

## Appendix C: Modelling approaches used to project spending

The modelling approaches used to project spending in this report can be considered in three groups:

- coverage trends models, for spending which is strongly related to coverage or participation rates for a payment or service and the unit cost growth is linked to a price index. These models were used to project spending in Disability Support Pensions (DSP), Parenting Payment (Single), unemployment allowances and education.
- cost trends models, for spending where unit cost growth is not related to a price index, but reflects a range of influences. The models use trends in cost per person by age and gender to project spending. These models were used to project health and aged care spending, including the individual components of health.
- comprehensive policy models, for payments, which interact significantly with individual income and assets over time, such as Age and Service Pensions.

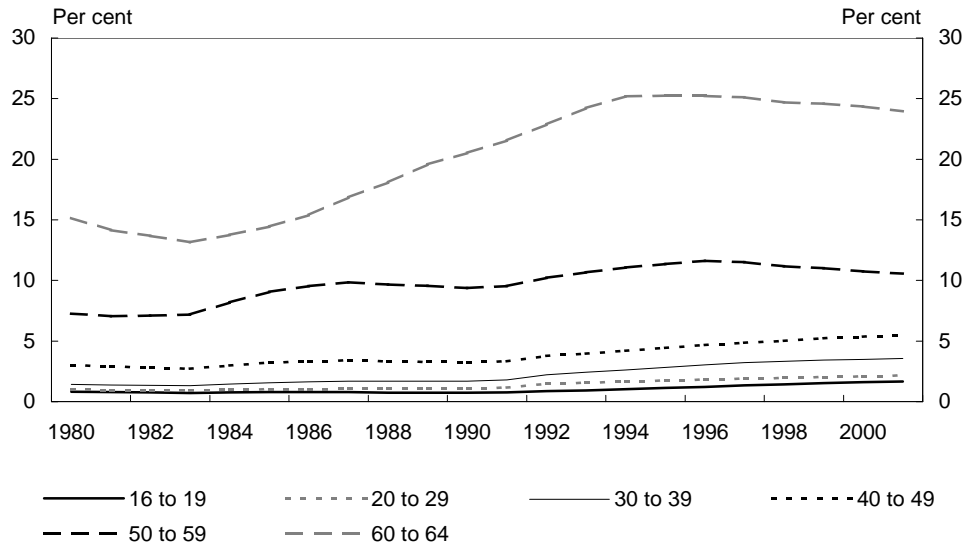
### **Coverage trends models**

This method derives trends of coverage or participation (in a payment or service) from historical data, using this as the basis for a coverage or participation projection, always by age and sometimes by gender. The projection of coverage often involves non-linear techniques such as logistic functions. This projection of future coverage is used together with the population projections and a standard unit cost to project future levels of spending. The standard unit cost is usually independent of age or gender and is assumed to grow in line with either wages or CPI depending on current policy. Some variations in the methodology are employed, depending on such factors as data availability, current policy and relevant periods of history.

The modelling for DSP is used to illustrate the process.

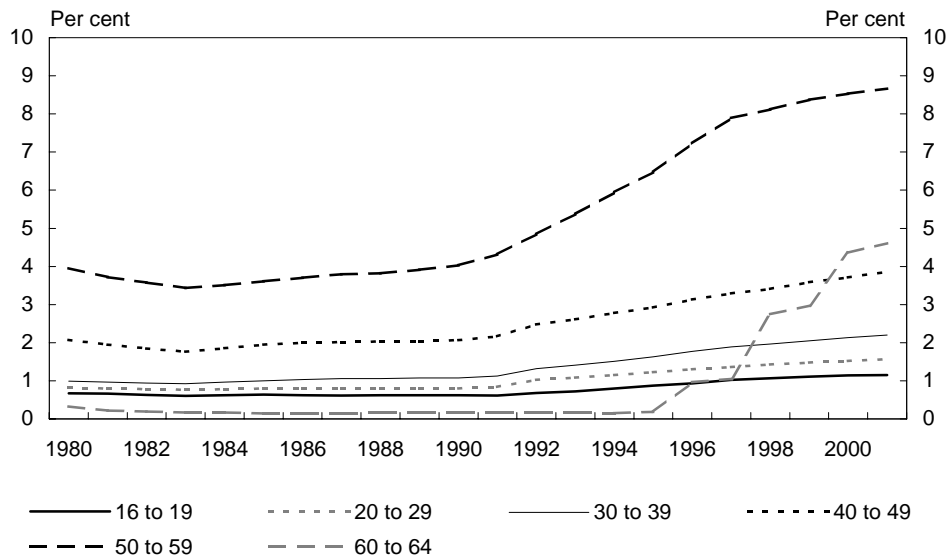
DSP has grown strongly for both men and women since 1983 when there were 220,000 recipients. In June 2001 there were 624,000 DSP recipients. Age-specific prevalence rates have also grown (Charts C1 and C2).

**Chart C1: Historical Disability Support Pension coverage rates, males by age**



Note: For years 1992 and 1993, numbers are for age bracket 21 to 29 rather than 20 to 29. Figures for June each year.  
 Source: Department of Social Security annual reports (various) and Department of Family and Community Services *Income Support Customers — a Statistical Overview* (various).

**Chart C2: Historical Disability Support Pension coverage rates, females by age**



Note: For years 1992 and 1993, numbers are for age bracket 21 to 29 rather than 20 to 29. Figures for June each year.  
 Source: Department of Social Security annual reports (various) and Department of Family and Community Services *Income Support Customers - a Statistical Overview* (various).

Coverage rates for the early retirement age groups of 50 to 59 and 60 to 64 are far higher than for other age groups. The unusual pattern for women aged 60 to 64 mirrors the gradual increase in eligibility age for the Age Pension.

The coverage rates were projected based on historical trends for seven age groups, with growth being gradually slowed. Exceptions are the rates for 50 to 59 and 60 to 64 males, where recent trends suggest that a very slight, gradual decline in coverage rates is appropriate. The number of recipients projected for a given year was obtained by multiplying these rates by the population in each age group. This estimate was then substantially modified in accordance with the expected movement of DSP clients to other payments resulting from the Budget measures. An average payment rate was calculated for DSP and indexed by wages (MTAWE) for future years. Projected nominal spending was derived by multiplying the projected recipient numbers and the indexed rate per recipient, and benchmarked to the forward estimates. Finally, the GDP projection was used to calculate the projections as a proportion of GDP.

**Table C1: Assumptions underlying models of payments to individuals**

	Coverage rates	Future trends	Unit cost growth
Disability Support Pension	Derived for seven age groups for men and women	Tapering of growth in coverage based on logistic curves Numbers adjusted for Budget measures	Average Weekly Earnings (AWE)
Parenting Payment (Single)	Derived for six age groups for men and women	Tapering of growth in coverage based on logistic curves	AWE
Unemployment allowances	Derived for eight age groups	Initial coverage based on recent average, but adjusted for budget measures	Consumer Price Index (CPI)
Family payments	Average per child aged up to 15	Coverage unchanged from recent average	CPI and AWE for parts
Education and training	Detailed age structure by sector	Tapering of growth in coverage based on logistic curves	Mixture of AWE and CPI cost indices

The methodology for education is similar to the approach above. The main difference is that the participation rates were projected separately for each sector, reflecting the relevant populations and data availability. For university education, logistic functions were used to project participation rates by year of age for those aged from 17 to 64 and for the group aged 65 and over. For vocational education and training, separate participation rates were projected again using logistic functions for each year of age from 15 to 24, the group aged under 15, and three groups for those aged 25 and over. For schools, no participation rate increases were projected.

Total education spending to 2005-06 reflects forward estimates. From 2006-07, Commonwealth contributions per student in each sector were calculated by dividing total Commonwealth spending for 2005-06 by the projected total number of

participants and indexed for projected increases in inflation and wages growth. For other education spending, the Commonwealth contribution was divided by the total number of all students as the spending cannot be allocated to any one sector. This cost per student was then similarly indexed.

The projected total numbers of students in each education sector for a given year were obtained by multiplying participation rates by the projected total population in each group or year of age. The indexed Commonwealth contributions per student were multiplied by the projected student populations to obtain nominal spending for each sector and added together to obtain projected nominal total Commonwealth spending on education. Finally, the GDP projection was used to calculate the projections as a proportion of GDP.

In effect, this methodology projects future Commonwealth funding of education based on the current Commonwealth spending combined with projections based on demographic change and economy-wide cost growth, rather than modelling it as a continuation of current funding arrangements.

### **Cost trends models**

These models use historical trends of spending per person of given age and gender as the basis for projecting future spending per person of given characteristics, combining this with the projected population. These trends in costs reflect the demand for and supply of services, the quality of services, government policies and contractual arrangements, and, importantly, technological change, as well as factors such as growth in wages of service providers.

Health and aged care spending were projected by combining historical trends of health and aged care spending with the projected demographic and economic changes in Part II. No explicit adjustment was made for compression of morbidity, as the available evidence for Australia is insufficient and inconclusive. However, to the extent that it occurs, it would have been captured implicitly as a factor constraining growth.

The primary model examined Commonwealth health spending by principal components. A secondary model examined aggregate Commonwealth health spending and the sensitivity of health spending to variation of the growth rate. Aged care spending was projected for the three components of nursing homes, hostels and Home and Community Care (HACC).

#### ***Health — primary model***

The primary model for health spending allows for spending by age to grow at different rates in different programmes. The areas modelled, the approach taken, and the relevant growth rates are in Tables C2 and C3.

**Table C2: Health primary model: components and modelling approach**

Component	Modelling approach	Non-demographic growth rates(a)
Pharmaceutical Benefit Scheme direct subsidies	Per person spending by sex and age group Same growth rate for all age groups	5.64 after allowing for 2002-03 Budget measures
Medical Benefits Scheme direct subsidies	Per person spending by sex and age group Separate growth rates for each age group	Age specific rates vary from -0.12 to 3.78
Hospital and health services	Per person spending by sex and age group Same growth rates for each age group	1.64
Other health spending(b)	Private health insurance was assumed to grow with the MBS, hospitals and nursing homes. The remainder of health spending was assumed to be a constant proportion of GDP	

(a) Per capita real age-adjusted.

(b) Other health expenditures includes the Private Health Insurance Rebate, other PBS and MBS spending, community and public health, administration, aids and appliances and research.

**Table C3: Historical health spending growth rates in components**

	Real growth rates per person (per cent)	Period
Hospital	1.64	1989-90 to 2000-01
PBS subsidy	5.64	1983-84 to 2005-06
MBS subsidy		1984-85 to 2000-01
0 to 4 years	0.52	
5 to 9 years	-0.12	
10 to 14 years	0.33	
15 to 19 years	0.94	
20 to 24 years	-0.11	
25 to 34 years	0.31	
35 to 44 years	1.45	
45 to 54 years	1.74	
55 to 64 years	2.43	
65 to 74 years	3.78	
75 and over	2.30	
Aged care	1.71	

Source: Commonwealth of Australia Budget Paper No.1 (various) and Department of Health and Ageing data.

The Pharmaceutical Benefits Scheme (PBS) is used to illustrate the method used in the primary model.

Firstly, the distribution of the cost to the Commonwealth of the PBS per person of a given age range and gender was determined. The annual cost varies from about

\$40 per person to about \$700 per person (aged over 80), with spending on women greater than that for men.

Secondly, historical information on the nominal total cost of the PBS each year was compiled and 1983-84 chosen as the start year for the analysis. This start date includes 20 years of readily available data with some policy changes.

The factors influencing the raw growth rate were extracted to determine the real per person age-adjusted growth rate for the PBS. This growth rate separates the impact of population growth and population ageing (captured in the demographic projections) from the non-demographic growth.

Given the 2002-03 Budget measures, growth was calculated to the end of the forward estimates period (2005-06) as follows:

- the nominal compound growth from 1983-84 to 2005-06 is 11.57 per cent;
- the real compound growth is 7.56 per cent;
- the real compound growth per person is 6.25 per cent; and
- the real compound growth per person, corrected for the changing age composition over the analysis period is 5.64 per cent.

The real per person age-adjusted growth rate of 5.64 per cent was used in the projection. This growth figure is assumed to apply for each age group and for all years of the projection.

Commonwealth PBS spending projections were then generated using the age by sex distribution of PBS spending, the real per person age-adjusted growth rate and population and CPI assumptions.

For the medical benefits component of health the greater availability of data allows a differential growth rate (per person in a given age range) to be calculated for different age ranges, with the calculated rates of growth being higher for older groups.

### ***Health — secondary model***

An aggregate model for health was used to project total health spending using a single growth rate and to test the sensitivity of Commonwealth health spending to variations in the growth rate.

The main data for this model are the real growth rate in health spending (per person age-adjusted) and a distribution of Commonwealth health spending per person of a given age.

The choice of starting date and inclusion or exclusion of major policy changes results in different growth rates, and the underlying growth rates and projected health

spending is very sensitive to those assumptions. Sensitivity analysis was conducted to demonstrate the impact of a non-demographic growth rate of 3.0 per cent and a lower growth rate of 2.5 per cent. The component model gives results between these two projections.

### ***Aged care projections***

The aged care sector comprises nursing homes, hostels and community care (HACC and other programmes funded by the Department of Health and Ageing and the Department of Veterans' Affairs). The age structure for the Home and Community Care programme was used for all Commonwealth community care. There is no stable trend in these areas because of major policy changes which have shifted the expenditure balance towards community care. Therefore, because wages are a significant component of spending in these areas, the real per person age adjusted growth rate going forward was assumed to be strongly influenced by real wages growth, and taken to be 1.75 per cent beyond 2007-08, reflecting the base productivity growth assumption. The same per capita growth rate was applied across all areas of aged care spending.

### **Comprehensive policy models**

RIMGROUP is a comprehensive cohort projection model of the Australian population, which starts with population and labour force models, tracks the accumulation of superannuation, estimates non superannuation savings, and calculates pension payments and the generation of other retirement incomes (after all taxes). The model is consistent with current policy and includes known future policy changes such as increasing the age pension entitlement age for women, increasing the superannuation preservation age, and continuing evolution of the superannuation system.

Numbers of pension recipients and the level of payments are calculated by the model, based on population, labour force participation and asset and income projections. Thresholds and withdrawal levels associated with income and asset tests are modelled in detail.

The ability of RIMGROUP to estimate improvements in retirement income and assets makes it superior to trend projections of Age Pensions or using a coverage rate approach. It projects in detail the higher retirement incomes of Australian retirees as the superannuation system matures and reflects this in a restraining influence on Commonwealth spending on age pensions over time.

The usual approach to testing such models is to see how they track history and to check their predictive ability. Testing on RIMGROUP has shown good results in respect of both tracking history and the ability to predict likely outcomes from policy changes.<sup>1</sup> The current projections have been benchmarked to the forward estimates.

---

<sup>1</sup> Rothman 1998.

