDP ratio in 2044-45 (proportion)							
	0.16	0.13	-0.21	-0.26	-0.25	-0.11	-0.27

a The low and high ageing scenarios correspond to scenarios P1 and P2 in chapter 2 respectively. The high migration case is 140 000 people per year phased in over several years. The scenario with higher across-the-board labour participation rate assumes that Australian age-specific participation rates reach the OECD 80th percentile, as modelled for the labour market and economic growth in chapters 3 and 5. Similarly, the scenario of older male participation is as modelled in chapters 3 and 5. The higher productivity scenario involves a sustained increase in annual labour productivity growth to 2.05 per cent.

Source: Commission estimates.

Several factors are responsible. Future changes in participation rates are more likely to involve workers who are less skilled, less productive and working fewer hours than others. Consequently, while their labour market status may be very important to their own social and economic wellbeing, the impact on overall output is likely to be more modest. Even were there to be a significant economic growth dividend from greater participation, the strong link between GDP growth and health care spending suggests that the economic gains might be realised as better health care, rather than as lower fiscal pressure.[10]

Surprisingly, *as measured*, fiscal pressures are also not likely to be very sensitive to broad changes in labour productivity. Productivity growth rates could well vary from the 1.75 per cent per annum assumed in projections over the next 40 years — but the impact of different productivity rates is mainly on Australians' living

10 The Intergenerational Report found a similar qualitative result, even though it did not have a link between GDP growth and health care demand. Even without this link, the Intergenerational Report (p. 61) found that increased labour supply resulting from greater participation by older males made less than a 0.3 percentage points difference to fiscal pressure faced by the Australian Government.

standards, rather than as a palliative for fiscal pressures per se. The Intergenerational Report found similar results (p. 61).

Box 13.1 **Exploring scenarios for fiscal pressure**

Higher fertility rates: A long-run total fertility rate of 2.05 (relative to 1.8) would decrease fiscal pressures arising from health, aged care and the Age Pension. Offsetting this, the greater number of children increases spending in education and requires greater social welfare payments directed at families. By 2044-45, higher fertility rates actually increase fiscal pressure slightly relative to the base, but the effect is negligible. However, its effect on the debt-to-GDP ratio in 2044-45 is larger, increasing the ratio by 0.13. This reflects the fact that increased fertility has few early benefits for labour force growth (and therefore few benefits for GDP itself until the mid 2020s[11]) and yet requires increased early spending on education and family-centred payments, whose future value builds because of financing costs. This is not to say that pro-natalist policies would not yield other benefits (including for growth beyond 2044-45).

Greater net migration: Net migration of 140 000 people per year (phased in over several years) — rather than 115 000 — reduces spending pressures by 2044-45 in all areas apart from other social safety net payments. This is because higher intakes reduce aged dependency ratios and add to the effective labour supply (and therefore economic growth). This reduces per capita Government spending in age-related areas, while providing a bigger resource base for funding existing needs. Nevertheless, the reduction in the fiscal gap by 2044-45 is still only around 0.6 percentage points (is similar to that found by the Intergenerational Report). And while higher net migration cuts the debt-to-GDP ratio by 0.21, the actual debt-to-GDP ratio remaining in 2044-45 would still be around 1.8. As in the case of fertility, the scenario does not consider the longer run sustainability effects.

Low ageing: Were there to be a combination of more migration, higher fertility and reduced gains in longevity (scenario P1 in chapter 2), the demographic transition would be slowed. This reduces ageing-related spending to GDP ratios, but increases fiscal pressures associated with education and family payments (reflecting the fertility sub-component of a low ageing scenario). Nevertheless, the fiscal gaps and overall accumulated liabilities are still sizeable.

High ageing: This reflects lower migration, lower fertility and greater longevity (scenario P2 in chapter 2). The results are not symmetric to the low ageing scenario and show that fiscal pressures could credibly be as much as 2 percentage points higher than the base case by 2044-45. However, the increase in accumulated liabilities is relatively muted, reflecting the fiscal gains from early low fertility rates.

Greater labour participation: Older males may increase their participation rates (as in the scenario explored in chapter 5). This is modelled as having zero impacts on health spending because of the feedback from additional GDP growth to greater health spending incorporated in the Commission's modelling. In other areas, spending pressures are reduced because GDP is somewhat larger. The Commission has also factored in significant savings from reduced payments for Disability Support Pensions. It is possible that increased participation rates might also produce savings in Age Pension outlays. This reflects the fact that increased labour participation rates would allow people to earn additional retirement or labour income, which would lead a proportion of this group to fail the threshold tests for eligibility for part pensions. This effect was not modelled, but is likely to be small. **(continued)**

11 No allowance has been made for the potentially negative effect of higher fertility rates on interim labour participation rates, so the GDP consequences may be worse than projected.

Box 13.1 **… continued**

A broader increase in participation rates (to the OECD 80th percentile as discussed by Gruen and Garbutt, 2003 and in chapter 3) has larger impacts on fiscal pressure. Indeed, it provides almost as much relief as a low ageing scenario in terms of its accumulated liabilities for Australian taxpayers. However, the gains are not as great as in Gruen and Garbutt, because the Commission links GDP and health spending and has treated additions to the labour supply as being different on average to incumbents (chapter 3).

Improved productivity rates to 2.05% per annum: As with higher participation rates, the links between GDP growth and health spending imply no gain for this area of Government spending, but some gains for other areas of spending relative to GDP. There are some gains in transfer payments relative to GDP where these payments are indexed to the CPI. The Commission has also estimated some reductions in eligibility for the Age Pension associated with greater superannuation asset accumulation and higher real wages. (Even though payments rise with AWE, eligibility for the Age Pension is dependent on asset and income tests that increase only with the CPI). This has bigger impacts in the medium term (the 2020s) rather than by 2044-45. Overall, the change in the fiscal gap relative to the base is small in 2044-45. However, the accumulated savings from higher productivity are still comparable with some other scenarios because the gains are realised throughout the projection horizon. (Were all transfer payments to be indexed to AWE rather than the CPI, the gains from this scenario would be considerably reduced.)

There are two important features of the modelling that underlie this result.

- Age-adjusted health costs per capita have been projected to increase at a rate 0.6 percentage points above that for GDP per capita (reflecting a combination of the effects of changing input prices, prevalence, and utilisation). The rationale for this is historical and methodological (appendix D and chapter 7). Consequently, in the projections, if productivity growth rates rise, GDP rises, and so do health care costs — by the same proportion — producing no change in the ratio. However, were health care costs *not* to fully rise with GDP (as in some scenarios of the economic model used by State Governments in their submissions to the Commission), then economy-wide productivity gains can be partly realised as reduced fiscal pressures.
- It has been assumed that Australian Government tax revenue stays fixed as a share of GDP (chapter 11), as in the Intergenerational Report. This has some historical and policy basis, but more particularly, makes explicit the policy choice of whether to fund any shortfall of revenue through taxes. However, were it to become necessary to fund any residual fiscal gap through income tax increases, this creates a link between different productivity growth rates and the remaining fiscal gap (this is demonstrated in section 13.5). The higher the productivity rate, the more the fiscal gap is closed for given real marginal tax rates.

What should be the policy response to these uncertainties about health costs, demography and the global economy? First, as one participant in this study

commented, prevarication is not an antidote to uncertainty. Policy responses still have to be made, even though the future is highly uncertain.

Second, it is clearly sensible to monitor the effects of ageing to see if the potential risks actually develop.

Third, downside risks are more important for policy makers than upside risks. Consequently, planning should be made on the basis that ageing may have more profound effects on fiscal pressure than those given in section 13.2, since there are credible circumstances in which this is possible. The Victorian Government (sub. 29, p. 40) emphasised the value of prudence in this context:

> However, future economic prosperity is not certain, mainly because there are risks to the natural environment that could forseeably impede future economic growth (e.g. climate change). In light of these uncertainties, prudent fiscal management and more broadly 'precautionary' policy settings in critical areas where errors could prove irreversible are appropriate.

Fourth, the fact that no one scenario resolves the fiscal gap by a significant margin, suggests that policy measures will have to work in concert to make a large difference to future tax burdens.

Finally, these uncertainties suggest the development of long-term policy approaches that are still beneficial ('no regrets') even if the expected outcomes do not eventuate. For example, improvements in the cost-effectiveness of the health sector will always be worth achieving.

13.4 The ageing 'problem' in perspective

Overall, the Commission projects that trends in spending (much of it the result of demographic influences) and revenue will create fiscal pressures for Governments of around 6.4 per cent of GDP by 2044-45 — or around $4 700 per capita in that year alone (in 2002-03 prices). The accumulated fiscal gap from 2003-04 to 2044-45 is projected to be around $2150 billion in 2002-03 dollars. Were the gap to be progressively financed by issuing debt, the stock of debt would be around $4150 billion by 2044-45 in 2002-03 prices (at a 5 per cent interest rate).

Notwithstanding the projected magnitude of the fiscal gap, the predominant view in policy discussion is that these potential impacts do not constitute a crisis, at least not yet. There are several reasons for supporting this view.

First and foremost, is the fact that an ageing population is fundamentally a reflection of this country's success. Economic, political and technological dividends

have allowed for greater life expectancy for Australians, as in other advanced countries. Greater female reproductive control, education, and labour force participation, combined with lower infant mortality, has lowered fertility rates — also changing the age structure.

At least historically, there was a trade-off between female participation rates and fertility rates. Had many more children been born in Australia in the 1970s and 1980s, our current and impending population structure would have been younger, but our workforce would have included far fewer, and less educated, women. Given that education also promotes productivity, two of the 'Ps' necessary for economic growth — participation and productivity — would have been significantly lower (Day and Dowrick 2004, pp. 4-5).

Indeed, as shown in chapter 3, labour force participation in Australia is currently at its highest rate since just before World War I. Moreover, the proportion of the total population in employment is the highest ever recorded in this country (figure 3.23). Even with the projected decline in participation, the ratio of actual employees to population will still be higher in 2050 than at any time in the entire century preceding 1990.

There are other reasons to temper any concern about an 'ageing crisis'.

- Australia will also be a richer country when these impacts are felt, providing a greater capacity to absorb the additional costs of its ageing population. As noted, average per capita incomes in 2044-45 will be around 85 per cent greater than today.
- People contribute more to a society than just through their marketplace labour. Older Australians play a significant role as volunteers, carers and community members. In any case, the extra leisure that older people are enjoying is a good like others; it just does not get picked up in GDP estimates.
- Unfunded pension liabilities, while significant, will not exert as much pressure on Government budgets as they will in many other OECD countries.
- While Australia does share in common with other countries the prospect of substantial growth in health care expenditure, provided that this is well directed, it will promote community wellbeing and may reduce the need for other age-related outlays, such as residential nursing home care.
- Finally, the ageing of the population is a gradual phenomenon and its economic and fiscal impacts will also gradually build up over time. Events with long lead times cannot be considered crises as long as there is scope for anticipatory countermeasures.

Nevertheless, the emerging fiscal gap is large and, in the absence of other policy actions to ameliorate it (see below), would need to be financed. A key issue in this context is who should pay and when. All financing methods have different economic and distributional implications.

13.5 Implications of financing the fiscal gap

The choices in financing a fiscal gap come down to increased debt, greater user contributions to service costs and higher taxes.

Greater government borrowing can be used to finance short-term fiscal gaps. But continued borrowing for greater Government provision of services over the half-century (or more) of Australia's demographic transition would not be sustainable. It would result in a massive accumulation of Government debt that would have to be paid back by future generations through higher taxes (less private consumption), reduced government services (less public consumption) or inflationary pressures (cutting the purchasing value of future generation's savings). As noted earlier, by 2044-45 alone, the implied debt would be twice the value of GDP were this approach to be taken.

There may be some scope to change the balance of public and private contributions in a number of the key spending areas. There have already been some shifts in this area (for example, in aged care funding). But one of the main areas of increased costs is public hospital services, where Governments have been committed to free universal access. So there is little scope for user charges to realistically eliminate the gap.

The taxation option and intergenerational effects

Taxes of all types and across all tiers of government comprised around 31.2 per cent of GDP in 2003-04 — and remain roughly stable over the Commission's base case projections. Were the future fiscal gap to be tax-financed in each year in which the gap fell, this implies an increase in the tax to GDP ratio of 6.4 percentage points by 2044-45 or an average 21 per cent increase in average tax rates.[12] Of course, if the gap were financed through selective taxes only — such as income taxes — this would require a bigger proportionate increase in these tax rates.

[12] Much smaller long-run tax rate changes are required if more of the tax increase were introduced earlier. For example, with an interest rate of 5 per cent, an increase in taxation of 2.6 percentage points of GDP (or an 8.4 per cent increase in average tax rates in 2003-04) would fully offset the debt implications of accumulated fiscal gaps to 2044-45.

Much of the concern about tax financing as a policy response arises from the intergenerational impacts were the financing of gaps to be simply left to the future. As the Victorian Government noted:

> The projected ageing of the Australian population has raised fears that the living standards of future generations will be unduly burdened by the costs of caring for a growing cohort of older people (sub. 29, p. 39).

But, as the Victorian Government (pp. 39-40) and other research has shown,[13] the principles of intergenerational equity do not imply that there needs to be a substantial reduction in consumption by current generations to finance the future increase in fiscal costs associated with ageing.

The driver of this result is productivity. Increases in productivity mean that the current young will have lifetime incomes that are much higher than the generation that will be retiring soon. The generation of males who started work in 1948-49 (and worked for 40 years) could expect average real lifetime wage earnings of around $1 million (in 2002-03 prices). In contrast, the male generation that commenced work the year after the retirement of the 1948-49 cohort (1988-89) could expect real lifetime wage earnings of around $1.9 million.[14] This suggests that there would at least be a capacity to pay for the fiscal costs of population ageing.

To put this more clearly in perspective:

- By 2044-45, the average income of Australians is projected to rise by around $35 000 per capita compared with 2003-04 (in constant 2002-03 prices). In that year, Australia will need to find around $4500 per person to meet the fiscal gap, or around 15 per cent of the gain in average income.
- Over the full period from 2003-04 to 2044-45, the accumulated fiscal pressure per capita is projected to be around $81 000 (before financing costs), while the accumulated additional GDP will be around $650 000 per capita.[15] So even after meeting the expenditure needs of Australia's ageing population, the dividends of

[13] For example, Day and Dowrick (2004) and Guest and McDonald (2002 and 2003).

[14] These are estimates based on a standard curve describing how wages increase with experience over a lifetime, combined with average weekly earnings rising by a productivity rate of 1.75 per cent after 2003-04. Previous years used average weekly male earnings (from ABS, *Average Weekly Earnings*, Cat. no. 6302 deflated by the GDP deflator from *National Accounts*, Cat. nos. 5206.0 and 5204.0).

[15] Per capita is used here loosely, reflecting the fact that the population grows and its members change as people are born and die during the 40 year period. Consequently, the per capita measure is the sum over the 40 years of the annual per capita gains from GDP growth compared with 2003-04, even though the population being used to derive the per capita measures changes each year.

economic growth mean that, on average, Australians will be better off by around $570 000 per capita from 2003-04 to 2044-45 than they would have been in the absence of such growth.

Accordingly, several Australian economists (for example, Guest and McDonald 2003 and Day and Dowrick 2004) have advocated leaving to the future income tax rate increases — with the effect of placing more of the burden of the fiscal gap on younger versus older generations.

A common concern associated with tax-financing of any fiscal gap is its effects on work incentives. Higher marginal taxes for given real incomes have damaging effects on (especially lower income) people's incentives to gain education, work and save. This would dampen future productivity and economic growth.

However, even were marginal tax rates for given real incomes to be fixed — by implementing complete indexation of resident individual income tax thresholds for inflation (to avoid bracket-creep) — a significant share of the projected fiscal gap would be covered as productivity growth pushed up workers' real earnings. 'Back-of-the-envelope' calculations[16] suggest that with 1.75 per cent annual productivity growth and complete inflation indexation of tax scales after 2004-05, more than 3.8 percentage points of the 6.4 percentage point fiscal gap in 2044-45 could be automatically financed this way. The debt-to-GDP ratio associated with cumulative fiscal gaps would fall to around 0.9, less than half that without the additional tax revenue. To the extent that existing progressive tax scales are deemed equitable, this financing method does not have adverse intergenerational equity consequences.

If productivity growth rates were higher, then even more would be financed automatically in this way, underlining the fact that improving Australia's productivity performance is important not only to raise household living standards, but also to deepen the potential tax base. For example, under this taxation scenario were productivity growth to rise to 2.05 per cent per annum (the average over the 1990s), then the remaining fiscal gap to be financed falls to 1.9 per cent of GDP in 2044-45 and the debt-to-GDP ratio in 2044-45 to around 0.64, or less than one-third of that without this revenue stream. (Of course, were productivity growth to falter, the remaining fiscal gap to be financed would expand again.)

16 The calculations are approximations only. They are based on the assumption that the distribution of total individual taxable income follows the wage distribution in August 2002 — and that this distribution is unchanged over time. The calculations use separate distributions for part-time and full-time workers, and take into account projected numbers of part-time and full-time workers until 2044-45 (chapter 3). The actual tax scales for 2002-03 and the inflation-adjusted scales for 2003-04 and 2004-05 are used for those years, with all other years using the inflation-adjusted 2004-05 scales. Average earnings in any part of the distribution rises by a constant 1.75 per cent per annum under the base case.

That said, under such an approach, while there would be no bracket creep, *average* individual income tax rates would still rise (by about 8 percentage points) because with rising productivity, a greater proportion of people's real incomes would be taxed at higher rates.[17] Equally, this could be expected to involve some adverse incentive effects. For example, Australia might find it more difficult to attract skilled migrants from high income, lower-taxing countries, or to prevent a brain drain to them. On the other hand, given the global prevalence of population ageing, many other advanced countries may well be in more difficult circumstances than Australia. It should also be emphasised that this approach would seem counter not only to the current policy prescription of no (further) rise in the ratio of Australian Government taxation to GDP, but also the specific intention that at least 80 per cent of taxpayers will face no higher tax rate than 30 per cent.[18]

Other policy options for (partly) financing the fiscal gap also have intergenerational impacts. For example, some of the accumulated wealth of the future old might be used to finance the gap, noting that the future old will own a much greater share of national wealth than the current old (chapter 11). On the face of it, implementing such a policy would appear to shift some of the fiscal costs on those who are responsible for those costs. However, to the extent that this group leaves bequests for their children (altruistically or accidentally), the shift will be partly illusory. Intergenerational impacts are hard to pin down because the consumption and savings behaviour of families across generations are linked.

Judgments about the appropriate intergenerational distribution of the financing burden of any fiscal gap would require formalised generational accounting methods (box 13.2) and also involve more than economic considerations. They are outside the ambit of this report. However, this brief analysis suggests that it is important at least to take account of the following facts:

- future generations will have substantially greater lifetime incomes than present ones;
  - some of the projected fiscal gap could be financed without increasing marginal tax rates at given levels of real income; and
- intergenerational impacts of ageing will ultimately depend, in part, on the extent to which wealth is re-distributed from older to younger generations within families.

[17] The Commission has also calculated that vertical equity would deteriorate slightly. For example, the ratio of incomes at the 90 per cent decile level grows relative to the 10 per cent decile, since less of low income earners income is covered by the tax free threshold. This could be corrected, with a relatively slight loss of effect on the fiscal gap, while actually improving the efficiency of the tax system.

[18] 2004-05 Budget Paper no. 1, p. 1.1.

13.6 Addressing the fiscal drivers

While the view that population ageing is currently a crisis can be dismissed, it still raises serious policy challenges. Governments are responsible for many of the costs that are strongly age related — health and aged care particularly — and will have to respond to the budgetary consequences as these costs rise relative to tax revenues.

Governments also hold some important levers that might be used to mitigate the effects of ageing. Just as the outcomes of ageing are dependent on the three Ps — population, participation and productivity — so too might some of the policy solutions to the fiscal gap lie here.

For example, governments:

- have some effects on population through immigration and family policies;
- shape superannuation, wages and welfare policies, which affect labour participation and the growth of the future labour supply;
- are responsible for microeconomic reform, innovation and education policies that affect productivity growth; and
- as regulators, purchasers and suppliers, have substantial potential to affect the cost effectiveness (and productivity) of Government-funded services, such as health care, that they provide to Australians.

The directions for policy attention can be divided into those that:

- deal with population directly through population policies;
- promote economic growth — through increased labour supply and productivity — so that the costs of population ageing are more affordable; and
- seek to increase the cost-effectiveness of government-provided services — particularly health and aged care.

Box 13.2 **Generational accounting**

A developing international literature on intergenerational accounting has attempted to measure tax burdens for current and future generations associated with government spending (Gokhale and Smetters 2003, Kotlikoff 2001, Auerbach, Gokhale and Kotlikoff 1991). It has been a particular focus in the USA because of the large overhang of unfunded social security pensions and Medicare. The methods have been widely used (such as by the US Federal Reserve, the European Commission, the IMF, and the World Bank).

At least part of the goal of generational accounting — bringing future government deficits to account now — has been undertaken in this report and in the studies made by the Intergenerational Report and various State Treasuries (though not over the much longer horizons typical of generational accounting exercises). But neither this study, nor any of the other Australian government studies, have yet explicitly determined the distributional effects among successive generations of options to finance the fiscal gaps.

Doing so is a potentially worthwhile exercise. However, it faces several technical and practical challenges.

- The data requirements (and accompanying uncertainties) for a comprehensive analysis are even greater than for the present study. For example, generational analysis would usually need to use longer time frames than this study.
- Results become even more sensitive to assumptions about trend growth rates. For example, the non-demographic growth rate for health care becomes the major long-term determinant of the health cost share, once the population is stable. Similarly, assumptions that preserve CPI indexation of some benefits, while others grow with AWE, result in very wide long-run relativities.
- Analysis should assign the value of the consumption of government services and the provision of tax revenue to each birth cohort, but this is difficult for some spending categories (eg defence) and for some taxes (eg taxes on capital).
- Assumptions must be made about savings behaviour and the extent of intergenerational altruism. These remain contentious, though the weight of evidence discredits the extreme view that altruism results in private intergenerational transfers that compensate for changes in the generational incidence of taxes.
- There are assets and liabilities other than those held by the Government that are relevant to judgments about intergenerational equity, but which may not be captured in intergenerational accounting. For example, these include the stock of public knowledge and environmental amenity (or lack of it).
- The measures of generational burdens must be carefully interpreted. For example, higher future tax rates on unborn generations may be seen as inequitable since they impose higher tax rates on future versus current generations. However, if future generations are also wealthier, then higher tax rates may be consistent with the re-distributive goals that are embodied in progressive tax scales.
- The broad conclusions reached by generational accounting can sometimes be reached with more simple information on future fiscal pressures. For example, warnings about the sustainability and implications of US social security arrangements do not require full intergenerational accounts.

What role for population policy?

Since the fundamental driver of the widening fiscal gap is population ageing, the question that arises is whether this could be ameliorated by policy action.

As noted in chapter 2, there are several myths about fertility that have led to premature concerns about Australia's capacity for population replacement. The measure most cited — the total fertility rate — is an artificial measure of fertility that can seriously underestimate the lifetime fertility experiences of real cohorts of women. The available evidence points to Australia having a reasonably high fertility rate by the standards of other countries.

Plausible changes in fertility (and net migration) above existing levels make relatively small differences to Australia's age dependency ratios over the projection horizon of this study. This limits their role as remedies for the emerging fiscal pressures.

Moreover, while governments can *partly* influence fertility rates through social security payments, childcare subsidies and encouragement of family-friendly policies, the empirical evidence suggests that fertility rates are not very sensitive to policy (box 13.3). The measures tend to have low 'additionality', either:

- providing substantial and tax-inefficient transfers to people who were going to have children anyway; or
- bringing forward the timing of children, without affecting completed fertility rates.

In any case, any reversal of declining fertility would initially increase the aggregate dependency rate, with adverse implications for per capita labour supply growth, economic growth and accumulated fiscal gaps in the initial decades (chapter 5 and table 13.6).

Increases in net migration are likely to be more amenable to policy action, since Australia is a small country and there are queues of willing migrants. Increases in net migration can partly reduce the fiscal pressures associated with ageing. It could help to overcome some skill deficits, with benefits for Australia's economic performance, as noted by the Victorian Government (sub. 29, p. 55). That said:

- migration has a bigger impact on population numbers than on Australia's age structure, which raises issues of congestion and sustainability (chapter 2); and
- a focus on skilled migration could yield a bigger payoff, but targets for skilled immigrants may become more difficult to meet, with other ageing countries competing with Australia for them and with the potential for greater emigration of skilled Australians. The Australian Nursing Foundation (sub. DR72), for example, highlighted the major world shortages of nurses.

Box 13.3 **The impacts of pro-fertility policies**

Policies to support children and families have many objectives, of which increases in fertility generally play a modest role. Nevertheless, some countries have set out to increase fertility rates through incentive payments and the provision of family services. For example, French policy is particularly focused on increasing family size, offering 104.73 Euros for 2 children, increasing incrementally to 641.51 Euros for 6 children (IRM, 2005). Unique to Sweden is a 'speed premium', whereby mothers can maintain their benefit level if they have another child within 30 months of the last, without the need to return to work between births (Ronsen, 2004).

Measurement of the effects of family policy is fraught with problems (Ronsen, 2004). Biases may exist from other factors, such as economic upswings. Policies often lead to earlier childbirths without increasing the final number of births and it is difficult to separate those births that occurred due to the policy and those that would have occurred anyway. Nevertheless, there is a general consensus that while pro-fertility policies increase the total fertility rate, the impacts are relatively small.

- Milligan (2002) evaluated the Québec Allowance for Newborn Children (ANC). This payment, effective from 1988 to 1997, focused on large families. The payments ranged from $500 (Canadian) for the first child, $1000 for the second and 20 quarterly payments of $400, totalling $8000 for the third (Milligan, 2002). By comparing the change in Québec fertility rates relative to wider Canadian fertility fluctuations, it was estimated that the cost of each additional birth attributed to the policy was on average $15 113 (Milligan, 2002).
- Using cross-country analysis, Gauthier and Hatzius (1997) estimated that increasing family allowances by 25 per cent would increase the total fertility rate by 0.07 in the long run.
- Where fertility directed policy has been influential, it has generally involved massive spending. This was the case for Sweden in the 1980s and Eastern Europe in the 1960's and 70's, with the latter devoting 10 per cent of their collective budgets to fertility policy measures (Caldwell et al. 2002). With significant resourcing and explicit government goals of raising fertility rates (Grant et al. 2004), Hohn (1988) estimates France's increase in TFR from family policy at 0.2 to 0.3 children per woman.
- Using Canadian data, Hyatt and Milne (1991) report that a one per cent increase in the real value of the maternity benefit increases the total fertility rate by between 0.09 and 0.26 per cent.
- For Norway, Kradval (1996) estimated that a 20 percentage point increase in childcare spending increased the TFR by 0.05.

Quite apart from policies directed at fertility, other government-influenced factors are important for fertility. For example, uncertainty and economic stability have been shown to play a role in the decision to have children, evident especially in the case of Sweden and in the transition periods for Poland and Germany (Ronsen, 2004; Grant, et al. 2004). So broad policy settings aimed at prosperity may be more influential in fertility decisions than explicit pro-natalist policies, without occasioning the deadweight costs.

In sum, while the roots of population ageing are demographic, population policies have only a limited capacity to remedy the fiscal implications of ageing, and some

may aggravate it over the medium term. That is not to argue that population-related policies are not beneficial for other reasons, simply that their rationale should not be based on their ability to moderate the ageing of the population.

Increased labour supply

With population ageing, labour supply and economic growth will slow as a greater share of Australians inevitably move outside the labour force. This is not, in itself, a problem, to the extent that:

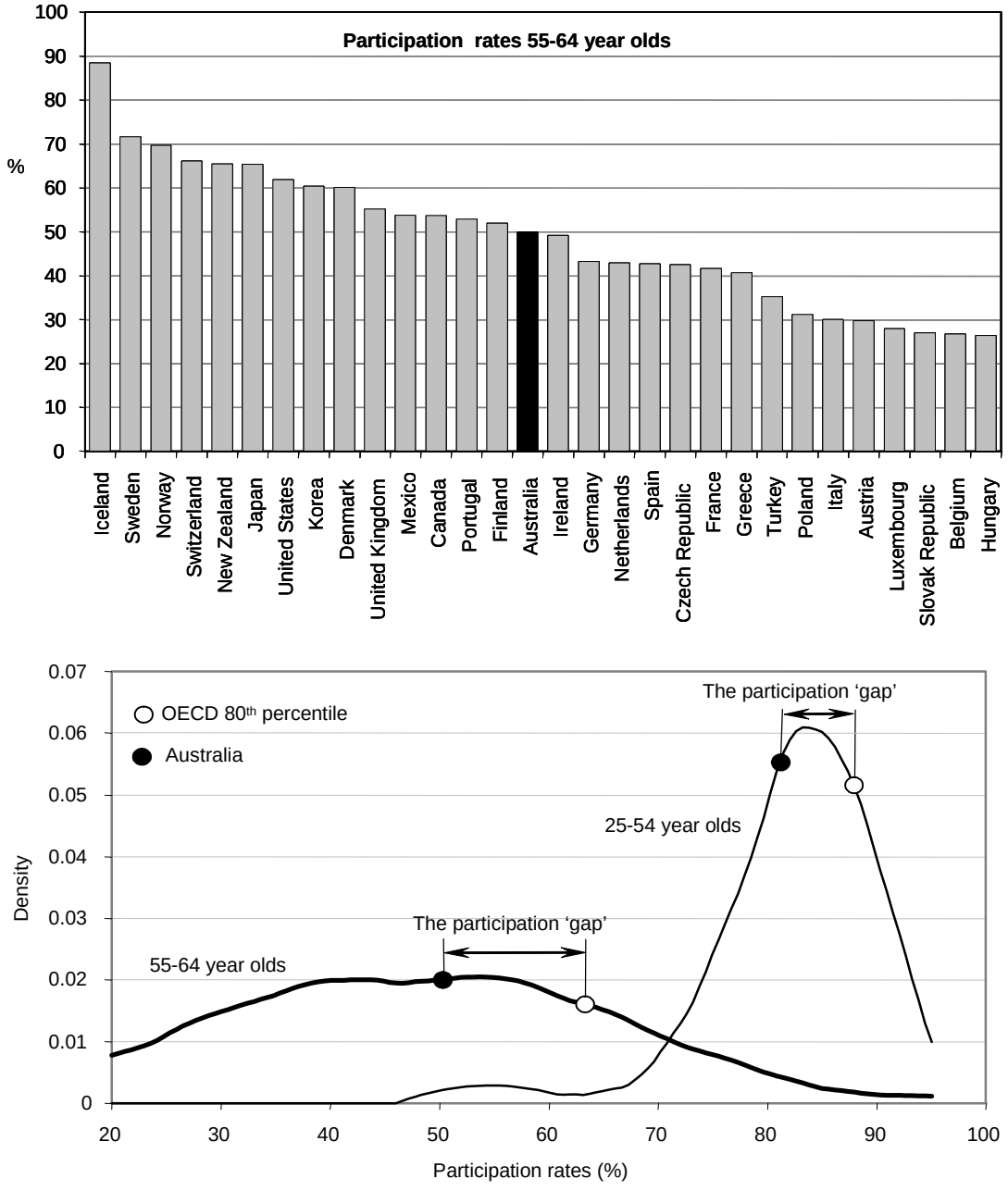
- people's exit from the labour market has not been induced by artificial (regulatory) incentives or by unduly poor labour market prospects for mature workers; and
- retirees have made prudent judgments about financing their old age.

However, there is compelling evidence that these assumptions are not warranted for everyone.

While labour force participation rates among Australians aged under 24 years are relatively high compared with other OECD countries, rates for older Australians are placed among the middle of OECD countries, and significantly below the highest performers (figure 13.3).

The involvement of mature Australians aged 55-64 year olds is particularly low relative to other age groups in Australia, and the gap between Australia and higher participation countries is wider for this group. The rapid growth of disability pensioners has been a major source of lower participation rates among mature and older Australians, especially males. This growth is partly testimony to injury risks in manual labour but it is also, in part, associated with low demand for unskilled (particularly male) workers. It has created a large group of disadvantaged people with limited employment prospects, as well as a substantial ongoing social welfare obligation for government.

Figure 13.3 **Labour force participation rates, OECD countries**
Males and females, 2002[a]



a The distributions of participation rates were calculated by nonparametric estimation using an Epanechnikov kernel (Silverman 1986). As in Gruen and Garbutt (2003), the 80th percentile was calculated for OECD countries. Since the calculations are indicative, adjustments for maternity leave and military service, and certain country exclusions made by Gruen and Garbutt, are not made here.

Data sources: Commission estimates and OECD (2004, *Employment Outlook 2004*, Statistical Annex, Table C).

Some of this problem may be generational and may reduce over time. Younger cohorts are better educated than older cohorts (chapter 3). That, together with a

growing tendency for lifelong training and education, and the development of new health technologies, suggest that (age-adjusted) disability pension rates may fall in the future and participation rates may climb somewhat. These assumptions have already been built into the Commission's projections.

The Australian Government is also pursuing policies that encourage greater engagement of DSP participants in the labour market (Department of Employment and Workplace Relations, sub. DR71, pp. 13-14). The Commission has explored the impacts of this for older males (chapter 5 and table 13.6), but has not modelled the effects for females (where DSP rates could be expected to rise for 60-64 year olds as a result of changes to Age Pension eligibility arrangements). Reforms that encourage greater integration by DSP beneficiaries into the labour force may have sizeable benefits for the pensioners themselves. They will also have useful collateral advantages for welfare spending, and to a lesser extent, Australia's economic prosperity.

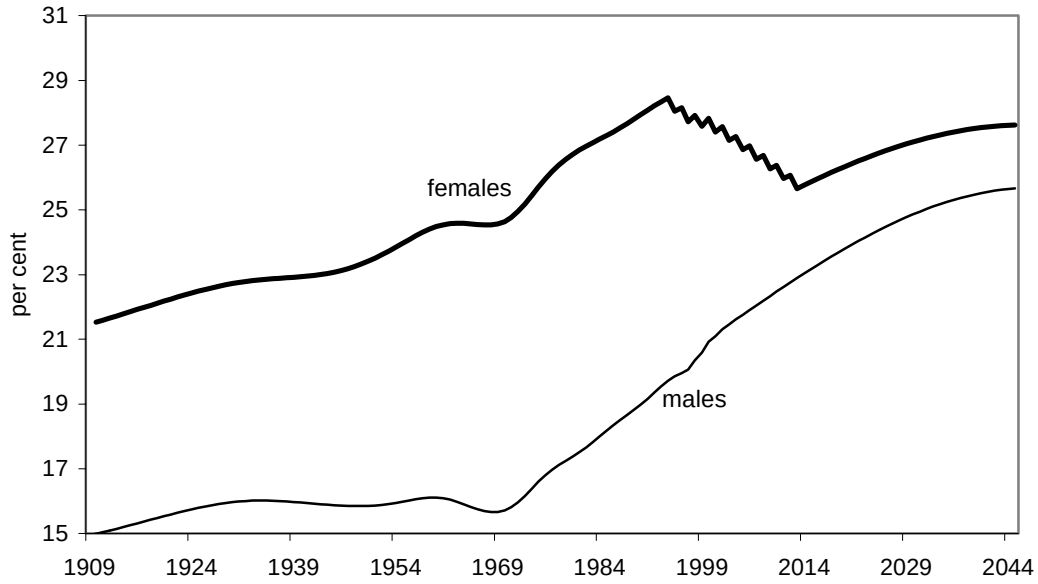
But institutional and regulatory factors underpinning labour participation also bear examination. For example, New Zealand, a country with broadly similar cultural attitudes to Australia, has significantly higher male and female participation rates at older ages. New Zealand's pension system is more oriented to higher participation rates for the old. For example, the age of eligibility for State-sponsored age pensions has been 65 years in New Zealand for several years now after past increases, while replacement rates (the ratio of pension payments to wage income) have tended to be low internationally and tax incentives to continue working while receiving a pension correspondingly high (OECD 2004d).

Comparative analysis of this kind and other evidence suggest gains from addressing artificial incentives to retire or remain outside the workforce, such as lowering effective marginal tax rates on labour income for people in receipt of pension or superannuation income. The Department of Employment and Workplace Relations (sub. DR71, pp. 12-13) argued that a range of initiatives had already taken place in this area, such as changes to the preservation age for superannuation, the Pension Bonus Scheme and the Mature Age Worker offset, whose effects will tend to discourage early retirement. However, other aspects of the superannuation system, such as the availability of lump sum benefits, may continue to encourage some early exits and subsequent reliance on the Age Pension.

The paradox of retirement incentives is that among developed countries, average life expectancy has increased significantly over the last century, while incentives have generally favoured earlier exit from the labour market. Over this period, eligibility for state pensions has remained stable or declined (and a range of mechanisms were introduced, now largely reversed, to encourage early retirement). As a consequence, people are spending a much greater share of their lives on state

pensions (figure 13.4). In this context, several participants in this study drew attention to the effects on participation and the public purse of the age for eligibility for the Age Pension. Mercer Human Resource Consulting (sub. 67, p. 18) proposed gradually raising the eligibility age for the age pension from 65 to 67 years by 2022, while the Securities Institute (sub. 22, p.4) suggested increasing the minimum age for the age pension for retirees, for example, to age 70 over a 10 year period starting in July 2005, with provision to increase it to age 75 years over another 10 year period. Some countries already have higher ages than 65 years for qualification for state pensions (for example, in Iceland and Norway it is 67 years, as it will be in the United States after a transition period).

Figure 13.4 **Years on age pension as a share of life**
1909-2045[a]



a This is calculated as the years of life left at the age of eligibility for the Age Pension (which is 65 for males throughout the period, and has moved from 60 to 65 years for females) as a share of the entire life expectancy of those who at least reach the pension eligibility age. For example, in 2004, a male aged 65 could expect to live a further 17.9 years, giving an expected share of total life on the pension as 17.9/(65+17.9) = 21.6 per cent.

Data source: Various ABS historical life tables and the B series implied lifetables (estimated by the Commission).

Increases in the age threshold for eligibility for the old age pension beyond 65 years would probably increase labour force participation rates. It is notable that in New Zealand the rapid transition from age 60 to 65 years for state pension eligibility in the 1990s was accompanied by an increase in participation rates for the 55-64 year age group of 15 percentage points (Johnson 2000, Duval 2004). It is likely that at least some of the trend growth in Australian female participation rates at older ages

in recent times has been prompted by the transition to age 65 years for age pension eligibility for women.

Increases in pension eligibility age would have a treble effect on pension outlays.

- It would reduce pension outlays proportionately by the ratio of the period of the delay to average life expectancy after 65 years.
- By increasing participation rates, some people would accumulate enough savings that they would be able to privately fund more of their retirement with no, or less recourse to publicly funded pensions.
- It would also tend to increase savings *rates* for those who wished to retire earlier than the state pension age, also with impacts on subsequent entitlement to the Age Pension.

But while delayed access to the Government funded pension would raise participation rates and produce direct fiscal benefits, any significant extension would have to be accompanied by continued safety net arrangements for those who were unsuccessful in the job market. To this extent, gains from lower Age Pension outlays would be partly lost through increases in other benefits.

There remains scope for a broader range of policy initiatives to enhance labour supply (and incidentally to reduce pressures from safety net funding) by:

- reducing the outflow of people from the workforce due to injury and disability or maintaining their attachment to the labour force during a period of rehabilitation;
- overcoming the concern by DSP recipients that getting a job and then losing it would forfeit their qualification for the DSP (DEWR 2004, p. 10);
- topping up workers' human capital and improving recognition of prior learning in providing credentials;
- promoting better job prospects and labour market readiness and matching services for discouraged mature age Australians (acknowledging that significant steps have already been taken with changes to the Job Network and with impending policy changes for DSP beneficiaries — DEWR, sub. DR71);
- increasing the scope and willingness for employers to hire and retain older workers. This includes a regulatory framework that promotes flexible working arrangements, such as part time and non-traditional working arrangements, and that does not create excessive transactions costs for employers; and
- facilitating age and family-friendly workplaces.

But initiatives directed at bringing current 'outsiders' into the workforce may not make a large difference to overall economic growth once account is taken of the

likely additional hours worked, unemployment rates and marginal productivity rates of these groups. This underlines the importance of taking early policy action to enhance participation rates in the future for today's younger cohort of employees.

The role of productivity growth

It has been shown that even small increases in economy-wide productivity growth rates have large impacts on Australians' well-being over a 40 year horizon. For example, with 1.75 per cent productivity growth, the average employee on $50 000 a year today would earn around $100 000 40 years hence (an increase of 100 per cent). But this would rise to around $113 000 with a 2.05 per cent productivity growth rate (an increase of 125 per cent over their present income). This is the power of compound interest.

Such productivity gains are obviously worth achieving in their own right. However, assuming no consequent increase in the tax share of GDP, their impact on the fiscal gap is likely to be muted. This is because (as noted previously), some of the ageing-related costs will rise with productivity (for example, wages of nurses in aged care facilities) and people's expectations of services rise with income (as in health care). But, at some point, such expectations may be moderated if the incremental value of such services were to fall, or if taxes and consumer charges needed to be raised greatly to sustain those service levels.

There are several other ways in which productivity gains may be seen as beneficial in an ageing context.

- To the extent that the fiscal gap may need to be financed through income taxes, the bigger the productivity gains, the greater the share of the fiscal gap that can be covered at given (real) marginal tax rates.
- Productivity gains increase people's absolute disposable incomes, even after taking account of the feedback of productivity on publicly funded consumption. The more they increase absolute income, the less justification for any intergenerational resistance to meeting the costs of ageing. Such income increases also mean that more people exceed income and asset eligibility thresholds for safety net payments, with commensurate savings for taxpayers.
- CPI-indexed Government benefits become relatively more affordable as GDP and tax revenue grows with higher productivity.
- Finally, productivity gains in government service provision (beyond those occurring in the general economy), have significant potential to decrease fiscal pressures directly.

Effective and efficient services

The major source of future fiscal pressure is Australia's health care system. This reflects the (inextricably linked) development of new technologies, increasing expectations of care and an ageing population. This is not a problem per se. Few people would want to go back to 1960s medical technologies and practices. Health care has generally become more effective and less physically intrusive or traumatic — and this trend will desirably continue. However, there are inefficiencies and problems in the health care system that, if addressed, could significantly reduce the fiscal gap, while improving patient outcomes.

These inefficiencies were highlighted in the Commission's (2004b, pp. 244ff) inquiry into national competition policy. They are also evident in the 'Blue Book' — produced each year by the Intergovernmental Review of Government Service Provision. For example, there are variations in performance between jurisdictions and between parts of the system, which suggest scope for changes to provide better services. But there are also deep-seated difficulties across the whole system that invite reform.

- Coordination between different types of services, different types of providers and all levels of government remains a focus for better delivery. This would help avoid cost-shifting incentives, reduce distortions in user choices and provide better information for improved outcomes. In its inquiry into National Competition Policy, the Productivity Commission identified Australia's elaborate mix of funding and administrative responsibilities for health care as a key source of poor coordination:

  > Rising costs, inefficiencies in resource use, poor outcomes for some community groups and increasing difficulties with access are all indicative of scope for significant improvement. Overlapping roles and responsibilities between the Australian and State and Territory Governments either cause or contribute to many of these problems (PC 2004b, p. xxxiii).

- The healthcare labour market is characterised by a range of inflexible professional demarcation rules that determine who can do what for whom. While some of these are appropriate, others may become (or already are) increasingly redundant with new technologies and better training for health care workers. These issues will become more serious with impending labour shortages in some professional areas. (The Productivity Commission is currently undertaking an inquiry for COAG into the health workforce.)

- It is important to ensure that the adoption of new health technologies (and the continuation of old practices) paid for by the public purse is justified on evidence-based grounds. The Pharmaceutical Benefits Scheme uses an evidence-based approach in making recommendations about the listing of drugs,

but other areas of the health system are not generally subject to systematic scrutiny. The Cochrane Collaboration has shown that many medical practices widely accepted in the past are not effective.[19] Of course, it is also important to ensure that evidence-based medicine is not used as a cloak for inappropriate rationing, or to undermine appropriate clinical freedoms of practitioners.

- A significant share of total health costs arises from preventable diseases, such as smoking-related cancer, obesity-related diabetes II, and cardiovascular disease related to sedentary activity and eating habits. There are also a large number of adverse events in the hospital system — estimated at thousands of avoidable fatalities a year (Richardson 2005) — that warrant remedial action. These are costly in their own right, but also suggest more general failures in the quality of care. People are also often relatively passive consumers of health care, which reduces their role in achieving better health outcomes (though this may be changing with more information available through the Internet). For example, patient behaviours make a large difference to the effective management of asthma and diabetes. These facets of the health care system suggest a central role for public health promotion and more effective involvement of better informed consumers in their own health care management.
- Pricing signals in health care remain appropriately muted, given the importance of having wide community access to such services. However, their practical application can create excessive demand in some parts of the health system and deficient demand in others. The challenge is to ensure the 'right' amount of resources in the health and aged care sectors, and their allocation in a way that best meets patients' preferences and needs. Neither excessive rationing nor over-consumption are desirable.

There is a smaller range of concerns in the aged care sector (where technology has to date played a weaker role in cost growth). But funding arrangements, regulation of the sector and scarcity of specialist aged care nurses have been identified as areas where potential policy action may be required (Hogan 2004). The Australian Government has adopted many of the Hogan Review's shorter term recommendations, and is consulting with the community about longer term initiatives, including the broad question of the role of price signals in the functioning of the system.

[19] See www.cochrane.org.

13.7 Summing up

The Commission's analysis and projections do not reveal an impending crisis as Australia's population ages. There is no 'generational storm' on the horizon (as one of America's most distinguished economists — Laurence Kotlikoff— has described the situation for the United States).[20] But the Commission's analysis does suggest that the demographic transition will be large, with the population of the over 65s growing from 2.6 million to just under 7 million by to 2044-45 (this is about one in every four Australians). A change of this magnitude will affect most facets of our lives — our economy, consumption patterns and social life. For all tiers of Australian governments, the pressing concerns are to provide adequate services, especially health and aged care, and to fund and manage these efficiently and equitably.

Fortunately, population ageing is a slow process, and the impacts on budgets are also gradual. This provides the opportunity for developing policies that smooth the costs of population ageing over long periods. The need to respond early to the problems posed by population ageing is receiving increasing recognition. There have already been a raft of policy initiatives over several years in superannuation and pension reform, which explicitly recognise the advantages of appropriately phased pre-emptive policies. Exercises such as the Intergenerational Report, the Australian Government Treasury's Demographic Challenges consultation process, the Hogan Report into aged care and this study itself provide some of the information for future action.

The broad options for future policy are to take actions that reduce the magnitude of the projected gap or that increase our capacity to pay for any remaining gap. Early intervention will avoid the need for inefficient or inequitable 'big bang' interventions, such as excessive tax increases or service rationing, which would also face public resistance. Population ageing can only be conceived as a crisis if we let it become one.

[20] Kotlikoff and Burns (2004).

APPENDICES

A Submissions and consultations

A.1 Submissions received

The following table lists the 41 submissions received prior to publication of the draft report and 33 subsequently. These submissions are available on the Commission's website (www.pc.gov.au/study/ageing/subs/sublist.html#list).

Participant	*Submission number*
ABARE	DR50
ACOSS	27
ACROD Limited	DR63
ACT Government	21
Alzheimer's Australia	24, DR55
Australasian Centre on Ageing	9
Australian Chamber of Commerce and Industry	DR68
Australian Dental Association Inc.	3
Australian Government Department of Family and Community Services	DR61
Australian Local Government Association	18
Australian Nursing Federation	36, DR72
Australians for an Ecologically Sustainable Population Inc.	7
Brotherhood of St Laurence	11
Carers Australia	26
Catholic Health Australia	20
City of Salisbury	DR52
Combined Pensioners and Superannuants Association of NSW Inc.	DR56
COTA National Seniors Partnership	DR57
CPA Australia	13, DR60
Department of Employment and Workplace Relations	DR71
Department of Industry, Tourism and Resources	33
Department of Treasury and Finance (WA)	DR70
Engineers Australia	DR44
Fitzpatrick, Nigel	30, 31, 34, 37, 38, DR47 & DR48
GlaxoSmithKline	35
Gray, Mathew	10
Hall, Alan	DR51

Investment and Financial Services Association Ltd	DR73
Malabam Health Board	4
Medicines Australia	32
Mercer Human Resource Consulting	DR67
Municipal Association of Victoria	DR43
Murdoch Children's Research Institute	6
Nambucca Shire Council	1
National Centre for Vocational Education Research Ltd	19
National Healthcare Alliance	DR42
National Rural Health Alliance Inc.	12
Northern Territory Government	8, 15, DR58
NSW Commission for Children and Young People	DR64
NSW Government	DR45
Olsberg, Diana	DR54
Paterson, John	DR49
Pharmacy Guild of Australia	DR65
Queensland Government	17, DR66
Queensland Nurses' Union	DR59
Real Estate Institute of Australia Ltd	5
Richardson, Jeff — Monash University	16, DR74
Securities Institute	22
Shire of Campaspe	14
Social Market Economy Institute of Australia	25
South Australian Government	23, DR62
Spillane, Brian and Veronica	41
Tasmanian Government	40, DR69
Ure, Richard	DR46
Van Wyk, Richard	2
VicHealth	DR53
Victorian Government	29
Volunteering Australia	28
Western Australian Government	39

A.2 Consultations

The Commission hosted two workshops in Canberra, attended by officials from Australian, State and Territory governments, to discuss approaches to estimating the economic and budgetary impacts of population ageing and work-in-progress. The first, was held on 29 July 2004 and the second, on 15 December 2004 (after the release of the draft report).

The Commission also held an experts' meeting on demographic projection scenarios on 17 December 2004. The group comprised Peter McDonald and Rebecca Kippen of the Demography and Social Program, Australian National University and officers from the Australian Bureau of Statistics.

In addition to continued liaison with workshop attendees, including visits to different jurisdictions, discussions were also held with the following parties:

Access Economics
Australian Bureau of Statistics
Australian Institute of Health and Welfare
Australian Local Government Association
Booth, Heather (Demography and Social Program, Australian National University)
Centre for Burden of Disease and Cost-Effectiveness (School of Population Health, Queensland University)
Department of Family and Community Services
Department of Health and Aged Care
Dowrick, Steve (Faculty of Economics and Commerce, Australian National University)
Epidemiology Services Unit (Queensland Health)
GlaxoSmithKline
Kippen, Rebecca (Demography and Social Program, Australian National University)
McMillen, Jan (Australian National University)
Medicines Australia
Richardson, Jeff (Centre for Health Economics, Monash University)
Securities Institute
Sheehan, Peter (Centre for Strategic Economic Studies, Victoria University of Technology)

B Education and labour force participation

Education and skill are central in labour force participation — and, in theory, could offset the influence of ageing on participation rates. Overall labour participation rates are much higher in Australia for people with higher educational qualifications (chapter 3). For example, in 2001, the age-corrected average labour participation rate[1] of an Australian male (female) with a degree or higher was 14.2 (21.0) percentage points higher than for a person who had 10 or less years of schooling. The gap is present for both males and females and for all ages over 25 years. These participation gaps are common to most OECD countries (OECD 2003a).

This pattern is not surprising. Higher educational attainment is associated with better wages, more enjoyable jobs and with tasks that involve a lower risk of acquiring a disability. These traits tend to increase labour participation rates and defer retirement. Higher attainment levels are also consistent with the general shift towards more high skill jobs generally in the economy. This may insulate employees from risks of prolonged unemployment and eventual exit from the labour force that can occur for less skilled workers employed in declining industries. Higher attainment also shifts comparative advantage between unpaid work, such as housework, and paid work, which provides another avenue for educational attainment to affect female labour supply.

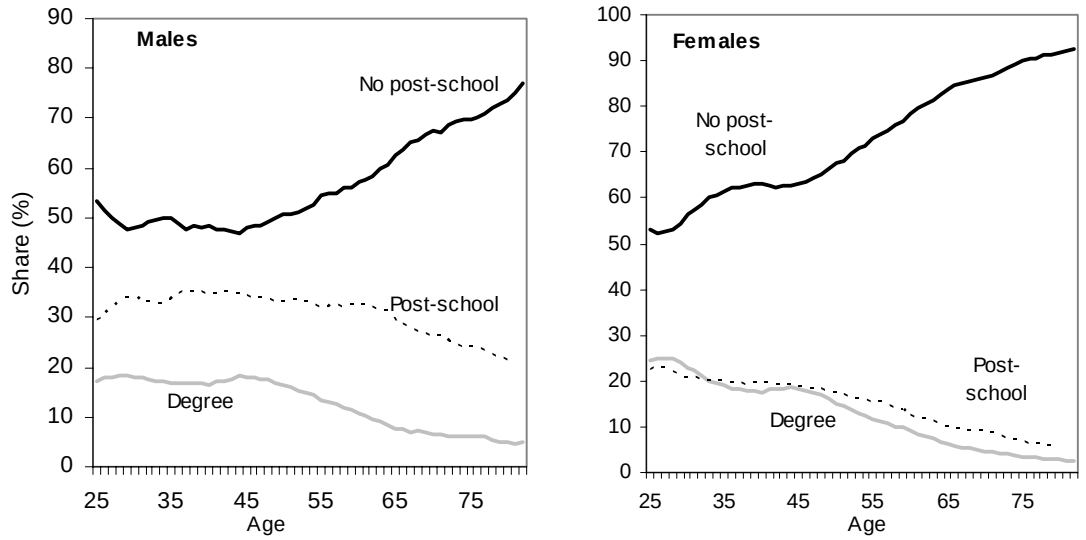
Levels of education have been strongly rising over time in Australia. For example, from 1981 to 2001, the incidence of a degree or higher qualification more than doubled for males and nearly increased fivefold for females.[2] The growth in attendance rates has meant that more recent cohorts have higher educational attainment rates than older ones. This leads to striking variations in educational

[1] Since old people have a higher likelihood of no post-school education and old people tend to have lower labour participation rates regardless of their educational attainment levels, it is important to age-correct the measure of the total participation rate. A measure similar to that of the Total Fertility Rate was used, namely the unweighted average of the participation rates of men and women aged from 15 to 65 years for degree holders and those with no post-school qualification.

[2] Up from 5.3 per cent to 12.5 per cent for males; and from 2.8 per cent to 13.3 per cent for females.

attainment rates by age in current cross-sections of the population (figure B.1). For instance, in 2001, only around 7.8 per cent of 65 year old males had a degree or higher qualification compared with 17.2 per cent of 25 year old males. The gap is even more significant for females (6.3 per cent for those aged 65 years compared with 24.4 per cent for those aged 25 years). The lower labour force participation rates of older people apparent now may, in part, reflect their lower average educational attainment.

Figure B.1 **Educational attainment rates by age**
Percentage rates, 2001



Data source: ABS Census data 2001 provided by the Australian Government Department of the Treasury.

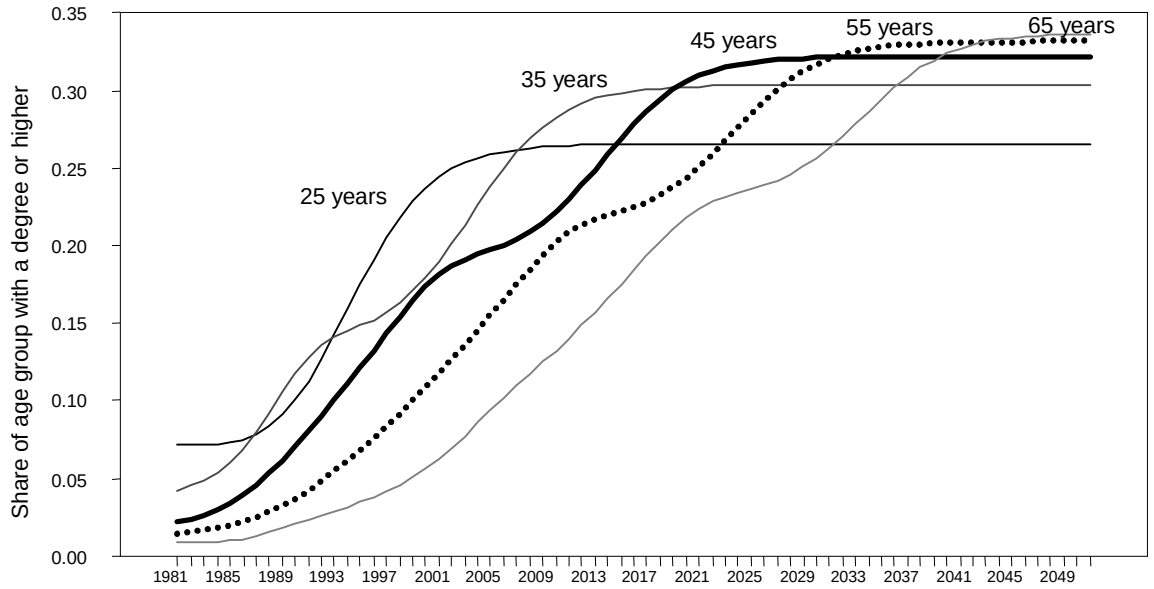
It is expected that average educational attainment will continue to rise among the workforce, particularly among older workers, if for no other reason that young cohorts with higher educational attainment will age and replace those with lower attainment. Moreover, while people often acquire tertiary educational qualifications when under 25 years, investment in education continues at older ages. The implication of this is that as tertiary entry rates for younger people stabilise, the current educational gap between older and younger people will narrow, then disappear and then reappear as a small educational premium for older people (figure B.2). For example, 55 year old females are projected to have higher educational attainment levels by 2023 than 25 year old females. And by 2032, 65 year old females will have higher educational attainment levels than 25 year old females.

The same pattern is apparent for males. But another implication of the patterns of entry by cohorts is that the current higher levels of educational attainment by males

of older ages compared with females of older ages will also be reversed in time (chapter 3). Since education is an important determinant of labour market outcomes, these long-term cohort shifts may affect the labour market experiences of older people generally, and of older females versus males.

It has been conjectured that the strong current relationship between educational attainment and labour force participation imply that future participation rates will rise — especially for older workers — as educational attainment in the population rises (Gruen and Garbutt 2003; Kennedy and Hedley 2003; Michigan State Department of Personnel 2000).

Figure B.2 **Share of females with degree or higher qualification**
1981 to 2051



a The data points for 1981, 1986, 1991, 1996 and 2001 are from the ABS population censuses. Between years were interpolated using a cubic spline. The projections from 2002 to 2051 were derived using cohort analysis. The analysis was based on age-specific entry rates into universities for ages from 15 to 90 year olds. The details of the method are in appendix 3. Similar analysis was undertaken for males and for post-school education that did not lead to a degree.

Data source: ABS Population Census data and Commission projections.

Gruen and Garbutt (2003, pp. 25-27) assess the impact of rising education on future labour participation by assuming that age-specific rates of labour participation by education stay at their current level. They then estimate the aggregate participation rates that result when education levels for older workers rises over time as the current educated young cohort ages. They find that labour participation rates increase for all ages and both sexes, with particularly large increases for people (and especially women) aged over 55 years.

However, future rises in educational attainment of older people may not increase their labour participation rates by as much as might be suggested by the current cross-sectional association between education and participation. While clearly a major effect of education is that it adds to the knowledge and skills of people, with benefits for wages, employment opportunity and productivity, there is evidence that at least *some* of these effects are spurious. One reason for this is because people selecting higher levels of education are different in innate ability from those who do not. People with more education do better in jobs and pay partly because they are, on average, innately more able people, rather than purely because of their higher educational levels.

The extension of higher education to many more people changes the mix of people who hold differing levels of educational attainment. For example, the one in 16 women aged 65 currently holding degrees mostly acquired their degrees in the 1960s, when entrance to university was difficult. The women concerned are likely to be more able as a group to the one in four women currently aged 25 who have a degree or higher.

On average, the innate ability of people with degrees or higher qualifications would be lowered by inflows of less able people. Simultaneously, the average innate ability of those with no post year 10 schooling is also lowered by outflows of people with greater ability. All other things being equal, this could be expected to dilute the effects of higher education on labour force participation and to exacerbate the labour market disadvantages associated with no post-school qualifications (box B.1). In considering the returns to education in Australia, Johnson and Wilkins (2003) conclude that 'the recent expansion in higher education is likely to be associated with a fall in future employment rates by age for degree-holders'.

Box B.1 **How can changes in education produce spurious gains in labour participation?**

An example illustrates how these spurious effects may arise. Say that there are only two qualifications (with and without a degree or ND and D) and two types of ability levels (high and low or H and L). Half the people have high innate ability (which is fixed over time). Altogether there are four groups representing the combinations of these two sets of characteristics — NDL, NDH, DL and DH. The labour participation rates for these four groups are, respectively 60, 80, 75 and 90 per cent.

At time t, say that 80 per cent of people of high ability take a degree and only 10 per cent of people with lower ability. Accordingly, the average labour participation rate of degree holders at this time is 88.33 per cent and of non-degree holders is 63.64 per cent (with an average for all people of 74.75 per cent).

Suppose that by time t+1 a further 10 percentage points of the H group take degrees and a further 30 percentage points of the L group. In that case, the average labour participation rate of degree holders at this time is 85.4 per cent and of non-degree holders is 62.9 per cent (with an average for all people of 77.5 per cent) — consistent with the dilution effects described in the main text.

Had it been assumed that participation rates by educational qualification stayed fixed over time (for example, 88.33 per cent for degree holders regardless of the proportions of people by innate ability), then the higher share of degree holders in year t+1 would have implied a spuriously high aggregate participation rate of 79.7 per cent. In this case, the spurious effect amounts to over 44 per cent of the actual change in participation rates (ie (79.7-77.5)/(79.5-74.75)-1).

It should be emphasised that the spurious effect does not rely on any assumption that returns to education are lower for people of lower ability or that they decline over time. Indeed, in this example, the percentage benefits from education in stimulating participation rates for people of low innate ability are double that of people with high innate ability. However, if they decline over time or are lower for people of lower ability then the spurious effect will be even greater.

Of course, showing that spurious effects *can* occur does not demonstrate that they *are* significant in reality.

Quite apart from the risk that the impacts of innate ability and education may be conflated when assessing the future effects of rising educational attainment, a range of other labour market trends need to be considered when looking at the link between education and labour participation.

- The continuing decline in the demand for low skill jobs — particularly for males — may accentuate the disadvantage associated with no post-school education, leading to even lower participation rates for these groups. The differential in labour participation rates between males with a degree or more and those with no post-school qualifications has increased for more recent cohorts. For

example, a male born in 1936, aged 45 and with a degree had a 6 percentage points premium in labour force participation over a peer with no post-school education. For the 1956 cohort, the differential was 17.9 percentage points.

- In contrast, for women, the labour participation advantage associated with a degree appears to be waning for more recent cohorts. For instance, a female born in 1936, aged 45 and with a degree had a 29.4 percentage points premium in labour force participation over a peer with no post-school education. For the 1956 cohort of the same age, the differential was 21.6 percentage points.
- More generally, OECD data suggests that the participation rate associated with a given level of tertiary attainment rate has fallen over time for both women and men of older ages (figure B.3). Continuation of this trend implies that the present relationship between participation rates and educational attainment will not give reliable indications of the future impacts of educational attainment.
- Some of the poor labour market participation rates of older people reflect transitions in the nature of the Australian economy over the past 25 years and the potentially scarring effects of major recessions. For example, the decline of labour intensive parts of manufacturing lowered the demand for blue-collar male jobs, which were disproportionately held by people without post-school qualifications. The disadvantages faced by this group were accentuated by several deep recessions that led to significant layoffs of mature workers who never got a job again. The corresponding group of older, less skilled males in the 2030s and 2040s will be in different industries and face different pressures.

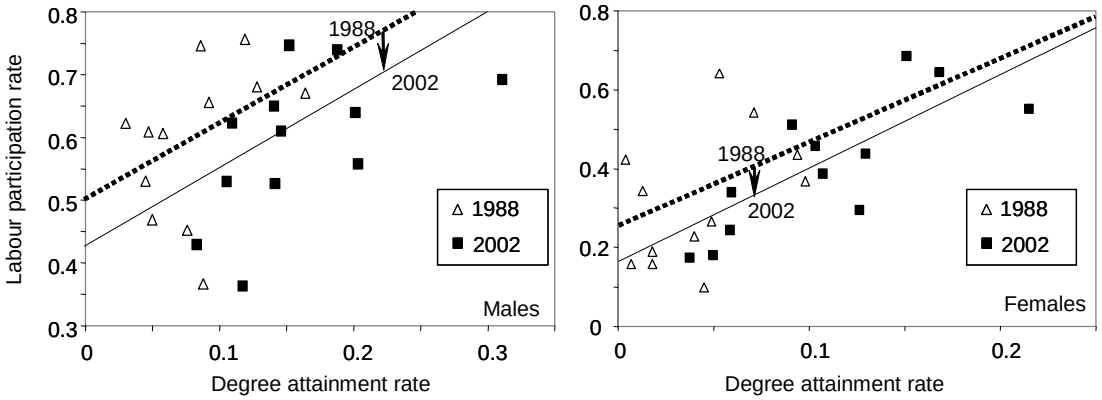
If the projection technique used by Gruen and Garbutt (2003) is applied to 1981 data, it suggests strong increases in participation rates for males and females by 2001. In fact, male participation rates generally fell across age groups from 1981 to 2001, and indeed the absolute size of the (negative) prediction errors from applying this technique were, on average, higher for those age groups where the percentage change in degree attainment rates were higher. In contrast, for females, participation rates increased by much *more* than suggested by changes in educational attainment alone. In this case, the positive prediction errors were highest for those where the percentage change in degree attainment rates were highest. So without controlling for other facets of the labour market and individuals that might be relevant,[3] this technique is likely to produce unreliable projections of labour participation rates.

Nevertheless, the key insight of Gruen and Garbutt is that rising educational attainment levels must rise significantly in the future old — and, all other things being equal, this will stimulate labour participation in these groups.

[3] Such as innate ability, the changing demand for skilled versus unskilled labour, changing attitudes to females in the labour market and the growing ascendancy of the service sector.

Figure B.3 **Association between degree attainment rates and labour participation rates**

55-64 year males and females, selected OECD countries, 1988 and 2002



a The graphs show the relationship between the labour participation rate for *all* 55-64 year olds (regardless of their educational qualifications) and the share of the 55-64 year olds who have a degree. This is a better way of assessing the labour supply impacts of a degree than looking at participation rates for degree holders compared with non-degree holders. This is because it resolves the selection bias problem and enables a judgment about whether the overall participation rate is stimulated by rising degree attainment rates (ie it takes account of the fact that non-degree holders' participation rates may fall as degree attainment rises). To see how the relationship changed over time, the relationship is shown for two years: 1988 and 2002. The degree rate for 2002 is derived from the attainment rates for tertiary type A and advanced research programs. The degree rate for 1988 is Level E (completed at least one university degree). All data relate to 55-64 year olds except the degree rate for 1988, which relates to 55 years and over. The lines are the ordinary least squares trend lines for the 1988 and 2002 samples (1988 is dotted). A fixed group of countries were used for the analysis (these being Australia, Belgium, Canada, Finland, Germany, Italy, Netherlands, Norway, Spain. Sweden, US and UK).

Data source: The labour participation rates for both years are from the OECD Labour Force Statistics database, as are the degree rates for 2002 (http://www1.oecd.org/scripts/cde/members/lfsdataauthenticate.asp). The degree rate for 1988 is from table 2.1 from the OECD www.oecd.org/dataoecd/63/52/3888221.pdf.

C Health expenditure projection methods and sensitivity analysis

C.1 Method

For this study, four categories of health expenditure (hospital, medical services (mainly Medicare), pharmaceutical and 'other' expenditure) and two levels of government (Australian Government and each of the State governments) have been projected separately and aggregated to estimate total government expenditure.

For Medicare, pharmaceutical and other expenditure, projections are based upon 'traditional' models, which combine the existing age profile of expenditure with projected population changes and changes in per capita costs. Hospital expenditure has been projected using an approach that incorporates costs incurred at the end of life.

Traditional approach

The data required to project Medicare, pharmaceuticals and other government health expenditure are the:

- age profile of expenditure for that component;
- projected growth and change in the age composition of Australia's population (the PC-M projections have been used); and
- the non-demographic growth rate for that component — the change in per capita costs for each age group.

The projected expenditure for each component of health expenditure in year (t) is:

$$\sum_{age=0}^{85}\left(HCE_{age}(1+g)^{t}\,POP_{age}(t)\right)$$

Where:

HCE_{age}	age specific per capita health care expenditure
$POP_{age}(t)$	the number of persons of a given age in a given year
$age \in (0,85)$	the reference age for per capita health care expenditure and the population size
$t \in (0,T)$	the reference year of expenditure prediction, where the year 2001 is given by $t = 0$
g	the annual growth rate in per capita health care expenditures

Tables C.1 and C.2 contain the age profiles used in this study. Each profile is expressed as an index. In combination with population data, the index is calibrated to total expenditure for each component to calculate cost per person for each age group.

Table C.1 **Index of age structure of government hospital expenditure**

Age group	*Male*	*Female*
0-4[a]	100	100
5-9	17	14
10-14	15	16
15-19	20	28
20-24	23	46
25-29	24	62
30-34	24	57
35-39	27	45
40-44	30	38
45-49	39	40
50-54	50	49
55-59	74	68
60-64	103	90
65-69	153	131
70-74	207	173
75-79	247	227
80-84	295	299
85+	371	364

a Index 0-4 = 100

Source: Natsem (2003).

Expenditure for a particular age group in any year is the cost per capita for that age group multiplied by the population in that age group for that year. Total expenditure for that year is the summation of expenditure for each age group.

Table C.2 **Index of the age profile of government health expenditure**

Age group	*Medicare*[a]		*Pharmaceutical*[a]		*Other*[b]	
	Male	Female	Male	Female	Male	Female
0-4[c]	100	100	100	100	100	100
5-14	51	56	107	105	71	75
15-24	61	127	198	312	76	93
25-34	70	189	314	495	79	107
35-44	94	193	496	753	81	95
45-54	140	233	868	1,259	89	98
55-64	221	300	1,748	2,565	116	116
65-74	339	376	3,581	4,706	163	148
75-84	296	388	3,084	4,886	228	209
>=85	189	256	2,858	4,381	223	203

[a] Health Insurance Commission data. [b] A profile constructed by applying the age profile that most closely matches individual components of other expenditure (including a neutral age treatment for items such as research and administration). [c] Index 0-4 = 100.

Source: Health Insurance Commission (2004 and unpublished) and Commission estimates.

Incorporating the proximity to death in hospital expenditure

Chapter 2 concluded that while medical costs — particularly hospital costs — are higher at the end of life, they do not remove ageing as a source of expenditure pressure in the future. One reason for this is that in Australia, ageing will bring with it a higher number of deaths.

The projections of higher hospital expenditure over coming decades are derived from a model that incorporates hospital costs at the end of life. Under this approach, health expenditure has been divided into two types:

- the proportion of annual costs associated with those that die in that year; and
- costs related to the ongoing health needs of each age group.

Expenditure related to death is projected using the estimated number of deaths in each age group. Recurring health expenditure is projected in the same way as for the constant age cost projections above. Details on the method are provided in box C.1.

Box C.1 **Projecting hospital costs**

To project expenditure associated with costs incurred in the last year of life, the number of future deaths (by age) is multiplied by the cost of a death in each age group. However, estimates of the expenditure incurred in the last year of a person's life are not readily available for Australia.

The costs per death used in the projections are based on UK data contained in Gray (2004) and Seshamani and Gray (2004). These studies used longitudinal data from Oxfordshire in the UK to analyse the determinants of health costs. Gray (2004) presents the proportion of hospital expenditure related to death for different age groups. For instance, he calculates that of the total hospital expenditure on those over 85, 65 per cent is expenditure on those in the last year of life. These proportions are adjusted to account for different mortality rates in Australia and the UK. For example:

- in the UK 15.9 per cent of the population aged over 85 is in the last year of life, whereas in Australia it is around 13.5 per cent; thus
- instead of 65 per cent of expenditure being associated with the last year of life, in Australia it is assumed that this figure is 58 per cent (65*13.5/15.9).

Once these proportions for each age group are known, the cost per death can be estimated. The derived figures are as follows:

Age group	Dollars per death
0-4	77 626
5-15	9 922
16-44	2 223
45-64	31 000
65-74	44 203
75-84	35 280
85+	22 287

Future death related costs are projected by multiplying the cost per death (indexed at the same rate as per capita costs in other models) by the number of deaths in each age group.

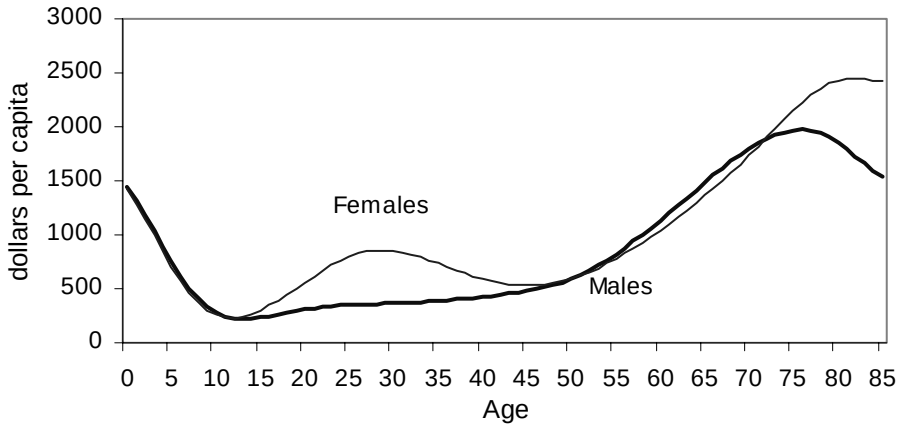
Ongoing, or recurrent, health expenditure in 2002-03 for each age group is calculated by deducting the estimated death-related expenditure for 2002-03 for each age group from the projected total expenditure for that age group. This is then divided by the number of people in each age group to derive an age profile of *recurrent* expenditure per capita for 2002-03. Significantly, this age profile still follows the normal upward sloping pattern for all but the oldest age groups (in itself a common pattern). Expenditure for a 75 year old is around 4.5 times that of a 45 year old (for both males and females) (figure C.1).

As in the traditional model, recurrent expenditure for each age group is projected by multiplying the residual recurrent per capita cost by the estimated population for that age group.

Total projected expenditure under this model is the sum of expenditure associated with death and recurrent expenditure.

Figure C.1 **Age profile of ongoing hospital expenditure after excluding costs in the last year of life** [a]

2002-03



[a] Smoothed using a Hodrick Prescott filter.

Data source: Commission estimates.

Sensitivity of results to the non-demographic growth rate

As noted by the Intergenerational Report, projection results are sensitive to the non-demographic growth rate. The Commission's projections are based upon a non-demographic growth rate, which is expressed as a premium above the projected growth in GDP per capita. The baseline projections in chapter 6 used a premium of 0.6 percentage points (for each component other than for pharmaceuticals). Table C.3 presents the results of using a non-demographic growth premia of 0.3 percentage points and 0.9 percentage points above the growth in GDP per capita.

Table C.3 **Projected government health expenditure as a proportion of GDP**

Under different non-demographic growth assumptions [a]

Growth in per capita health expenditure above per capita GDP growth	2002-03	2014-15	2024-25	2034-35	2044-45
	%	%	%	%	%
0.3 percentage points	5.7	6.7	7.8	8.6	9.1
0.6 percentage points	**5.7**	**6.9**	**8.3**	**9.4**	**10.3**
0.9 percentage points	5.7	7.2	8.8	10.3	11.6

[a] Growth assumptions apply to hospital, Medicare and other expenditure. Non-demographic growth in pharmaceutical expenditure is projected using a logistic function, which asymptotes to the growth in GDP per capita plus the relevant premium — appendix D.

Source: Commission estimates.

C.2 Alternative projection methods

Chapter 6 referred to the results for two alternative projection methods:

- a life expectancy adjustment; and
- the traditional approach where hospital costs, like other components of expenditure, are projected purely according to the age cost profile.

Details on the life expectancy adjustment are provided below.

Life expectancy adjustment

The life expectancy for all age groups is increasing as age specific mortality rates fall. Early work by Fuchs (1984) and Manton (1982, cited in Fuchs) have suggested that health care among the elderly is not so much a function of time since birth (age), but time to death. This is predicated on the view that most of the expected additional years of life will be healthy years of life. If this were to be the case, health care use of a 75 year old in 20 years time will not be the same as a 75 year old today. It may, say, be more likely to approximate that of say a 71 year old. This approach is sometimes also referred to as a 'proximity to death' method because a 75 year old in 20 years time is four years further away from death than the 75 year old today and hence, it is argued, will have lower health costs. Either way it is possible to adjust the constant age cost projections to take account of changes in life expectancy contained within demographic projections (box C.2).

This approach assumes that increases in life expectancy are costless to the health budget. But as described in chapter 6, there is growing evidence that increases in life expectancy are not costless. Rather, they arise partly because of increasing use of medical treatment across a wider range of conditions. Hence this approach has been presented as a sensitivity test rather than incorporated in the base projection.

Box C.2 **Life expectancy adjustment**

The method employed by the Commission to adjust for increases in life expectancy is based on Badham (1998) and involves a number of steps.

- Most profiles of expenditure by age are calculated by age bands — 65–69, 70–75 etc — with each person within the band assumed to have the same expenditure. To adjust for life expectancy it is necessary to have an estimate of costs by individual age. Piecewise linear adjustment approximations were used to generate this profile. As Badham (1998) says 'Each piece of the linear function is defined by two points, given by average age … in an age band and the per capita cost for that age band'.
- This expenditure profile is then recalibrated so that the profile applied to the present population results in the current level of total expenditure.
- For each age group over 65, and for each year until 2044-45 an 'effective age' is calculated, by subtracting the increase in life expectancy predicted by the ABS (unpublished data) for that age from the current age. For example, a 70 year old male is projected to have an 'effective age' of 67 by 2024–25 and 66 by 2044-45.
- Total expenditure is estimated by multiplying the 'effective age' by the corresponding costs for that age group cost profile.

Adjusting for increased life expectancy under this method will always reduce expenditure. Taking the ABS data as given, the magnitude of the impact will depend on the age-cost profile. A profile where costs increase significantly with age will result in a larger impact than a 'flatter' profile.

Alternative projection results

Table C.4 compares the results of the baseline approach with simulations that include a life expectancy adjustment and those based purely on age cost profiles (that is, excluding death-related costs from hospital costs).

Compared with the baseline, the adjustment for increased life expectancy results in slightly lower expenditure, while the traditional simulations result in a slightly higher level of expenditure. However, under each method expenditure is projected to increase significantly in real terms and as a percentage of GDP between 2002-03 and 2044-45. Indeed, the differences between each method are less than the impact of small variations in the non-demographic growth rate.

Table C.4 **Projection methods compared**

Total government expenditure, 2002–03, 2024–25 and 2044–45

	2002–03		*2024–25*		*2044–45*	
	$ billion	% GDP	$ billion	% GDP	$ billion	% GDP
Baseline projection (Incorp. costs of death in hospital)	43.1	5.7	111.3	8.3	211.2	10.3
Life expectancy adjusted	43.1	5.7	104.3	7.7	202.5	9.9
Traditional approach	43.1	5.7	115.3	8.6	221.6	10.8

Source: Commission estimates.

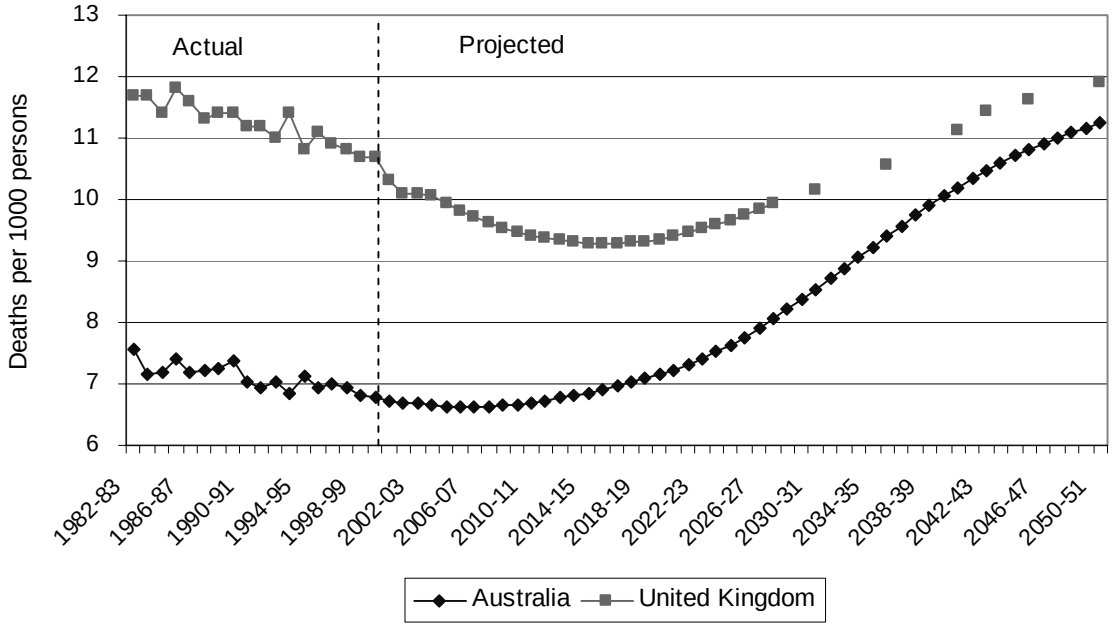
As discussed above, the baseline projections were based on UK data from Gray (2004) on the costs incurred before death. It should be noted that for the UK, Gray finds a more significant difference between the traditional projection method and one incorporating costs incurred before death than those contained in table C.4 for Australia. In Gray's analysis the traditional method is about 50 per cent higher than the proximity to death projection to 2026.

The Australian projections are high relative to those of the UK because of differences in demography. As shown in figure C.2, in Australia the crude death rate increases by around 20 per cent between now and 2026-27 (Gray's projection period), whereas in the UK it is projected by the Government Actuary Department to be virtually the same as it is now (after declining to 2015).

The impact of demographic differences (both age structure and deaths) between Australia and the UK on projected hospital expenditure is shown in figure C.3. Two indexes are provided for the UK.

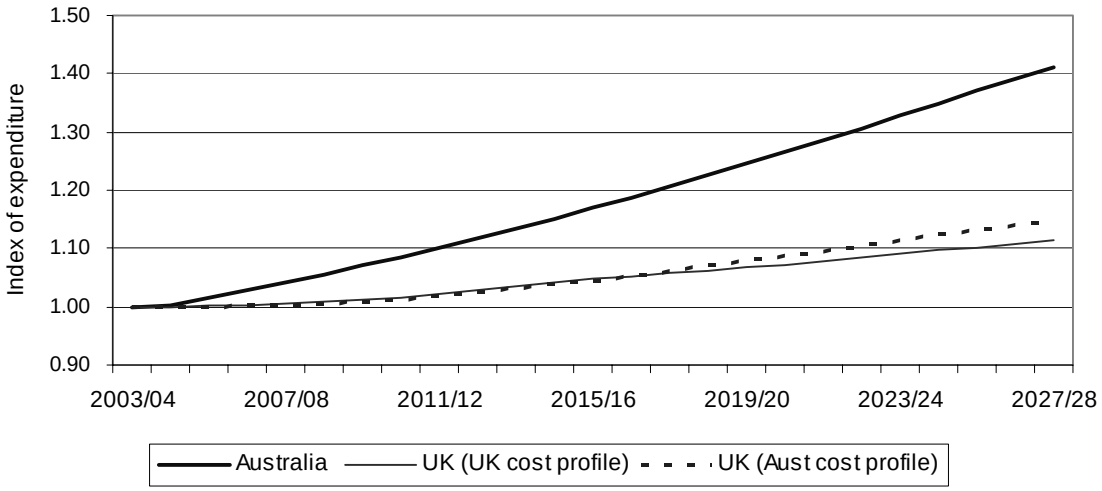
- To achieve a like with like comparison, the UK index represented by the dotted line combines UK demography with the same cost profile of expenditure used in the Australian projection. Thus, the substantial difference between the two is solely attributable to demography.
- The smooth UK index of expenditure uses both UK demography and a UK age profile of hospital expenditure. The relevance of this projection is that it closely reproduces that contained in Gray (2004) for the UK.

Figure C.2 **Actual and projected crude death rates in Australia and the UK**
1982 to 2051



Data source: ABS (2003b); ABS (2002d); UK Government Actuary Department: 2003-based Principle Projections, UK Office of National Statistics Data set PD1013.

Figure C.3 **Index of projected Australian and UK hospital expenditure** [a]
Incorporating costs incurred in the last year of life



a All non-demographic growth is excluded from the comparisons.

Data source: Commission estimates.

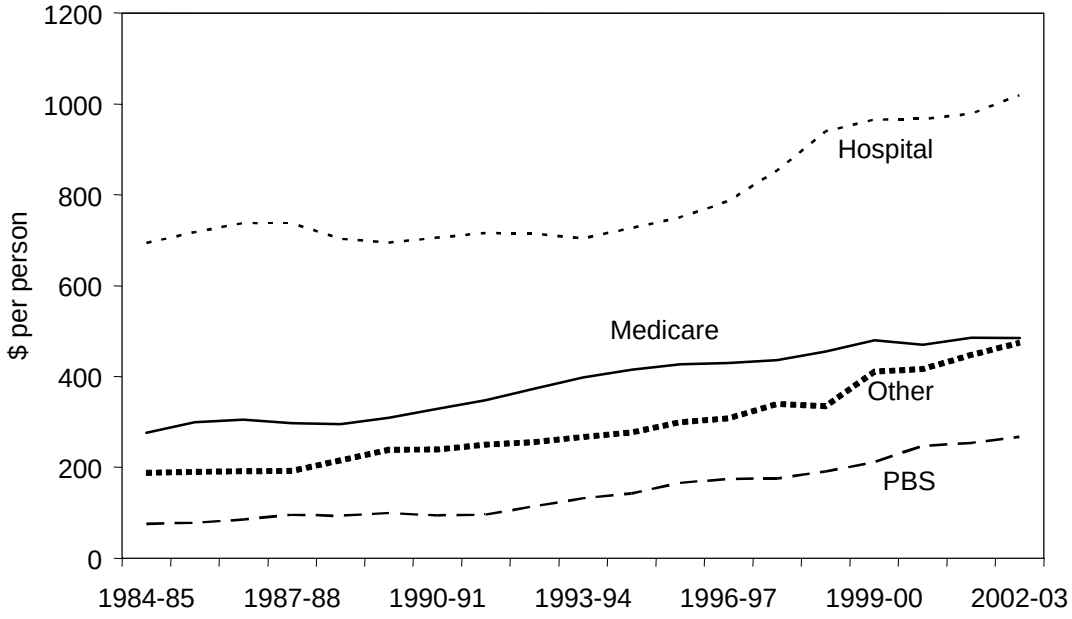
These results illustrate that the ageing impact on health expenditure is not likely to be uniform across all countries.

Although more work — particularly on the costs incurred at the end of life in Australia would be useful — the Commission's analysis suggests that, for Australia at least, using other projection methods does not qualitatively alter the expected impact. The ageing of the Australian population will place considerable upward pressure on health expenditure.

D Non–demographic growth in health expenditure

Real government expenditure per person has increased substantially over the last 20 years for all components of health expenditure (figure D.1).

Figure D.1 **Real government health expenditure per person**
1984-85 to 2002-03



Data source: AIHW expenditure data cube (www.aihw.gov.au).

A significant part of this growth has occurred because of non-demographic factors. Non-demographic growth is the real increase in per person costs that is not attributable to changes in the age structure of the population or population growth. It comprises:

- increases arising from the introduction of new technology;
- increased demand from consumers arising from greater wealth or changing community expectations;
- changing patterns of demand arising from increased prevalence of conditions; and

- any excess health inflation (where health prices rise at a greater rate than general prices).

Projections of health expenditure are sensitive to assumptions about the non-demographic growth rate.

Expenditure projections are usually based on the assumption that future expenditure will bear some relation to past expenditure patterns and growth. However, there are a range of issues associated with interpreting past trends and it is important not to be locked into a mechanistic approach. This appendix discusses the factors important to determining the growth rates used in the projections in chapter 6.

Cost of disease burden

The future prevalence and treatment of major diseases will have a significant bearing on future health costs. The major burden of disease in Australia arises from long-term conditions such as cardiovascular diseases, cancers, mental illness and nervous system disorders.

Aggregate data on past trends of disease burden are not always a sound guide to future costs because 'cohort effects' are very important in determining the prevalence of disease. For example, smoking rates have declined, particularly among men, so smoking related diseases are unlikely to be the same burden in the future as past costs would indicate.

According to the AIHW (2004a):

- Cardiovascular disease is still the leading cause of death for both males and females despite a marked drop in death rates since the 1960s.
  - The decline in deaths associated with these diseases is related to environmental and behavioural (largely reduced smoking) factors as well as better treatment for cardiovascular diseases.
  - The range and quality of drugs available for preventing or treating cardiovascular disease have improved over the last 10 to 15 years. The use of drugs to lower cholesterol have quadrupled since 1996. Similarly use of Angiotensin–Converting Enzyme (ACE) inhibitors to lower blood pressure has more than tripled between 1990 and 2000.
- Cancer is the second leading cause of death — although overall death rates fell between 1992 and 2002 it now kills more middle-aged people than cardiovascular disease.

- Dementia is a major cause of severe and profound disability. Dementia overwhelmingly affects people over 65 years. Alzheimer's Australia (2005) presents projections by Access Economics estimating that there will be around 730 000 people with dementia by 2050.
- Type II diabetes prevalence has more than doubled over the past two decades and is estimated to affect around one million Australian adults. Obesity — one of the main risk factors for type II diabetes — has also doubled over the past two decades. About one in five Australians are now obese.

The non-demographic growth rate is an amalgam of the prevalence and the future costs of treatment per person for the major disease categories. Researchers from the School of Population Health at the University of Queensland and the AIHW (Vos et al. 2005) provide projections of both these elements for eight major diseases until 2031. The diseases are cardiovascular diseases, cancer, mental disorders, sense organ disorders, musculoskeletal diseases, diabetes, chronic obstructive pulmonary disease and neurological disorders. The study finds there is likely to be a continuation of many existing trends. For example between 2001 (the reference year) and 2031:

- the incidence of stroke is projected to decline by over 50 per cent for both men and women;
- the incidence of coronary heart disease is projected to decline by 55 per cent and 57 per cent for males and females respectively;
- the prevalence of diabetes is expected to increase by more than 100 per cent for men, and by over 70 per cent for women;
- the incidence of lung cancer is expected to decline for men by 27 per cent but remain broadly stable for women (smoking rates for women have not shown the same decline as for men); and
- dementia rates are projected to remain stable throughout the period.

Notwithstanding the substantial decreases in rates of disease for some conditions, the number of cases in the population is projected to increase for all diseases. Ageing of the population and to a lesser extent general population growth account for the increase.

The Study concludes that 'a large rise in health costs is expected over the next 30 years'. The ageing of the population comprises the largest component of the increase (box D.1).

The Study also noted a number of changes in treatment practice that are likely to affect future costs, including:

- an increase in the proportion of people with a disease who are treated;
- changes in the pattern of treatment with a shift in emphasis from hospital to medical and pharmaceutical services;
- changes in the pattern of service delivery, especially in the provision of more services to older people who are starting to receive similar levels of health services as the middle aged with similar diseases; and
- changes in technology such as new drugs, new procedures and application of old drugs in new ways.

Box D.1 **Projection of disease occurrence and health care expenditure in Australia from 2001 to 2031 (Vos et al 2005)**

Vos et al (2005) concluded that a large rise in health costs can be expected over the next 30 years, notwithstanding falls in the incidence of some major diseases such as cardiovascular disease and tobacco related cancers. Excluding aged care, health expenditure is projected to increase by $19.3 billion or nearly 160 per cent by 2030-31. Ageing and population growth accounted for two thirds of this increase ($8.9 billion and $5.6 billion respectively). If the incidence of some diseases had not been projected to decline, the increase would have been $2.4 billion higher.

It is difficult to directly compare the results of this Study with the Commission's projections. Vos et al (2005) examined government and private health costs for the diseases in question, which comprise 43 per cent of total health costs. In contrast the Commission has projected all government health expenditure (but not private expenditure). Different population projections have also been used.

Nevertheless, the Commissions results are generally higher than in the Study. The Commission projects that real expenditure will be around three times higher in 2030-31 than in 2002-03. The major source of difference appears to relate to the impact of demand and technology health costs rather than the shifts in disease prevalence.

- In Vos et al (2005) ageing is the largest factor in the expenditure increase. In the Commission's projections, ageing is significant, but non-demographic factors remain the largest component of the expenditure increase.

Source: Vos et al (2005)

A link between growth in health expenditure and GDP?

The Intergenerational Report projected non-demographic growth in health expenditures using stand-alone growth rates. A threshold issue is whether the non-demographic growth rate is expressed as an absolute number (such as 2.0 per cent a year), or as a premium over the expected growth in GDP per capita (say, 0.6 percentage points above the increase in GDP per capita).

This issue arises because there appear to be links between growth in health expenditure and economic growth.

- Economy-wide productivity changes will raise wage rates throughout the economy, including the health sector. To the extent that labour productivity growth in the health sector is lower than the economy generally, this implies that the overall health costs associated with any given service level will rise. To the extent that labour productivity in the health sector is the same or higher than the economy as a whole, then costs fall relative to service levels. However, unlike some other sectors — such as agriculture — the nature of many productivity gains in the health sector means that they cannot be realised as reduced inputs for the same service provision. The gains are often part and parcel of improved quality of outputs, which cannot then be reduced. It is somewhat akin to computer technology. New computers are very much more powerful and productive than older ones, but consumers do not have the option of purchasing a very cheap 286 computer.
- A range of studies have found that a country's GDP per capita is a strong predictor of its health expenditure (technical paper 5). Indeed, as a country's wealth increases, it tends to devote an increasing share of national income to health. Studies show that the income elasticity of demand for health care consistently exceeds one at the national level (Getzen 2000).
  - Technology is likely to play a significant role in the relationship between national income and health expenditure. Health care is not a fixed product through time. It is a continuously evolving set of treatments. As an effective treatment is developed — for example, for a particular cancer that was untreatable up to that point — it becomes a necessity for those with the disease. As such, there is a high willingness by governments to fund such treatments. If technology did not change, and hence the range of available treatments did not expand, it is unlikely that over time there would be a high income elasticity observed between national income and health expenditure.[1]

It should be noted that even with these links, in practical terms the basis for expressing the non-demographic growth rate would not matter if future GDP per capita performance was expected to be the same as past performance. If this were the case, whether the non-demographic rate was expressed as a stand-alone rate or a premium over GDP per capita would yield the same result. However, as discussed in chapter 5, it is uncertain that Australia can reproduce the same productivity

[1] This also partly explains why health expenditure has an income elasticity more associated with a luxury good than with a necessity. Medical technology develops new treatements that are necessities for those with the condition. The impact of this stream of new necessities on health expenditure gives it a high income elasticity and the appearance of a luxury.

performance that it experienced over the recent past. Ageing is also likely to have an impact on GDP per capita through reduced workforce participation. In this context, using stand-alone rates derived from past expenditure trends may overstate somewhat future non-demographic growth because those trends were partly dependent on a higher GDP performance. Thus, it would appear to be appropriate to:

- examine trends in health expenditure as a premium over the growth in GDP per capita; and
- based on these rates, project non-demographic growth as a premium over projected GDP performance.

This approach has been adopted in the projections in chapter 6.

While the choice of approach will affect the results, it should be recognised that expenditure projections are characterised by a high degree of uncertainty. Uncertainty about future growth rates is likely to outweigh the impact of choice of the projection base. No matter which approach is adopted, sensitivity analysis using different growth rates is critical (appendix C).

Over what time period should past growth trends be estimated?

Growth in government health expenditure has been greater over some periods than others. The components of health expenditure have also increased at different rates over different periods. Year on year growth rates fluctuate dramatically, but average annual (or compound) growth rates also vary significantly depending on the time period selected for measurement.

Two opposing factors influence the time period over which to base the non-demographic growth rate. On one hand, the period should extend back long enough to constitute a clear trend and abstract from one–off factors. On the other hand, a trend based on a more recent period is likely to incorporate more recent influences on policy and expenditure. It is recent developments that are likely to most heavily influence future expenditure.

Bearing in mind the need for a clear trend, the Commission considers that at least 10 years of data are necessary. However, relevance of the data would tend to rule out of consideration the volatile changes in health expenditure of the 1970s. While a significant element of judgment is required, the policy influences embodied in the trends from 1984–85 onwards (after the introduction of Medicare) are likely to constitute a broad indication of long–term growth in health expenditure.

The Intergenerational Report, for example, used a range of periods as a basis for the non-demographic growth rate. Medicare and hospital projections were based on the trend over the last decade while the pharmaceuticals rate was based on the trend over the last two decades. In its alternative modelling of aggregate Australian Government expenditure Treasury used growth rates that reflected the trend over the mid to late 1980s. This approach reflects that the past trends do not generate a definitive non-demographic growth rate and significant judgment is required.

Removing the effect of past ageing

Past growth rates *include* the effects of ageing on expenditure over the last 20 years. This effect must be removed in order to project future expenditure (otherwise the effect of ageing would partially be double counted through the growth rate and through the population projections).

It is not possible to directly observe and isolate the effect of ageing from previous increases in expenditure. However, under the assumption that the present age profile of expenditure applied in the past (which the available data tend to indicate is the case), the effect of ageing can be imputed. The age profile of expenditure is used to project expenditure backwards using past years' demographic profiles. The change in expenditure each year is a combination of population change and ageing. The change attributable to population is deducted from the total leaving the change attributable to ageing.

Under this method the past increase attributable to ageing is around 0.5 per cent to 0.6 per cent per annum. These figures are consistent with previous studies such as AIHW (1999) and the Intergenerational Report.

Component growth rates or an aggregate growth rate?

Individual components of health expenditure have grown at different rates over the last 20 years. The Commission has projected each component of health expenditure separately. This raises the issue of whether the non–demographic growth rate for each component should reflect its past growth, or the aggregate growth rate for total government health expenditure.

For short-term projections, the growth rate for each component should be used since there is statistical evidence of persistence. In the short term, expenditure for each component is most likely to reflect its past growth path.

Over a 40 year projection period, however, adopting different growth rates for components within the same broad class of expenditure can be problematic. Even

fairly small differences in growth rates over such a long period will lead to significant changes in the share of expenditure of each component, which may not be credible. For example, depending on the period selected, the age adjusted compound hospital premium over GDP has either been negative (from 1984-85 to 2002-03) or up to 0.8 per cent (table D.1). Thus it is not certain that observed differences in growth *between* components at any point in time will persist for long periods in the future. While some shifts in shares could be expected, dramatic shifts are unlikely unless there are very different past growth paths.

Table D.1 **Real per capita age-adjusted compound growth in government health expenditure less per capita GDP growth**
Selected periods

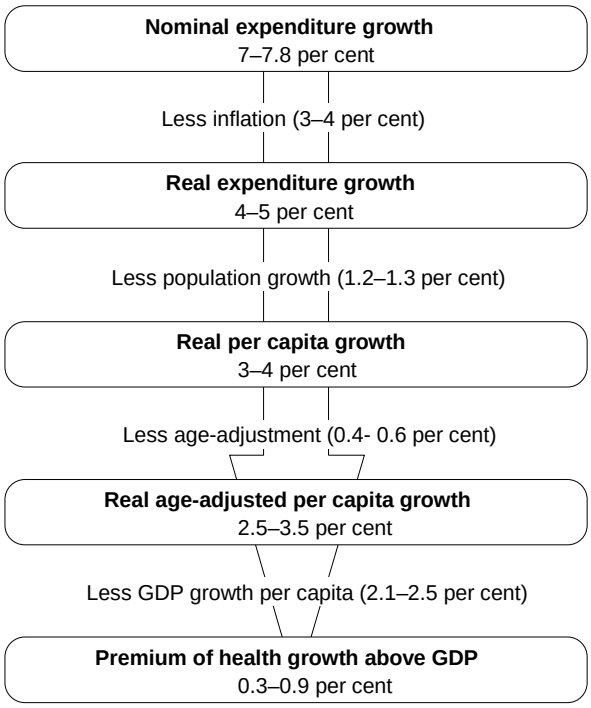
	1984-85 to 2002-03	*1989-90 to 2002-03*	*1993-94 to 2002-03*
	%	%	%
Hospitals	-0.4	0.3	0.8
Medicare	0.5	0.9	-1.1
Pharmaceuticals	4.6	5.2	4.9
Other	2.6	2.8	3.3

Source: PC calculations.

With the exception of pharmaceutical expenditure, the Commission has used the same growth rate (expressed as a premium above the GDP growth rate) for each component of health expenditure, and for State and Australian government expenditure. The rate used is 0.6 percentage points above the projected growth in GDP per capita. Box D.2 shows the derivation of this growth rate and the observed ranges for each variable. With respect to these ranges, it is worth reiterating the point made earlier that examining past trends does not yield a definitive growth rate. Sensitivity analysis has been conducted with premia of 0.3 percentage points and 0.9 percentage points above the growth in GDP per capita.

Box D.2 **Derivation of the non-demographic growth rate[a]**

Average annual compound growth in government health expenditure (excluding PBS) from over various periods to 2002-03



a The final premium health growth rate range is not determined by direct subtraction of sequential range values since these range boundaries did not occur simultaneously.

Source: AIHW Expenditure data cube and Commission calculations.

Pharmaceutical expenditure is treated differently because it has displayed a significantly higher growth over the last 20 years — and particularly over the last 10 years — than all other health expenditure.

Pharmaceutical growth per capita

Pharmaceutical expenditure under the PBS has increased at a real age–adjusted average annual per capita growth rate between 1984-85 and 2001-02 of over 6.5 per cent (a premium of 4.9 percentage points over GDP growth per capita). This is more than double total government health expenditure (with the pharmaceutical component removed) over the same period. A divergence on this scale justifies a different treatment of non-demographic growth.

One approach is to use a constant non-demographic pharmaceutical growth rate throughout the projection period. This approach was adopted in the

Intergenerational Report.[2] It found that expenditure under the PBS would increase from 15 per cent to 41 per cent of total Australian Government expenditure. As discussed above, a growth rate above that of other components results in a significant rise in the share of expenditure attributable to that component.

However, since the Intergenerational Report was released there have been a number of developments, which indicates that very high rates of growth may not be sustained:

- there has been a slowing in the growth of PBS expenditure over the last two years;
- the Pharmaceutical Benefits Pricing Authority is increasingly incorporating risk sharing arrangements into its agreements with drug companies to minimise the expenditure implications of drugs being more widely prescribed than for their intended indications; and
- a number of high cost, widely prescribed drugs such as statins are due to come off patent in the next few years (Medicines Australia, sub. 32, p. 2).

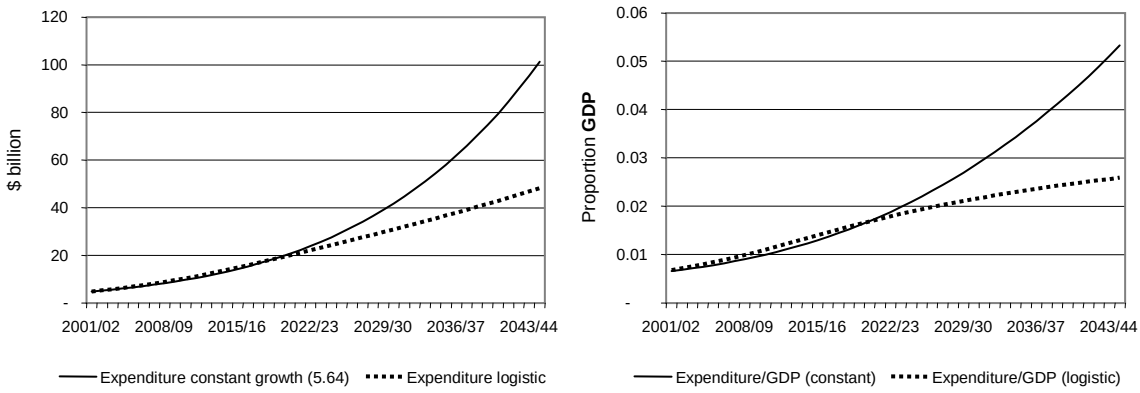
In the light of these developments, another approach is to initially have a significantly higher growth rate for pharmaceutical expenditure than for other components, but for the rate to trend down over time to the general growth rate. This also results in a shift in the share of expenditure towards pharmaceuticals, but not to the same extent as under the first approach. Underpinning this view is that while shares of individual components of health expenditure may gradually change they are unlikely to fundamentally alter their relationship with one another.

The latter approach has been used in the projections. Non-demographic growth is initially set at a premium of over 4 percentage points above growth in GDP per capita and trends, via a logistic function, to the growth rate for other components. The disadvantage of an essentially arbitrary logistic function is outweighed by the advantage of retaining long-run balanced growth between different components of health expenditure.

Figure D.2 compares the results of both approaches (a logistic function and the constant Intergenerational Report growth rate). The results of both approaches are similar until 2020. However, after that time they diverge dramatically. While a constant growth rate is acceptable for short-term projections, the exponential rate of growth in figure D.2 demonstrates that it may be unrealistic for longer term projections.

[2] The Intergenerational Report used a real per capita age adjusted non-demographic growth rate of 5.64 per cent: the rate calculated from 1983-84 to the end of the (confidential) forward estimate period.

Figure D.2 **Effect of logistic vs constant non-demographic growth rate on government pharmaceutical expenditure**
2001-02 to 2044-45



Data source: Commission estimates.

E Voluntary work

Older people make a valuable contribution economically and socially through participating in a range of unpaid activities including volunteering, informal caring of children and the aged and providing help to families and communities. Informal caring of the aged was examined in chapter 7. This appendix looks at volunteering. It explores the relationship between volunteering and age and examines the likely trends in volunteering over the next 40 years.

E.1 Volunteers

Volunteers work across many sectors of the community including health and welfare, emergency services, community services, conservation, sport and recreation, education, overseas aid, religion, animal welfare, and early childhood development. Volunteering includes formal unpaid work through an organisation or program, as well as informal volunteering such as doing favours for family, friends, or neighbours.

Volunteering through organisations

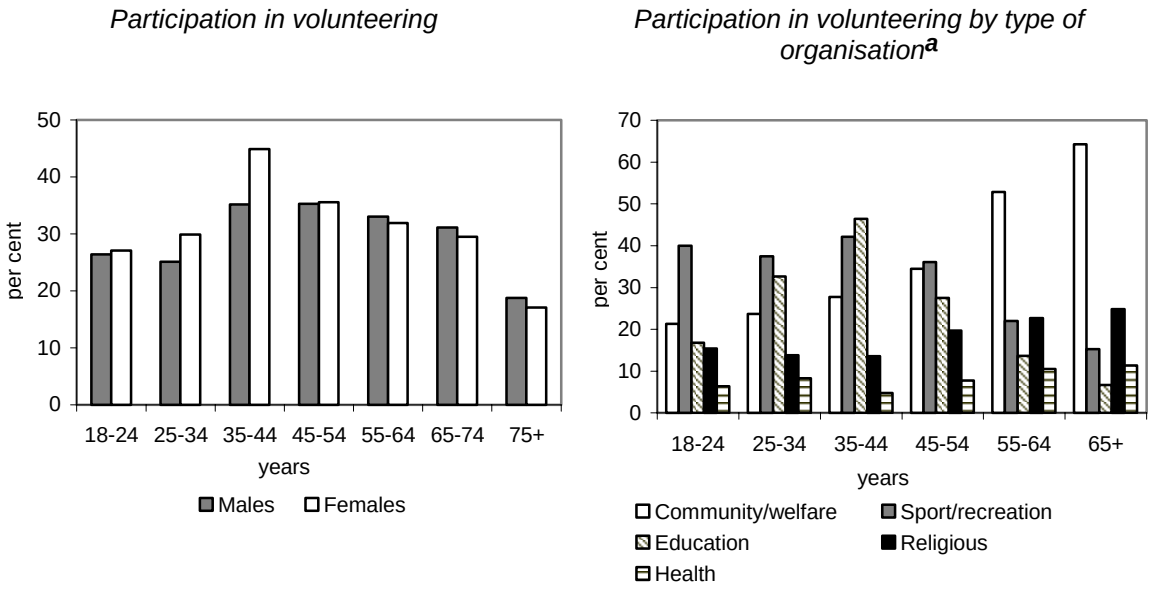
In 2000, 32 per cent of Australians aged 18 years and over were engaged in voluntary work through an organisation, contributing over 700 million hours of unpaid work (ABS 2000, Cat. no. 4441.0).

Formal volunteering is increasing. In 1995, participation in voluntary work and time spent volunteering was lower at 24 per cent and 512 million hours respectively.

Rates of volunteering are highest for the middle aged and in particular, for women aged 35 to 44 years (figure E.1). Age is also a determining factor of the type of voluntary work undertaken:

- young age groups volunteer predominantly in the area of sport and recreation;
- the 35 to 44 year age group participates mainly in education; and
- older age groups (above 55) volunteer predominantly in the areas of community and welfare and religion (figure E.1).

Figure E.1 **Voluntary work through organisations**
2000, by age group



a Education comprises education, training and youth development; data does not sum to 100 because some volunteers participate in more than one sector.

Data source: ABS (2000, *Voluntary Work*, Cat. no. 4441.0).

Participation in volunteering is highest in South Australia and the ACT. In all States and Territories participation is higher in regional areas than metropolitan areas, peaking at 45.8 per cent for females in Western Australia (table E.1).

Table E.1 **Participation in voluntary work through organisations**
By State and Territory, 2000, per cent

	Males		*Females*		*Total*	
	Metropolitan	*Regional*	*Metropolitan*	*Regional*	*Metropolitan*	*Regional*
New South Wales	22.3	35.7	27.0	39.4	24.7	37.6
Victoria	29.3	42.1	28.5	45.5	28.9	43.8
Queensland	28.2	29.4	32.2	34.8	30.2	32.1
South Australia	33.8	43.7	37.6	45.2	35.8	44.5
Western Australia	29.0	43.4	27.4	45.8	28.2	44.6
Tasmania	35.0	33.6	28.3	37.8	31.5	35.7
Northern Territory	32.7	31.3	30.3	32.7	31.6	32.0
ACT	36.2	-	36.3	-	36.2	-
Australia	**27.5**	**36.1**	**29.4**	**40.0**	**28.4**	**38.1**

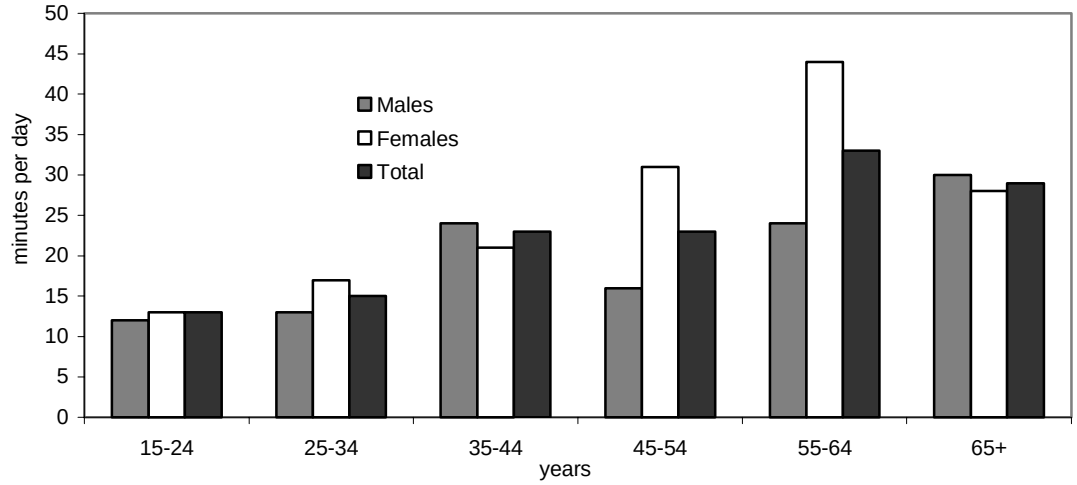
Source: ABS (2000, *Voluntary Work*, Cat. no. 4441.0).

Informal volunteering

Volunteering also exists outside formal organisations. The ABS time use survey measures voluntary work as unpaid work for community organisations as well as caring for an adult and doing favours for family and friends outside the home. The last survey (1997) was conducted over four, 13 day periods using a diary approach.

In 1997, 23 per cent of women and 16 per cent of men spent time volunteering or caring for an adult. Women aged 55 to 64 years and men over 60 years figured particularly prominently (figure E.2).

Figure E.2 **Average time spent volunteering or caring for an adult, 1997**



Data source: ABS (1997, *How Australians Use Their Time*, Cat. no. 4153.0).

The value of volunteering

Volunteering — while not counted as part of Gross Domestic Product — produces substantial gains for Australian society. Estimates of the economic value of volunteering range from $11 billion to $42 billion annually. The differences can be attributed to the definition of volunteering and the method of estimation employed. For example:

- the ABS (1997, cat. 5240.0) define volunteering as formal volunteering through an organisation, doing favours for family and friends outside the home and caring for an adult. Using alternative approaches, the ABS estimates that the economic value of volunteering is between $21 billion and $30 billion annually; and
- Ironmonger (2000) broadens the definition of volunteering to include support for other children and estimates that the value of volunteering is $42 billion a year.

De Vaus et al. (2003) uses ABS time use survey data and ABS estimates of unpaid work (Cat. no. 5240.0) to estimate the value of volunteering and other forms of unpaid work by age group and gender.

Based on these estimates, the annual value of volunteering (which excludes adult care and child care), is $11.5 billion. As a group, the total value of volunteering is highest for the 25-44 years age group (table E.2). However, the maximum average value of volunteering occurs at 45-54 years for females ($1 114 per person) and 65-74 years for males ($1 394 per person).

Table E.2 **The value of volunteer work by age group**
1997 (2002-03 dollars)

	Females		Males	
Age	Average $ per annum, per person	Total value $000	Average $ per annum, per person	Total value $000
15-24	423	540 345	422	556 274
25-44	697	1 963 697	754	2 090 323
45-54	1 114	1 307 898	644	750 787
55-64	1 073	854 975	965	825 769
65-74	912	873 679	1 394	1 113 613
75+	766	425 855	639	246 609
Total	**783**	**5 966 450**	**746**	**5 583 373**

Source: De Vaus et al. (2003, p. 14), data converted to 2002-03 prices using GDP implicit price deflator, estimates of total value of volunteering based on ABS population data for 1997.

E.2 Volunteering in an ageing population

Participants in this study were generally optimistic about the impact of population ageing on volunteering. For example, the ACT Government (sub. 21, p. 18) commented:

> Volunteering is likely to be one of several areas in the community that will benefit from an ageing population in the ACT. The Territory currently has one of the highest rates of volunteering among the States and Territories, and the rates of volunteering among the growing number of retirees are expected to continue to grow over the next two decades.

This section examines the implications of an ageing population on the pool of volunteers and the value of volunteering over the next 40 years.

The pool of volunteers

Data on participation rates in volunteering were applied to demographic projections to project the number of volunteers by age and gender over the next 40 years. While conceptually the most appropriate measure of volunteering includes volunteering through informal routes, as well as through organisations, information on this basis is very dated. Accordingly, the Commission used more recent (and better measured) ABS data on voluntary work through organisations only (Cat. no. 4441.0) as the basis for estimation of the number of future volunteers (box E.1).

Box E.1 **Some limitations**

Voluntary work survey data

ABS data on voluntary work through organisations does not include data on informal volunteering. However, the data are more recent than the time use survey (2000 rather than 1997) and have information on the type of volunteering work undertaken by age group.

The Commission used participation rates in volunteering rather than time spent volunteering as a basis for projections. Time spent volunteering would be a more accurate measure of the total contribution each age group makes to volunteering. However, survey data on participation rates are a more reliable measure of volunteering than survey data on time spent volunteering.

Age-specific participation rates may not be stable

One of the drawbacks of the method used by the Commission in undertaking these projections is that it fixes age-specific volunteering rates at their year 2000 values. However, it is uncertain how rates of volunteerism will change with an ageing population or with other social and economic factors. The Victorian Government (sub. 29, p. 51) and the Western Australian Government (sub. 39, p. 32) suggested that different cohorts may behave differently. For example:

> The high participation rates of those currently aged 35-44 and 45-54 years suggest that as these cohorts age, volunteerism among older age groups (65+) may be higher than that today, as the healthier, more active older people of the future continue their volunteer activity (Victorian Government, sub. 29, p. 51).

Changes in the need for volunteers might also be expected to influence people's willingness to volunteer. For example, the large projected increase in the number of lone old people may prompt other adults to volunteer for their (part) care.

Were age-specific participation rates to rise as a result of these effects, then the Commission's estimates of the number of volunteers would be underestimated.

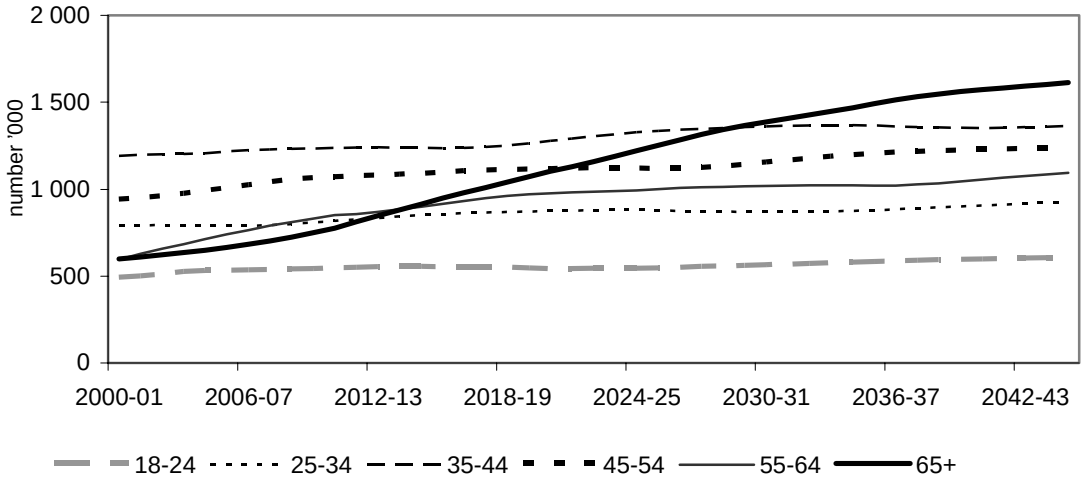
The Commission projects that the number of volunteers over time will increase from 4.75 million in 2002-03 to over 6.84 million in 2044-45, an increase of

44 per cent. If the population were not to experience ageing the number of volunteers would be marginally lower, growing to about 6.77 million in 2044-45. However, as discussed in chapter 3 if ageing were not to occur the age structure of volunteers would be significantly different.

Over the next 40 years growth in volunteers will primarily occur in the 65 and over age group, reflecting their greater share in the population:

- The number of volunteers in the 65 and over age group is projected to more than double, from 598 000 volunteers in 2000-01 to 1.6 million in 2044–45.
- The number of volunteers in the 45–54 years and 55–64 years age groups are also expected to increase — by 31 per cent and 84 per cent respectively.
- In contrast, no growth is expected in the number of volunteers for younger age groups (figure E.3).

Figure E.3 **Projected number of volunteers working for organisations**
2000-01 to 2044-45



Data source: Commission estimates.

These trends result in shifts in the shares of volunteers by age group. Over the next 40 years, the share of volunteers aged over 45 is projected to increase from 46 per cent in 2001-02 to 58 per cent in 2044-45. Over the same period, the share of volunteers aged less than 45 years is projected to fall from 54 per cent in 2001-02 to 42 per cent in 2044-45.

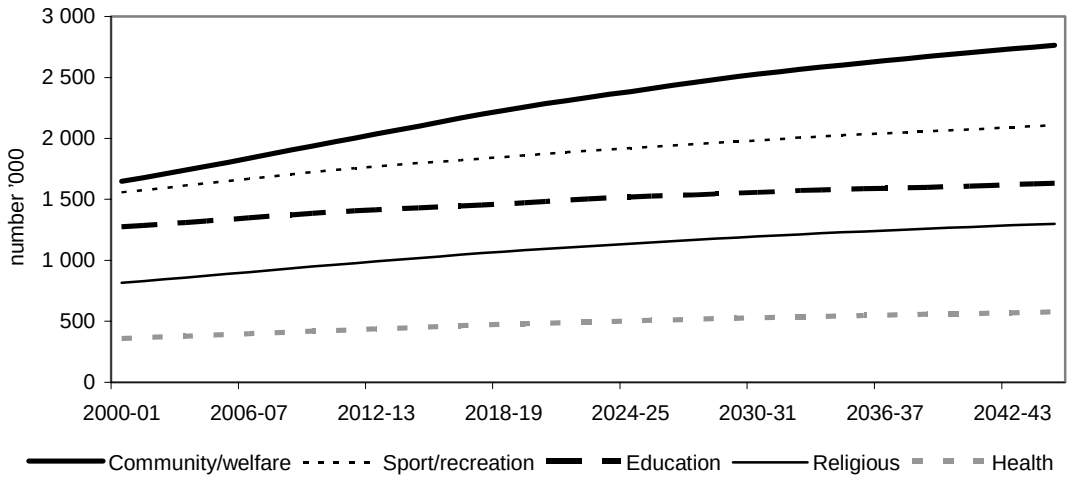
This will have implications for organisations that rely on younger volunteers. For example, Volunteering Australia (sub. 28, p. 6) commented:

> Some of the challenges of an ageing population for volunteering may be associated with particular types of organisations. The 65 and over age groups are strongly represented in the community/welfare, religious and health areas of volunteer work.

Conversely, this age cohort is underrepresented in the areas of sport and recreation and education/training/youth development. These types of organisations may experience difficulty in attracting volunteers as the population ages.

The Commission's projections also suggest that, over the next 40 years, growth in the number of volunteers is expected to be significantly lower in the areas of sport and recreation and education (figure E.4).

Figure E.4 **Projected number of volunteers by type of organisation**[a]
2000-01 to 2044-45



a Projections assume that the participation rates by organisation will remain constant over time. However, in the future older people may increasingly volunteer in non-traditional areas to prevent any shortfalls that may occur in particular organisations.

Data source: Commission estimates.

Further, the Victorian Government (sub. 29, p. 52) cite emergency services, which rely on a relatively 'young' volunteer base (capable of meeting the physical demands of service provision), as an area where shortfalls in volunteering may occur.

In addition, several participants commented that maintaining a volunteer base will be a challenge in rural and regional areas, which are ageing faster than the total population. For example, Volunteering Australia (sub. 28, p. 9) said:

> Volunteering is more common in rural and regional areas, with the rate of volunteering around 10 per cent higher in the rural and regional areas of Australia than the capital cities. However, the types of volunteering that are most common are also those dominated by the young and middle age cohorts. In rural and regional areas, 39.2 per cent of involvements are in sport/recreation, and 24.5 per cent are in education/training and youth development. Any decline in these areas raises concerns for the recreational and developmental opportunities for younger people in these

communities and the social capital that these areas of volunteering accrue for the entire community.

The value of volunteering

The Commission used estimates by de Vaus et al. (2003 p. 14) of the average value of volunteer work by age group as a basis for projections on the value of voluntary work. These estimates include both the value of volunteering through an organisation and informal volunteering.[1] It was assumed that the value of voluntary work increased in line with average weekly earnings (assumed 1.75 per cent annually).

Over the next 40 years, the value of volunteering is expected to rise from 1.8 to around 2.1 per cent of GDP (table E.3).

Table E.3 **The value of volunteering by age group, projections**
per cent of GDP

Age (years)	*2002-03*	*2008-09*	*2014-15*	*2024-25*	*2034-35*	*2044-45*
15-24	0.17	0.16	0.16	0.15	0.15	0.15
25-44	0.62	0.58	0.57	0.57	0.56	0.55
45-54	0.35	0.35	0.34	0.34	0.35	0.34
55-64	0.30	0.34	0.36	0.38	0.37	0.39
65-74	0.23	0.24	0.30	0.36	0.39	0.39
75+	0.12	0.13	0.15	0.20	0.27	0.31
Total	1.80	1.82	1.88	2.00	2.09	2.13

Source: Commission estimates.

[1] The Commission also considered including estimates of unpaid work for adult care and projecting the value of volunteering and caring for adults (as the ABS does). However, estimates of adult care for non-family outside the household ($11 per person each year for females and $9 for males, sub. 10, p. 15) are small relative to the value of volunteer work and therefore would not have any significant effect on projections.

F Fiscal risks for governments

F.1 The vertical fiscal imbalance and fiscal pressure

The evidence on revenue and spending suggests that all jurisdictions will face fiscal pressures and risks as a result of an ageing population in Australia. However, the incidence of these risks and pressures is complicated by the financial dependence of States[1] on the Australian Government. Changes in the payments made by the Australian Government to the States as a result of ageing pressures can shift budget pressures between the different tiers of government. For example, Access Economics (2002) identified this as a risk of contagion from Federal to State finances.

A brief picture of Federal financial relations is needed in order to analyse the likelihood and size of any such shifts in fiscal pressure.

The Australian Government raises more revenue than it directly spends, reflecting its role as the principal tax collector within Australia's federal system. Its major tax revenue sources are income taxes, the Goods and Service tax (explicitly collected on behalf of State governments), and excises.[2]

The GST revenue is distributed to the States. The Australian Government also makes several other payments to State and local governments (figure F.1). The most important of these are special purpose payments (SPPs), which are tied grants covering a broad range of areas, such as health, education and housing. The bulk are paid to the States for their own spending purposes, though some are also paid *through* the States for local government and other purposes. A small share is paid directly to local government.

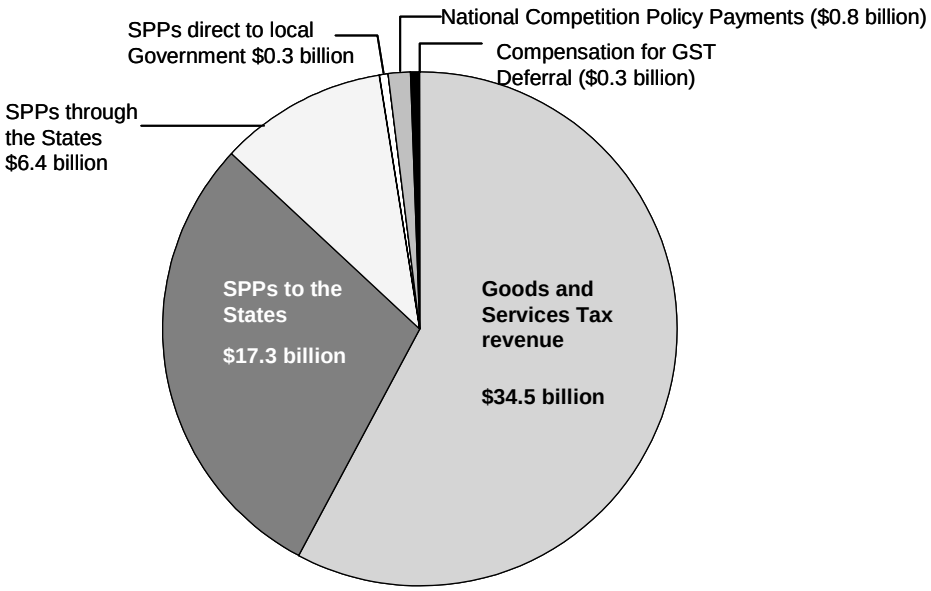
---

1 In this appendix, 'States' refers to the States of Australia, the Northern Territory and the Australian Capital Territory.

2 Income taxes levied on businesses and individuals comprise the biggest single source of taxation revenue in Australia, amounting to $131.3 billion in 2002-03, or 55 per cent of total taxation revenue collected by all tiers of Australian governments. In comparison, the GST amounted to $31.3 billion and Australian Government excise tax was $20.8 billion (ABS, 2004, *Taxation Revenue, Australia*, Cat. no. 5506.0).

When supplemented by their own-source revenue, these grants and payments are the means by which the States fund expenditure, such as hospitals and schools. The transfers are large as a share of the total revenue available to State and local governments (panel A of table F.1).

Figure F.1 **Payments by the Australian Government to State and local government**
2004-05 estimated



Data source: Australian Government (2004, *Federal Financial Relations 2004-05*, 2004-05 Budget Paper no. 3, Canberra).

F.2 What payments are at risk?

The GST is effectively a state tax that is collected by the Australian Government. Accordingly, while population is likely to erode GST revenues as a share of GDP (and therefore produces fiscal pressures for the States — chapter 11), there is little risk that the revenue will be withheld by the Australian Government.

SPPs, on the other hand, are discretionary and partly conditional transfers to the States.[3] The Queensland Government (sub. 17, p. 44) emphasised that SPPs are not within the control of State governments and so present budget risks:

[3] For example, they may require dollar for dollar matching for eligibility and that certain performance criteria be met for continued funding. At various times, the Australian Government has discontinued its funding of programs established as SPPs.

Special purpose payments are largely at the discretion of the Commonwealth Government such that there is significant uncertainty surrounding the growth of SPPs relative to GDP.

SPPs represent a significant source of revenue for all States, but, relative to own-source tax revenue, they figure particularly prominently for Tasmania, the Northern Territory and Western Australia (table F.1). Due to the large relative magnitude of SPPs to States' own-source tax revenues, divergent assumptions about the future size of these payments can make a sizeable difference to fiscal risks faced by the different tiers of government.

Table F.1 **State and local government dependence on payments from the Australian Government**

2002-03

	NSW	*VIC*	*QLD*	*SA*	*WA*	*TAS*	*NT*	*ACT*	*Total*
Revenue of State and local governments[a]									
A Share of total revenue (%)									
Own-taxation revenue	38.1	36.3	28.6	29.8	31.5	21.6	11.8	29.0	33.5
Other own-source income	23.4	25.7	29.7	24.8	26.7	25.7	15.9	29.4	25.5
Current grants and subsidies	38.5	38.0	41.7	45.4	41.8	52.7	72.3	41.6	41.0
Total revenue	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Payments to State governments[b]									
B Ratio to own-source taxation revenue									
SPPs	0.37	0.41	0.52	0.53	0.59	0.72	1.20	0.39	0.45
GST revenue	0.64	0.69	1.05	1.18	0.86	2.21	6.15	0.90	0.84
Other payments	0.06	0.04	0.02	0.06	0.03	0.09	0.03	0.03	0.05
All payments	1.07	1.14	1.60	1.77	1.48	3.01	7.38	1.32	1.33

[a] This relates to the consolidated finances of States and local government. Current grants and subsidies are mainly SPPs from the Australian Government and GST revenue, paid to State and local governments, either directly or indirectly. For example, it includes SPPs paid *through* States for local government and other uses (such as private schools). [b] This excludes SPPs paid through State governments and SPPs paid directly to local government. Other payments includes Budget Balancing Assistance and National Competition payments. Own-source taxation revenue used in panel B is only for States, thus excluding local government (cf. panel A).

Source: ABS (2004), *Government Finance Statistics, Australia*, Cat. no. 5512.0, April (for consolidated data in panel A); Australian Government (2003), 2003-04 Budget, Budget Paper no. 3 (for data on payments to States only); and ABS (2004), *2002-03 Taxation Revenue, Australia*, Cat. no. 5506.0, April (for own-source State taxation revenue used as the denominator for data in panel B).

F.3 Fiscal pressures for the 'Combined States' compared with the Australian Government

How SPPs are viewed shapes how they are projected. There are two broad perspectives on their role:

- SPPs may be seen as hypothecated payments made by the Australian Government — payments dedicated to produce certain social and economic outcomes. From this perspective, they will respond to changing service needs.
- SPPs may be seen as a revenue source to help meet various service expenses, but one that is not guaranteed to grow at the same rate as those services.

SPPs as *hypothecated* payments

To the extent that SPPs are viewed as hypothecated payments, they are not mere discretionary income transfers, but payments that are tied to certain objectives, such as a well functioning hospital system. From this perspective, the payments are not constrained by thresholds in GDP shares or real per capita amounts, but by service needs.

The appropriate projection method in this context is to establish a constant price funding amount in a base year for those expenditures that are age-related — health, education and aged care — and to project future trends in these on the basis of population, ageing effects and non-demographic factors. This was the way in which the Intergenerational Report projected all age-related Australian Government spending, including those that are funded through SPPs. The Governments of Victoria (sub. 29, p. 16) and South Australia (sub. 23, p. 24) considered this as one possibility among several, when exploring the fiscal pressures for States.

The most important single expenditure item in SPPs are the health care grants (around $7.5 billion in 2003-04). Aside from the short-term deviations introduced by Health Care Agreements,[4] it can be expected that ageing, population and non-demographic factors[5] will significantly increase this base value over time. Overall,

[4] Health Care Agreements provide a contingent level of funding from the Australian Government to the States for public hospitals. The AIHW (2004, p. 246) notes that in the first year of any agreement, the Australian Government's share of total funding tends to increase, while over the remainder of the agreement's period the States increase their funding share. Accordingly, the 'trend' over the life of any particular health agreement is misleading.

[5] It is assumed that the values of these factors are the same regardless of the funding source. In theory, it would be possible to use a different non-demographic rate for different funding sources were the funding shares to be changing. The long-run evidence suggests that, if anything, the Australian Government has accounted for a rising share of the total costs of public hospitals. This

it is expected that public hospital funding contributed by both State governments and the Australian Government will rise relative to GDP. Implicit in this projection methodology is that there is no shift in the *share* of total funding given by either level of government after the base year. In the case of health care grants given by the Australian Government to the States for public hospitals, it could be expected that the ratio of grant values to GDP will increase by around 60 per cent from 2002-03 to 2044-45.

Of course, other SPPs are expected to fall relative to GDP — such as those paid to education. However, all other things being equal, SPP to GDP ratios could be expected to rise overall, because ageing pressures on services are likely to increase the Australian Government's health SPPs by more than they decrease their education SPPs. The point to emphasise is that using this methodology, the relevant SPP to GDP ratios are the *outcome* of the projections, rather than a financing constraint imposed by the Australian Government on the States.

It is also worth noting that under this approach not all sub-components of the SPPs are modelled. As in the rest of this study, the focus of projections is on those expenditure items that are affected by population ageing. For example, the Commission has not undertaken detailed modelling of defence spending at the Australian Government level. Similarly, SPPs on land care and other environmental projects are not projected. The Commission has, however, broadly examined trends in Governments' spending in non-age related areas to assess whether they might exacerbate or relieve fiscal pressures associated with age-related spending (technical paper 8). After considering broad spending trends, the Commission's base case assumption is that, in aggregate, these residual areas of government spending are roughly maintained as a share of GDP. This assumes there are no direct feedbacks from ageing fiscal pressures on environmental, defence and other non-ageing government expenditures. Of course, it is possible that one method by which governments may fund the rising costs of ageing is to cut back on these other spending items, but this should not be modelled implicitly as a forgone conclusion.

SPPs as an uncertain revenue source

The alternative view is that SPPs do not need to rise with service needs. Rather, they are like other government transfer payments, and are constrained by similar conditions, such as dependency on tax revenues.

would suggest a higher non-demographic growth rate for health care grants from the Australian Government than public hospital funding from State governments. However, given the recent stability of the funding share, the Commission's projections are based on the assumption of a fixed future funding share, and consequently on the same non-demographic rate for both funding sources.

There is a floor to the risks borne by the combined States as a result of variations in SPP revenue. As part of the 1999 *Intergovernmental Agreement on the Reform of Commonwealth-State Financial Relations* (Clause 5(v)), the Commonwealth indicated that it:

- will continue to provide SPPs to the States; and
- has no intention of cutting aggregate SPPs as part of the ongoing process of tax reform.

This commitment is seen as, at least, requiring that the Australian Government maintain *real* SPPs *per capita* over time. But it does not require SPPs to be maintained as a share of GDP or to meet the growing service needs for which they are provided. This was a source of potential concern to many States:

> … State budgets will be heavily influenced by the level of Commonwealth funding for Specific Purpose Payments (SPPs). If SPPs are only maintained in real terms (the only position the Commonwealth has agreed to), and not adjusted for growth in demand for services, State budgets will have significantly higher deficits. (ACT Government sub. 21, p. 18)
>
> Historical precedent suggests that Commonwealth funding to States, whether in the form of general or specific purpose funding, will struggle to keep up with, let alone outpace, economic growth. (Queensland Government, sub. 17, p. 44)
>
> Current arrangements also do not suggest a Commonwealth policy of escalating SPPs in line with service needs … Our experience is also that the Commonwealth is seeking to reduce the need to grow SPPs by imposing increasingly stringent conditions on States to receive SPPs. (Western Australian Government, sub. DR70, p. 2)
>
> It is conceivable that Commonwealth priorities could be re-aligned through resource allocation decisions which involve a reduced relative commitment to programs which are currently jointly resourced by the Commonwealth and the States. (South Australian Government sub. DR62, p. 2)
>
> The States … will face significant fiscal pressures should the Commonwealth choose not to increase SPPs in line with the demand for these services. (Tasmanian Government, sub. DR69, p. 3)

Accordingly, some States' baseline projections for future fiscal pressures assumed no real growth in per capita SPPs (such as the ACT and South Australian Governments).[6] However, the ACT Government also observed that 'in all likelihood, this scenario will not hold', while the South Australian Government also considered an alternative scenario, in which SPPs grow more rapidly than this. For example, if it were assumed that the Australian Government maintains SPPs at their current shares of State spending in each portfolio, then the South Australian

6 Sub. 21, p. 12 and sub. 23, p. 24 respectively. The Victorian Government (sub. 29, p. 28) also considered this scenario, but not as their base case.

Government estimated that combined States' SPP revenue improves by $30 billion in 2041-42, while the Australian Government balance worsens by $30 billion. (The Commission estimates that this is around 1.6 per cent of GDP in 2041-42).

Another perspective is that Australian taxation revenue will generally rise with GDP — and that this will allow SPPs to rise in per capita real terms. Accordingly, some State governments modelled SPPs as a fixed share of GDP. For example, the Queensland Government explored ten long-term fiscal scenarios, in which nine presupposed that SPPs grew at the same rate as gross state product (GSP when cumulated across States is equal to GDP), while one assumed that SPPs grew slower than GSP.

These various projection scenarios for SPPs are consistent with the usual ways of projecting income payments more generally in the economy. For example, welfare transfers are often projected as growing with population numbers and prices, while taxation revenue is often modelled as a roughly fixed share of nominal GDP.

Historical trends in intergovernmental payments

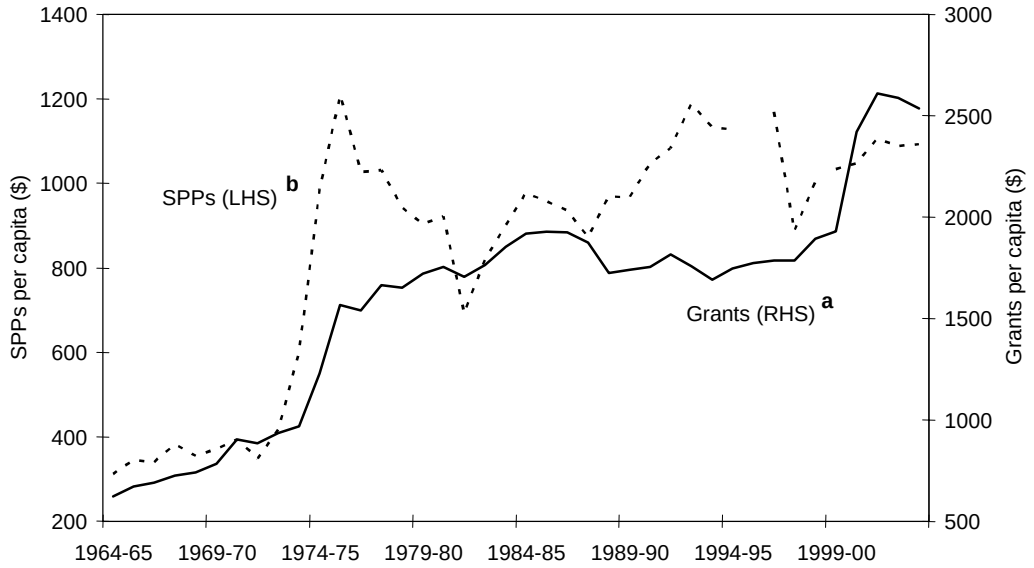
Accordingly, there are three broad approaches for projecting SPPs. They could grow with:

- prices and population;
- GDP; or
- service needs.

A starting point for the assessment of which of the three broad approaches above is most credible is the historical pattern of transfers from the Australian Government to the States.

Gauging this historical pattern is bedevilled by changes in intergovernmental spending and taxing policies. But a broad view can be obtained by looking at various measures of grants made by the Australian Government to other levels of government (figures J.2, J.3 and J.4).

Figure F.2 **What has happened to real per capita grants to the States?**
1964-65 to 2003-04, Per capita real value (2002-03 prices)



a Grants comprise Commonwealth current grants to State and local general government. They include untied grants that are recommended by the Grants Commission and SPPs (they do not include capital grants). Data are from the ABS (*National Accounts*, Cat. no. 5206 for 1972-73 to 2003-04) and from Foster and Stewart (1991, for 1961-62 to 1971-72). Data for the period from 1948-49 to 1960-61 are estimated as a fixed proportion of total Commonwealth capital and current grants to States and local government (from Foster and Stewart). There are some significant changes in the series. Australian Government grants to the States fell in 1971-72 when the Australian Government transferred payroll taxes to the States. The increase in the late 1990s reflects the introduction of the GST. The grants were converted to real values using the GDP implicit price deflator (from ABS National Accounts) and to per capita terms by dividing by a moving average of end of fiscal year populations. **b** Special purpose payments are those 'to and through' the States, but exclude payments made directly to local government and advances. Over the period covered by the data, the Northern Territory and ACT have been included and there have been major policy shifts involving universities and public hospitals, amongst others, that will have affected the magnitude of the payments. Data from 1999-2000 are based on accrual accounting and are not directly comparable with past data.

Data sources: ABS (*National Accounts* Cat. no. 5204.0 and 5206.0) and Foster and Stewart (1991) and data supplied by the Department of Finance.

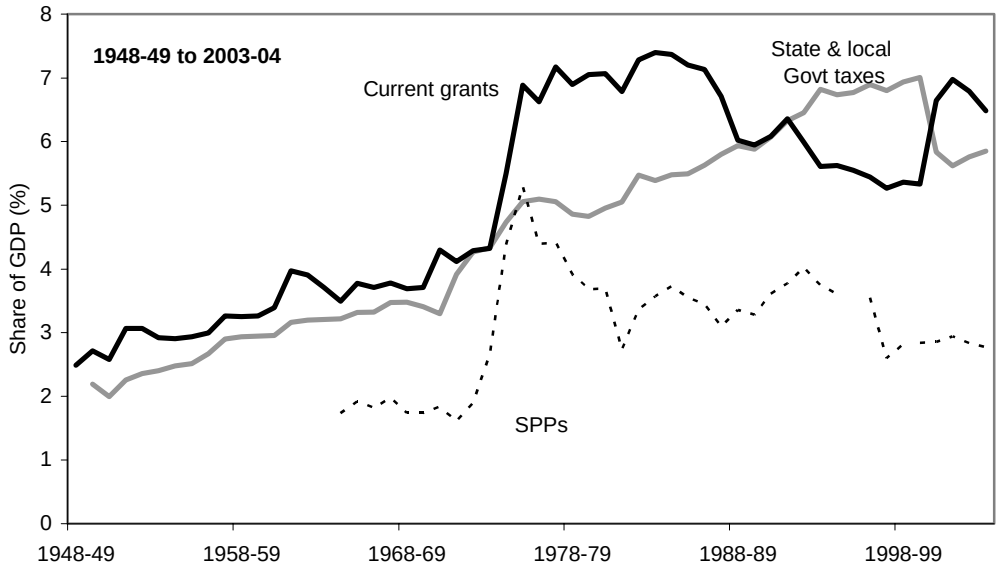
The data imply that:

- While volatile from year to year, current grants to all levels of government[7] and SPPs 'to and through' the States have generally increased in real per capita terms (figure F.2). This suggests that the assumption of maintenance of real per capita SPPs over the next 40 years — while reasonable over short periods — would represent a break from past long-run trends.

[7] That is, including grants made directly to local government or through States to local government and other parties. However, these exclude capital grants, which have generally decreased in importance from the 1970s (Mathews and Grewal 1995). It is important to look at total grants as well as SPPs since funding can shift between them.

- Over the post-WWII period, current grants increased as a share of GDP — broadly in line with the greater role of Australian governments in the economy generally (figure F.3). However, after rising steeply when new spending initiatives were instituted by the Whitlam Government in the early 1970s[8], the grant share has no longer climbed steadily. Indeed, from 1983-84 to 1997-98 the grant share fell steadily from around 7.4 to 5.2 per cent of GDP. This reflected severe pressures on the Australian Government's budget and the capacity to reduce payments while States could successfully increase their own-source revenue (such as conveyancing and gambling revenue). With the introduction of the GST, and the replacement of a range of State taxes, the grant share of GDP again increased significantly and has been roughly stable since. SPPs have also faced large swings, but have exhibited a slow decline as a share of GDP since the early 1980s.
- Current grants fell slowly as a share of State spending over the past 30 years, until the introduction of the GST (figure F.3). SPPs, on the other hand, have been roughly stable as a share of States' spending from the early 1980s, after large swings in the prior decade.

Figure F.3 **Have grants kept pace with GDP?[a]**

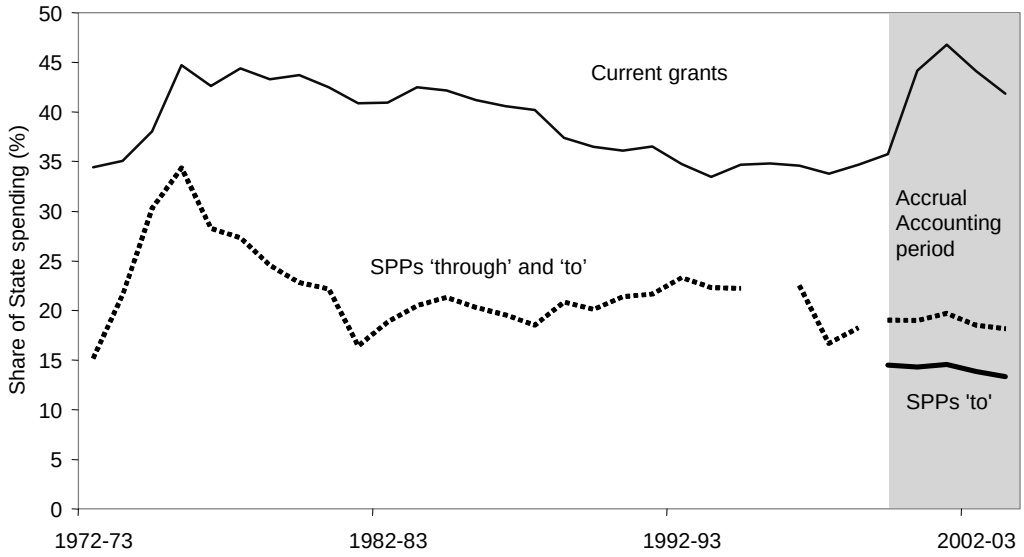


a The derivation and definition of SPPs and current grants is described in figure F.2. All items are expressed as a share of GDP in current prices. The GDP data are from the ABS (*Australian National Accounts*, Cat. no. 5204.0 and 5206.0) for 1959-60 to 2003-04. GDP data for previous years were estimated from the relationship between the present GDP measure and the old GDP(I) measure published in the National Accounts. State & local government taxes include all taxes, fees and fines for these two tiers of government (from ABS Cat. no. 5206.0 for 1972-73 to 2003-04 and spliced from Foster and Stewart for past data).

Data sources: As in figure F.2.

8 Mathews and Grewal 1995; James 2001.

Figure F.4 **Have grants kept pace with State spending?[a]**
1972-73 to 2003-04 (share of State spending)



a State and local government spending is measured as 'Total use of gross income' less 'Net savings' from the National Accounts (Cat. no. 5206.0). SPPs and current grants are defined in figure F.2.

Data source: As in figure F.2.

While the historical trends do not support the view that SPPs are likely to only keep pace with population and price movements, it is hard to distinguish either of the other two possibilities raised previously. Either way, the trends confirm that the States can face fiscal risks associated with flagging Commonwealth payments over a span of years.

In any case, it should be emphasised that the projection methodology used by the Commission is based on maintaining broad policy settings. However, many of the changing past trends in total current grants or its sub-component, SPPs, reflect significant policy shifts or different social/economic circumstances to those of the present or likely future:

- Relatively little population ageing has occurred, so there is little scope to explicitly identify the impacts of ageing on SPPs in past data.
- The role of SPPs have changed. In 1964-65, around 40 per cent of SPPs were applied to transport and communication, while in 2003-04 this had fallen to below 5 per cent. In contrast, education and health have grown strongly (for example, health from 3.7 per cent in 1964-65 to 36.4 per cent in 2003-04).
- Until the introduction of the GST, there was a tendency over time for the Australian Government to shift payments between recurrent spending and untied

grants to SPPs (which are tied grants).[9] This would have had the effect of maintaining the SPP to GDP (and State spending) ratios, even while overall payments fell relative to GDP. In the future, this trade-off will not be possible.

As a consequence, the historical trends may not be a reliable indicator of future growth patterns in SPPs.

Judging the different funding scenarios by their likely outcomes

Another way of assessing the most appropriate projection methodology for SPPs is to weigh up their likely outcomes against each other. Figure F.5 represents the range of outcomes that lie between three broad scenarios:

- Case C (the base case) assumes that SPPs by the Australian Government for public hospitals, home and community services, government schools and vocational education increase (or decrease) with the associated service needs in the States (box F.1). This is the approach used by the Commission in its projections throughout this report. Case C is represented as a zero line in the diagram because our interest is not in total fiscal pressure associated with each scenario, but the *difference* in fiscal pressure between them. To reveal that difference, the common fiscal pressure associated with the three cases has been netted out.
- In case A, the Australian Government fixes SPPs in real per capita terms, while States have to fund *all* of the spending on the age-related areas under their operational control (public hospitals, home and community services, government schools and vocational education) in line with service needs. Since GDP still grows in per capita real terms, such a scenario implies that SPPs fall as a share of GDP. By 2044-45, SPPs would only constitute 1.1 per cent of GDP, compared with a current level of around 2.1 per cent (and a projected level of 2.7 per cent were SPPs to keep up with service pressures, as under case C). And, given continuation of trends, SPPs would account for less than 0.5 per cent of GDP by 2100-01. This case produces bigger fiscal pressures for State governments because they have to meet the age-related costs associated with the entire public hospital system, without a compensating increase in SPPs from the Australian Government.
- Case B is the same as case A, except that the revenue constraint posed by SPPs is relaxed somewhat. It is assumed that the Australian Government fixes the ratio of nominal SPPs to GDP at just over 2 per cent (the estimated ratio in 2003-04).

[9] Thus, using the data from Mathews and Grewal (1995), the share of recurrent payments accounted for by untied grants fell from 81 per cent in 1972-73 to 51 per cent in 1993-94.

Box F.1 **Different models of state spending**

This is a simplified picture of the budget circumstances of the States, which helps to illustrate the different ways of modelling federal fiscal relations and ageing.

Suppose that there is only one age-related expenditure (say, public hospitals). Public hospital spending (A) is partly funded directly by the States and partly by public hospital SPPs from the Australian Government (PHSPP). All terms are in constant prices. States also spend on non-age related services (N) and again these are partly funded directly by the State governments and partly through non-age related SPPs (NASPP) made by the Australian Government. States receive revenue from own-state revenue (R), GST payments and SPPs (comprising PHSPP and NASPP).

So net expenditure by State governments is: $E_t = A_t + N_t - R_t - GST_t - PHSPP_t - NASPP_t$

The three different views of how PHSPP and NASPP may change after the base year are:

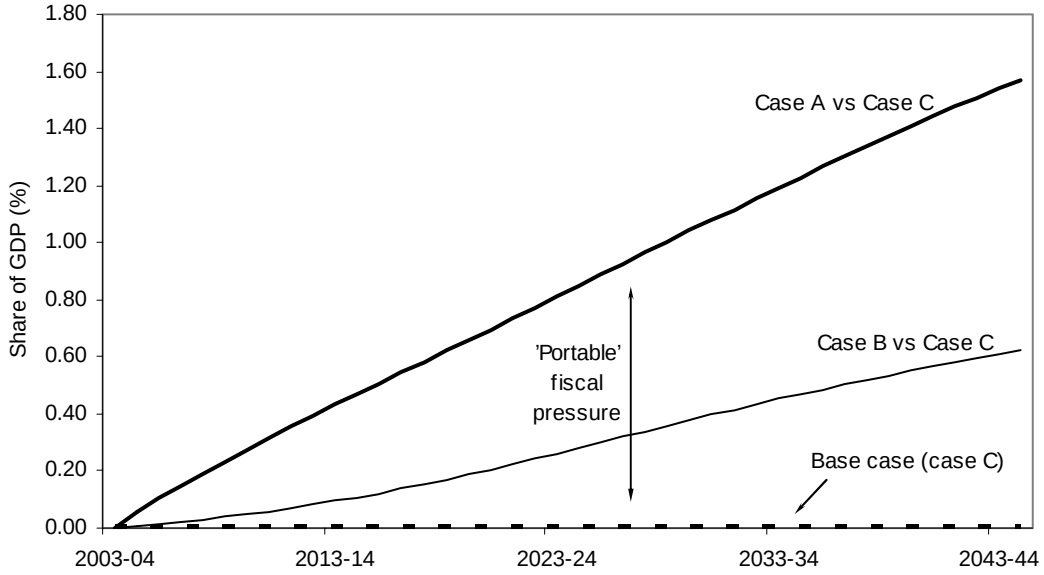
In case A, SPPs are maintained in real per capita terms at their 2003-04 values so that:
$(\mathrm{PHSPP_t} + \mathrm{NASPP_t}) = (\mathrm{PHSPP_{2003\text{-}04}} + \mathrm{NASPP_{2003\text{-}04}})/\mathrm{POP_{2003\text{-}04}} \times POP_t = \lambda POP_t$
In case B, SPPs comprise a fixed share of GDP, so that:
$(\mathrm{PHSPP_t} + \mathrm{NASPP_t}) = (\mathrm{PHSPP_{2003\text{-}04}} + \mathrm{NASPP_{2003\text{-}04}})/GDP_{2003\text{-}04} \times GDP_t = \phi GDP_t$
In case C, SPPs are set so that they maintain the base year share of total State spending on age and non age-related items, so that:
$\mathrm{PHSPP_t} = (\mathrm{PHSPP_{2003\text{-}04}}/\mathrm{A_{2003\text{-}04}} \times \mathrm{A}_t = \alpha \mathrm{A}_t$ *and*
$\mathrm{NASPP_t} = (\mathrm{NASPP_{2003\text{-}04}}/\mathrm{N_{2003\text{-}04}} \times \mathrm{N}_t = \beta \mathrm{N}_t$

Under Case C, SPPs by the Australian Government keep up with service pressures. Indeed, if case C holds, State net spending can be re-written as: $E_t = (1-\alpha)A_t + (1-\beta)N_t - R_t - GST_t$. In this instance, forecasts of fiscal pressure for the States require projections of State-funded spending only (not including SPPs).

Values of net spending corresponding to these three cases can then be calculated (E_A to E_C). The effect of the three alternative assumptions on fiscal pressure can be appraised by taking the difference between the net spending measures (noting that most terms cancel). Accordingly, the effect on fiscal pressure of case A relative to case C is $E_A - E_C = \alpha A_t + \beta N_t - \lambda POP_t$, while the effect of case B relative to C is: $E_B - E_C = \alpha A_t + \beta N_t - \phi GDP_t$. It is clear that $E_A - E_C$ will get large over time because A and (to a lesser extent) N grow faster than the population over time. Similarly, $E_B - E_C$ will also grow over time (albeit less rapidly) because A grows as a share of GDP over time. Thus the fiscal pressure measures will be much larger for case A versus C and modestly greater for case B versus case C.

In the data shown in figure F.5, the above model is elaborated to take account of the four most important age-related areas of spending by States.

Figure F.5 **Portable fiscal pressure** [a]



[a] SPP data for the base year (2003-04) is from the 2004-05 Budget Papers. The three lines shown are the differences in fiscal outcomes associated with the three alternative assumptions for SPPs — and are derived by subtracting the net spending outcomes E_A-E_C, E_B-E_C and (as the base case) E_C-E_C — as described in box F.1. The GDP share was calculated for two scenarios.

Data sources: PC estimates; Australian Government (2004, *2004-05 Budget*, Budget Paper no. 3) and data from the Australian Government Department of Finance.

The economic and policy implications of case A (vis a vis case C) would be:

- By 2044-45, an additional deficit to the States of about 1.6 per cent of GDP. The shortfall in 2044-45 would be $32 billion or around $1 100 per capita (in 2002-03 prices). The *accumulated* shortfall in State finances from 2004-05 to 2044-45 would be $540 billion in 2002-03 prices.
- These transfers would provide relief from fiscal pressure for the Australian Government. In effect, tax receipts would rise in line with GDP, while outlays to the States would fall. There would be a corresponding need for States to find other revenue sources, cut spending or to borrow. These financing methods all face some limitations:
  - Borrowing to meet the deficit would not be sustainable in the long run.
  - Were the deficit to be tax-financed, it would require that the States increase their tax share of GDP by around 1.6 per cent above the counterfactual. Since currently their taxes are around 4.5 per cent of GDP, this would imply significant increases in State tax *rates.* States do not have the same degree of tax policy flexibility as the Australian Government (which is the reason for the vertical fiscal imbalance that leads to Commonwealth payments to the States in the first place). Accordingly, tax financing by the States might lead

to economically inefficient taxes, a point also noted by Access Economics (2002) in its analysis of fiscal concerns for the States and by the Tasmanian Government (sub. DR69, p. 3).

  - Were the overall supply of services to only stay fixed in real per capita terms, then this would imply that State spending would fall relative to GDP. This would permit States to run surpluses, despite falling SPP to GDP ratios. However, real per capita demand for some key services operated by the States, such as public hospitals, home and community services and disability services, will increase with population ageing. Moreover, many of the services provided by the States — health care, education and law and order — are ones for which public expectations of increased quality and quantity rise as our national income grows.[10] Consequently, failure to provide increased services per capita would probably be perceived unfavourably as progressively more severe rationing.
  - More private funding for services could be sought. However, for the most important service for which States are funded by the Australian Government, public hospitals, pricing is outside the control of the States.[11] Australian Government policy is for free access by Australians to public hospitals.

- Other than the case where State governments reduce the funding of services relative to GSP, the first scenario pre-supposes an increased role for the States in funding social services, such as hospitals and home and community care. By extension, this would also represent a substantial diminution of the role of the Australian Government, and, therefore, a transformation in the historical responsibilities of these different tiers of government.

Implications

Overall, while case A is possible, it pre-supposes a complete shift in long-run fiscal relations, and significant — quite possibly inefficient — policy initiatives to deal with the resulting deficits. For that reason, it is probably not a realistic depiction of the likely fiscal pressures that will be borne by State governments.

But what of the counterfactual — case C? It recognises that the Australian Government has wider tax and other policy options to meet the fiscal pressures of

[10] And in any State services where productivity growth is less than the assumed 1.75 per cent per annum, real costs per capita would rise as real wages rose. This implies that the supply of such services would have to contract were there a requirement for State costs to stay constant in real per capita terms.

[11] Health care grants from the Australian Government to the States accounted for nearly half of Australian Government funding 'to' States in 2003-04.

ageing. It also seems broadly consistent with the long-run pattern of federal fiscal relations.

However, its realism also depends on the capacity for the Australian Government to increase SPPs from around 2.1 to 2.7 per cent of GDP over the next forty years — a time when population ageing will have also increased spending in other areas, such as pharmaceuticals, Medicare and Age Pensions. Under case C, the degree of fiscal burdens associated with ageing experienced by State governments are relatively modest compared with the Commonwealth. Accordingly, if the Australian Government attempts to share the fiscal burdens more widely, State governments do face a risk that SPPs may not grow as fast as under case C. Nevertheless, the Commission has interpreted such an Australian Government response as a shift in long-run policy settings. The point of the modelling exercise is to consider fiscal outcomes associated with no change in long-run policy settings, and in that context, the preferred base case for modelling is case C.

That said, it may be useful to distinguish fiscal *risks* for the States from fiscal *pressures*. Such risks pick up the possibility that case C will not hold — or that growth in SPPs are moderated in response to the fiscal pressures borne by the Australian Government under case C. While case A is probably too extreme a measure of that risk over the long run, the intermediate assumption — case B — appears more plausible. The implications for State finances are significant. The economic implications of case B (vis a vis case C) would be an additional deficit to the States of about 0.6 per cent of GDP by 2044-45. The shortfall in 2044-45 would be $13 billion or around $450 per capita (in 2002-03 prices). The *accumulated* shortfall in State finances from 2004-05 to 2044-45 would be $194 billion in 2002-03 prices.

It is also important to note that even were case C to characterise the ‘average’ policy setting, States still might be exposed to fiscal risks associated with the ebbs and flows of Australian Government payments over the short run. It is clear, for example, that the recent health agreements did not increase Australian Government spending in line with GDP over the life of the agreement. However, this should be seen as a short-term phenomenon, and should be placed in the context that this was a period in which State gains from GST revenue exceeded expectations. In the short run, case A is probably a reasonable scenario for evaluating fiscal risks to the States.

Finally, as shown above, the fiscal position of different tiers of government is sensitive to varying assumptions about the rate of growth of SPPs, whereas the fiscal position of combined governments is not. The immediate implication of this is that *aggregate* fiscal pressure borne by collective Australian governments is the best single measure of the fiscal consequences of ageing.

F.4 Relative fiscal risks for individual States compared with each other

The bulk of the fiscal risks to States occur for the States as a group. Nevertheless, chapter 2 indicates that population ageing is stronger in some States than others. In the absence of mechanisms that took account of these variations, States that face more population ageing, such as Tasmania and South Australia, would be disadvantaged in the distribution of SPPs and GST revenue. In fact, Australian governments have developed a complex mechanism administered by the Grants Commission — horizontal fiscal equalisation (HFE) — which takes accounts of factors that advantage and disadvantage States, including differing age structures.

The Grants Commission estimates socio-demographic composition (SDC) disabilities for each State. These reflect differences in the characteristics of State populations on the use of services and/or the cost of each unit of service. States with greater SDC disabilities are the recipients of greater payments. SDC disabilities are highly disaggregated by factors, including age, that create cost differences. Of 23 State services, only two (public housing maintenance and public housing user charges) did not have 'use weights' that varied with age. While there remain differences between State governments about how to fully measure and account for disadvantage in different populations, in the latest review of the SDC disabilities, these related to factors like indigeneity, location and cultural and linguistic diversity, not ageing (CGC 2003). Figure F.6 illustrates the possible extent of HFE required to share fiscal pressure equally between the States by 2044-45. They suggest Western Australia, South Australia, Tasmania and the Northern Territory might ultimately need bigger shares of total GST revenue as a result of demographic pressures.

HFE limits the likely fiscal risks associated with ageing for individual States. Accordingly, the South Australian Government argued that:

> Since HFE equalises the capacity of State Governments to deal with differing demographic budget trends, there is little value in … exploring the fiscal impacts of population ageing between individual State Governments (sub. 23, p. 19).

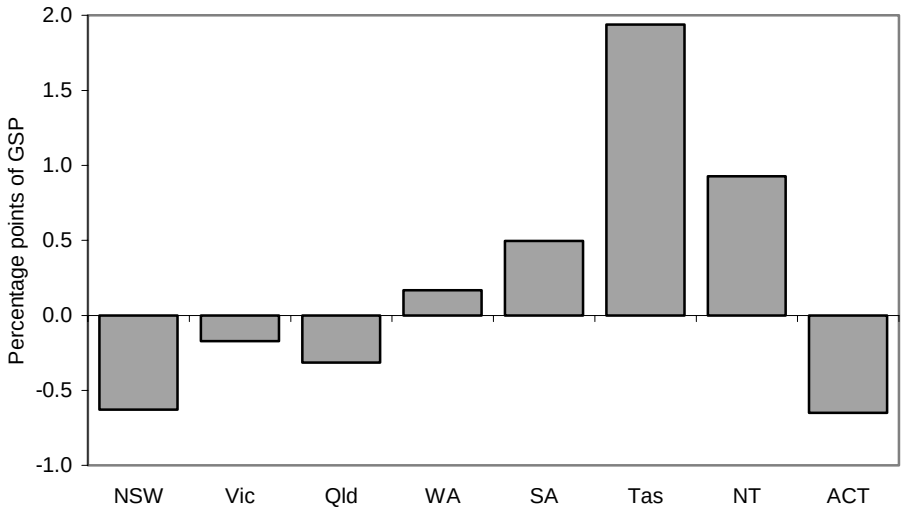
On the other hand, the Tasmanian Government (sub. DR69, p. 5) argued that HFE was an imperfect process and that the objective of equalisation might not be fully met. To the extent this is true, this would act as a source of additional fiscal risk for individual jurisdictions.

These risks cannot be precisely enumerated given the complexity of the models used by the Grants Commission and the lack of a clearly superior alternative by which risks could be judged. Overall, the Commission's judgment is that the

ageing-related risks posed by any defects associated with HFE are likely to be small. Moreover, given the ongoing evaluation of models used by the Grants Commission and the development of better datasets to calibrate them, it is likely that these risks will diminish over time. Since the Grants Commission also takes account of SPPs to individual States in its recommendations for allocating GST revenue, HFE is also likely to deal with most ageing related risks posed by individual State SPPs.

Figure F.6 **How much horizontal fiscal equalisation might be needed to compensate for ageing?** [a]

2044-45 relative to 2003-04



[a] The first step in estimating the potential role for HFE associated with ageing was a calculation of the fiscal pressure facing States *before* GST revenues had been distributed. This fiscal pressure was calculated as the net fiscal position of each State relative to its position in 2003-04, or N_t-$N_{2003-04}$, where N_t (net fiscal position in year t) is defined as R_t - E_t, where R_t and E_t are age-related revenue to GDP and expenditure to GDP respectively (excepting GST). Then the net fiscal position of each State was subtracted from the combined States net position (including GST revenue) for 2044-45 to give a picture of the extent to which each State would need additional or less GST revenue than others. The effect of such a re-distribution would be that each State would face the same fiscal pressure as every other State. A positive (negative) number means that a State should be a beneficiary (loser) from HFE. The high value for the Northern Territory reflects assumptions about investments in health care for the Indigenous population and demographic projections for that sub-population.

Data source: Commission estimates.

References

ABS (Australian Bureau of Statistics) 1995, *Demographic estimates and projections: concepts, sources and methods*, Cat. no. 3228.0, Canberra.

—— 1998a, 'Family formation: family planning', in *Australian Social Trends, 1998*, http://www.abs.gov.au/ausstats.

—— 1998b, *Survey of Disability, Ageing and Carers*, Cat. no. 4430.0.

—— 1999, *Labour Force, Australia, Special Article — Labour Force Projections: 1999–2016*, Cat. no. 6203.0, October.

—— 2001a, *Surveys of Income and Housing Costs, Australia*, Cat. no. 6541.0.

—— 2001b, *Migration*, Cat. no. 3412.0.

—— 2001c, Aboriginal and Torres Strait Islander Mortality: Evaluation of experimental life tables, Demography Working Paper 2001/2.

—— 2002a, 'How long can I look forward to live? Mortality projections for 'real' cohorts', in *Year Book Australia, 2002*, http://www.abs.gov.au/ausstats.

—— 2002b, 'Regional population ageing', in *Australian Social Trends, 2002*, http://www.abs.gov.au/ausstats.

—— 2002c, 'Australian schools: participation and trends', in *Year Book Australia, 2002*, http://www.abs.gov.au/ausstats.

—— 2002d, *Deaths, Australia*, Cat. no. 3302.0.

—— 2003a, *Government Finance Statistics, Australia, 2001-02*, Cat. no. 5512.0, Commonwealth of Australia, Canberra.

—— 2003b, *Population Projections Australia, 2002–2101*, Cat. no. 3222.0.

—— 2003c, *Net Overseas Migration: Adjusting for Actual Duration of Stay or Absence*, Demography Working Paper 2003/5.

—— 2003d, *Disability, Ageing and Carers: Summary of Findings*, Cat. no. 4430.0.

—— 2004a, *Taxation Revenue*, Cat. no. 5506.0.

—— 2004b, *Interpretation and Use of Overseas Arrivals and Departures Estimates*, Demography Working Paper 2004/2, Cat. no. 3106.0.55.002, September.

—— 2004c, *Population by Age and Sex, 1970-71 to 2002-03*, Cat. no. 3201.0, Commonwealth of Australia, Canberra.

—— 2004d, *Household and Family Projections 2001 to 2026*, Cat. no. 3236.0.

—— 2004e, 'Echoes of the baby boom', in *Australian Social Trends, 2004*, http://www.abs.gov.au/Ausstats/abs@.nsf/0/47f151c90ade4c73ca256e9e001f8973?OpenDocument (accessed 27 January 2005).

—— 2004f, *Yearbook Australia, 2004*, Number 86, Cat. no. 1301.0, Commonwealth of Australia, Canberra.

—— 2004g, *Experimental estimates and projections, Aboriginal and Torres Strait Islander Australians*, Cat. no. 3238.0, September.

—— 2004h, *Calculating experimental life tables for use in population estimates and projections of Aboriginal and Torres Strait Islander Australians*, Demography Working paper 2004/3, Cat. no. 3106.0.55.003, September.

—— 2004i, *Measuring net overseas migration*, Technical Note, December.

—— 2005, 'Labour force participation in Australia', in *Year Book Australia, 2005*, Cat. no. 6105.0.

Access Economics 2001, *Population Ageing and the Economy*, Commonwealth Department of Health and Aged Care, Canberra.

—— 2002, *Longer Term Sustainability of States' Financial Position*.

AIC (Australian Institute of Criminology) 2003, *Australian Crime: Facts and Figures 2003*, AICPress, Canberra.

AIHW (Australian Institute of Health and Welfare) 1999, *Older Australia at a Glance*, 2nd edn, Cat. no. AGE 12.

—— 2000, *Australia's Health 2000*, http://www.aihw.gov.au/publications/health/ah00/.

—— 2001, *Expenditures on Health Services for Aboriginal and Torres Strait Islander People, 1998-99*, AIHW Cat. no. IHW 7, Canberra, http://www.aihw.gov.au.

—— 2002, 'Assistance for housing', in *Australia's Welfare 2001*, ch. 3, http://www.aihw.gov.au/publications/aus/aw01/aw01-co3.pdf.

—— 2003a, 'A growing problem, trends and patterns in overweight and obesity among adults in Australia, 1980 to 2001', *Bulletin*, Issue 8, September, Canberra.

—— 2003b, *The Supply of Informal Care 2003 to 2013: Alternative Scenarios*, AIHW Cat. no. AGE 32, Canberra.)

—— 2003c, 'Assistance for housing', in *Australia's Welfare 2003*, ch. 5, http://www.aihw.gov.au/publications/aus/aw01/.

—— 2003d, 'Disability prevalence and trends', *Disability Series*, Cat. no. DIS34, December.

—— 2004a, *Australia's Health 2004*, AIHW Cat. no. AUS 44, Canberra.

—— 2004b, *Health Expenditure Australia: 2002-03*, AIHW Cat. no. HWE 27 (Health and welfare expenditure series no. 20), Canberra.

—— 2004c, *Health system expenditure on disease and injury in Australia, 2000-01*, AIHW Cat. no. HWE 26 (Health and Welfare Expenditure Series no. 19), Canberra.

—— 2004d, *Carers in Australia: Assisting Frail Older People and People With a Disability*, AIHW Cat. no. AGE 41 (Aged care series), Canberra.

—— 2004e, 'Health, wellbeing and body weight, characteristics of overweight and obesity in Australia, 2001', *Bulletin*, Issue 13, March, Canberra.

—— 2004f, 'Obesity trends in older Australians', *Bulletin*, Issue 12, February, Canberra.

ALGA (Australian Local Government Association) 2003, *State of the Regions Report 2003*, A report prepared for the ALGA by National Economics, November.

—— 2004, *State of the Regions Report 2004-05*, A report prepared for the ALGA by National Economics, November.

Alvarado, J. and Creedy, J. 1998, *Population Ageing, Migration and Social Expenditure*, Edward Elgar, Cheltenham United Kingdom and Northampton, United States.

Alzheimers Australia, 2005, *Dementia Estimates and Projections: Australian States and Territories*, Access Economics, February.

AMA (Australian Medical Association) 2002, *An Analysis of the Widening Gap between Community Need and the Availability of GP Services*, A report to the AMA by Access Economics, February.

Andersson, B. 2001, 'Scandinavian evidence on growth and age structure', *Journal of Regional Studies*, vol. 35, no. 5, pp. 377–390.

Argyrous, G. and Neale, M. 2003, 'The 'disabled' labour market: the disability support program and unemployment', *Journal of Australian Political Economy*, vol. 51, pp. 5–28.

Atkinson, M. and Creedy, J. 1997, 'The choice of early retirement age and the Australian superannuation system', *Australian Journal of Labour Economics*, vol. 1, no. 1, March, pp. 1–23.

Auerbach, A.J., Gokhale, J. and Kotlikoff, L.J. 1991, 'Generational accounts: a meaningful alternative to deficit accounting', in Bradford, D. (ed.), *Tax Policy and the Economy*, MIT Press, Cambridge, Massachusetts.

Auerbach, A.J. and Kotlikoff, L.J. 1992, 'The impact of demographic transition on capital formation', *Scandinavian Journal of Economics*, vol. 94, no. 2, pp. 281–95.

Aungles, P., Karmel, T. and Wu, T. 2000, *Demographic and Social Change*, DEST, Canberra, http://www.dest.gov.au/highered/occpaper.htm#2000 (accessed January 2004).

Australian Government 2004, *A More Flexible and Adaptable Retirement Income System*, Canberra.

Australian Government Actuary 2003, *2002 Military Superannuation and Benefits Scheme and Defence Force Retirement and Death Benefits Scheme (MSBS and DFRDB)*, Canberra.

Australian Government Treasury 1999, 'The measurement of saving in Australia', *Economic Roundup*, Spring.

—— 2002, *Intergenerational Report 2002-03*, Budget Paper no. 5, 14 May, Commonwealth of Australia.

—— 2004, *Federal Financial Relations 2004-05*, Budget Paper no. 3, 11 May, Commonwealth of Australia.

Bacon, B. 1999, 'Ageing in Australia: some modelling results and research issues', in Productivity Commission and Melbourne Institute of Applied Economic and Social Research, *Policy Implications of the Ageing of Australia's Population, Melbourne, 18–19 March*, Conference Proceedings, AusInfo, Canberra, pp. 77-106.

Bains, M. 2003, 'Projecting future needs', in OECD, *A Disease-based Comparison of Health Systems*, Paris.

Barnes, P., Johnson, R., Kulys, A. and Hook, S. 1999, *Productivity and the Structure of Employment*, Productivity Commission Staff Research Paper, AusInfo, Canberra, July.

Bateman, H. and Piggott, J. 2001, The Australian approach to retirement income provision, Faculty of Economics and Commerce, University of NSW, Paper presented for the International Seminar on Social Security Pensions, Tokyo, March 5–7.

Borsch-Supan, A. 2001, 'Labour market effects of population ageing', Mannheim Research Institute for the Economics of Ageing and NBER.

Baumol, W.J. 2004, 'Education for education innovation: entrepreneurial breakthroughs vs. corporate incremental improvements', NBER Working Paper Series, no. 10578.

Beer, A. 1999, 'Fast forward to the future? A vision of home ownership and housing wealth in the next century', in Yates, J. and Wulff, M. (eds) *Australia's Housing Choices*, University of Queensland Press, pp. 87–9.

Beller, G. 2001, 'Coronary heart disease in the first 30 years of the 21st Century: challenges and opportunities', *Circulation*, vol. 103, pp. 2428–35.

Bishop, J. (Minister for Ageing) 2005, *Report on the Operation of the Aged Care Act 1997: 1 July 2003 to June 2004*, February.

Blomqvist, A.G. and Carter, R.A.L. 1997, 'Is health care really a luxury?', *Journal of Health Economics*, vol. 16, no. 2, pp. 207–29.

Bodman, P., Draca, M. and Wild, P. 2003, 'Recent convergence behaviour of the Australian States: a time series approach', in Williams, C., Draka, M. and Smith, C. (eds) *Productivity and Regional Economic Performance in Australia*, Office of Economic and Statistical Research, Queensland Treasury.

Bongaarts, J. and Feeney, G. 1998, 'On the quantum and tempo of fertility', *Population and Development Review*, vol. 24, no. 2, pp. 560–4.

Booth, H. and Tickle, L. 2003, 'The future aged: new projections of Australia's elderly population', Working Papers in Demography, no. 90, Australian National University, Demography and Social Program, Canberra.

—— 2004, *Beyond three score years and ten, prospects for longevity in australia*, Working Papers in Demography, no. 92, Australian National University, Demography and Social Program, Canberra, February.

Borland, J. and Wilkins, R. 1996, 'The age-earnings structure in Australia', *Australian Economic Papers*, December, pp. 69–84.

Borland, J. 1997, 'Changes in the supply of labour in Australia', in Productivity Commission, *Changing Labour Markets*, AGPS, Melbourne, pp. 19–44.

Börsch-Supan, A. and Essig, L. 2003, 'Household saving in Germany, results of the first SAVE study', NBER Working Paper 9902, NBER, August.

Brooks, R. 2000, 'Population aging and global capital flows in a parallel universe', IMF Working Paper, WP/00/151.

BTRE (Bureau of Transport and Regional Economics), 2002, 'Regional public transport in Australia: long-distance services, trends and projections', Working Paper 51, http://www.btre.gov.au.

Burke, G. 2003, 'Australia's educational expenditures', Centre for The Economics of Education and Training (CEET), Working Paper no. 50, Monash University and ACER.

Bryant, J. 2003, 'Demographic change and New Zealand's economic growth', New Zealand Treasury Working Paper 03/04, Wellington.

Bryant, J., Jacobsen, V., Bell, M. and Garrett, D. 2004, 'Labour force participation and GDP in New Zealand', New Zealand Treasury Working Paper 04/07, Wellington.

Burniaux, J., Duval, R. and Jaumotte, F. 2003, 'Coping with ageing: a dynamic approach to quantify the impact of alternative policy options on future labour supply in OECD countries', OECD Economics Department Working Paper no. 371.

Butlin, M.W. 1977, *A Preliminary Annual Database 1900/01 to 1973/74*, Reserve Bank of Australia, Research Discussion Paper 7701, May.

Byles, J.E. and Flicker, L. 2002, 'Population ageing and trends in health and disease', commissioned for Myer Foundation, *2020 A Vision for Aged Care in Australia*, http://www.myerfoundation.org.au (accessed 19 April 2004).

Cahuc, P. and Zylberberg, A. 2004, *Labor Economics*, MIT Press, Cambridge, Massachusetts.

Cai, L. 2004, 'An analysis of durations on the Disability Support Pension (DSP) program', Melbourne Institute Working Paper no. 8/04, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

—— and Gregory, R.G. 2003, 'Inflows, Outflows and the Growth of the Disability Support Pension (DSP) Program', *Australian Social Policy 2002-03*, pp. 121–43.

—— and Gregory, R.G. 2004, 'Labour market conditions, applications and grants of disability support pension (DSP) in Australia', *Australian Journal of Labour Economics*, forthcoming.

Caldwell, J. C., Caldwell, P. and McDonald, P. 2002, 'Policy responses to low fertility and its consequences: a global survey', *Journal of Population Research*, vol. 19, no. 1.

Carmichael G. 1998, 'Things ain't what they used to be! Demography, mental cohorts, morality and values in post-war Australia', *Journal of the Australian Population Association*, vol. 15, no. 2, pp. 91–113 (Presidential Address to the Australian Population Association).

Carmichael G.A. and McDonald P. 2003, 'Fertility trends and differentials', in Khoo S. and McDonald P. (eds), *The Transformation of Australia's Population 1970 – 2030*, UNSW Press.

CGC (Commonwealth Grants Commission) 2003a, 'Payroll taxation', Draft Assessment Paper, CGC 2003/1.

—— 2003b, 'Socio-demographic composition', Draft Assessment Paper, CGC 2003/59, August.

Chernichovsky, D. and Markowitz, S. 2003, 'Ageing and aggregate costs of medical care: conceptual and policy issues', *Health Economics.*

Condon, J., Barnes, T., Cunningham, J. and Armstrong, B. 2004a, 'Long-term trends in cancer mortality for Indigenous Australians in the Northern Territory', *Medical Journal of Australia*, vol. 180, no. 10, pp. 504–7.

Condon, J., Barnes, T., Cunningham, J. and Smith, L. 2004b, 'Improvements in Indigenous mortality in the Northern Territory over four decades', *Australia and New Zealand Journal of Public Health*, vol. 28, no. 5, October.

Coory, M. 2004, 'Ageing and healthcare costs in Australia: a case for policy-based evidence?', *Medical Journal of Australia*, vol. 180, no. 11, pp. 581–83.

Crepon, B., Deniau, N. and Perez-Duarte, S. 2002, *Wages, Productivity, and Worker Characteristics: A French Perspective*, January, http://www.crest.fr/pageperso/dr/crepon/CreponDeniauPerezDuarte2002.pdf.

Culyer, A.J. 1990, 'Cost containment in Europe', in OECD, *Health Care Systems in Transition*, Paris.

Cumpston, J. 1989, *Health and Disease in Australia: A History*, AGPS, Canberra.

Cunningham, J. and Paradies, Y. 2000, Mortality of Aboriginal and Torres Strait Islander Australians, 1997, Australian Bureau of Statistics Occasional Paper, Cat. no. 3315.0.

Cutler, D. 2001a, *The Reduction in Disability Among the Elderly*, Proceedings of the National Academy of Science, vol. 98, no. 12, June.

—— 2001b, 'Trends in Medicare spending near the end of life', in Wise, D. (ed.), *Themes in the Economics of Ageing 2001*, University of Chicago Press, Chicago.

Davis, E., Beer, J., Gligora, C. and Thorn, A. 2001, 'Accounting for change in disability and severe restriction, 1981–1998', Australian Bureau of Statistics Working Paper 2000/1, March, Canberra.

Day. C. and Dowrick, S. 2004, 'Ageing economics: human capital, productivity and fertility', *Agenda*, vol. 11, no. 1, pp. 1–20.

Debelle, G. and Vickery, J. 1998, 'The macroeconomics of Australian unemployment', in Debelle G. and Borland, J. (eds), *Unemployment and the Australian Labour Market*, Reserve Bank of Australia, Conference Volume, July.

De Vaus, D. 2002, 'Fertility decline in Australia: A demographic context', *Family Matters*, Australian Institute of Family Studies 63, Spring/Summer, vol. 30.

De Vaus, D., Gray, M. and Stanton, D. 2003, *Measuring the Value of Unpaid Household, Caring and Voluntary Work of Older Australians*, Research Paper no. 34, Australian Institute of Family Studies, November.

DEST (Department of Education, Science and Training) (various years), *Finance (various years): Selected Higher Education Statistics*, Commonwealth of Australia., Canberra, http://www.dest.highered/statpubs.htm.

—— (various years), *Annual Report, (various years)*, Commonwealth of Australia, Canberra.

—— 2003, *Finance 2002: Selected Higher Education Statistics*, Commonwealth of Australia, Canberra, http://www.dest.highered/statpubs.htm.

—— 2004a, *Finance 2003: Selected Higher Education Statistics*, Commonwealth of Australia, Canberra, http://www.dest.highered/statpubs.htm.

—— 2004b, *University Student Numbers by Age, 1989 to 2002*, special request.

DEWR (Department of Employment and Workplace Relations), 2003, *Submission to the Senate Select Committee on Superannuation: Inquiry into Planning for Retirement*, Canberra.

—— 2004a, *Job Network Disability Support Pension Pilot: Interim Evaluation Report*, Evaluation and Programme Performance Branch, Employment Analysis and Evaluation Group, October, Canberra.

—— 2004b, *National and State Skill Shortage Lists, Australia - 2004*, Canberra.

DoFA (Department of Finance and Administration) 2003, *PSS and CSS Long Term Cost Report, A Report on the Long Term Cost of the Public Sector Superannuation Scheme and the Commonwealth Superannuation Scheme 2002*, prepared by Mercer Human Resource Consulting, Sydney, http://www.finance.gov.au/super/docs/Ltcr-02.pdf (accessed 17 March 2005).

DoHA (Department of Health and Ageing) 2003, *Trends in Hospital Activity in Australia 1991-92 to 2000-01*, Occasional papers: new series no. 15, July.

—— 2004, Program overview, http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/hacc-index.htm (accessed 8 March 2005).

—— 2005, Your finances, State and Territory concessions, http://www.seniors.gov.au/finances/stateconcsn.htm (accessed 14 March 2005).

Dow, W.H. and Norton, E.C. 2002, 'The red herring that eats cake: Heckit versus two-part model redux', *Triangle Health Economics Working Paper Series*, Working Paper no. 1.

Duval, R. 2004, *The Retirement Effects of Old-age Pension and Early Retirement Schemes in OECD Countries*, Department of Economics, OECD, Paris, June.

DVA (Department of Veterans Affairs), 2004, *Annual Report 2003-04.*

FaCS (Department of Family and Community Services), 2001, *Income Support and Related Statistics: A 10 Year Compendium, 1989–1999*, Occasional Paper no. 1.

—— 2004a, *Annual Report 2003-04*, http://www.facs.gov.au/annualreport/2004/index.htm (accessed 17 January 2005).

—— 2004b, Labour market and related payments, a monthly profile, March, http://www.facs.gov.au/internet/facsinternet.nsf/aboutfacs/programs/monthly_profile.htm (accessed 12 October 2004).

—— 2004c, Submission to Senate Select Committee Inquiry, attachment C — concessions for pensioners and self funded retirees, http://www.facs.gov.au/internet/facsinternet.nsf/aboutfacs/programs/seniors-concessions.htm (accessed 11 March 2005).

—— and DEST (Department of Education Science and Training) 2004, *Student Income Assistance Payments For 2002*, special request, FaCS, Canberra.

Felder, S., Meier, M. and Schmitt, H. 2000, 'Health care expenditure in the last months of life', *Journal of Health Economics*, vol. 19, no. 5, pp. 679–95.

Feyrer, J. 2002, 'Demographics and productivity', Paper prepared for NBER Program on Economic Fluctuations and Growth, Meeting October 18, Chicago, Draft, August 21, pp. 1–41, Dartmouth College, Hanover, United States.

Fitzgerald, V. 2004, 'Australia's ageing population: implications for savings and retirement income', in CEDA, *Australia's Ageing Population: Fiscal, Labour Market and Social Implications*, Melbourne.

Foster, R. and Stewart, S. 1991, *Australian Economic Statistics, 1949-50 to 1989-90*, Reserve Bank of Australia, Occasional Paper no. 8, February.

Freedman V., Martin L. and Schoeni R. 2004. 'Disability in America', *Population Bulletin*, vol. 59, no. 3, Population Reference Bureau, http://www.prb.org.

Freedman V, Crimmins E, Schoeni R, Spillman B et al. 2004. 'Resolving inconsistencies in trend in old-age disability: report from a technical working group' *Demography*, vol. 41, no. 3, pp. 417–41.

Fredriksen, D. and Stølen, N. 2003, Possible ways to moderate the future pension burden in Norway, Paper presented at the International Microsimulation Conference on Population, Ageing and Health: Modelling Our Future, Canberra, December.

Fuchs, V. 1984, '"Though much is taken" — reflections on ageing, health, and medical care', NBER Working Paper 1269.

—— 1998a, 'Health care for the elderly: How much? Who will pay for it?', NBER Working Paper 6755.

—— 1998b, 'Provide, provide, The economics of ageing, NBER Working Paper 6442, July.

Gaston, N. and Nelson, D. 2001, 'The employment and wage effects of immigration: trade and labour economics perspectives', Research Paper 28, University of Nottingham.

Gauthier, A.H. and Hatzius, J. 1997, 'Family benefits and fertility: an econometric analysis', *Population Studies*, vol. 51.

Gavrilov, L. and Heuveline, P. 2003, 'Aging of population', in Demeny, P. and McNicoll, G. (eds), *The Encyclopedia of Population*, New York, Macmillan Reference.

Gerdtham, U., Sogaard, J., Anderson, F. and Jonsson, B. 1992, 'An econometric analysis of health care expenditure: a cross-section study of the OECD countries', *Journal of Health Economics*, vol. 11, no. 1, pp. 63–84.

Gerdtham, U.G. and Lothgren, M. 2000, 'On stationarity and cointegration of international health expenditure and GDP', *Journal of Health Economics*, vol. 19, no. 4, pp. 461–75.

Getzen, T.E. 1992, 'Population ageing and the growth of health expenditures', *Journal of Gerontology*, vol. 47, no. 3, pp. S98–S104.

—— 2000, 'Health care is an individual necessity and a national luxury: applying multilevel decision models to the analysis of health care expenditures', *Journal of Health Economics*, vol. 19, pp. 259–70.

Gibbons, R. and Waldman, M. 1999, 'Careers in organisations: theory and evidence', in Ashenfelter, O. and Card, D. (eds), *Handbook of Labour Economics*, vol. 3B, Elsevier, Amsterdam, ch. 36.

Girosi, F. and King, G. 2003, *Demographic Forecasting*, (draft book manuscript as at 11 March 2003), http://www.gking.harvard.edu/preprints.html.

Gokhale, J. and Smetters, K. 2003, *Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities*, AEI Press, Washington DC.

Goss, J., Mann, N. 2004, Disease and dollars: what's being spent, Presentation to Australian Institute of Health and Welfare Conference on Australia Health, May.

Grant, J., Hoorens, S., Sivadasan, S., van het Loo, M., DaVanzo, J., Hale, L., Gibson, S. and Butz, W. 2004, *Low Fertility and Population Ageing: Causes, Consequences and Policy Options*, RAND Corporation, Santa Monica, California.

Gray, A. 2004, *Estimating the impact of ageing populations on future health expenditures*, Public Lecture to the National Institute of Economics and Business and the National Institute of Health and Human Sciences, 4 November, http://www.ecocomm.anu.edu.au/nieb/canberra%20lecture%201104.pdf, (accessed 15 November 2004).

Gray, L., Yeo, M and Duckett, S. 2004, 'Trends in the use of hospital beds by older people in Australia: 1992–2002', *Medical Journal of Australia*, vol. 181, pp. 478–81, http://www.mja.com.au/public/issues/181_09_011104/gra10343_fm.html (accessed 6 November 2004).

Greenspan, A. 2003, *Aging Global Population*, Testimony of Mr Alan Greenspan, Chairman of the Board of Governors of the US Federal Reserve System, before the Special Committee on Ageing, US Senate, 27 February 2003, Washington DC, *BIS Review*, 10/2003.

Gregory, B. 1999, 'Comment on Aging and the cost of health services', in *Policy Implications of the Ageing of Australia's Population,* Productivity Commission, March, Melbourne.

Groes, N. and Holm, A. 1999, *Education and Imbalances in the Labour Market, 1980–2017*, AKF, Denmark, August.

Gruen, D. and Garbutt, M. 2003, 'The output implications of higher labour force participation', Treasury Working Paper 2003-02, October, Canberra.

—— 2004, The long term fiscal implications of raising Australian labour force participation or productivity growth, Treasury Working Paper 2004-01, April.

Gudex, C. and Lafortune, G. 2000, 'An inventory of health and disability-related surveys in OECD countries', *OECD Labour Market and Social Policy* Occasional Paper 44, October, Paris.

Guest, R. 2004, 'Australia's older and wealthier future', *Policy*, Winter, http://www.cis.org.au (accessed 27 October 2004).

Guest, R., Bryant, J. and Scobie, G. 2003, *Population Ageing In New Zealand: Implications for Living Standards and the Optimal Rate of Saving*, New Zealand Treasury Working Paper 03/10, June.

Guest, R. and McDonald, I.M. 2002, The economic implications for Australia of prospective demographic change, Paper given at the Australian Conference of Economists, October.

—— 2003, 'How much support will the taxpayer provide for us when we are old?', *Economic Papers*, vol. 22, no. 1, pp. 1–12.

—— 2004, 'The effect of alternative world fertility scenarios on the world interest rate, net international capital flows and living standards, http://www.economics.unimelb.edu.au/staffprofile/imcdonald/worldmodel.doc.

Haberland, J. and Bergmann, K.E. 1995, 'The Lee-Carter model of the prognosis of mortality in Germany', *Gesundheitswesen*, vol. 57, no. 10, October, pp. 674–79, (article in German).

Haegeland, T. and Klette, T.J. 1999, 'Do higher wages reflect higher productivity? Education, gender and experience premiums in a matched plant–worker data set', in Haltwinger, J., Lane, J., Speltzer, J.R., Theeuwes, J. and Troske, K. (eds), *The Creation and Analysis of Employer–Employee Matched Data*, North Holland, Amsterdam.

Hamilton, Barton, H., Nickerson, Jack, A. and Owan, Hideo 2004, *Diversity and Productivity in Production Teams*, John M. Olin School of Business, Washington University, St. Louis, draft, May.

Hannerz, H. 2001, 'An extension of relational methods in mortality estimation', Demographic Research, 4(10), 26 June, http://www.demographic-research.org (accessed 9 September 2004).

Hansen, P. and King, A. 1996, 'The determinants of health care expenditure: a cointegration approach', *Journal of Health Economics*, vol. 15, no. 1, pp. 127–37.

HBF (Health Benefit Fund) 2003, Media release, 28 October, http://www.hbf.com.au/Press release/HBFmaintainsfinancialstrength.html.

Headey, B. Marks, G. and Wooden, M. 2004, 'The Structure and distribution of household wealth in Australia', Melbourne Institute Working Paper no. 12/04, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Health Canada 2001, *Health expenditures in Canada by Age and Sex: 1980-81 to 2000-01*, August.

Henry, K. 2003, Address to the Melbourne Institute's 40th Anniversary Dinner, Melbourne Institute Working Paper Series no. 17/03, July.

HIC (Health Insurance Commission) 2004, *Medicare Database*, http://www.hic.gov.au.

Hitiris, T. and Posnett, J. 1992, 'The determinants and effects of health expenditure in developed countries', *Journal of Health Economics*, vol. 11, no. 2, pp. 173–81.

Hogan, W. 2004, *Review of pricing arrangements in residential aged care*, Canberra, http://www.health.gov.au.

Hohn, C. 1988, 'Population policies in advanced societies: pronatalist and migration strategies', *European Journal of Population*, vol. 3, pp. 459–81.

Hoover, D. Crystal, S., Kumar, R., Sambamoorthi, U. Cantor, J. 2002, 'Medical expenditures during the last year of life: findings from the 1992–96 Medicare Current Beneficiary Survey', *Health Services Research*, vol. 37, no. 6, December.

Hough, C. 2004, *Pensioner Rate Concession Review: Discussion Paper for the Victorian State Government*, Bayside City Council, February.

HREOC (Human Rights and Equal Opportunity Commission) 1999, *Age Matters? A Discussion Paper On Age Discrimination*, HREOC, Sydney.

HRSCEFPA (House of Representatives Standing Committee on Economics, Finance and Public Administration) 2003, *Rates and Taxes: A Fair Share for Responsible Local Government*, The Parliament of the Commonwealth of Australia, October.

Hutchens, R.M. 1989, 'Seniority, wages and productivity: a turbulent decade', *Journal of Economic Perspectives*, vol. 3, no. 4, pp. 49–64.

Hyatt, D. E. and Milne, W. J. 1991, 'Can public policy affect fertility', *Canadian Public Policy*, vol. 17, no. 1, pp. 77–85.

Hyndman, R.J. 2004, Functional forecasting and mortality handouts, http://acpr.edu.au/Publications/fda_handout.pdf (accessed 20 January 2005).

—— and Ullah, M. 2005, Robust forecasting of mortality and fertility rates: a functional data approach, Monash University, Business & Economic Forecasting Unit, Victoria, Australia.

Ilmakunnas, P. and Maliranta, M. 2002, Labour characteristics and wage-productivity gaps, Paper prepared for presentation at the DILEED Conference, Wellington, New Zealand, 21–22 March.

Ilmakunnas, P., Maliranta, M. and Vainiomaki, J. 1999, 'The roles of employer and employee characteristics for plant productivity', Helsinki School of Economics and Business Administration, Working Paper W-223.

—— 2004, 'The roles of employer and employee characteristics for plant productivity', *Journal of Productivity Analysis*, vol. 21, pp. 249–76, Kluwer Academic Publishers, The Netherlands.

Ingles, D. 2000, *Structural ageing, labour market adjustment and the tax/transfer system*, Department of Family and Community Services, Policy Research Paper no. 5.

Institute of Actuaries of Australia 2003, Submission to the House of Representatives Standing Committee on Ageing Inquiry into long term strategies to address the ageing of the Australian population over the next 40 years, February, http://www.actuaries.asn.au/PublicSite/pdf/submission030305ageing.pdf (accessed 12 February 2005).

IRM (International Reform Monitor) 2005, *Social Policy, Labour Market Policy and Industrial Relations*, Bertelsmann Foundation, http://www.reformmonitor.org/index.php3?mode=status (accessed 2 February 2005).

Ironmonger 2000, 'Measuring volunteering in economic terms' in Warburton and Oppenheimer (eds), *Volunteers and Volunteering*, Federation Press, Sydney, pp. 19–31.

Jacobzone, S. 2003, 'Ageing and the challenges of new technologies: can OECD social and healthcare systems provide for the future', *The Geneva Papers on Risk and Insurance*, vol. 28, no. 2, April, pp. 254–74.

James, D., 2001, *Federal–State Financial Relations: The Deakin Prophecy*, Department of the Parliamentary Library (Australia), Research Paper no. 17.

Jewell, T., Lee, J., Tieslau, M. and Strazicich, M.C. 2003, 'Stationarity of health expenditures and GDP: evidence from panel unit root tests with heterogeneous structural breaks', *Journal of Health Economics*, vol. 22, no. 2, pp. 313–23.

Johnson, R. 2000, 'The effect of old-age insurance on male retirement: evidence from historical cross-country data', Research Division, Federal Reserve Bank of Kansas City, December.

Johnson, D. and Wilkins, R. 2003, 'The net benefit to government of higher education: a "balance sheet" approach', *Economic Papers*, June 2003.

Jönsson, B. and Eckerland, I. 2003, 'Why do different countries spend different amounts on health care?', in OECD, *A Disease-based Comparison of Health Systems*, Paris.

Jovanic, Boyan 1979, 'Job matching and the theory of turnover', *Journal of Political Economy*, vol. 87, no. 5 pp. 973–90. University of Chicago.

Karatzas, G. 2000, 'On the determination of the US aggregate health care expenditure', *Applied Economics*, vol. 32, no. 9, pp. 1085–99.

Kelly, S. 2003, *Self Provision In Retirement? Forecasting Future Household Wealth*, National Centre for Social and Economic Modelling University of Canberra

Kendig, H and Gardner, I. 1997, 'Unravelling housing policy for older people' in Borowski, A. Encel, C. and Ozanne, E. (eds) *Ageing and Social Policy in Australia*, Cambridge University Press, Melbourne, pp. 174–93.

Kendig, H. and Neutze, M. 1999, 'Housing implications of population ageing in Australia', in Productivity Commission and Melbourne Institute of Applied Economic and Social Research, *Policy Implications of the Ageing of Australia's Population, Melbourne, 18–19 March*, Conference Proceedings, AusInfo, Canberra, pp. 435–50.

Kenyon, P. and M. Wooden 1996, 'Labour supply', in Norris, K. and Wooden, M. (eds), *The Changing Australian Labour Market*, Economic Planning Advisory Commission Paper no. 11, AGPS, Canberra, pp. 15–38.

Kippen, R. 2003, 'Trends in age- and parity-specific fertility in Australia', Working Papers in Demography, no. 91, Demography and Sociology Program, The Australian National University, Canberra.

—— 2004, 'Declines in first- and second-birth rates and their effect on levels of fertility', *People and Place*, vol. 12, no. 1, pp. 28–37.

Kohler, H.P., Billari, F.C. and Ortega, J.A. 2002, 'The emergence of lowest low fertility in Europe during the 1990s', *Population and Development*, vol. 28, no. 4, pp. 641–80.

Kohler, H.P. and Ortega, J.A. 2002, 'Tempo-adjusted period parity progression measures: assessing the implications of delayed childbearing for cohort fertility in Sweden, the Netherlands and Spain', *Demographic Research*, vol. 6, no. 7, pp. 146–90.

Kotlikoff, L.J., 2001, 'Generational policy', in Auerbach, A.J. and Feldstein, M.S. (eds), *The Handbook of Public Economics*, vol. 4, 2nd edn, Elsevier, Amsterdam, the Netherlands.

Kotlikoff, L.J. and Burns, S. 2004, *The Coming Generational Storm, What You Need to Know about America's Economic Future*, MIT Press.

Kotlikoff, L.J. and Gokhale, J. 1992, 'Estimating a firm's age-productivity profile using the present value of workers' earnings', *Quarterly Journal of Economics*, pp. 1215–42.

Kravdal, 1996, 'How the local supply of day-care centres influences fertility in Norway: a parity–specific approach', *Population Research and Policy Review*, vol. 15, no. 3.

Kryger, T. 2004, Casual employment: trends and characteristics, Research Note no. 53, 2003–04, Statistics Section, Australian Parliamentary Library, 24 May, Canberra.

La Grange, R. and Ferraro, K. 1987, 'The elderly's fear of crime: a critical examination of the research', *Research on Ageing*, vol. 9, no. 3, pp. 372–91.

Lamers, L.M. and van Vliet, R.C.J.A. 1998, 'The high costs of death: should health plans get higher payments when members die?', *Medical Care*, vol. 36, pp. 1451–60.

Layard, R., Nickell, S. and Jackman, R. 1991, *Unemployment*, Oxford University Press, Oxford.

Lee, R.D. and Lawrence R. Carter 1992, 'Modelling and forecasting US mortality', *Journal of the American Statistical Association*, vol. 87, September, p. 419.

Lee, R.D. and Rofman, R. 1994, 'Modelling and projecting mortality in Chile', *Notas Poblacion* 22(59), June, pp. 183–213.

Lee, R.D., Carter L. and Tuljapurkar S. 1995, 'Disaggregation in population forecasting: do we need it? And how to do it simply', *Mathematical Population Studies* 5(3), July, pp. 217–234.

Lehman, H. 1953, *Age and Achievement*, Oxford University Press, London.

Leonard, J.S. and Levine, D.I. 2003, 'Diversity, discrimination and performance', Institute of Industrial Relations Working Paper, iirups'091'03, University of California, Berkley.

Levitt, S. 2004, 'Understanding why crime fell in the 1990s: four factors that explain the decline and six that do not', *Journal of Economic Perspectives*, vol. 18, no. 1, pp. 163-190.

Lindh, T. and Malmberg, B. 1999, 'Age structure effects and growth in the OECD, 1950–1990', *Journal of Population Economics*, vol. 12, pp. 431–49.

London Health Observatory 2001, Calculating life expectancy and infant mortality rates, mapping health inequalities across London, Technical Supplement, http://www.lho.org.uk (accessed 9 September 2004).

Lubitz, J., Cai, L., Kramarow, E. and Lentzner, H., 2003, 'Health, life expectancy and health care spending among the elderly', *New England Journal of Medicine*, vol. 349, no. 11, pp. 1048–55, September.

Madge, A. 2000, *Long-Term Aged Care: Expenditure Trends and Projections*, Productivity Commission Staff Research Paper, AusInfo, Canberra, October.

Malmberg, B. 1994, 'Age structure effects on economic growth — Swedish evidence', *Scandinavian Economic History Review*, vol. 42, no. 3, pp. 279–95.

Manton, K. and Gu, X. 2001, 'Changes in the prevalence of chronic disability in the United States black and non-black population above 65 from 1982 to 1999', *Proceedings of the National Academy of Science*, vol. 98, no. 11, May.

Masson, P.R. and Tryon, R.W. 1990, 'Macroeconomic effects of projected population ageing in industrial countries', IMF Working Paper, January.

Mathers, C. Penm, R., Carter, C. Stephenson, C. 1998, *Health System Costs of Diseases and Injury in Australia, 1993-94*, Australian Institute of Health and Welfare, Health expenditure series no. 2, Canberra.

Mathews, R. and Grewal, B. 1995, *Fiscal Federalism in Australia: From Keating to Whitlam*, Centre for Strategic Economic Studies, Victoria University, Melbourne.

Mayhew L., 2001, Disability - global trends and international perspectives, Paper presented to the Staple Inn Actuarial Society, Staple Inn Hall, 4 December, www.sias.org.uk/papers/disability.pdf (accessed 5 July 2004).

McCoskey, S.K. and Selden, T.M. 1998, 'Health care expenditures and GDP: panel data unit root test results', *Journal of Health Economics*, vol. 17, no. 3, pp. 369–376.

McCoy, V., Wooldredge, J., Cullen, F., Dubeck, P. and Browning, S. 1996, 'Lifestyles of the old and not so fearful: life situation and older persons' fear of crime', *Journal of Criminal Justice*, vol. 24, no. 3, pp. 191–205.

McDonald, P. 1998, 'Contemporary fertility patterns in Australia: First data from the 1996 census', *People and Place*, vol. 6, no. 1, pp. 1–13.

—— 2000, 'Gender equity, social institutions and the future of fertility', *Journal of Population Research*, vol. 17, no. 1, pp. 1–16.

—— 2002, Low fertility: unifying the theory and the demography, Paper prepared for the 2002 Meeting of the Population Association of America, Atlanta, 9–11 May.

—— 2003, *Medium and long-term projections of housing needs in Australia*.

McDonald, P. and Kippen, R. 1998, *Household Trends and Projections: Victoria, 1986–2011*, Victorian Department of Infrastructure, Melbourne.

—— 1999a, 'Ageing: the social and demographic dimensions', Paper presented at Productivity Commission and Melbourne Institute of Applied Economic and Social Research, *The Policy Implications of the Ageing of Australia's Population, Melbourne, 18–19 March*, Conference Proceedings, Ausinfo, Canberra, pp. 47–70.

—— 1999b, *The Impact of Immigration on the Ageing of Australia's Population*, Commonwealth of Australia, Canberra, May.

—— 2000, 'Population futures for Australia and New Zealand: an analysis of the options', *New Zealand Population Review*, vol. 26, no. 2, pp. 45–65.

—— 2002a, The impact of long term visitors on projections of Australia's Population, prepared for the Department of Immigration and Multicultural and Indigenous Affairs, May.

—— 2002b, 'Projecting future migration levels: should rates or numbers be used?', *People and Place*, vol. 10, no. 1, pp. 82–3.

McDonald, P., Khoo, S.E. and Kippen, R. 2003, 'Alternative net migration estimates for Australia: exploding the myth of a rapid increase in numbers', *People and Place*, vol. 11, no. 3, pp. 23–36.

MCEETYA (Ministerial Council on Education, Employment, Training and Youth Affairs), (various years) *National Report on Schooling (various years)*, Statistical Annex, Curriculum Corporation, Melbourne http://www.curriculum.edu.au.

—— 2003, Demand and supply of primary and secondary school teachers in Australia, http://www.mceetya.edu.au/public/demand.htm (accessed 12 February 2005).

McLean, I.W. 2004, *Why Was Australia So Rich?*, University of Adelaide, August.

Meara, E. White, C. and Cutler, D. 2004, 'Trends in medical spending by age, 1963-2000', *Health Affairs*, vol. 23, no. 4, July/August.

Medoff, J.L. and Abraham, K.G. 1980, 'Experience, performance, and earnings', *The Quarterly Journal of Economics*, December, pp. 56–89.

Melbourne Institute of Applied Economic and Social Research 2002, *Living in Australia, HILDA Survey Annual Report 2002*, University of Melbourne.

Menec, V., Lix, L. Steinbach, C., Ekuma, O., Sirski, M., Dahl, M., and Soodeen, R. 2004, *Patterns of Health Care and Costs at the End of Life*, Manitoba Centre for Health Policy, February.

Miller, P. and Mulvey, C. 1997, 'Computer usage among Australian workers', *Australian Journal of Labour Economics*, vol. 1, no. 1, March.

Milligan, K. 2002, 'Quebec's baby bonus: can public policy raise fertility?', *Backgrounder*, CD Howe Institute.

Moise, P. and Jacobzone, S. 2003, 'Population ageing, health expenditure and treatment: an ARD perspective', in OECD, *A Disease-based Comparison of Health Systems*, Paris.

Morgan, P.S. and Rhindfuss, R.R. 1999, 'Re-examining the link of early childbearing to marriage and subsequent fertility', *Demography*, vol. 36, no. 1, pp. 59–76.

Murphy, C. 2002, A Guide to Econtech's Industry Model — Murphy Model 600 Plus (MM600+), Econtech, 26 May 2002, http://www.econtech.com.au /Information/Documents/Word/MM600PLUS.pdf (accessed 5 July 2004).

Nahuis, R., Canton, E. and de Groot, H. 2000, 'Vested interests, ageing and growth', *GPB Report*, 00/3, pp. 44–7.

NATSEM (National Centre for Social and Economic Modelling) 2004, *Who's Going to Care: Informal Care and an Ageing Population*, Report prepared for Carers Australia, June.

Navaneetham, K. 2002, Age structural transition and economic growth: evidence from South and Southeast Asia, Draft, http://www.ideas/repec.org/p/ind/ cdswpp/337.html.

NCVER (National Centre for Education Research) (various years), *Australian Vocation Education and Training Statistics: Financial Information*, Australian National Training Authority, Melbourne, http://www.ncver.edu.au/statistic/index.html.

—— 2003a, *Australian Vocation Education and Training Statistics: Financial Information*, Australian National Training Authority, Melbourne, http://www.ncver.edu.au/statistic/index.html.

—— 2003, Australian National Training Authority, Melbourne, http://www.ncver.edu.au/statistic/index.html.

—— 2004a, *Australian Vocation Education and Training Statistics: Financial Information*, Australian National Training Authority, Melbourne, http://www.ncver.edu.au/statistic/index.html.

—— 2004b, *Annual Curriculum Hours Studied in VET, 1994 to 2002*, Special Request.

—— 2004b, *VET Expenditure, 1992 to 2002*, Special Request.

New South Wales Anti-Discrimination Board 2004, Myths and legends of ageing, http://www.lawlink.nsw.gov.au/adb.nsf/ (accessed 10 November 2004).

Newhouse, J. 1992, 'Medical care costs: how much welfare loss?' *Journal of Economic Perspectives*, vol. 6, no. 3, pp. 3–21.

Newhouse, J.P. 1977, 'Medical-care expenditure: A cross-national survey', *The Journal of Human Resources*, vol. 12, no. 1, pp. 115–25.

Ng, E. and Gentleman, J. 1995, 'The impact of estimation method and population adjustment on Canadian life table estimates', Health Reports, Volume 7 (3), 15–22, Statistics Canada.

Nguyen, Duc-Tho (Tom), Smith, Christine and Meyer-Boehm, Gudrun 2003, 'Variations in Economic and Labour Productivity Among the States of Australia: 1984-85 to 1998-99', in Williams, Christine, Draka, Mirko and Smith, Christine (eds) *Productivity and Regional Economic Performance in Australia*, Office of Economic and Statistical Research, Queensland Treasury.

NIPSSR 2002, *Population Projections for Japan (January, 2002)*, National Institute of Population and Social Security Research.

OECD (Organisation for Economic Cooperation and Development) 1995, *The Transition from Work to Retirement*, Social Policy Studies, no. 16, Paris.

—— 1998, 'Work-force ageing in OECD countries', ch. 4 in *Employment Outlook*, June, OECD, Paris.

—— 2003a, *Education at a Glance 2003*, Paris (with data tables available from http://www.oecd.org/document/34/0,2340,en_2649_34515_14152482_1_1_1_1,00.html).

—— 2003b, *Trends in International Migration*, http://www.oecd.org/document/32/0,2340,en_2649_33931_31844576_1_1_1_1,00.html (accessed 10 February 2005).

—— 2004a, Monitoring and understanding disability among elderly populations in OECD countries: Feasibility study, Paris, January.

—— 2004b, *Health Data 2004 — Frequently Requested Data*, http://www.oecd.org/document/16/0,2340,en_2649_34631_2085200_1_1_1_1,00.html (accessed 9 November 2004).

—— 2004c, *Social Expenditure data*, SOCX Database http://www.oecd.org/document/2/0,2340,en_2649_34635_31612994_1_1_1_1,00.html (accessed 9 November 2004).

—— 2004d, The labour force participation rate of older workers, the effects of pension and early retirement schemes, Economics Department, http://www.oecd.org/dataoecd/25/4/31743847.pdf (accessed 20 February 2005).

Okunade, A. and Murthy, V. 2001, 'Technology as a "major driver" of health care costs: a cointegration analysis of the Newhouse conjecture', *Journal of Health Economics*, vol. 21, no. 1, pp. 147–59.

Olshansky, J. 2004, Will human life expectancy decline in the 21st century?, Paper presented to the EMBL/EMBO Joint Conference 2004.

PC (Productivity Commission) 1999a, *Australia's Gambling Industries*, Report no. 10, AusInfo, Canberra.

—— 1999b, *Nursing Home Subsidies*, Inquiry Report no. 4, AusInfo, Canberra.

—— 2002, *University Resourcing: Australia in an International Context, Research Report*, December.

—— 2003, *Productivity Commission Submission to the Review of Pricing Arrangements in Residential Aged Care*, June.

—— 2004a, *First Home Ownership*, Inquiry Report no. 28, Melbourne.

—— 2004b, *Review of National Competition Policy Reforms*, Discussion Draft, Canberra, October.

—— 2005, *Review of National Competition Policy Reforms*, Inquiry Report no. 33, Canberra, forthcoming.

PC and Melbourne Institute (Productivity Commission and Melbourne Institute of Applied Economic and Social Research) 1999, *Policy Implications of the Ageing of Australia's Population, Melbourne, 18–19 March*, Conference Proceedings, AusInfo, Canberra.

Persson, J. 1999, *Demographic and Per Capita Income Dynamics: A Convergence Study on Demographics, Human Capital, and Per Capita Income for the US States*, FIEF Working Paper Series, no. 156, November 15, pp. 1–41, http://www.swopec.hhs.se/fiefwp/as/fiefwp0156.htm, (accessed 10 July 2003).

PHIAC (Private Health Insurance Administration Council) 2004, *Annual Report*, http://www.phiac.gov.au/publications/ar_previous/index.htm.

Piper, K. and Siemon, D. 2003, Informing state concessions policy, Paper presented at the International Microsimulation Conference on Population Ageing and Health: Modelling our Future, Canberra, 8–9 December.

PRB (Population Reference Bureau) 1998, *Population Handbook*, http://www.prb.org/pdf/PopHandbook_Eng.pdf.

—— 1999, *World Population: More than just Numbers*, http://www.prb.org/Content/NavigationMenu/PRB/PRB_Library/World_Population__More_Than_Just_Numbers/WorldPopMoreThanNos_Eng.pdf.

Preston S. H. 1991, 'Demographic Change in the United States, 1970–2050', in Manton, K. G., Singer, B. H. and Suzman, R. M. (ed.) *Forecasting the Health of Elderly Populations*, Springer–Verlag, New York, pp. 51–77.

Queensland Government Treasury 2002, *Queensland Household Gambling Survey 2001*, http://www.responsiblegambling.qld.gov.au/pdf/household_gambling_survey_2001.pdf (accessed 31 August 2004).

Ravindiran, R., Rawnsley, T. and Jose, A. 2002, A cohort analysis of unemployment and participation rates for Australia, Paper presented to the 31st Conference of Economists, Adelaide, 30 September to 4 October.

Richardson J. 2005, 'Priorities of health policy: cost shifting or population health', *Australia New Zealand Health Policy*, (2, 1).

Richardson J. and Robertson I. 1999, 'Ageing and the cost of health services', in *Policy Implications of the Ageing of Australia's Population*, Productivity Commission and Melbourne Institute, March, Canberra.

Richardson, D. 2004, *The Budget 2004: Some Issues Arising*, Current Issues Brief no. 6, Australian Parliamentary Library, Canberra.

Ring, I. and Firman, D. 1998, 'Reducing Indigenous mortality in Australia: lessons from other countries', Medical Journal of Australia, 169, pp. 528–533.

Romer, Paul, M. 1987, 'Crazy explanations for the productivity slowdown', *NBER Macroeconomics Annual*, pp. 163–202.

Ronsen, M. 2004, 'Fertility and family policy in Norway: is there a connection?', *Demographic Research*, vol. 10, article 10.

Salas, C. and Raftery, J.P. 2001, 'Econometric issues in testing the age neutrality of health care expenditure', *Health Economics*, vol. 10, pp. 669–71.

Salt, B. 2004, *The Big Shift*, 2nd edn, Hardie Grant Books, Australia.

Sams, D. and Williams, P. 1982, Some projections of Australian population and labour force, 1980 to 2001, BACHUROO model project paper BP-30, Monash University, May.

Sarel, M. 1995, 'Demographic dynamics and the empirics of economic growth', IMF Staff Papers, vol. 42, no. 2, pp. 398–410.

Schieber, S.J. 2003, Creative destruction in ageing societies, Presentation to The Economic and Budgetary Implications of Global Ageing: A Joint Conference of European Commission (Directorate General for Economic and Financial Affairs) and the Global Ageing Initiative of the Center for Strategic International Studies, Brussels, 5 March.

Schoeni R. F., Freedman V. A., and Wallace R. B. 2001, 'Persistent, consistent, widespread, and robust? Another look at recent trends in old-age disability', *Journal of Gerontology: Social Sciences*, vol. 56B, no. 4, pp. S206–18.

SCRGSP (Steering Committee for the Review of Government Service Provision) 2003, *Report on Government Services 2003*, Productivity Commission, Canberra.

—— 2004, *Report on Government Services 2004*, Productivity Commission, Canberra.

—— 2005, *Report on Government Services 2005*, Productivity Commission, Canberra.

Seshamani, M. and Gray, A.M. 2004, 'A longitudinal study of the effects of age and time to death on hospital costs', *Journal of Health Economics*, March, vol. 23, no. 2, pp. 217–35.

Shahidullah, M. 2001, Aboriginal and Torres Strait Islander mortality: evaluation of experimental Indigenous life tables, Australian Bureau of Statistics Demography Working Paper 2001/2.

Sheehan, P. 2002, *Health Costs, Innovation and Ageing*, Pharmaceutical Industry Project Working Paper Series, Working Paper no. 9. Centre for Strategic Economic Studies, Victoria University of Technology, Melbourne.

Silverman, B. 1986, *Density Estimation for Statistics and Data Analysis*, Monographs on Statistics and Applied Probability 26, Chapman & Hall, London.

Skirbeck, V. 2003, Age and Individual Productivity: A Literature Survey, MPIDR Working Paper, WP 2003-028, August, Rostock, Germany.

Sobotka T. 2003, 'Tempo-quantum and period-cohort interplay in fertility changes in Europe, evidence from the Czech Republic, Italy, the Netherlands and Sweden', *Demographic Research*, vol. 8, no. 6, pp. 151–214.

—— 2004, *Postponement of Childbearing and Low Fertility in Europe*, Dutch University Press, The Netherlands, http://www.ub.rug.nl/eldoc/dis/rw/t.sobtka/ (accessed 4 February 2005).

South Australian Department of Health 2005, Submission to Productivity Commission research study on the impact of medical technology on Australian health expenditure, sub. 35.

Stacey, G. and Downes, P. 1995, Wage Determination and the Labour Market in the Treasury Macroeconomic (TRYM) Model, Modelling Section, Commonwealth Treasury, Canberra.

Steer, Davies and Gleave 2001, *Understanding Travel by Older People*, Commissioned Report prepared for Road System Management, VicRoads.

Stooker, T., van Acht, J.W., van Barneveld, E.M., van Vliet, R.C.J.A., van Hout, B.A., Hessing, D.J. and Busschbach, J.J.V. 2001, 'Costs in the last year of life in the Netherlands', *Inquiry*, vol. 38, no. 1, pp. 73–80.

TGC (Tasmanian Gaming Commission) 2004, *Australian Gambling Statistics 2004*.

Thorburn, C. 1999, *Births, Death, Passports and Pensions*, Sessional Meeting, October, Institute of Actuaries of Australia.

Thorpe, E., Florence, C., and Joski, P. 2004, 'Which medical conditions account for the rise in health care spending?', *Health Affairs*, http://www.*content.healthaffairs.org/cgi/content/abstract/hlthaff.w4.437* (accessed 25 August 2004).

Thurecht, L., Bennett, D., Gibbs, A., Walker, A., Pearse, J. and Harding, A. 2003, *A Microsimulation Model of Hospital Patients: New South Wales*, Technical Paper no. 29, National Centre for Social and Economic Modelling, University of Canberra, May.

Tosun, M.S. 2001, *Asymmetric Population Ageing, Open Economy and Fiscal Policy*, Bureau of Business Economics Research, College of Business and Economics, West Virginia University, Morgantown, Wyoming, United States.

Transport NSW 2001, *Train Users in Sydney*, Issues Paper 2001/01, Transport Data Centre, Sydney.

—— 2002, *Bus Users in Sydney*, Issues Paper 2002/02, Transport Data Centre, Sydney.

Troy, P. 1999, 'The implications of ageing for transport and accessibility', in Productivity Commission and Melbourne Institute of Applied Economic and Social Research, *Policy Implications of the Ageing of Australia's Population, Melbourne, 18–19 March*, Conference Proceedings, AusInfo, Canberra, pp. 451–64.

Tuljapurkar S., Li N. and Boe C. 2000, 'A universal pattern of mortality change in the G7 countries', *Nature*, 405, pp. 789–92.

—— 1998, 'Mortality change and forecasting: how much and how little do we know?', *North American Actuarial Journal*, vol. 2, no. 4.

Tulloch, J., Lupton, D., Blood, W., Tulloch, M., Jennett, C. and Enders, M. 1998, *Fear of Crime*, vol. 1, Centre for Cultural Risk Research, Canberra.

Turner, D., Giorno, C., De Serres, A., Vourc'h, A. and Richardson, P. 1998, *The Macroeconomic Implications of Ageing in a Global Context*, Economics Department Working Papers, no. 193, OECD.

UN 1999, *Population ageing 1999*, Division of Economics and Social Affairs, http://www.un.org/esa/population/publications/aging99/aging99.htm (accessed 31 March 2004).

—— 2003, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2002 Revision and World Urbanization Prospects: The 2001 Revision, http://esa.un.org/unpp, (accessed 27 January 2005).

UNDP 2003, 'Millennium development goals: a compact among nations to end human poverty', *Human Development Report 2003*, http://www.hdr.undp.org/reports/global/2003/.

Vamplew, W. (ed.) 1987, *Australian Historical Statistics*, Fairfax, Syme and Weldon Associates.

Visco, I. 2001, The fiscal implications of ageing populations in OECD countries, Oxford Centre on Population Ageing, Pensions Symposium, 7 June.

Vos, T., Goss, J., Begg, S. and Mann, N. 2005, *Projection of disease occurrence and health care expenditure in Australia from 2001 to 2031*, (forthcoming), School of Population Health, University of Queensland and the Australian Institute of Health and Welfare.

Warr, P. 1994, 'Age and job performance', in Snel, J., Cremer, R. and Kemper, H. (eds), *Work and Ageing: a European Perspective*, Taylor and Francis, London, pp. 309–21.

Webb, R. 2003, 'Commonwealth general purpose financial assistance to local government', Department of the Parliamentary Library, Research Paper no. 1, October.

Wen, X. 2004, 'Trends in the prevalence of disability and chronic conditions among the older population: implications for survey design and measurement of disability', *Australasian Journal of Ageing*, vol. 23, no. 1, pp. 3–6.

Weston, R., Qu, L., Parker, R. and Alexander, M. 2004, *"It's not for lack of wanting kids..." A Report on the Fertility Decision Making Project*, Research report no. 11, Australian Institute of Family Studies, Canberra.

Wilmoth, J.R. 1996, 'Mortality projections for Japan: A comparison of four methods', in Graziella Caselli and Alan Lopez (eds), *Health and Mortality among Elderly Populations*, Oxford University Press, pp. 266–87.

Wilson, T. and Bell, M. 2002, 'Experiments with different internal migration models in sub-national population projections', Queensland Centre for Population Research Discussion Paper 2002/03, University of Queensland.

—— 2004, 'Australia's uncertain demographic future', *Demographic Research*, vol. 11, no. 8, http://www.demographic-research.org (accessed 23 September 2004)

Withers, G., Endres, T. and Perry, L. 1985, *Australian Historical Statistics: Labour Statistics*, Australian National University, Source Papers in Economic History no. 7, ANU, Canberra.

Withers, G. 2002, 'Population ageing and the role of immigration: for the student', *The Australian Economic Review*, Melbourne Institute of Applied Economic and Social Research, vol. 35, no. 1, pp. 104–12.

Wooden, M., VandenHeuval, A., Cully, M. and Curtain, R. 2001, *Barriers to Training for Older Workers and Possible Policy Solutions*, Prepared for the Department of Education, Training and Youth Affairs, through the National Institute of Labour Studies, Flinders University of South Australia, January.

Yates, J. 1997, *Trends in Home Ownership*, Department of Urban Affairs and Planning, Sydney.

—— 1999, 'Decomposing Australia's home ownership trends, 1975–1994', in Yates, J. and Wulff, M. (eds) *Australia's Housing Choices*, University of Queensland Press, pp. 27–42.

Young, C. 1990, *Australia's Ageing Population — Policy Options*, Bureau of Immigration Research, Melbourne.

—— 1994, 'Beliefs and realities about the demographic role of immigration', *Australian Quarterly*, vol. 66, no. 4, Summer, pp. 49–74.

Zacharakis, A., Reynolds, P.D. and Bygrave, W.D. 1999, 'National entrepreneurship assessment: United States of America 1999 Executive Report', *Global Entrepreneurship Monitor*.

Zhao, Y., Guthridge S., Magnus, A. and Vos, T. 2004, 'Burden of disease and injury in Aboriginal and non-Aboriginal populations in the Northern Territory', *Medical Journal of Australia*, vol. 180, 17 May.

Zwiefel, P., Felder, S. and Meirs, M. 1999, 'Ageing of population and health care expenditure: a red herring?', *Health Economics*, vol. 8, pp. 485–96.

—— 2001, 'Reply to: Econometric issues in testing the age neutrality of health care expenditure', *Health Economics*, vol. 10, no. 7, pp. 673–4.