SCHOOL OF ECONOMICS

Discussion Paper 2003-03

The Demographic Gift in Australia

Natalie Jackson

and

Bruce Felmingham

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Natalie Jackson[1] and Bruce Felmingham[2]
University of Tasmania

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[1] Senior Lecturer in Social Demography, School of Sociology and Social Work
[2] Reader in Economics, School of Economics

1.   Introduction

Debates over the relationship between population change and economic growth have a long history. They range across arguments that population growth restricts economic development; promotes, and indeed is the primary cause of economic development and/or is entirely independent of economic development.

A potential factor that has not been sufficiently emphasised in this debate is the changing age structure (changes in proportions of the total population at each age) which accompany population growth. However, this situation may be about to change, with a number of researchers claiming that the now-developing countries are about to derive a significant economic benefit from a phenomenon known as the 'demographic gift'. This gift is argued to emerge at a certain point in the demographic transition (the shift from high to low birth and death rates), when the age structure is such that the maximum proportion is in the primary working-age, tax-generating, and saving years (usually 15-64 years), and is thereby simultaneously supporting the minimum possible proportion of young and old. Cases detailed are Japan and several other East Asian 'miracle' economies (for example, Lee, Mason and Miller (2001); Bloom, Canning and Sevilla (2002). A large part of the miracle, it is proposed, has been (and in the developing countries, will soon be) demographic—declining fertility causing the working age populations of these countries to grow several times faster than their dependent young and elderly populations.

In the developed countries, both the baby boom, which was an anomalous period (1946-65) during the demographic transition, and the so-called baby bust between 1965 and the late 1970s, have had the ultimate effect of prolonging the period during which this situation is extant. However, in the developed world the argument does not seem to have received the attention it deserves. Indeed, it would seem that a broader appreciation of the 'gift' is only now emerging, as its positive effects begin to manifest in the developing

countries and as the potential impact of its forthcoming loss in the former countries becomes apparent. That is to say, in the developed countries, it is the loss of the gift in the form of a decline in the proportion of the population at working age that is the underlying cause of governmental concern about population ageing: burgeoning numbers and proportions of elderly having to be supported by declining proportions of young and middle-aged tax-generating and savings-conscious workers.

Another important but hitherto largely ignored player in the argument is the median individual. This is the person whose age exceeds that half of the population who are younger, but is exceeded by the remaining half who are older. Currently in Australia this person is aged 35.9 years. He or she was born in 1968, after the peak of the baby boom, which occurred in 1961. Paradoxically, he or she was born prior to 1971, when the most populous of Australia's age cohorts were born. This apparent paradox is explained by the momentum effect[3] which maintains fertility (cohort size) for a period after the birth rate (per woman) has begun to fall. By 1971, the birth rate had fallen from its baby boom peak in 1961 of 3.6 births per woman, to 2.9 births. However, by 1971, the first of the baby boomers had arrived at reproductive age, adding three-quarters of a million more women to the reproductive age group, so even though the birth rate per woman was lower, the increased numbers of women delivered to Australia its largest cohort. As implied above, paradoxically also, this momentum-derived cohort was born during the so-called 'baby bust', the period between the mid 1960s and 1970s, when birth rates were plummeting (see Appendix A).[4]

The importance of the median individual is that he or she, along with his or her proximate cohorts, has only recently entered Australia's historically highest income earning

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[3] The momentum effect is the growth potential contained in the population age structure following fertility decline. Increasing numbers of people continue to reach reproductive age in each successive year due in part to higher fertility when they were born and in part to increasing life expectancy. These distended cohorts continue to produce large numbers of children even after fertility per woman has fallen below the replacement level of 2.1 births.
[4] The 'baby bust' may be considered somewhat of a misnomer, referring to the decline in births per women, rather than the actual size of the birth cohort.

age group, namely the age range 35 to 44 years. Aggregate income will be at its maximum when the median individual is in this highest income earning age, and will decline as he/she moves through the age distribution to lower income earning groups (for example age 45-54, although as we note later, in Australia this differs slightly by state). We argue that this marriage of age and income distributions provides a unique approach to measuring the income effect of the demographic gift initiated by the momentum effect, and sustained through a large period of structural population ageing by the baby boom and the baby bust cohorts. [5]
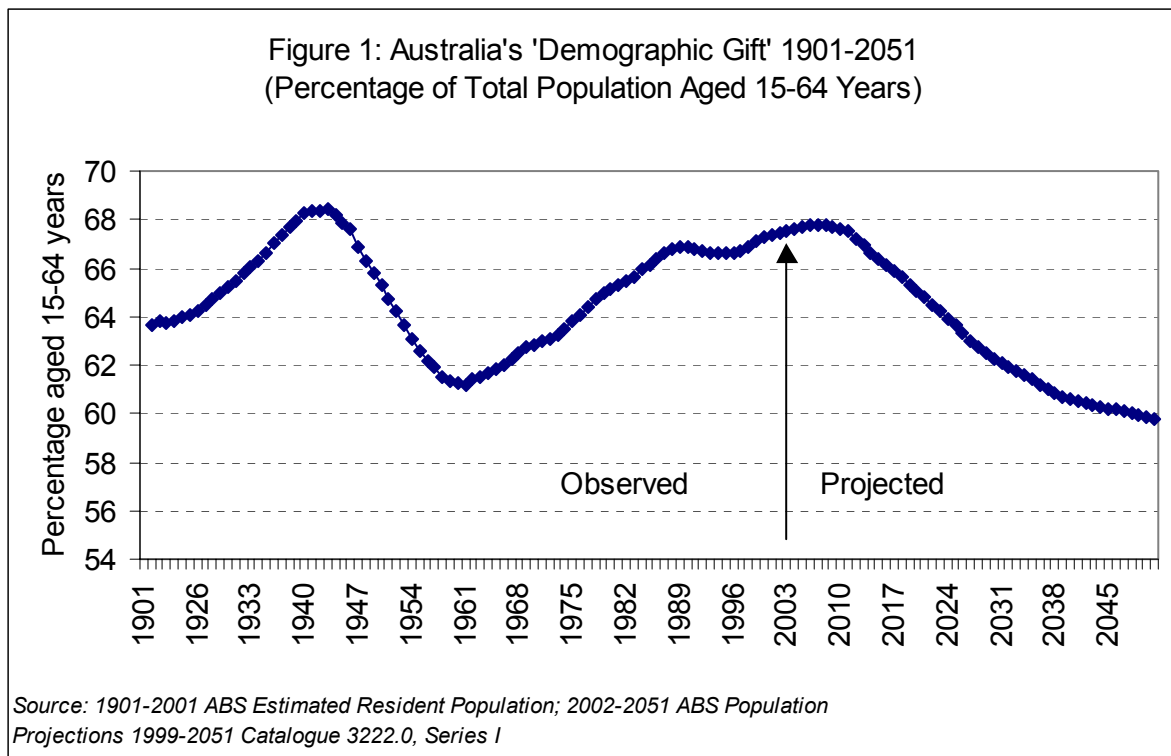
A formal statement of this study's objectives emerges from this assemblage of demographic characteristics: the goal is to illustrate the Australian experience of the demographic gift in terms of the changing proportions aged 15-64 years, with a secondary focus on the median individual and those aged 35-44 and 45-54 years; to project the aggregate weekly earnings of Australian individuals over a projection period from the year 2001 to 2051 and consequently to assess the economic effect of the loss of the gift. We conclude with a brief comment on the demographics at State and Territory level.

2.   The demographic gift

As outlined above, the concept of the demographic gift conventionally refers to the period during which the maximum proportion of the population is aged 15-64 years. Figure 1 shows that Australia experienced a peak in this indicator in 1943, when 68.2 per cent of the total population was of working age, and will experience a second—its last for some

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[5] Population ageing has two technical dimensions: structural and numerical ageing. Structural ageing refers to the increasing proportions of elderly in the population, and is primarily caused by falling birth rates that are delivering fewer babies and children into the base of the population age structure. Numerical ageing refers to the absolute increase in the numbers of elderly, and is primarily caused by increases in life expectancy, first when the current elderly themselves were born, and more recently (since the 1980s) by improved longevity at older ages. The baby boom, which initially caused the population age structure to grow younger, was not the cause of structural ageing, but will soon come together with numerical ageing to amplify the increase in the proportions at older ages (see Jackson 2001).

considerable time—around 2008, when 67.8 per cent will be at these ages (according to ABS 2000 Series I).[6] The dip over the 1960s reflects, of course, the baby boom, which delivered large numbers of children into the population and subsequently reduced the proportion at 15-64 years; at its peak in 1961, 30 per cent of the population was aged 0-14 years. Between now and 2051 the 15-64 year population will decline to less than 60 per cent of the total population, 1.4 percentage points (2.2 per cent) below the trough it reached in 1961. The implications for issues such as the dependency ratio are significant and well acknowledged.

Figure 1: Australia's 'Demographic Gift' 1901-2051
(Percentage of Total Population Aged 15-64 Years)

Source: 1901-2001 ABS Estimated Resident Population; 2002-2051 ABS Population Projections 1999-2051 Catalogue 3222.0, Series I

To this picture, Figure 2 adds long-term trends in GDP (at current values, indexed to 1959). At r=0.93, the correlation over the period 1959 to 2000 is striking: while many other

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[6] The high variant (Series I) assumes a constant annual net migration gain of 110,000, a constant Total Fertility Rate of 1.75 from 2009, and life expectancy increasing one year for every ten years projected. This series has been used in this paper in order to reflect the higher levels of international immigration that Australia is likely to experience in the future as it seeks to offset declining natural increase. It should be noted, however, that the fertility assumption is higher than is already the case, and is highly unlikely to remain at this level.

factors are involved, there can be little doubt that Australia's demographic gift has been associated with a sizeable economic dividend over the years.

Figure 2: The Demographic Gift (Percentage Aged 15-64 Years) 1901-2051, and GDP (1959-2002, Indexed to 1959)
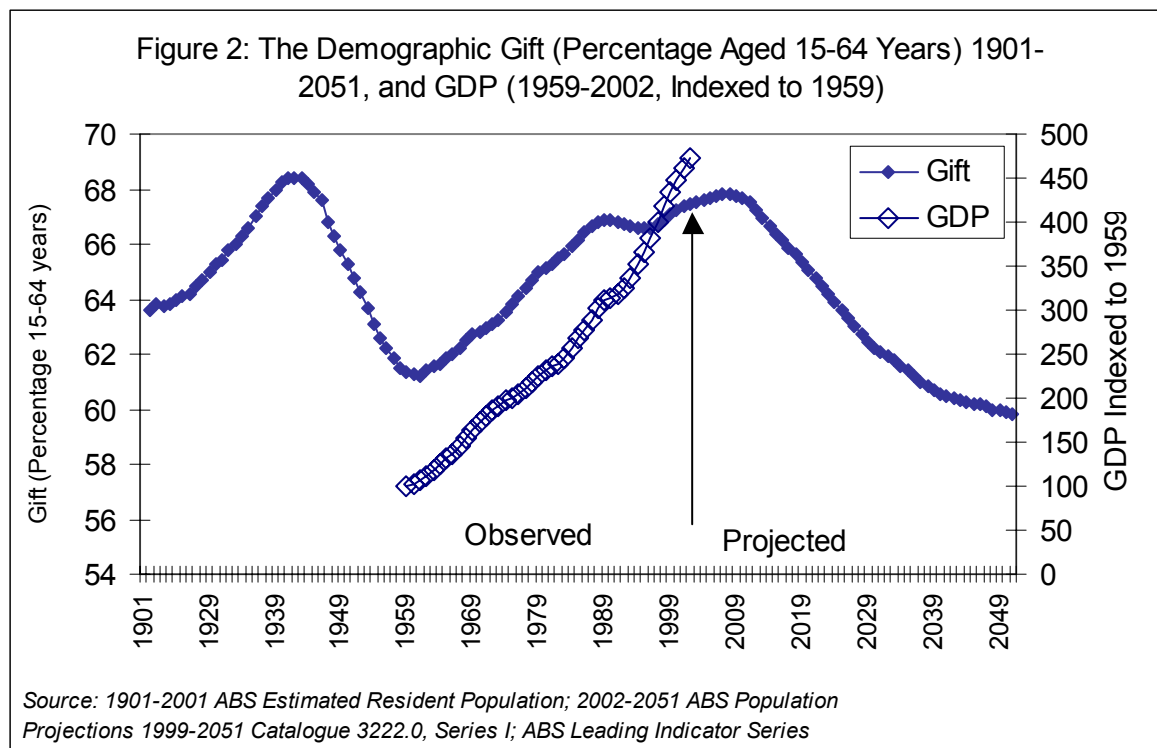
The next question must be, then, to what extent will the forthcoming loss of the gift impinge upon the Australian economy? There are many approaches to this inquiry, ranging from a consensus that Australians are not saving enough to support an ageing population and that government intervention is needed - for example, Argy (2001); Wood (2001), to those like Guest and McDonald (2001c) who, using a model of optimal saving, conclude that Australians over-saved by 5.3 percent of GDP over the period 1960-64 to 1973-74, and under-saved by 1.7 percent in the later period 1974-75 to 1994-95. Indeed, they argue that ageing-adjusted living standards will continue to increase, albeit at a reduced annual average rate of 1.2 percent. Guest and McDonald (2001b) conclude that there is no case for government intervention to deal with this aspect of population ageing.

The analysis we outline below supports Guest and McDonald, and proffers what we believe to be an explanation for their findings. We believe that Guest and McDonald could not offer this explanation themselves, because their unit of analysis, the savings behaviour of households, could not engage with the changing demography in the required manner. Instead, we take individual income and age groups as our key variables.

In Figure 3, aggregate weekly income is projected to 2051, and decomposed first by the effect of changes in age structure and second by population size over the 2001 base (see Appendix B for methodology). Table 1 gives a summary of the results. All else remaining equal, the data indicate that, on current values, the sequential loss of the demographic gift will by 2011 reduce Australia's aggregate weekly income by around 1.9 per cent ($128m per week), a reduction which expands to 8.6 per cent ($724m per week) by 2051. As might be expected, the major impact begins in 2011, when the first of the baby boomers reach formal retirement age. Importantly, as we note below, this outcome (and its implications) differ substantially by state and territory, but here we focus on the national level only.

Table 1: Projected Effect of Population Ageing on Aggregate Weekly Income, Selected Years, Series I
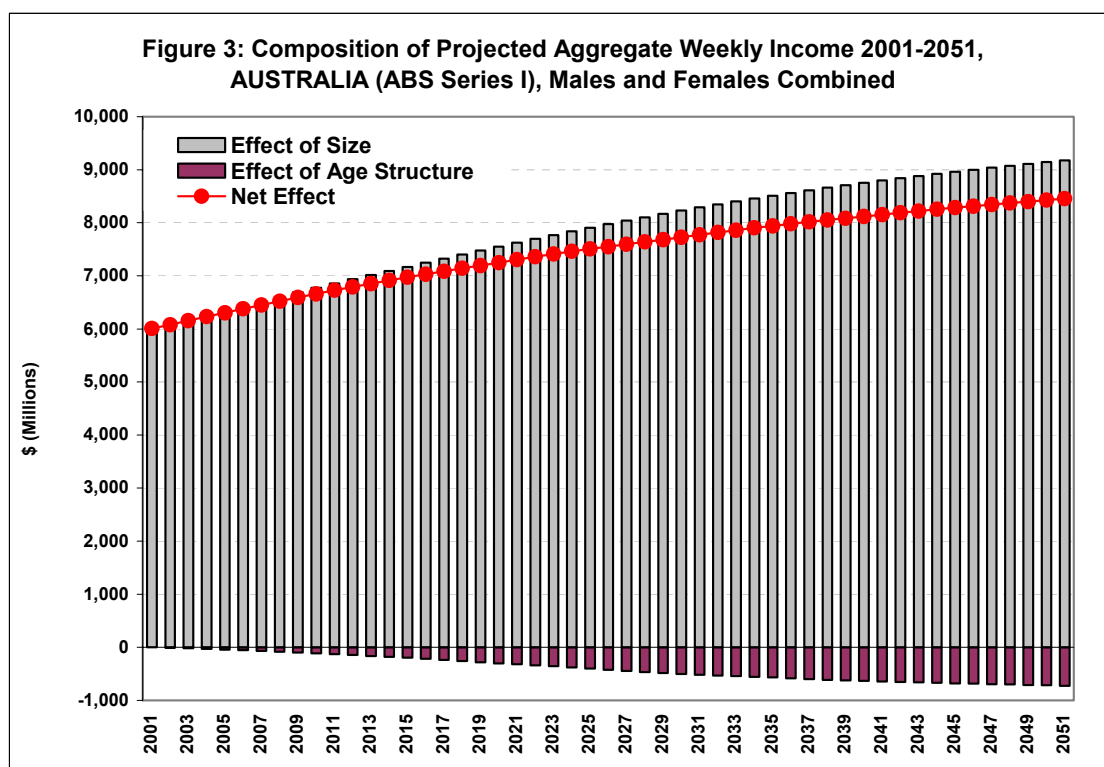
	2001	2011	2021	2031	2041	2051
Percentage Effect	0.0	-1.9	-4.4	-6.6	-7.9	-8.6
Value per week ($ Millions)	$ -	-$ 128.06	-$ 319.33	-$ 516.29	-$ 644.45	-$ 724.08
Aggregate Weekly Income* ($ Millions)	$ 6,006.05	$ 6,728.43	$ 7,304.53	$ 7,773.31	$ 8,153.63	$ 8,454.32

Source:	*Calculated by the authors from ABS Basic Community Profiles 2001.0*
	Table B13 and ABS Population Projections 1999-2100 Catalogue 3222.0
Notes:	*Calculated by holding 2001 age structure constant. See Appendix B for methodology*

Figure 3: Composition of Projected Aggregate Weekly Income 2001-2051, AUSTRALIA (ABS Series I), Males and Females Combined

We argue, however, that this impact would be greater if it were not for the ameliorating effects of the baby busters, those distended momentum effect cohorts born approximately 1965-1979 and now (in 2003) aged between 24 and 38 years. As noted earlier, not only are these cohorts currently in or moving towards their highest income-earning years, the age group 35-44 years, but they also include Australia's median individual, who only entered this age band in the year 2000—the year in which Australia's median age became 35 years. As a result, and even though the proportions in the age group itself are now declining, Australia stands to benefit for some time yet from the movement of the median individual and his/her proximate cohorts into and through this age group. Indeed, he or she will not exit

this key age group until after 2051 under the ABS high variant projections, or 2041 under the medium variant conditions. [7] This implies a period of 'gift' of a minimum 41 years.[8]

We can gain an appreciation of this 'median individual effect' by examining the relative contribution to projected aggregate weekly income made by each age group. Table 2 gives each age group's projected percentage share of the working age population, their share of projected aggregate weekly income, and the ratio of these two indicators (income contribution per person). The data show that 35-44 year olds in 2001 accounted for 19.1 per cent of the working age population, but contributed 25.3 per cent of aggregate weekly income, an income/population share ratio of 1.32. The underlying proportions decline across the projection period, but their ratios increase, to 1.44 by 2051. Although making only a slightly greater contribution than that of the age groups either side (25-34 and 45-54 years), when aggregated this age group remains by far the biggest contributor to aggregate income across the period. By contrast, in 2001 and 2051 the age group 20-24 years accounts for 8.7 and 6.6 per cent respectively of the working age population, but only 1.0 and 0.9 per cent of aggregate income.

Sometime between 2041 and 2051, the median individual will move out of the high-earning 35-44 age group, and into the relatively high earning 45-54 age group. As a result, all else remaining equal, he or she and his or her proximate cohorts will continue to deliver a sizeable component of Australia's aggregate income well into the future.

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[7] The Series I assumptions were given at footnote 6. The medium case (Series II) projections assume an annual net international migration gain of 90,000 per persons; international and interstate migration to each state at approximately current levels of distribution; the Total Fertility Rate falling to 1.6 by 2008 and then remaining constant, and life expectancy increasing one year for every ten years projected.

[8] The methodology used here is simply an analysis of past and projected trends in the median age, which, for our purposes, denotes the median individual.

Table 2: Projected Shares of Working Age Population and Aggregate Weekly Income, By Age, AUSTRALIA 2001-2051, Series I

	2001	2011	2021	2031	2041	2051
Percentage share of working age population						
15-19	8.7	8.0	7.3	6.9	6.8	6.6
20-24	8.9	8.3	7.6	7.3	7.2	7.1
25-34	18.9	16.9	16.0	14.9	14.5	14.4
35-44	19.1	17.7	16.1	15.5	14.7	14.5
45-54	17.1	17.1	16.2	15.1	14.9	14.4
55-64	11.7	14.8	15.2	14.8	14.1	14.2
65-74	8.4	9.5	12.4	13.2	13.2	12.9
75+	7.1	7.7	9.2	12.3	14.7	16.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Percentage share of aggregate weekly income						
15-19	1.0	1.0	0.9	0.9	0.9	0.9
20-24	8.2	7.8	7.3	7.2	7.1	7.1
25-34	24.8	22.6	21.9	20.8	20.5	20.4
35-44	25.3	23.8	22.3	21.9	21.1	20.9
45-54	22.5	22.8	22.2	21.1	21.1	20.5
55-64	9.5	12.1	12.7	12.7	12.3	12.4
65-74	4.7	5.3	7.2	7.8	7.9	7.7
75+	4.1	4.6	5.5	7.6	9.2	10.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of income share to population share						
15-19	0.12	0.12	0.12	0.13	0.13	0.13
20-24	0.92	0.94	0.96	0.99	1.00	1.00
25-34	1.31	1.34	1.37	1.40	1.42	1.42
35-44	1.32	1.35	1.38	1.41	1.43	1.44
45-54	1.31	1.33	1.37	1.40	1.42	1.42
55-64	0.81	0.82	0.84	0.86	0.87	0.88
65-74	0.55	0.56	0.58	0.59	0.60	0.60
75+	0.58	0.59	0.60	0.62	0.62	0.63
TOTAL	…	…	…	…	…	…

Source: *ABS Population Projections 1999-2100 Catalogue 3222.0, Series I*
               Median Income calculated from ABS Basic Community Profiles 2001.0 Table B13

The passage of the median individual through the key income-earning age groups is one likely reason for the Guest and McDonald (2001 b, c) findings that population ageing will not greatly impinge upon Australia's future living standards. In short, this passage sustains the period of demographic gift, and, as Guest and McDonald argue, implies that government intervention is not in any way urgent.

However, we argue that this issue, when considered by State and Territory, results in somewhat different findings, with important implications for government intervention. An indication of these State and Territory findings and their implications is given in Table 3, which shows first the year in which the median individual of each state/territory (compared

with Australia in total) entered or will enter the 35-44 year age bracket, second, the projected year in which he/she will exit that age group, and third the resulting number of years of 'demographic gift' that each region can anticipate. Data are given for two projection series (I and II) to indicate the likely parameters of change.[9]

Table 3: Actual and projected year in which median individual will enter and leave 35-44 year age group, by ABS Projection Series and State/Territo

	Enter		Exit		Period of 'gift'	
	Series 1	Series II	Series 1	Series II	Series 1	Series II
TAS	1997	1997	2029	2021	32	24
SA	1995	1995	2027	2025	32	30
VIC	1999	1999	2050	2035	51	36
NSW	1998	1998	2051+	2040	…	42
QLD	2003	2002	2051+	2048	…	46
WA	2004	2004	2051+	2051+	…	…
ACT	2010	2007	2051+	2051+	…	…
NT	2051+	2051+	2051+	2051+	…	…
Australia	2000	2000	2051+	2041	…	41

Source: ABS Population Projections 3222.0
Notes: Shaded cells denotes entry and/or exit will not occur before 2051

Two important findings emerge from this analysis. First, the median individuals of Western Australia, the Australian Capital Territory (ACT), and the Northern Territory are currently aged 34, 33 and 29 years respectively, and have not yet even entered the all important 35-44 year age group, meaning that these regions have yet to look forward to the full benefits of their demographic gift. Indeed, the Northern Territory's median individual is not projected to enter this age group during the projection period—that is, before 2051—under either projection series. Second, due to marked differences in the speed of population ageing and the impact of migration in each state and territory, there are equally marked differences in the number of years that each region will enjoy their gift. For example, under Series II (the medium case), Tasmania will enjoy only 24 years of gift, compared with

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[9] See footnotes 6 and 7. Specific assumptions for each State and Territory are found in Chapter 4 of the ABS *Population Projections 1999-2101* Catalogue 3222.0.

36 years for Victoria, 42 years for New South Wales and 46 for Queensland. Under Series I (the high variant), both Tasmania and South Australia will enjoy 32 years of gift, while Victoria will reap the benefits for around 51 years. The median individuals of New South Wales and Queensland (currently 36 and 35 years respectively) will not exit the 35-44 year age group during the entire projection period under the Series I assumptions, so it is not yet possible to ascertain their period of gift should these conditions prevail, while the median individuals of Western Australia, the ACT and the Northern Territory will not exit this age group during the entire projection period under either projection series.

Finally, but to complicate matters slightly, the few exceptions to the rule that the 35-44 year age group is the highest earning age group need to be considered. These exceptions occur in the ACT and the Northern Territory, where the highest earning age group in each is currently that aged 45-54 years. Thus, the median individuals of these regions are still some way off entering their highest income-earning age group. The explanation for the disparity would seem to lie in the relatively large proportions of the economically active populations of these two regions employed in the relatively high-earning Government Administration and Defence industry, 23.9 per cent in the ACT and 17.7 per cent in the Northern Territory (ABS 2003, Table 26b). By contrast, in 2001 the remaining six states had an average of 4.3 per cent of employed persons working in this key industry, ranging from 3.0 per cent in Victoria to 5.3 per cent in Tasmania. Relative proportions in each labour force status would of course also have a bearing on these statistics, as would the ratio of males to females at each age and in each industry and labour force status.

In the ACT and Northern Territory we also find that the 45-54 year age groups enjoy, respectively, the highest and second-highest per capita earnings of *any* age groups in *any* state/territory. Thus, not only have the median individuals of these two regions not yet entered their relatively high earning 35-44 year age groups, but they will not enter their *very*

high earning 45-54 year age groups until sometime after 2051. Their demographic gifts will therefore be considerably greater than those of other states, and their respective periods of demographic gift will extend well beyond those implied in Table 3.

This does not mean that the projected aggregate incomes of the ACT and Northern Territory will necessarily follow the same trajectory. Instead, these are affected by the relative speed at which each region is ageing structurally (Jackson and Felmingham 2002:102 see also Eding 1999, and van der Gaag 1999, using EU data), and thus by the relative size of their working age populations, *vis-à-vis* those of non-working age. Once the ACT passes the point at which it officially becomes an 'old' population (10 per cent over the age of 65 years – Weeks 1999:278-9), around 2007, it will undergo the most rapid ageing of any Australian State or Territory, taking just 25 years to transit the space between having 10 and 20 per cent aged 65+ years. This compares with 42 years for the country as a whole, ranging from 36 years in Tasmania and Western Australia to 44 years in New South Wales. By contrast, the speed at which the Northern Territory will age is difficult to predict, since it is not projected to even reach the official 'old' population indicator of 10 per cent aged 65+ years until around 2047 (Jackson and Felmingham 2002:100-103).

3.   Summary and Discussion

This paper outlines Australia's experience of the demographic gift—the period during which the population age structure is optimal for the support of its younger and older members. The concept is applied to projected aggregate income (2001-2051) to show one economic impact of the forthcoming loss of the gift, the legacy of population ageing. We show that population ageing will reduce aggregate income by around 1.9 per cent by 2011, increasing to 8.6 per cent by 2051. However, we argue that this impact is itself ameliorated by the movement of the median individual through the population age structure, and that the

finding goes some distance to explaining those of other analysts, such as Guest and McDonald's (2001b, 2001c), who argue that population ageing will have a minimal impact on other projected economic factors, such as aggregate savings. We also argue that the situation differs at the State and Territory level, as these are undergoing markedly different rates (and causes) of population ageing.

The 'median individual' is the key player in this story. The significance of the median individual is that aggregate income will be at its maximum when he or she is in the highest income earning age group, and will decline as he/she moves through the age distribution to lower income earning groups. We show here that he or she and his/her proximate cohorts have in fact only just entered Australia's highest income-earning age group—that at 35-44 years—and will not exit this group until 2041 on the ABS medium case projections, and 2051 under the high variant. As a result, while the proportion of the total population that is at this age will decline over the 2001-2051 period, its contribution to aggregate income will increase. This effect will be sustained—albeit at a reducing rate—as the median individual moves into the next but slightly lower-earning income-earning group, at age 45-54 years.
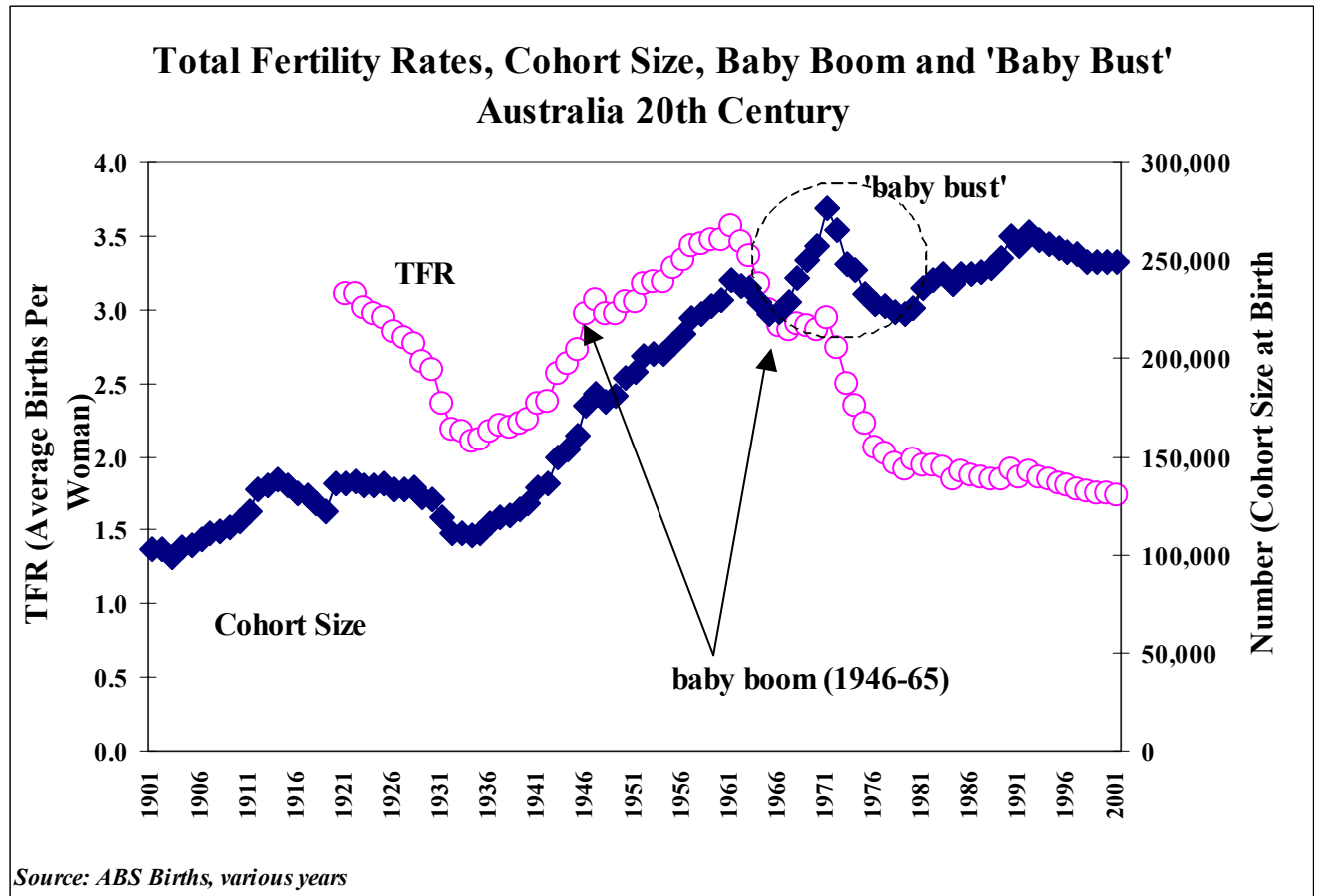
As we note, this picture differs substantially at State and Territory level, with the median individuals of some states not yet having entered the 35-44 year age group, and those of other states already well through this age group. We leave these complex issues for another paper, but feel compelled to note them here, lest their macro-level analogue be taken as definitive.

From a national perspective, the policy implications emerging from this analysis are similar to the recommendations proposed by Guest and McDonald, the impact of ageing on aggregate weekly incomes are of small order (1.9 percent reduction by 2011) and there is no rationale for heavy policy intervention. However, the results of our preliminary analysis of

the demographic gift at State and Territory level is that the income effects of ageing we have illustrated above vary markedly across States and Territories. The result could be that ageing, in particular the income effects of the demographic gift, could result in a changed pattern of income distribution across States and Territories. This result indicates that there is need for further regional analysis of ageing; however, the disparity between regional aggregate income effects evident in the current analysis reinforces the argument that policy responses to ageing should involve all three tiers of government. This supports the direction of the discussion about policy responses to ageing evident in Jackson and Felmingham (2002, p.112-115).

A more detailed analysis of regional income effects of ageing is an important item on any further research agenda. Finally, the observed correlation of the gift with GDP raises once more the long-questioned nature of the relationship between demographic characteristics and economic growth. The outcomes of this study indicate that we should return to this issue with renewed interest.

Total Fertility Rates, Cohort Size, Baby Boom and 'Baby Bust' Australia 20th Century

Source: ABS Births, various years

APPENDIX B

Methodology

The methodology for Figure 3 and Tables 1 and 2 followed a four step process:

1. Median weekly incomes for 2001 by age and sex were derived from ABS Basic
    Community Profiles (2003) Catalogue 2001.0 Table B13 (weekly individual income by
    age and sex). The results are given in Table a.

Table a: Median weekly income by age and sex, 2001

	Males	Females
15-19	45	48
20-24	402	313
25-34	609	405
35-44	701	323
45-54	614	401
55-64	412	213
65-74	219	210
75+	225	224
TOTAL	416	230

Source: *Derived from ABS Basic Community Profiles 2001.0, Table B13.*

2. The data from step 1 were projected to 2051 by (a) holding them constant at 2001 ($)
    values, (b) multiplying them by the projected numbers of males and females at each
    matching age (15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+ years) for each year,
    according to ABS Population Projections, Catalogue 3222.0, Series I (the 'high variant'
    assumptions), and summing the results (thus deriving a weighted sum). This process
    derived the combined effect ($ value) of projected changes in population size and age
    structure, according to 2001 income levels and distribution.

3. The data from step 1 were then separately projected to 2051 by (a) holding the age-sex
    structure constant at 2001 (percentage distribution) values, and (b) applying projected
    total population size for each year. This derived (a) the number that *would be* in each age-
    sex group at each year *if there were no changes to the age structure*, and (b) the aggregate
    weekly income of each age-sex group under these conditions. The result is the $ value
    <u>effect of changes in population size alone</u> (i.e. the age structure has been held constant).

4. The data from step 3 were deducted from the data from step 2, and their differences
    summed, to derive the component ($ value) due to projected <u>changes in age structure
    alone.</u>

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