Australian Government

Implications of the aging of AUSTRALIA'S POPULATION

Alternative scenarios analysed using **ABARE**'s state based general equilibrium model

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Background

The Productivity Commission has invited submissions on their research study *Economic Implications of an Ageing Australia*. ABARE is presenting this submission following examination of the Draft Research Report released in November 2004.

ABARE is well placed to provide a broad economic assessment of the aging population using its newly constructed state based general equilibrium model of the Australian economy, AUSTATE. Detailed population dynamics are incorporated in the design of AUSTATE, with life expectancy and mortality rates influenced by national income, and birth rates drifting toward an equilibrium. Interstate migration is determined by state to state differentials in unemployment and wages, with allowance made for utility differences associated with location in each state. International migration rates are policy driven so are exogenously determined in AUSTATE using historical patterns.

For further information about AUSTATE refer to the documentation on ABARE's web site (www.abareconomics.com/research/models/austate.html).

Labor force participation rates

In this submission, ABARE will present alternative assumptions for projections of labor force participation rates to those presented in the Draft Research Report. Projections of the economic consequences of the aging population depend mainly on the labor force participation rate projections, so it is important that these participation rate projections cover a range of reasonable assumptions.

On close examination of the participation rate projections generated from Productivity Commission modeling (figure 3.16 of the Draft Report), there are three issues that could be raised:

- the participation rate of the older female population does not converge toward that of the male population;
- it is not clear whether account has been taken of the implications of technological change in health care — for example, in biotechnology and nanotechnology — for older age health and life expectancy; and
- no explicit account has been taken of the increasing educational status of the older population and the impact that this could have on workforce participation rates.

Convergence of the female participation rate to the male rate

In the Draft Report the female participation rate converges to and eventually meets the male participation rate for the 45–49, 50–54 and 55–59 age groups (figure 3.16 of the Draft Report). It would seem reasonable to project this in view of the rapid transformations that have taken place in Australia's labor force in recent decades.

However, the rate of convergence for the 60–64 age group is much slower, there is no convergence in the 65–69 age group, and there is divergence in the 70+ age group. Instead, it could be hypothesised that a pattern of convergence similar to the younger age groups but with a lag could emerge.

For example, the participation rate in the 50–54 year age group for females is projected to be about 78 per cent and for males 83 per cent in 2020 according to figure 3.16 of the Draft Report. Ten years later one may expect a similar ratio of participation rates for females versus males in the 60–64 age group — that is, the same group of people ten years on. The ratio that is 94 per cent for the 50–54 year age group in 2020 falls to about 80 per cent in 2030 and then to 55 per cent in 2035 (by then the 65–69 year age group).

This pattern of females dropping out of the labor force at a much faster rate than males as they get older is perhaps based on historical patterns but the methodology and assumptions used need more clarification in the Draft Report to determine this. However, there are reasons to suggest that any such historical patterns may change. Apart from social developments that could influence older age female workforce participation rates — for example, lower marriage rates, higher divorce rates and smaller families — a range of recent labor market developments could influence such change, including:

- transformation of occupational composition, with more females in skilled and managerial positions;
- advancements in equal opportunity;
- reduction in discrepancies in wages between females and males; and
- equalisation of retirement and superannuation conditions and entitlements.

An alternative view may be that the older age female participation rate could be projected to exceed the male rate, with the gap increasing in the successive age groups. This could be so for two reasons: females have a higher life expectancy and so require greater savings; and, in any given older age group, females tend to be healthier than males (hence the increased life expectancy) and so would be more capable of continued participation in the workforce.

Technological change in health care

Any improvements in older age health through technological improvements in health care are likely to have significant implications for labor force participation rates for older people for two reasons: because they will be *able* to, and because they will *need* to. The notion that older aged people will become more able to remain in the labor force is evident.

But why will people need to participate in the labor force for longer? Technological improvements in health care imply increases in life expectancy. If people do not change the age at which they leave the labor force, this will mean that savings built over the years engaged in the labor force will need to be spread over a longer period. To maintain living standards in retirement — and a retirement where there will be expectations of greater health to be enjoyed — people will need to work longer.

For example, suppose a person considering retirement at the age of 65 prepares for and expects a further twenty years of healthy life. Now consider a scenario where technological advancements in the future extend life expectancy by ten years. A similar person aged 65 at the time of retirement would then have to adjust their expectations so that their savings available at the age of 65 would extend 50 per cent longer to thirty years. Alternatively, their savings would need to be 50 per cent higher to maintain the same living standards.

In this example, the current era 65 year old worked for about 45 years, which translates to around 70 per cent of their expected healthy adult life. For the person in the future era where life expectancy has extended by ten years, it may be reasonable to conjecture that retirement would be delayed by 70 per cent of these years. In other words, it may be reasonable to expect that the current participation rate for people aged 65 would become the participation rate for those aged 72 in a future era where life expectancy has extended ten years. Under these assumptions the participation rate of 72 year olds would increase by about 10 percentage points.

The concept that the aging process could be retarded and life expectancy extended by ten years or more in the foreseeable future is an outcome considered realistic in the medical technology literature. The pace of technological advancements in health technology, and in biotechnology in particular, have scientists talking now of radical changes in longevity, with perhaps decades added to lifespans — refer for example, to the US Government Bioethics web site (www.bioethics.gov/).

Increasing educational status

In the 'Overview' of the Draft Report it was explained that the old of the future will have substantially higher educational attainment. In fact for those aged 65 and over, the proportion of the population with a degree in 2051 is projected to be at least five times greater than the current level (figure 11 of the Draft Report).

It is explained in chapter 3 of the Draft Report that there is a substantial deviation in labor force participation rates of older age groups according to educational status. For example, on visual inspection of figure 3.14 of the Draft Report, the participation rate for males aged 65 with a degree is around 40 per cent. This falls to 28 per cent for 70 year olds and 17 per cent for 75 year olds. For males with no post school qualifications these numbers are 19 per cent, 10 per cent and 6 per cent. A similar pattern is evident for females.

Because there exists a substantial causal relationship between education and older age participation it is essential that it is captured properly. It is not made clear in the Draft

Report how the cohort modeling methodology can do this, and from observation of the projection results it is suspected that the effects may not be fully captured.

Suppose that the proportion of those aged 65 and over with a degree increases from the current level of around 7 per cent to 35 per cent in 2051 (figure 11 of the Draft Report), then this factor alone should increase the participation rates for the over 65 age groups by about a third of the gaps above. For example, the participation rate for 70 year old males should increase as a result of this effect by about 6 percentage points (one-third by 28 minus 10).

Scenarios

To demonstrate the implications of some of these observations about the Draft Report, four scenarios are considered using AUSTATE for the period to 2041:

1. **Reference case** — the standard ABARE reference case that incorporates a range of forecast information for macroeconomic variables and sector specific variables drawn from modeling work within ABARE.
2. **Convergence of the older female participation rate to the male rate** — in addition to the standard ABARE reference case, the participation rate for females aged 55 and over converges by 2041 to that for males at a linear rate.
3. **Higher old age participation rates** — in addition to the standard ABARE reference case, the labor force participation rate for people aged 65 and over increases by 4 percentage points by 2041 at a linear rate and with the 2003 differential between males and females maintained. This scenario is therefore exclusive of the convergence of older female participation scenario.
4. **Convergence and shifting participation rates** — in addition to the standard ABARE reference case, there is a shift in the over 51 male participation rates so that by 2041 the 2003 participation rates lag by seven years (for example, the 65 year old participation rate in 2003 becomes the 72 year old participation rate in 2041); and there is convergence for all females aged 51 and over to the new male participation rates. The seven year lag in participation is based on the earlier example of the influence on retirement age of a ten year increase in life expectancy.

The methodological approach in this submission is to understand the economic contribution made under alternative assumptions about patterns of labor force participation rates of the older age groups. This will be done by comparing scenarios 2–4 with the reference case scenario. These scenarios are not designed to represent predictions of future outcomes, but to highlight the implications of possible developments in the older age labor market not considered in the Draft Report.

Assumptions

Key assumptions adopted for this scenario analysis include:

- the federal government budget surplus remains constant as a share of GDP and this is facilitated by adjustments to corporate and personal income tax rates;
- all state government budget surpluses remain constant as a share of each state's GSP and are facilitated by adjustments in real expenditure;
- increases in life expectancy do not lead to a rise in real health expenditure as a share of GDP;
- international migration into each state continues across the projection period at a constant rate of each state's population as follows:
  - New South Wales 0.684 per cent
  - Victoria 0.540 per cent
  - Queensland 0.518 per cent
  - South Australia 0.204 per cent
  - Western Australia 0.764 per cent
  - Tasmania 0.046 per cent
  - Northern Territory 0.420 per cent
  - Australian Capital Territory 0.054 per cent
- international migration rates are the same for the three scenarios;
- life expectancy for both males and females increases by 0.1 year each year so that by 2041 life expectancy is higher by 3.8 years, leading to an increase of 2.85 per cent in total population by 2041; and
- AUSTATE accounts for the labor force participation rate for each single year age group, sex and state, and changes in labor force participation rates are determined endogenously in the model according to real wages — but no allowance is made in the reference case for any other influences on labor force participation rates other than real wage rates.

Population projections

The population projections generated by AUSTATE through to 2041 are reported in table 1 for the reference case scenario. In comparing these projections with ABS population projections, the AUSTATE projections for Australia as a whole marginally exceed the ABS Series A projections (high population growth), but there are variations on a state by state basis. In particular, the ABS projects more rapid population growth for Queensland at the expense of less rapid growth in New South Wales and Victoria.

The AUSTATE population projections reveal the expected pattern of a more rapidly growing older age population compared with total population growth (table 2). The gap between older age population growth and total population growth is particularly prominent in the period 2012–21, before tapering off in the following years. Across the states and territories there is considerable variability in the average growth rates of the older age population in the early projection years, but the variability diminishes over time.

1 AUSTATE population projections to 2041 – reference case scenario

	2011	2021	2031	2041
	'000	'000	'000	'000
New South Wales	7 231.5	7 893.1	8 744.2	9 720.5
Victoria	5 367.2	5 945.6	6 690.3	7 560.5
Queensland	4 137.6	4 721.6	5 387.9	6 128.4
South Australia	1 583.6	1 685.0	1 844.2	2 050.3
Western Australia	2 195.1	2 488.7	2 801.0	3 131.7
Tasmania	491.2	517.7	565.4	632.3
Northern Territory	236.1	272.1	317.2	366.8
Australian Capital Territory	358.9	390.7	427.2	467.4
Australia	21 601.3	23 914.5	26 777.4	30 057.8

2 AUSTATE population growth rate projections to 2041 – seniors (65 and over) versus total rates of population growth; reference case scenario

	Average growth							
	2004–11		2012–21		2022–31		2032–41	
	Seniors	Total	Seniors	Total	Seniors	Total	Seniors	Total
	%	%	%	%	%	%	%	%
New South Wales	1.84	0.88	3.20	0.88	2.80	1.03	1.84	1.06
Victoria	1.79	1.05	3.37	1.03	2.93	1.19	2.10	1.23
Queensland	2.55	1.51	4.02	1.33	3.16	1.33	2.24	1.30
South Australia	0.93	0.43	2.68	0.62	2.34	0.91	1.49	1.07
Western Australia	2.83	1.39	4.44	1.26	3.26	1.19	2.09	1.12
Tasmania	1.08	0.15	2.56	0.53	2.16	0.89	1.29	1.12
Northern Territory	8.19	1.54	7.37	1.43	4.88	1.54	3.27	1.46
Australian Capital Territory	4.09	1.03	5.12	0.85	2.96	0.90	1.98	0.90
Australia	2.00	1.05	3.52	1.02	2.92	1.14	1.99	1.16

Broad economic impacts

The higher female labor force participation rate in the convergence of older female participation rate scenario leads to an increase in the overall labor force participation rate of 1.9 percentage points. This contributes significantly to Australia's economic performance, with real gross domestic product being nearly 2.0 per cent higher than it would have been under reference case conditions in 2041, and real gross national product (GNP) 1.8 per cent higher (table 3). Real consumption and investment expenditure are also significantly higher and the extra domestic production generates additional export volumes that are facilitated by a small depreciation in the real exchange rate compared with the reference case.

The higher old age participation rates scenario leads to an increase in real GDP of 0.9 per cent compared with the reference case and an increase in real GNP of 0.8 per cent. Less than proportional increases occur in real consumption and investment, and export volumes increase by 1.1 per cent. Driving these increases is the rise in the overall participation rate of 0.9 percentage points generated by the 4 percentage point increase in the over 65 participation rate.

The results for the convergence and shifting participation rates scenario confirm that the measures of the economic consequences of Australia's aging population outlined in the Draft Report would be substantially altered if the convergence of the older age female participation rate in conjunction with the impacts on participation of increased life expec-

3 Macroeconomic impacts of the three scenarios to 2041 – change compared with the reference case

	2011	2021	2031	2041
	%	%	%	%
Scenario 2: Convergence of older female particpation rate to male rate				
Real GNP	0.38	0.94	1.44	1.77
Real GDP	0.43	1.09	1.63	1.96
Real consumption	0.22	0.58	0.90	1.09
Real investment	0.37	0.74	1.03	1.08
Export volumes	0.54	1.34	1.95	2.23
Real exchange rate	–1.04	–2.34	–3.10	–3.34
Scenario 3: Higher old age participation rates				
Real GNP	0.13	0.37	0.63	0.83
Real GDP	0.15	0.43	0.71	0.92
Real consumption	0.07	0.23	0.39	0.52
Real investment	0.13	0.30	0.49	0.56
Export volumes	0.18	0.53	0.86	1.07
Real exchange rate	–0.36	–0.95	–1.40	–1.63
Scenario 4: Convergence and shifting participation rates				
Real GNP	1.82	4.44	6.77	7.88
Real GDP	2.11	5.13	7.70	8.75
Real consumption	1.05	2.68	4.14	4.76
Real investment	1.72	3.25	4.29	3.84
Export volumes	2.64	6.27	9.03	9.62
Real exchange rate	–4.74	–9.55	–12.14	–12.29

tancy were included. Real GDP in this scenario is 8.8 per cent higher than in the reference case in 2041 and real GNP 7.9 per cent higher. Consumption, investment and export volumes are all significantly higher and the real exchange rate would be much lower to accommodate the increase in Australia's production.

Across the states and territories, changes in gross state product in all three scenarios move broadly in line with the respective changes in Australia's GDP (table 4). South Australia, Victoria and the Northern Territory tend to benefit most from the changes, and Queensland, Western Australia and the Australian Capital Territory the least.

4 Impact on gross state product of the three scenarios to 2041 – change compared with the reference case

	Scenario		
	2	**3**	**4**
	%	%	%
New South Wales	1.96	0.92	8.82
Victoria	2.06	0.97	9.26
Queensland	1.77	0.83	7.85
South Australia	2.15	1.00	9.23
Western Australia	1.79	0.85	7.87
Tasmania	1.86	0.82	8.02
Northern Territory	2.18	1.05	8.96
Australian Capital Territory	1.60	0.76	7.28

Labor market impacts

Employment in the convergence of older female participation rate scenario increases steadily over the projection period and by 2041 is 3.2 per cent higher than for the reference case (table 5). However, the rise in employment is insufficient to accommodate the rise in labor supply, leading to rises in the unemployment rates across all states (table 6). The 1.9 percentage point increase in the overall labor force participation rate translates to an increase in labor supply of 3.6 per cent. Across Australia, the unemployment rate will be 0.6 percentage points higher than in the reference case.

The gap between demand and supply of labor is moderated by falls of around 5 per cent across all states in real wages compared with the reference case (table 7). To understand the context of the real wage effects, it is perhaps more appropriate to view the results from the reverse perspective. In the reference case, there is a substantial tightening of the labor market as a result of the sharp reductions in participation caused by aging. The convergence of older female participation scenario moderates this tightening of the labor market.

AUSTATE contains a partial adjustment mechanism in its labor market framework so that in each state, changes in the unemployment rate have an inverse effect on real wages, but real wages do not adjust sufficiently to maintain market equilibrium at a 'natural' unemployment rate. Hence, in this scenario, the real wage adjustments of around 5 per cent should be interpreted as less than what would be required to neutralise the impact on unemployment of the increase in labor supply. The partial adjustment mechanism is designed to mimic real world observations of rigidity — but not complete rigidity — in wage rate responses to labor market disequilibrium.

The increase in employment for the higher old age participation rates scenario is 1.5 per cent which is just under half of that for the convergence of older female participation scenario. This is reflected in the results across all states and territories for employment, unemployment and real wages (tables 5, 6, 7).

5 Impact on employment of the three scenarios to 2041 – change compared with the reference case

	2011	2021	2031	2041
	%	%	%	%
Scenario 2: Convergence of older female particpation rate to male rate				
New South Wales	0.74	1.79	2.63	3.14
Victoria	0.76	1.83	2.74	3.26
Queensland	0.72	1.71	2.56	3.13
South Australia	0.78	1.83	2.66	3.27
Western Australia	0.77	1.87	2.74	3.42
Tasmania	0.73	1.71	2.36	2.94
Northern Territory	0.71	1.97	3.37	3.99
Australian Capital Territory	0.56	1.31	2.01	2.44
Australia	0.74	1.79	2.65	3.20
Scenario 3: Higher old age participation rates				
New South Wales	0.26	0.72	1.18	1.51
Victoria	0.26	0.71	1.19	1.57
Queensland	0.24	0.68	1.11	1.49
South Australia	0.27	0.73	1.18	1.52
Western Australia	0.26	0.77	1.24	1.64
Tasmania	0.25	0.68	1.03	1.30
Northern Territory	0.22	0.74	1.45	1.95
Australian Capital Territory	0.17	0.51	0.83	1.20
Australia	0.25	0.71	1.17	1.53
Scenario 4: Convergence and shifting participation rates				
New South Wales	3.65	8.66	12.92	14.46
Victoria	3.69	8.80	13.37	15.07
Queensland	3.50	8.26	12.48	14.35
South Australia	3.80	8.79	12.93	14.42
Western Australia	3.79	9.15	13.66	15.83
Tasmania	3.56	8.17	11.49	13.07
Northern Territory	3.45	9.46	15.90	17.33
Australian Capital Territory	2.63	6.13	9.54	11.19
Australia	3.64	8.64	12.99	14.68

6 Impact on unemployment rate for the three scenarios to 2041 – change compared with the reference case

	Scenario		
	2	3	4
	Percentage points	Percentage points	Percentage points
New South Wales	0.67	0.32	3.57
Victoria	0.65	0.30	3.46
Queensland	0.76	0.35	3.97
South Australia	0.71	0.32	3.76
Western Australia	0.65	0.31	3.52
Tasmania	0.84	0.35	4.25
Northern Territory	0.57	0.27	3.27
Australian Capital Territory	0.61	0.29	3.28
Australia	0.64	0.30	3.42

Consistent with the macroeconomic results, the convergence and shifting participation rates scenario leads to substantial implications for the labor market. Employment across Australia is 14.7 per cent higher compared with the reference case in 2041, with the results for the states and territories ranging from 11.2 per cent for Australian Capital Territory to 17.3 per cent for the Northern Territory (table 5). These results are driven by a 9.0 percentage point rise in the overall participation rate — a 10.5 percentage point rise for females and 7.3 percentage point for males. The total increase in labor supply is 17.1 per cent, causing real wages to be significantly lower than the reference case and the unemployment rate to be up by 3.4 percentage points (tables 6 and 7).

7 Impact on real wages for the three scenarios to 2041 – change compared with the reference case

	Scenario		
	2	**3**	**4**
	%	%	%
New South Wales	–5.08	–2.49	–20.61
Victoria	–5.13	–2.53	–20.91
Queensland	–4.76	–2.31	–19.43
South Australia	–4.92	–2.27	–19.96
Western Australia	–5.03	–2.47	–20.75
Tasmania	–4.69	–2.05	–18.61
Northern Territory	–5.48	–2.72	–22.94
Australian Capital Territory	–6.01	–3.05	–23.68